Agricultural Markets in the Semi-Arid Tropics

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Foreword

Agricultural marketing—as this volume shows—remains a highly controversial issue. Not many international centers of agricultural research have had the competence and courage to address this important issue in a systematic way.

This volume is the outcome of a workshop that we believe represented a major initiative in assembling a wide spectrum of scholars and practitioners to discuss the major facets of agricultural marketing. Participating in the dialogue were people of different nationalities and disciplinary backgrounds but with common experiences in studying, practicing, regulating, or administering agricultural marketing. I am pleased to present the outcome of their dialogue to the public.

Equitable and efficient agricultural markets are vital for rural development. We hope that the discussion initiated here will continue so that research on agricultural marketing will be advanced.

L.D. Swindale
Director General ICRISAT

Preface

The primary objective of the workshop was to deepen the understanding of the role that marketing plays in agricultural development in the semi-arid tropics, considering both economic efficiency and social equity as important goals of development. Discussions at the workshop were designed to bring out controversial issues and initiate interdisciplinary dialogue at an international level.

Classical economic theory suggests that market access and interregional exchange of agricultural products induce participants to emphasize those components within a given enterprise for which there is a comparative advantage; this increases aggregate productivity, even though regional and social disparities may develop, which would have to be redressed out of the additional surplus produced. Marxist analysis stresses the ambivalent nature of the process of commercialization, wherein commodity production can be increased along with increasing exploitation of the wage labor force and differentiation of classes. The environmentalist's concern is that enhanced depletion of natural resources by an efficient commercial system will generate short-run gains and cause long-run damage. Representatives from these different schools of thought presented their viewpoints in discussing these controversial issues.

Agricultural marketing involves spatial aspects as well as economic issues. Also, marketing systems can be organized, regulated, and partly or wholly replaced by public interventions. Accordingly the interdisciplinary dialogue was widened by inviting not only social scientists, but also administrators and practitioners of agricultural marketing. This lent a balanced perspective to the deliberations.

The workshop covered the following areas: (1) an overview of existing market channels of commodities typically produced and traded in semi-arid tropical countries; (2) the spatial organization of agricultural marketing systems; (3) analyses of economic efficiency gains from agricultural marketing; (4) the equity aspects of agricultural marketing; and (5) the range of public interventions across various countries.

In a summary session, an attempt was made to draw policy conclusions both for public interventions and for future research.

Two field visits were organized, one to the ICRISAT research station and the other to see rural markets. The first visit provided insight into the work done on technology development at ICRISAT Center. ICRISAT is investing about 70% of its annual research budget on the crop improvement programs, 20% on the Farming Systems Research Program, and less than 10% on the Economics Program. National institutions collaborate with ICRISAT in technology generation, and they are responsible for the transfer of innovations to the farmer.

The second visit was a tour of the markets of Jadcherla and Kalvakurty in Mahbubnagar district of Andhra Pradesh in India, and of Aurepalle village, where ICRISAT's Economics Program is conducting household surveys since 1975. This tour provided an opportunity to see typical regulated daily markets, with auctions being conducted, and to talk to traders and farmers attending the markets. In Aurepalle participants could meet farmers and see their houses, including grain-storage facilities and implements used.

The papers presented in this volume have been edited in consultation with the authors. For reasons of space and balanced presentation, not all papers and discussants' comments could be reproduced in full. To ensure greater coherence, papers are printed in this volume in an order somewhat different from the order of their presentation at the conference. And to avoid confusion that could result from rearranging discussant's comments so as to accompany the papers they relate to, all discussion is summarized cumulatively in Chapter 6.

I want to take this opportunity to thank all those involved in the preparation and conduct of the conference, as well as those helping in the preparation of the proceedings. This includes my colleagues in the Economics Program and in other units of ICRISAT, as well as representatives of the Osmania University and the International Geographical Union.

Special thanks are expressed to ICRISAT's Information Services for their efforts in the editing and printing of these proceedings.

Dr. Curtis R. Jackson, ICRISAT's Director of International Cooperation, lent his full support to this conference; his contribution is appreciated.

Very personal thanks are extended to Dr. Barbara Harriss, who has evinced keen interest in ICRISAT's economics work over the years. She has put in a special effort in helping to edit and organize this report. She also deserves credit for contributing to the drafting of issues and research recommendations listed in Chapter 7.

Matthias von Oppen
Leader, Economics Program
ICRISAT
September 1985

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Agricultural Market Channels

Plant Breeders' Rights and the Multilevel Seed System

R.A.E. Mueller*

Summary

This paper contains a discussion of the likely effects of plant breeders' rights (PBR) on the seed industry in developing countries and some policy implications of PBR for the international agricultural research centers (IARCs), with special reference to the sorghum breeding industry and to breeders' rights as specified by the Union for Protection of New Varieties of Plants (UPOV).

Important traits of the seed industry for food-grain sorghum are reviewed, the PBR system according to UPOV described, its effects on supply of new varieties and demand for research outputs are discussed, and some implications of PBR for the IARCs are summarized.

Since PBR can be regarded as a substitute for informal means of appropriating returns to research and development and because the economic costs of alternative schemes are not known, it is argued that the IARCs should neither actively promote nor discourage the implementation of PBR. They could, however, have an important role in designing and evaluating PBR schemes.

Resumé

Les droits des phytosélectionneurs et le système de semences à niveaux multiples : *Cet article étudie les effets probables de l'établissement des droits de phytosélectionneurs (PBR) sur l'industrie semencière, dans les pays en voie de développement. Il traite, en outre, des implications que la mise en vigueur de ces droits pourrait constituer pour la politique des centres internationaux de recherche agricole (IARC), ceci surtout dans le cas de l'industrie de selection du sorgho et dans le cas des droits de selectionneurs tels que précisés par l'Union pour la protection de nouvelles varietes de plantes (UPOV).*

Par ailleurs, on fait le point des traits importants de l'industrie semenciere pour le sorgho grain. Le système des PBR, selon l'UPOV, est decrit, et l'on examine l'effet de ce systeme sur la fourniture de nouvelles variétes et la demande de resultats des recherches. Des consequences de l'introduction des PBR sur les IARC sont soulignees.

Les PBR pouvant être considères comme susceptibles de remplacer les moyens informels permettant de s'approprier les bénéfices de la recherche et du développement, d'une part, et parce que les coûts économiques éventuels des autres solutions restent inconnus, d'autre part, il est proposé dans cet article, que les IARC ne doivent ni promouvoir d'une facon active, ni decourager la mise en vigueur des PBR.

Cependant, ces centres pourraient jouer un role important en ce qui concerne la mise au point et l'evaluation des projets d'introduction des droits de phytosélectionneurs.

Introduction

In the recent past plant breeders' rights (PBR) have aroused the emotions in some quarters of the general public (Mooney 1979) and the concern of plant breeders and research administrators in the international agricultural research centers (IARCs). The debate within the IARC system culminated in a workshop on PBR by the Technical Advisory Committee (TAC) of the Consultative Group on International Agricultural Research (CGIAR) and a set of recommendations for the IARCs has been released (TAC 1982).

Because Godden (1982) has already provided a broad discussion of the major economic effects of PBR, the scope of this paper is limited to some

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aspects of PBR that, I believe, have been neglected or have received insufficient consideration.

Breeders' rights, like patents, define legalized and enforceable private property rights to the output from innovation. The breeder of a new variety may deny others free access and unrestricted use of the new variety; in this sense PBR are exclusive rights. The right to exclude has two important consequences.

First, it provides the basis for market exchange of innovations. If there were no exclusive rights to new varieties, they could not be sold. Second, since private rights are a precondition for the existence of a market for new varieties, they allow breeders to appropriate returns to innovative breeding. However, both effects can be achieved by means other than PBR. Market exchange of new varieties is also possible when breeders respect informally defined private rights to new varieties. Appropriation of returns to innovative breeding is also possible when barriers to entry into the seed industry for a variety exist. Therefore, where an innovative private breeding industry exists and where PBR have not been enacted, it is safe to assume that breeders have available other means of appropriating returns to breeding, because otherwise no private breeder would be in the industry. Hence, where PBR are enacted for an existing private industry, they are never the only means for appropriating returns but only supplementary or complementary to other means that already existed before the enactment of PBR. For these reasons, PBR legislation is more appropriately treated as an institutional change that may facilitate market exchange of new varieties and appropriation of returns to innovative breeding rather than an institutional innovation that allows otherwise infeasible exchange and appropriation.

The objective of this paper is to identify some of the effects such an institutional change is likely to have on supply of new varieties and on demand for inputs to innovative breeding. Furthermore, because markets for some inputs to breeding do not exist, e.g., research results and seed of semi-finished varieties, breeders cannot express changes in their demand for these inputs through price signals. The discussion of the effects of PBR on demand for inputs therefore emphasizes the manner in which changes in demand will be expressed by breeders.

To substantiate what might otherwise be a highly speculative discussion, this paper is limited to the sorghum breeding industry and to the specification of breeders' rights according to the Union for the Protection of New Varieties of Plants (UPOV).

Objectives and Structure of the International Seed Industry for Grain Sorghum

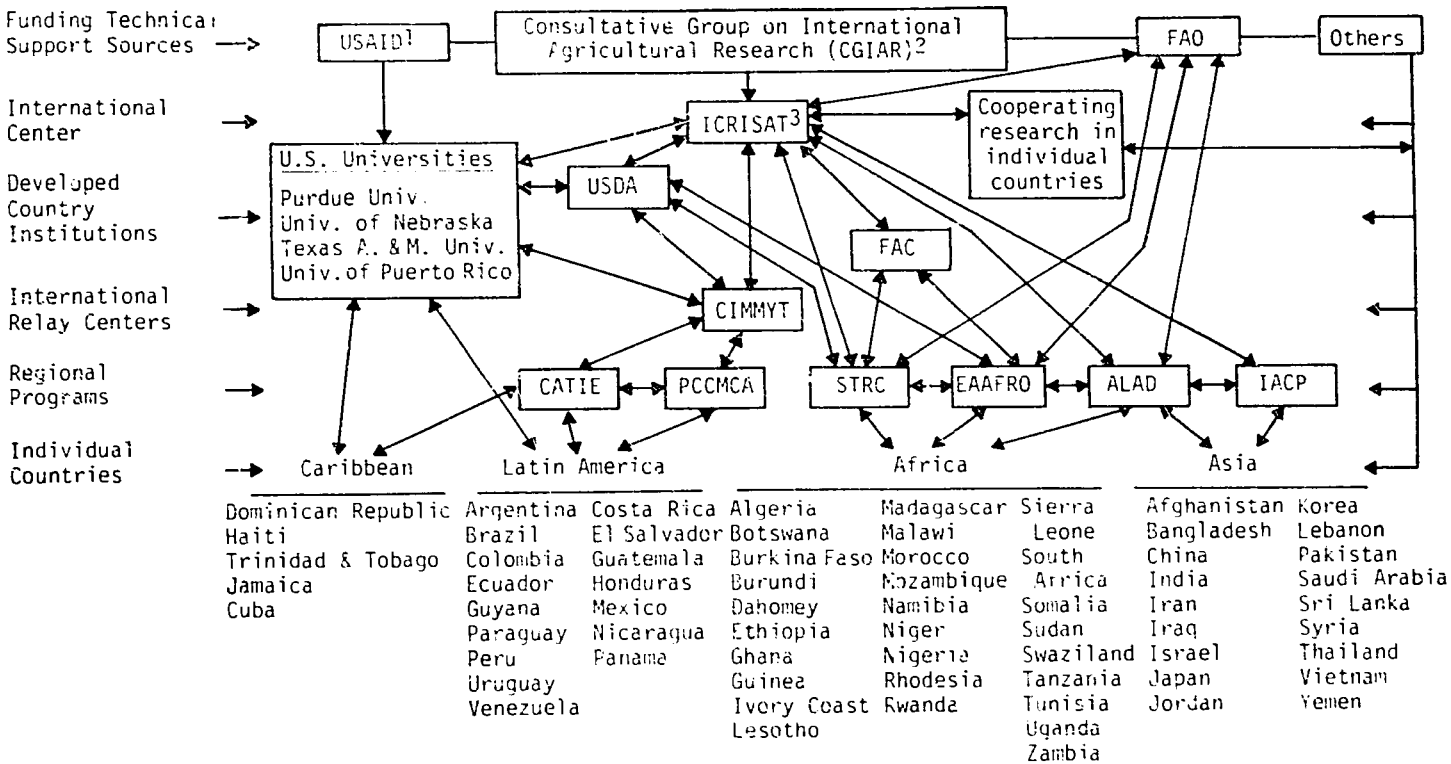
ICRISAT has the mandate to improve sorghum production, and is part of a complex network of international and national research and development organizations concerned with the breeding and extension of new sorghum varieties (see Fig. 1). ICRISAT's objectives that are relevant in the context of the sorghum breeding industry are:

- to serve as a world center to improve the yield and nutritional quality of sorghum;
- to identify constraints to agricultural development in the semi-arid tropics and to alleviate them through technological and institutional changes; and
- to assist national and regional research programs.

ICRISAT works towards these objectives through research and training, and the identifiable outputs from these activities are scientific reports, seeds of new varieties, and trained personnel (Swindale 1982). Major inputs into sorghum breeding are: seed from ICRISAT's gene bank, research results from other research units, and the expertise of ICRISAT's breeding staff.

Seed of new varieties produced by ICRISAT is passed on to national breeding organizations, where it is further developed to suit local conditions and needs until a new seed for on-farm use is released (see Fig. 2)

It is only at this farm-production stage that the value of all the activities along the chain of research, development, recurrent testing, and multiplication materializes in the shape of an increase in the income of farm families. The value of the outputs at the higher levels of this system is not determined in market exchange, because market exchange occurs only when farmers sell sorghum to consumers or when government agencies sell new seed to farmers. However, seed prices are frequently determined, not by market forces, but by governmental order and rationing of seed, if necessary. At the higher levels of the sorghum seed



1. USAID is shown apart in order to indicate funding linkages to U.S. research institutions. USAID also contributes through bilateral arrangements to individual country programs. Other donor members of CGIAR have corresponding additional linkages.
2. The donor members supporting ICRISAT are Germany, Norway, Sweden, Switzerland, United Kingdom, Nigeria, USA, UNDP, and IDRC. All CGIAR members are potential financers of operating linkages within the network.
3. The links between ICRISAT and the individual countries take the form of information and materials exchange, the conduct of seminars and workshops, cooperative research projects, advisory services, and training.

Figure 1. Major linkages in the international sorghum research network. (Source: USAID 1975.)

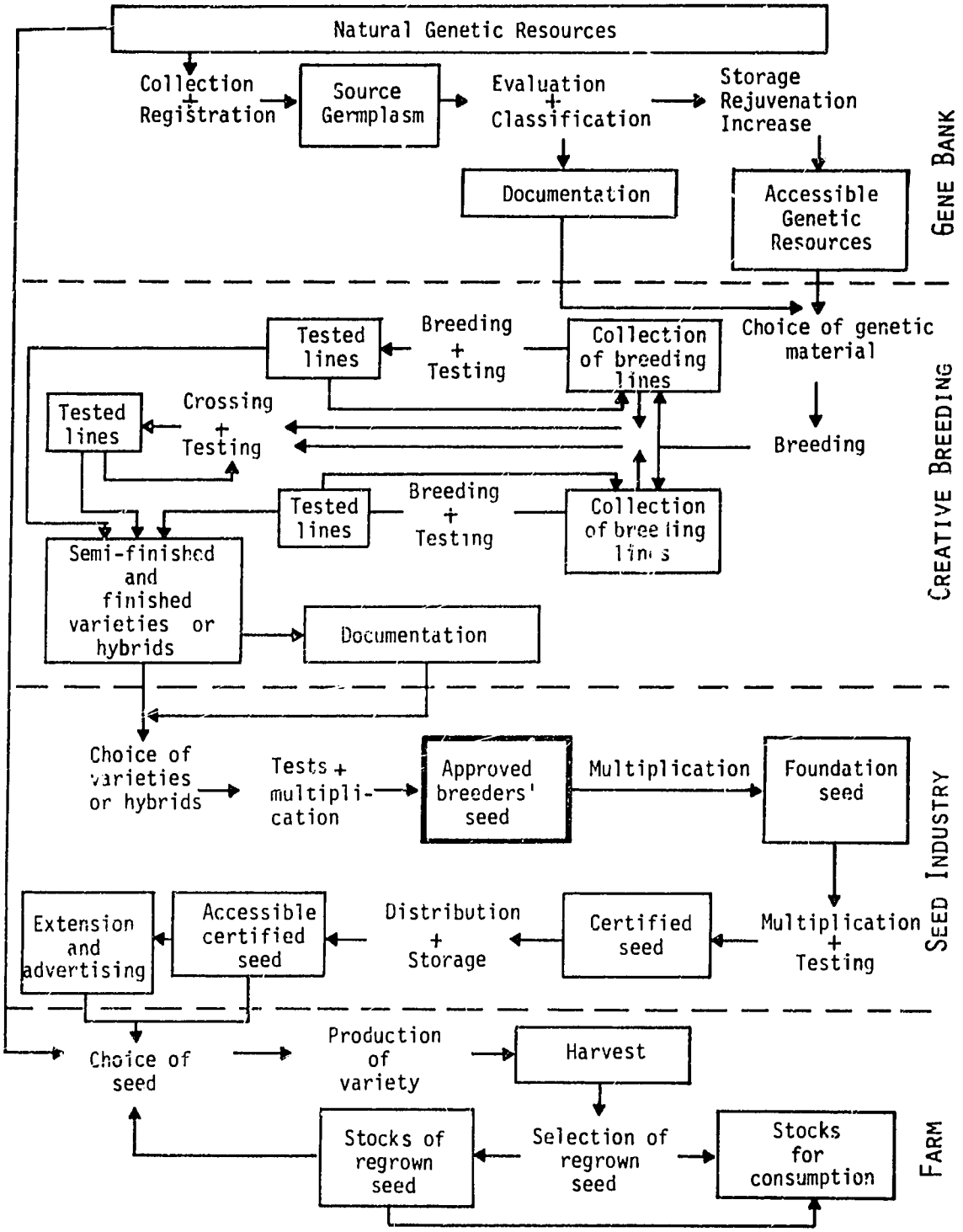


Figure 2. Simplified chart of the development of a new variety.

system, rationing is usually not necessary, because some outputs at these levels are either not exclusive in use—e.g., research results—or the costs of providing additional supplies are negligible, e.g., seed from the gene bank or seed of semi-finished varieties.

In most countries, the international noncommercial breeding industry for sorghum has virtually no competitors. Although it could be expected that sorghum breeders from developed countries would attempt to enter this large market, the aggregate figures in Table 1 show that the potential demand for sorghum seed is not for feed, but, with the exception of Latin America, largely for grain sorghum. The preferences of consumers for particular varieties of grain sorghum are also clearly evident; the international market for grain sorghum seed is therefore quite segmented.

This is accentuated by the necessity to adapt cultivars to local growing conditions defined in terms of climate, soils, diseases and pests, and other environmental variables. Given this segmentation of potential demand and the high cost of marketing seed in developing countries lacking adequate infrastructure, entry into these markets is perhaps not a very profitable prospect for large seed firms with extensive experience in the feed sorghum seed markets of developed countries. It is therefore not very likely that multinational companies will enter this industry. If competition for the public breeding industries is to arise at all, the competitors are more likely to be national firms.

The Nature and Effects of Plant Breeders' Rights

The Protection Provided by PBR

The establishment of PBR falls into the domain of national legislation. Hence, any country can define PBR within certain limits as it chooses; the limits thereby are largely defined by its legal system and the available infrastructure necessary to issue, monitor, and enforce PBR. Given the conceivable multitude of PBR schemes, it is convenient to start the discussion of the nature of PBR with the description of an existing PBR system. The example described here is based on the International Convention for the Protection of New Varieties and Plants as it is administered by the Union for the Protection of New Varieties of Plants (UPOV).[1] The objective of the convention is:

> to recognize and to secure to the breeder of a new variety, or his successor in title, the right to require, not withstanding certain reservations..., his prior authorization for the production, for the purposes of commercial marketing, and for the offering for sale or marketing, of the reproductive or vegetative propagating material of his new variety. (Mast 1975, p. 378).

In order to structure the characterization of PBR according to UPOV's scheme, it is convenient to distinguish between rules for issuing a PBR; the potency of the right; the domain of the right; the holders of the right; and the transferability of the right to other holders.

Rules for Issuing a PBR

The rules for issuing a PBR can be summarized by four criteria:

> distinctness; uniformity; stability; and denomination.

A PBR is only issued if the variety submitted for protection is distinguishable by one or more clearly describable and recognizable characteristics from any other variety whose existence is a matter of common knowledge; that is, if any one of these conditions is met:

1. cultivation or commercialization of the variety is already in progress;
2. the variety has been entered for official registration;
3. the variety is included in a reference collection, or
4. the variety is precisely described in a publication.

The rules that specify the requirements for "uniformity" and "stability" are rather technical, and are adapted to the type of variety. The denomination

1. This Union comprises 12 member states, including most EEC countries. UPOV rights can be established for many species, including wheat, maize, barley, oats, and potatoes but ICRISAT's mandate crops are not included in UPOV's list of species for which protection can be obtained under the convention (UPOV 1980).

Table 1. Sorghum production, supply, and utilization in semi-arid tropical (SAT) countries. (Averages 1972-74.)

SAT zone and country	Production (000t)	Domestic supply (000t)	Utilization of domestic supply: Seed (000t)	Seed (%)	Food (000t)	Food (%)	Feed (000t)	Feed (%)	Waste (000t)	Waste (%)
Australia	1 102	1 275	5	2			271	98		
South Asia	8 229	8 920	276	3	7 997	90	118	1	530	6
India	7 986	8 582	264	3	7 714	90	96	1	509	6
Pakistan	316	325	11	3	282	87	16	5	16	5
Sri Lanka	1	1			1					
Thailand	144	12	1	8			6	50	5	42
West Asia	1 078	1 092	37	3	990	91	9	1	55	5
Iran	10	10	1	10			9	90		
Oman	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Saudi Arabia	188	189	3	2	176	93			9	5
United Arab Emirates	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Yemen Arab Republic	880	893	33	4	814	91			46	5
Africa	7 635	7 828	213	3	6 758	86	24	0	761	10
East Africa	2 876	2 806	55	2	2 421	86	24	1	306	11
Ethiopia	967	967	22	2	797	83	4	0	145	15
Somalia	152	152	6	4	138	91			8	5
Sudan	1 568	1 502	23	2	1 330	89	16	1	132	8
Tanzania	189	185	4	2	156	84	4	2	21	12
Southern Africa	423	478	10	2	440	92			28	6
Botswana	13	67	1	2	64	95			2	3
Madagascar	1	1			1	100				
Malawi	100	100	2	2	88	88			10	10
Mozambique	212	212	5	2	197	93			11	5
Namibia	3	3	0	0	3	100			0	0
Zambia	44	45	1	2	41	93			2	5
Zimbabwe	50	50	1	2	46	92			3	6
West Africa	4 336	4 544	148	3	3 897	86			427	9
Benin	69	59	3		54				2	
Ghana	165	165	4	2	81	49			8	5
Guinea	5	6			5	83			1	17
Guinea Bissau	4	4	0	3	4	92			0	5
Niger	184	226	13	6	190	84			23	10
Nigeria	3 343	3 510	94	3	3 065	87			351	10
Burkina Faso	566	574	34	6	498	87			42	7
Latin America	7 785	6 485	77	1	380	6	5 835	90	192	3
Argentina	4 578	2 643	54	2	293	11	2 204	83	92	4
Brazil	300	279	3	1			270	97	6	2
El Salvador	144	148	1	1	81	55	58	39	8	5
Mexico	2 688	2 917	17	1			2 841	97	58	2
Nicaragua	53	55	1	1	6	10	43	79	6	10
Paragway	5	5	0	1	-	-	4	93	0	6
Venezuela	17	438	1	0	-	-	415	95	22	5
Total SAT (excluding Australia)	24 727	24 325	603	2	16 125	66	5 986	25	1538	6
United States[2]	20 054	15 343	51	0			15 224	99	-	-

n.a not available, - = production negligible

rule requires that a uniform nomenclature be used, which may not be used as a trademark.

With regard to the potency, PBR involves a property rule rather than a liability rule; the holder of a PBR to a variety can refuse to allow a nonholder the use of his protected variety, whereas a liability rule only requires that the holder of the right is compensated. The domain of PBR is constrained in several dimensions. PBR protection, which is normally granted for 15 to 18 years, is terminated if the holder can no more present protected material, if the variety is no more true to description, or if the holder does not pay fees.

The domain of PBR is also attenuated with regard to the potential users who might otherwise compete for the use of the new variety. Only commercial users who wish to sell seed of the new variety are excluded by PBR; but noncommercial users and other breeders cannot be excluded on account of a PBR. In particular, farmers may reproduce seed from a protected variety. UPOV also allows a general clause for attenuation of PBR: if it is in the interest of the general public, the rights granted by PBR may be restricted in an unspecified manner if the holder of the PBR is adequately compensated (Mast 1975).

The holder of the right may be the breeder of the new variety or any successor in title of the breeder. UPOV does not specify any limits on royalties or rules for the transfer of PBR. In contrast to patents, which are only granted if the protected process is described and disclosed, PBR does not require disclosure of the method by which the breeder has obtained the new variety.

Appropriation of Returns to Breeding[2]

The sorghum system outlined in Figure 2 can be viewed as comprising a hierarchy of five levels, where each level is characterized by its inputs and outputs:

Consumption: the input is sorghum for food, the output from consumption activity is utility.

Production: the input is seed of new varieties, and the output, sorghum.

Innovation: the input is knowledge and seed of semi-finished varieties, and the output, seed of finished new varieties.

Research: the inputs are genetic source material, expertise, and creativity; the output is new knowledge in breeding and semi-finished varieties.

Collection: the input is naturally occurring genetic material; the output is a stock of accessible genetic material.

Note that utility is only generated at the level of consumption; the value of the higher level outputs must therefore be evaluated in terms of their contribution to utility from sorghum consumption. The value of production is evaluated in terms of its extension of otherwise limited consumption. The value of innovation is its contribution to increasing production and the impact this finally has on consumption. The activities and outputs from the other levels must be evaluated in a similar manner.

In this system, rights to exclude certainly exist at the lowest level of consumption; i.e., property rights to consumer goods are in most countries supported by law and enforced by government. As a consequence, producers can sell sorghum to consumer and the value of production is measured by the value in exchange of its outputs.

At the next higher level, government agencies usually control supply of new seeds and supply is rationed by means other than price. This has two consequences: first, sorghum farmers cannot use price signals to induce increases in supply of new seed; second, returns to research and breeding may not accrue to government but to sorghum farmers according to their production abilities. However, rationing systems are likely to encourage the creation of secondary markets in which new seed is traded at competitive market prices.[3] If such markets arise, the value of new seed is determined in exchange and these prices may be used for guiding future breeding effort. Furthermore, in this case returns to research and breeding can be appropriated by the recipients of new seed, irrespective of their abilities as sorghum producers.

If the rationing scheme cannot be perfectly executed, a further consequence might be that government officials who have the power to deny farmers access to new seed may devise illegal schemes of auctioning off the limited seed supply. In this case the bribes and kickbacks provide some information about the value to producers of new seed; the returns to research and breeding then

2 Parts of this section draw on v. Weizsaecker (1981).

3 In a letter to K.R. Chopra dated 5 Jan 1982, Dr. L.R. House of ICRISAT reported that seed of new varieties of wheat and rice was traded at 75 times the price of grain and that occasionally as much as Re 1 per kernel of new seed was paid.

are, however, not appropriated by farmers but by corrupt government officials.

In contrast to government breeding agencies, which can be financed with taxpayers' money, private commercial breeders can only exist if they can appropriate sufficient returns to cover costs of breeding. In the absence of PBR, two broad means of appropriating returns to breeding are available to private breeders.

First, where the private breeding industry is small enough for the activities of each breeder to be easily monitored by his competitors, codes of ethics that stipulate that breeders refrain from imitation may be workable. Such codes are nothing but informal property rights to new varieties and are largely equivalent to PBR. They differ from PBR in that the costs of obtaining the right to a new variety are usually higher with PBR, and the costs of enforcing the right are usually lower with PBR than with informal rights.

The second means of appropriating returns to breeding are those that prevent or reduce competition from imitators. For example, hybrids that cannot be regrown, or varieties that quickly lose valuable characteristics when regrown, provide effective protection from imitators. Or the breeder of a new variety may convince farmers that his seed is superior to the seed produced by imitators. In contrast to property rights to new varieties, these means of appropriating returns are best suited to breeders who are vertically integrated into seed multiplication and marketing. With these means the returns to breeding depend not on increased production from the new variety but on how effectively the innovative breeder can keep his competitors at bay.

Where PBR are introduced for an existing private breeding industry, these rights should not be misinterpreted as providing breeders with a means for appropriation of returns that would otherwise have been lost completely. Rather, they are means to appropriate a larger share of these returns or at a lower cost.

The question then is how changes made through PBR in the net returns to breeding will affect the conduct of profit-maximizing breeders, individually and as a group.

A likely place where PBR could be allocated within the sorghum seed system is the stage of breeders' seed (see Fig. 2). But how are PBR likely to affect supply of new seed at this stage and demand for inputs to innovative breeding that are generated at higher levels of the seed system?

Effects of PBR on Supply of New Varieties

The effects of introducing PBR legislation will depend on the means that were employed to appropriate returns prior to such legislation. It is also necessary to distinguish between effects resulting from changes in the individual breeder's incentives and costs on the one hand and effects resulting from changes in competition among breeders on the other.

Where appropriation of returns to breeding was formerly made by informally specified property rights to new varieties, introduction of PBR will only affect supply of new varieties by individual breeders if the total cost of obtaining protection under PBR—including the costs of forgone returns—is lower than the cost of protection from informal schemes. If these costs are reduced through PBR, net returns to breeding will increase and thus attract more resources into breeding and thereby increase output of new varieties. Whether or not extension of breeding effort is also accompanied by an increase in the number of firms in the breeding industry is difficult to assess in general. However, two arguments suggest that new firms are likely to enter the field. First, the prospect of increased net returns is likely to attract breeders from other breeding industries. Second, with informally specified property rights for new varieties, newcomers to the sorghum breeding industry have no legal means of obtaining protection from the incumbents of the industry. The costs of obtaining protection can be artificially increased by the incumbents, effectively barring entry to newcomers. With PBR, although this barrier to entry is not totally removed, the costs of obtaining rights are fixed and cannot be raised by incumbents at will. The effect of PBR on entry and competition then largely depends on the level at which governments fix the costs of obtaining PBR.

In industries where returns had previously been appropriated by means other than informal property rights, PBR will also stimulate individual breeding efforts and thus tend to increase output of new varieties. Furthermore, breeding will be directed to new varieties most valued by farmers rather than to varieties that facilitate appropriation of returns. For example, enforceable breeders' rights would reduce the incentive to breed hybrids or varieties that quickly lose valuable characteristics. Finally, introduction of PBR is likely to have important positive effects on competition in the sorghum breeding

industry. Once PBR are established, breeders' seed becomes a tradeable commodity and can more easily be exchanged between breeders and seed producers. This would widen the scope for specialization in innovative breeding and reduce the incentives for downstream integration.

However, the potential increases in the supply of new varieties through increased resources devoted to breeding and through competition and specialization should not be overestimated.

Whichever system of PBR is implemented, the rights will have to be attenuated in some way to reduce the costs of administering and enforcing the system. A case in point is the important attenuation in UPOV's PBR scheme, which prevents only identified breeder-competitors, but not farmers, from regrowing protected varieties, and which does allow other breeders to use a new variety for their own breeding efforts. These attenuations have been introduced because such uses even if not permitted, would be difficult to detect and prevent.

Any attenuation of rights will, however, reduce the proportion of returns that the breeder can appropriate. This, in turn will result in reduced breeding effort, and possibly affect the direction of innovative breeding. For example, because use of a new variety in another breeder's program is permitted, a new variety may not be released until it has been developed to a stage where further development is unlikely. Similarly, the permission to regrow seed for noncommercial uses directs innovative activity to hybrids rather than to varieties which could be regrown without loss of performance (Quinby 1982).

In addition, the realized effects of PBR on entry and competition will be rather limited because of the segmentation of the grain sorghum seed market. This limitation will be felt most strongly where governments impose direct or indirect restrictions on market entry by foreign firms.

Effects of PBR on Demand for Research Outputs

A PBR scheme would affect not only the supply of new varieties but also the demand for research outputs. In the absence of property rights to new knowledge, a market for research results will not exist, and innovators will have to find other means to obtain access to research results and to stimulate research efforts. For these purposes, innovators may act as a group or individually.

Group activities aimed at obtaining access to research results are sponsorship of journals, subsidization of conferences and workshops, and other means which accelerate the flow of knowledge. In general, these activities can be regarded as beneficial because they liberate researchers from the task of promoting their own output.

Group activities aimed at increasing the intensity and guiding the direction of research may take two forms: (1) the innovative sector may lobby the funding body of the research sector, or (2) the innovative sector may itself provide funds for research it deems desirable. In the case of IARCs, lobbying is not attractive because there is no single funding body. Attempts to entice the IARCs to engage in specific research projects would also pose no major problems to the IARCs because they are free to turn such offers down. In summary, these group activities on behalf of the users of new knowledge would on the whole be beneficial because they could accelerate the flow of information, provide additional research funds, and provide the IARCs with feedback from the users of their outputs.

On the other hand, activities of individual breeders who aim to obtain research information quickly could become a nuisance to researchers. A more serious effect of such activities, however, is that breeders are likely to provide incentives to individual researchers in return for preferential access to new research results. If researchers accept, this may be unethical, but is not necessarily contrary to the objective of the IARCs to increase productivity in their mandate crops. Such unethical behavior would, however, distract from goal achievement, if researchers actively reduced supply of new knowledge so as to increase its price, or—what is more likely to happen—if such behavior reduced productivity of research teams by straining interpersonal relations.

Also valuable to breeders is output from the IARCs in the form of semi-finished varieties and genetic material from gene banks. The present policy of the IARCs is to provide these materials free upon request. Although this may result in excessive demand,[4] private breeders cannot obtain a competitive advantage under this scheme.

4. Another cause for excessive demand could arise when breeders suspect information leakages from the IARCs. If competitors could infer a breeder's plans from his demand for genetic material and semifinished varieties, the breeder will counteract by extending his demand to a much larger number of different varieties to make such inferences impossible.

Government and PBR

The establishment of PBR is the prerogative of national governments, which may assume two positions: first, they may actively and independently introduce PBR legislation and provide the infrastructure necessary for issuing and enforcing rights. This view assumes that governments will know that PBR would be socially desirable and, furthermore, which particular specification of PBR would be desirable from a social point of view. This approach to the establishment of PBR would be quite risky. Governments usually do not know the costs of enforcing informally defined rights, and a PBR legislation that does not reduce enforcement costs at a given level of protection will have no effect on the conduct of breeders. It is therefore not likely that governments will take this approach to enacting PBR.

The second governmental approach to PBR is to wait until a demand for legislation is expressed from the private breeding industry. If this approach is chosen, the difficulty is to distinguish demand that stems from a legitimate desire of the breeding industry to reduce the costs of protecting new varieties and established firms' attempts to bar newcomers' entry into the breeding industry. To that end established breeders threatened by entry are likely to suggest complicated and costly procedures for testing new varieties and issuing rights. Where governments do not have available the expertise to distinguish between necessary and unnecessary degrees of technical sophistication of the procedures for issuing rights, they will have to rely on disinterested expert advice from breeders who are not part of the industry. ICRISAT's staff could provide such assistance to governments.

Governments usually will have to bear some of the costs of administering PBR, and are therefore likely to prefer schemes with low budget costs. In considering the specifications of PBR legislation, however, account must be taken not only of the costs of administration, but also of the effects of the specifications on the direction of breeding effort.

Experience with PBR: A Review

Concern has been expressed about (1) undesirable effects on the overall efficiency of the sorghum breeding system, and (2) inequitable distribution of benefits generated by the system of PBR.

Efficiency of the Research and Breeding System

Three arguments frequently allege undesirable effects of PBR on the efficiency of the breeding system. First, it is held that PBR would hamper the free exchange of information and breeding material. In this context Hagberg (1983) writes: "The PBR system is delaying marketing and inhibiting free exchange of basic breeding material, etc., as it is functioning at present in Europe." However, L.R. House (1982: personal communication) expressed a different experience for the USA: "The general experience in the USA is positive—it has not influenced breeders' willingness to exchange seeds with each other." Both these views of experts would be difficult to substantiate because it is near-impossible to know what the exchange of breeding material would have been in the absence of PBR. Furthermore, it is not clear whether Hagberg and House refer to horizontal exchange between breeders at the same stage of breeding or to vertical exchange between breeders at different levels.

A PBR scheme such as that of UPOV, which provides only protection from commercial use of new breeding material, would only inhibit horizontal exchange if breeders perceived no benefits from cooperation in breeding. Vertical exchange of breeding material is more likely to be facilitated than inhibited by PBR. In this regard Frankel (1981) writes: "In countries with PBR there can be no restriction because the sale of protected varieties is controlled by law. But where there is no such protection, as in Australia and Canada, the recipient breeder must give an undertaking that in no circumstance will the material reach commercial sale. This is hard to give since there is no guarantee against misappropriation by others." (Cited by Godden 1982, p. 24).

The overall effect of PBR on the exchange of breeding material is therefore difficult or impossible to assess ex ante. Furthermore, the details of the PBR specifications and the conduct of breeders are likely to be the decisive factors bearing upon exchange of material.

The second argument holds that PBR direct breeding effort towards material that can be protected, and away from material that may result in larger increases in yields but is difficult or impossible to protect. In essence, this argument holds that there are costs of PBR other than the costs of obtaining and enforcing protection. However, since a perfect PBR scheme does not exist, the

designers of any new scheme will have to evaluate carefully the costs of issuing and enforcing rights against the costs of misdirected breeding effort. Bureaucrats and administrators are likely to underestimate the economic costs of misdirected breeding effort and emphasize the more tangible expenses of administering a particular scheme. Breeders and economists are then called upon to counterbalance this bias.

The third argument about the undesirable effects of PBR holds that PBR is likely to result in oligopolistic or monopolistic breeding industries. Against this argument it can be held that undesirable effects of market power can only be demonstrated against the background of a static model of perfect market competition. The effects of market power on progressiveness of a dynamic system are, however, much less understood theoretically and the empirical evidence is not unanimous. The question here is not whether consumption possibilities could be improved when market power is removed once new varieties have been provided, but whether there are other means of providing an identical flow of innovations which avoid the losses associated with market power. Furthermore, PBR will tend to reduce the incentives for vertical integration at the innovation level, since they reduce the costs of enforcing rights to new varieties. Competition on the innovation level is therefore likely to increase.

In summary, the alleged undesirable effects of PBR on efficiency of the breeding system are difficult to substantiate empirically and their theoretical basis is weak. In my view, negative effects are most likely to come from ill-designed PBR schemes that disregard or underestimate the costs of misdirected breeding efforts, or that serve to arbitrarily raise barriers to entry.

Equity of the System

It has been held that PBR creates the risk of misappropriation of semi-finished varieties by private breeders within or outside the IARCs (Hagberg 1983). Even where this occurred, it would not necessarily interfere with improving crop production; only the returns to researc would be differently distributed. Misappropriation could be easily prevented by quickly releasing semi-finished varieties into the public domain through description in recognized journals.

Concern has been expressed that private breeders may use PBR to extract profits from countries by selling them new varieties bred from the genetic material stored in gene banks and without remunerating the countries from where this genetic material has been collected (Mengesha and Prasada Rao 1982). This argument confuses the biological identity of genetic material with equal economic value. If genetic material is valuable when stored in a gene bank this does not imply that the same genetic material had economic value when it was scattered in a remote area. This argument is perhaps best understood as an attempt by governments to claim rents for a resource for which there was no demand.

Implications of PBR

Private breeders' rights are a legalized form of establishing and enforcing property rights in new varieties. They are the equivalent of property rights to commodities. Just as the latter enable producers to exchange and compete in production, property rights to new varieties enable private breeders to compete with each other.

PBR always substitute or are complementary to pre-existing means of appropriating returns to breeding of new varieties. The reason for establishing PBR where they did not exist is therefore not to provide such means where none existed but to devise a system that reduces the costs of appropriating returns. The IARCs should neither actively support nor inhibit the creation of PBR because the IARCs cannot assess what the costs to breeders will be of appropriating returns. With small numbers in an industry, informal codes of ethics may provide breeders with sufficient protection at much lower costs. In this regard, the centers could help breeders in young industries to develop adequate codes of ethics and design workable institutions for the arbitration of disputes.

If governments wished to enact PBR laws, the IARCs could assist in the specification of the rights, by (a) evaluating the likely effects on the direction of breeding efforts of the specifications, and (b) counteracting attempts by breeding industries to bar others' entry by recommending unnecessarily complex and costly schemes for issuing rights to new varieties.

When research at the IARCs is of particular interest to breeders in a country where PBR legislation exists, researchers may be exposed to occupational ethical hazards. If they cannot withstand these hazards, the administration of the IARC

would have to penalize unethical behavior and to monitor researchers' conduct.

Misappropriation of semifinished or other breeding material released from the IARCs is a minor concern, because, it does not necessarily affect achievement of the IARC's objectives and can, under all existing PBR schemes, be prevented at low cost.

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Marketing Channels and Farmers' Access to Improved Seed for Rainfed Agriculture

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Summary

Quality seed is vital to raising agricultural production, and a national and state seed agency network has been established to grow and distribute certified seed throughout India. However, high prices, inefficient distribution, insufficient extension work, and unscientific use of hybrid seed have combined to keep the program from making the expected impact on production. Experience with high-yielding wheat and rice has shown that farmers are willing to invest in quality seed where returns justify the added expense. This paper outlines major problems in seed production and distribution, points out flaws in the present delivery system, and suggests some remedies, including more active involvement of village cooperatives and Farmers' Service Societies, and greater cooperation between research and extension services.

Résumé

Les circuits commerciaux et l'accès des paysans aux semences améliorées pour la culture pluviale: *Les semences de bonne qualité sont indispensables à l'augmentation de la production agricole. En effet, un réseau d'agences de semences a été établi, tant au niveau national qu'au niveau régional, afin de permettre la production et la diffusion de semences certifiées partout dans l'Inde. Cependant, des conditions défavorables telles que des prix élevés, une diffusion peu efficace, des actions de vulgarisation insuffisantes ainsi que l'utilisation peu scientifique de semences hybrides ont eu pour résultat d'empêcher la réalisation de l'impact prévu de ce programme sur la production. Les travaux déjà effectués avec des variétés de blé et de riz à haut rendement ont permis de constater que les paysans sont prêts à investir dans les semences de bonne qualité dans le cas où les bénéfices justifieraient la dépense supplémentaire. Cet article donne un aperçu des problèmes majeurs qui se manifestent dans la production et la diffusion de semences, et souligne certains défauts du système de livraison actuel. Il propose, en outre, des solutions qui comprennent entre autres une activité plus engagée de la part des coopératives agricoles rurales et des Associations de service aux paysans, ainsi que la coopération plus étroite et importante entre les services de recherche et de vulgarisation.*

Introduction

Quality seed being the most important input for attaining higher levels of productivity in agriculture, its timely availability is a factor that will influence agricultural production in India. At the same time, even seed with high potential cannot yield good results unless the farmer has access to other essential inputs and unless all of them are used according to the dictates of local conditions. Another important input is fertilizer. Organized fertilizer marketing started in India long before the establishment of channels for the distribution of certified seed after the National Seeds Corporation (NSC) came into existence. The distribution system of chemical fertilizers had come in for detailed and critical study by various expert committees, and the Fertilizer Association of India was established to improve the marketing system for chemical fertilizers in our country.

When there is a shortage of an essential agricultural input, the marketing system can become a

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serious constraint to availability of that input in remote areas and to small and marginal farmers. During the days of fertilizer shortage, for example, most distributing agencies, including the cooperatives, were reluctant to go into the interior regions, because they had a ready market for the product close at hand and on their own terms.

The problem with seed has been somewhat different. Neither the NSC nor any of the state agencies have been able to embark on an ambitious production program with the confidence that the quality seed produced at high cost will be lifted by the farmers if the distribution channel is kept in good shape.

Seed being one of the basic inputs needed for a breakthrough in crop production, it should be made available to every farmer in the country. This presupposes that the farmer is inclined to use high-quality certified seed if it is available in time and is within his easy reach. Unfortunately, in the present context, this is only a presumption.

Production of quality seed of all important crops in abundance does not pose a serious problem to our seed-producing agencies. The wide range of agroclimatic conditions in India give us a unique opportunity to produce practically all types of seed. Unfortunately, the underdeveloped character of our agricultural system does become a serious constraint.

The production of certified seed by the NSC first started with the hybrids of certain millets, followed by seed of dwarf varieties of wheat and rice. The replacement ratio of such hybrids should be 100% every year; unfortunately, even with our two most important cereal crops, wheat and rice, hybrid seed replacement is only 10 to 20%, in spite of 25 years of concentrated effort. What are the reasons for such an unsatisfactory situation?

Although agriculture has been a responsibility of the states from the beginning, we also have a national system of seed production in our federal setup. Many states have accepted that the national organization can play a vital role in the production and marketing of seed in the country. The cost of the seed must be kept at reasonable levels so that the farmer finds it remunerative to use quality seed. Seed of certain crops can be produced more economically and efficiently in certain regions of the country. Certain regions present problems of storage due to high humidity and rainfall. Certain areas often become prone to particular diseases. From this point of view, it has been accepted that production of seed could be more efficient if planning is done for the country as a whole. In a national program the central government and each state government plays its own assigned role; however, this makes the system somewhat complicated. Unless there is a proper understanding between all the agencies concerned, including the seed-producing and marketing agencies in the private sector, there could be duplication of efforts and avoidable wastage.

Wherever state seed corporations have been established, they are expected to play the most prominent role within the state in the marketing of seed and in production, wherever production programs can be undertaken efficiently and economically. The NSC has by now a wide network, including 90 sale points directly managed and over 3000 private seed dealers throughout the country. This network covers all states, including the 11 states which have their own State Seeds Corporations.

Organizational Shortcomings

In certain states and local areas where agriculture has made good progress, seed agencies are eager to operate, because they get a ready response from the farmers and have little promotional work to do. On the other hand, there are many states where neither the cooperative network nor the sale points of the state and national corporations have been able to penetrate into remote, particularly unirrigated, areas. Special attention should be given to such areas in order to organize an effective channel for the marketing of quality seed suitable for the area.

A serious constraint to organizing an efficient marketing system is the absence of advance planning. If a state could give a realistic projection of its demands for a period of 3 years, it should pose no problem for the state corporation, NSC, and other seed-producing organizations to satisfy these demands. This, however, involves something more than a general plan of stepping up the high-yielding varieties program. The extension agency must not only prepare a detailed plan by crop and by season, but must also decide what area is to be brought under which hybrids and varieties in different agroclimatic regions. Otherwise, there will be surplus seed of some varieties existing side by side with shortages of seed for others.

The starting point should be the All India Coordinated Workshop where research workers and

senior officials of the Directorate of Agriculture are expected to plan what varieties should be utilized in different states and under different conditions. Unfortunately, there is little rapport between the extension and research agencies. While on the one hand research scientists claim that ideal varieties exist for different agroclimatic regions, many Directors of Agriculture feel that these do not satisfy the local and specified needs of many areas. For instance, the eastern region is still not satisfied with the rice varieties currently available for cultivation under high rainfall or excess water, or in areas of high salinity.

Basic Factors Influencing Marketing Acceptability of the Product

I have taken some pains to elaborate this point because, of the four basic factors that influence marketing, the acceptability of the product is the most important one. The other three—price, distribution system, and market promotion—will, of course, affect the overall marketing program, but quality and acceptability of the product will ultimately prevail over all other factors. Often, producing agencies have surpluses of certain varieties of pulses, oilseeds, and other crops inspite of overall shortages in the country.

Price, Distribution, and Promotion

Specialists and expert consultants have recommended that the seed corporations should have a more aggressive and meaningful market development program. I have no doubt that this is needed and will yield good results. But it is vital that the farmer be convinced that returns from quality seed are worth the additional investment made.

Here the seed industry faces a more acute problem than other agencies concerned with production of other agricultural inputs such as chemical fertilizers, pesticides, and agricultural implements. In the case of fertilizers, the plant requires certain basic nutrients in varying proportions, and as long as these are available, the problem is taken care of. There may be hundreds of brands of fertilizer, sold under different names, but each one fully answering the same need. Similarly with pesticides and many other inputs, all brands serve the same purpose. Under such conditions market promotion and servicing aspects get higher precedence and can make a very good impact.

In the case of seeds, however, a particular variety that is found extremely suitable for one particular area may not only be not suitable but could even be dangerous if inducted into certain other agroclimatic regions. The seed-producing organizations will require expert guidance in such matters and this knowledge will have to be passed on to the marketing wing as well.

Agencies to be Involved in the Inputs Delivery System

Cooperatives

Studies on the organization of the agricultural inputs delivery system during the last two decades have all come to the conclusion that a multi-agency approach is likely to yield the best results in India. Though cooperatives are theoretically most suitable for this responsibility, serious weaknesses in the cooperative organization at all levels make it imperative that other agencies, both in the public and private sectors, also play a prominent role in the marketing of agricultural inputs.

Our seed corporations have also not taken sufficient interest in utilizing the cooperative channel for the production and marketing of quality seed. Often we entrust a part of the responsibility to larger marketing federations, who may not themselves be working through the cooperative network. Village cooperatives have not received sufficient attention either from the state governments or from the agencies concerned with cooperative development at the national level. Excellent recommendations have been made by expert committees and the National Commission on Agriculture regarding the role that could be played by the Farmers Service Societies, but little seems to have been done in actual practice.

Farmers Service Societies

I feel that it will be worthwhile for the seed-producing organizations to entrust the full responsibility of seed production and distribution to a number of Farmers Service Societies, giving them

not only the maximum possible concessions but also expert guidance in doing the work. The program can be enlarged depending upon the outcome of the first experiment. If special concessions and privileges are given to the marketing federations it should be on the condition that they should operate fully through the village cooperatives. Otherwise the phenomenon of cooperative middlemen thriving at the expense of the primary cooperatives will continue to prevail.

Price Structure

The price structure can also be a serious constraint in the marketing of quality seed if prices are considered unreasonable by the farmers. But production of certified seed is an extremely complicated and costly process and such seed cannot be made available at a price comparable to the market price of grain and ordinary seed. Experience during the last decade and a half shows that farmers who have become convinced about the efficacy of high-yielding varieties of wheat and rice, and even hybrid millets, are willing to pay a higher price, provided the quality is good and the variety is suited to local conditions.

The situation is somewhat different for pulses and oilseeds. These crops are grown mostly in scanty rainfall areas without irrigation facilities, and despite research scientists' claims that farmers can get economic returns from these crops under rainfed conditions, actual results do not support these claims.

Even the more progressive farmers who dominate the seed-producing class are not enthusiastic about taking up seed production of pulses and oilseeds; because per hectare yields are extremely low, the cost of seed production is high. The same factor discourages grower farmers from using costly certified seed, because they feel that economics of production cannot sustain such investments. The Government of India has tried to solve this problem by extending subsidies on quality seed of pulses and oilseeds.

Possible Solutions

In my opinion a multipronged attack is necessary for solving this problem. The system of subsidy could continue for some time, but ultimately the solution lies in improving the technology and achieving higher levels of productivity for these crops. Our productivity in pulses and oilseeds, millets and even in rice, is among the lowest in the world. Unfortunately, no special incentive has been given to farmers who depend upon millets for a primary source of income. Because millets are clubbed along with other cereals, which show a general rising trend in production, the stagnation in millet production has gone unnoticed, although the productivity of certain millets has gone down in many important states and in the country as a whole, despite the advent of new high-yielding hybrids, and despite 25 years of research and development.

A possible explanation could be that hybrid seed is being used unscientifically. As noted earlier, seed replacement for hybrids should be 100% every year: unfortunately, in most of the states, it is only 2 to 10%. Use of hybrids without replacement for 4 successive years and more is not uncommon in many important millet-growing states. This serious problem should be attacked immediately.

Attempts have been made in most of the states to strengthen the agricultural extension agencies by what is known as the Training and Visit System. But surprisingly, even in those places where the program has run for the longest period, the majority of farmers still do not appear to have accepted the idea that hybrid seed should be replaced every year. Again there are states that have done comparatively well, producing large quantities of hybrid seed primarily for profits for their corporations, though the states' seed replacement rate remains miserably poor.

If this hurdle can be removed and the farmers taught to replace hybrid seed according to the recommended package of practices, it will create huge demands for hybrid seed. This will enable the seed corporations both in the public and private sectors to establish a large number of processing plants and engage more experts to supervise the seed-production program. The corporations will thus be able to work more economically and prices will automatically be reduced.

Already the demand for certified seed of wheat and rice seems to be picking up, and it is possible that the country will have to increase production of certified seed to three or four times the present level in the next few years. If the seed-producing agencies could make a reasonable profit in these big programs, they could afford to go in for large-scale production of pulses and oilseeds and even absorb some loss in their marketing.

Extension Services

While the seed-producing organizations should involve themselves much more in sales promotion activities which will include extension education also, the primary responsibility for the extension work rests with the state governments and agricultural universities. The Minister for Agriculture has repeatedly emphasized that the research organizations should take a little more active interest in taking the results of their research to the farmers. Demonstration research farms, under the ideal conditions that prevail in the National Demonstrations, are not sufficient to convince farmers of the efficacy in the field of the recommendations coming from the research institutions.

I have long held that our important research institutes and agricultural universities should have large-scale demonstration programs covering a large administrative unit, with the active assistance of the extension agency. A block would be too small; perhaps a district, which is the unit for local-level planning, would serve. Research leaders should not only work out the technical programs suitable for the local area but also the organizational setup that is considered ideal for delivering the goods. The research and extension wings will also have to work in a spirit of cooperation rather than confrontation.

Conclusion

It has been calculated that our food production level should be in the range of 225 million tonnes by 2000 A.D. This will mean that production under normal conditions should reach approximately 240 million tonnes, to allow for bad crop years which come quite frequently. If this target is to be achieved, the rate of growth during the next 15 years will have to be more than double that of the last 35 years.

Seed production may have to be stepped up to about 10 times the present level. The organizations concerned with seed production will have to do a lot of thinking on the type of marketing system suitable for each state. The public sector organizations, the cooperatives, and the private sector will have to supplement each other's efforts. Organization of Farmers Service Societies that could cater to all the needs of the farmers, as recommended by the National Commission on Agriculture and the T.A. Pai group, should receive adequate attention from the state governments not merely to ensure inputs to farmers but to help transform Indian agriculture.

Marketing of Fertilizers and Other Inputs for Rainfed Agriculture

B.P. Sikder*

Summary

In India, 105 million hectares are rainfed. The bulk of pulses, oilseeds, millets, and coarse grains are produced in this area, which accounts for 73% of the arable land and 42% of the food grains produced in the country. The farmers in this area have very limited resources and their management skill is poor. Extension services are not adequate. The soils are also poor, specially in nutrients. The weather is uncertain. These factors have resulted in poor consumption of fertilizers, seeds, etc., and also in poor disbursement of production credit. Marketing of agricultural inputs has become difficult because of these constraints.

The paper makes several suggestions to improve the situation. It is necessary to strengthen the infrastructure: storage, sale points, extensive road network, etc. Availability of easy and soft credit in time will have to be ensured, and flexibility of credit adjustment should be provided in times of drought floods. Widespread extension work may be resorted to. Availability of the inputs is to be ensured in a way that places inputs nearer the farmers' reach and in adequate quantities. Inventory carrying cost for the inputs in this area requires to be subsidized. An integrated approach to all the inputs for successful marketing is suggested for adoption by input agencies.

Résumé

Commercialisation des engrais et d'autres intrants pour l'agriculture pluviale : *En Inde, la culture pluviale s'etend sur quelque 105 millions d'hectares, qui représentent 73% de la superficie arable totale et 42% de la production des grains vivriers du pays. Une part très importante de la production des légumineuses, des oléagineux, des mils et des cereales secondaires provient de ces régions pluviales. Cependant, les paysans de ces regions ne disposent que de ressources très limitées et de techniques d'aménagement très pauvres. En outre, les services de vulgarisation ne sont pas suffisants, les sols sont tres carences surtout en éléments nutritils et les conditions climatiques sont aléatoires. Ces facteurs ont conduit à une faible consommation d'engrais, de semences, etc , ainsi qu'à une mauvaise répartition du crédit de production.*

Cette communication fait plusieurs propositions pour remédier à la situation actuelle. Il est indispensable de renforcer l'infrastructure telle que le stockage, les points de vente, le réseau routier extensif etc. On doit assurer la disponibilité à point de prêt consenti à des conditions faciles et de faveur. Le crédit doit être suffisamment souple pour être ajusté lors des sécheresses et des crues et les activités de vulgarisation doivent être largement répandues. Tout en assurant la disponibilite des intrants agricoles il faut veiller à ce que ces intrants soient à la portée des paysans et en quantités suffisantes. Les frais de stockage et de manutention des intrants dans cette région devraient etre subventionnés. Il est conseillé aux agences d'intrants agricoles d'adopter une methode d'approche intégrée pour l'ensemble des intrants en vue de mener à bien leur commercialisation.

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ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 1985. Agricultural markets in the semi-arid tropics. Proceedings of the International Workshop, 24-28 October 1983, ICRISAT Center, India. Patancheru, A.P.502324, India: ICRISAT.

Introduction

Out of a net cultivated area of about 143 million ha in India, about 105 million ha are rainfed (Table 1). Dryland/rainfed land accounts for 73% of the total cultivated area, but it contributes only 42% of food grains produced in the country. The bulk of our pulses, oilseeds, millets, coarse grains, and even industrial raw materials, such as cotton, are produced under rainfed conditions. Percentages of important crops grown rainfed are as follows:

Pearl Millet	96%	Maize	84%
Sorghum	86%	Chickpea	85%
Groundnut	90%	Cotton	75%
Rapeseed and mustard	80%	Pulses	92%
Rice	58%	Wheat	35%

The semi-arid tropical (SAT) areas of India account for 10% of the area and 58% of the population of the world's total SAT. Landholdings here are small to marginal, cropped by very poor farmers with few resources for land and water management. The soils of the Indian SAT are mostly black or red. Black soils are deficient in nitrogen. On shallow black soils only *kharif* (rainy-season) crops are grown; on deep black soils, with low rainfall, only *rabi* (postrainy-season) crops are grown. Some deep soils in high-rainfall areas may be double-cropped, but the general pattern is to take only one crop in rainfed areas.

The red soils are deficient in nitrogen and phosphorus; they are also shallow, with low water-holding capacity.

Rainfall patterns in SAT India are extremely variable; there may be dry spells even within the monsoon period, and these areas are not only subject to drought in bad monsoon years but also to floods in good ones.

Water being the chief limitation to crop improvement, water harvesting and development of watersheds are now being tried over an area of 42 million ha, but funds and credit for such development are limited.

Inputs and Marketing of Inputs

In SAT India, therefore, supply and marketing of agricultural inputs must be done in the context of uncertain weather, poor soils, drought, and floods on the one hand and inadequate resources, credit, trained extension workers on the other.

Shortage of essential inputs must therefore be supplied to the farmer at his doorstep in time and in enough quantity.

Technology

Technology for dryland farming has been developed by institutions such as the Indian Council of Agricultural Research (ICAR) and the Internationa Crops Research Institute for the Semi-Arid Tropics (ICRISAT), but it needs to be disseminated among the farmers. Extension agencies in the states, however, are grossly understaffed and extension staff are thinly spread over large areas: for e.g., 400 village-level workers per district in dryland vs 800 in irrigated areas.

Fertilizer manufacturers have now begun to adopt a number of rainfed districts. They also disseminate technology through farmers' gatherings (*Kisan melas*), seminars, workshops, etc. Rural broadcasts over All India Radio and television are also made throughout the country. But these efforts should be intensified. For instance:

- these workers should be given incentives to show demonstrably higher production and input consumption beyond a predetermined level in their areas;
- the number of village-level workers per district should be increased from 400 to 800 in rainfed areas;
- the ICAR, agricultural universities, and state governments should prepare simple leaflets in regional languages on the technology to be followed by farmers, and the leaflets distributed in advance of the season.

Although technology is not marketed in the conventional sense, it is the main instrument of sales promotion activity for inputs such as fertilizer, seed, pesticides, and tools.

Fertilizer

Fertilizer is the costliest agricultural input in India; 85% of fertilizer is consumed in irrigated areas, which cover only 27% of total arable land; only 15% of total fertilizer is spread over the rainfed areas,

Table 1. Net cultivated area and percent rainfed cultivated area in India, 1978/79.

State	Net area sown (000 ha)	Net area irrigated (000 ha)	Net rainfed area (000 ha)	Rainfed area (%)
Andhra Pradesh	11349	3665	7694	67.8
Assam	2679	572	2107	78.6
Bihar	8532	2960	5572	65.3
Gujarat	9543	1715	7828	82.0
Haryana	3650	1918	1732	47.5
Himachal Pradesh	561	89	372	66.3
Jammu and Kashmir	724	305	419	57.9
Karnataka	10315	1409	8906	86.3
Kerala	2204	228	1976	89.7
Madhya Pradesh	18847	2315	16532	87.7
Maharashtra	18245	1896	16349	89.6
Manipur	140	65	75	53.6
Meghalaya	193	48	145	75.1
Nagaland	150	54	96	64.0
Orissa	6097	1148	4949	81.2
Punjab	4177	3262	915	21.8
Rajasthan	15471	2895	12576	81.3
Sikkim	61	10	51	83.6
Tamil Nadu	6251	2873	3878	54.0
Tripura	246	29	217	88.2
Uttar Pradesh	17482	8892	8590	49.1
West Bengal	5539	1489	4050	73.1
Andaman and Nicobar Islands	32	-	32	100.0
Arunachal Pradesh	112	24	88	78.6
Dadra and Nagar Haveli	20	1	19	95.0
Delhi	73	61	12	16.4
Goa, Daman and Diu	134	13	121	90.3
Lakshadweep	3	-	3	100.0
Mizoram	77	8	69	89.6
Pondicherry	31	27	4	12.9
Total	142938	37961	105077	73.4

which cover 73% of arable land. Again, 45% of farming households use fertilizers on one-third of the total cropped area. Small and marginal farmers, who represent about 65% of farming households and account for 25% of land, consume only 31% of fertilizer (see Table 2). It is obvious, therefore, that fertilizer consumption in the rainfed semi-arid tropical areas will have to be increased by intensive marketing.

In order to encourage fertilizer use the Government of India has taken a number of steps in recent years, for example:

- transport cost up to block level is borne by the Government;
- prices have been reduced by 7.5% since June 1983;
- the rate of interest for fertilizer trading has been reduced by 1.5%;
- the distribution margin has been increased;
- about 3 million minikits of fertilizer are being distributed free of charge to the farmers over a 5000-block area.

Fertilizer Production and Supply

Fertilizer requirements in India are met by indigenous production and import. Import planning is done well in advance and monitored by a high power committee. Requirements for each season are assessed by state and by fertilizer, well before the commencement of the season. A supply plan divided by state, by fertilizer, and by manufacturer and pool handling agency is prepared in consultation with the states. The railways and manufacturers and handling agencies are notified under the Essential Commodities Act.

In preparing this supply plan, primary markets of manufacturers, transportation, and crop requirements for specific fertilizers are taken into consideration. In other words, the supply plan ensures least-cost distribution. It is closely monitored and reviewed every month, and corrective action whenever necessary is taken in time.

Within the parameters of the supply plan allocations, marketing of fertilizer is to be done by the manufacturers or pool handling agencies within the states. They are free to appoint their own dealers, plan their distribution, etc. Within the state, actual distribution among the farmers is done by institutional agencies, such as the cooperatives, agro-industries corporations, etc., and by private dealers. Institutional agencies distribute about 46% of fertilizer consumed in the country and private dealers, 54%. There were 1 32 690 fertilizer sale points in the country as of 31 March 1983.

Fertilizer Marketing

Marketing of fertilizer has the following important components:

1. assessment of production and import requirements;
2. advance marketing plan on least-cost basis;
3. product promotion;
4. logistics of distribution (type of fertilizers, packing transportation, storage and handling);
5. after-sales service; and
6. training of marketing personnel.

In all these activities all Governmental agencies, manufacturers/pool handling agencies, and distribution agencies work together.

Marketing in Rainfed Areas

Marketing of fertilizers in rainfed areas is beset with constraints some of which are:

- uncertainty of rain/monsoon;
- low credit availability;
- low resources of the farmers;
- heavy inventory-carrying costs, which increase with failure or delay of monsoon;

Table 2. Pattern of fertilizer consumption in India by size of farm.

Item	Size of farm (ha)					
	<1	1-2	2-4	4-10	>10	All households
Distribution of cultivator households (%)	40.7	24.8	19.8	12.1	2.6	100.0
Area cultivated (%)	9.7	15.7	24.3	31.6	18.7	100.0
Cultivator households using fertilizer (%)	36.8	44.8	55.3	55.4	58.8	45.2
Proportion of fertilized area to gross cropped area (%)	31.3	32.7	36.1	35.2	34.2	84.4
Proportion of fertilized area to gross cropped area of households using fertilizers (%)	79.9	70.3	62.4	58.9	49.8	61.5
Fertilizer input per fertilized ha(kg)	92.3	85.8	80.1	71.1	59.0	76.4
Distribution of fertilizer consumption (N P_2O_5 K_2O) (%)	12.2	18.5	22.8	20.0	11.2	100.0

Source: Roy, P.K., and Siddiqui, H.Y. Fertilizer use in India: role of small and marginal farmers. Fertilizer Marketing News, October 1980

- inadequate infrastructure for storage, sale points, etc., and
- shortages of high-yielding seed, which in turn influence fertilizer purchases.

When the rains come early, most farmers go without fertilizers, because it is not available. In case of floods, which also take place often, there is hardly any urea for a booster dose because of logistic constraints. In case of drought or scanty rainfall, fertilizer stored in the area must be transported to irrigated areas with assured water availability. In such situations, consumption of fertilizer also goes down (Table 3).

The following suggestions should be considered in order to ease marketing constraints in rainfed areas.

1. Requirements should be assessed on a normal monsoon basis, with at least 11% growth rate.
2. The entire requirement of each district and block should be prepositioned well before the season by distribution agencies.
3. If, because of drought, fertilizer remains unused, distribution agencies should be fully compensated for inventory carrying and transport.
4. The rate of interest should be lower for fertilizer distribution in these areas.
5. Sale and storage points should be opened in every micro-watershed area.
6. In case of drought or flood, short-term credit should be converted to medium-term loans and fresh short-term loans should be made available.
7. Minikits of fertilizer should be distributed to small and marginal farmers on a much larger scale than before.

Table 3. Comparative fertilizer consumption in indicated rainfed areas of India in a good year and a drought year.

State	District	Consumption (000 t) 1981/82 Good year	1982/83 Drought year
Andhra Pradesh	Anantapur	19.64	12.10
	Chittoor	22.73	15.22
	Cuddapah	24.50	18.16
Karnataka	Gulbarga	4.76	3.89
	Raichur	43.09	3.91
Gujarat	Junagadh	40.51	37.78
	Amradi	28.53	26.56
	Rajkot	50.46	46.33
	Jamnagar	21.99	19.56

Seed

Seed is the basic agricultural input; the Government of India recognizing the importance of seed, set up the National Seeds Corporation in 1963 for the production and distribution of improved seed, and followed this in 1969 with state seed farms. Seed of high-yielding varieties of wheat and rice was the harbinger of the green revolution in India. (See Menon, these Proceedings, pp 15-19, for details of the structure and responsibilities of the seed corporations).

During the 30-year period from 1953 to 1983, the certified seed distributed in the country increased about 23-fold, from 18300 tonnes to 420600 tonnes. The proposed targets for 1983/84 and 1984/85 are 5 88 500 and 7 20 000 tonnes, respectively. The production of breeders' seed has also gone up—from 2.68 tonnes in 1979 to nearly 17 tonnes in 1983.

In order to develop the infrastructure required for production and distribution of seed, the Government of India, in collaboration with the World Bank, launched a National Seed Project in October 1976. In Phase I of the project, Punjab, Haryana, Andhra Pradesh, and Maharashtra were covered; in Phase II, which commenced from December 1978, Bihar, Karnataka, Orissa, Rajasthan, and Uttar Pradesh. The estimated investment in these projects is Rs. 894.7 million (US $89.4 million) of which the World Bank contributed about Rs. 410 million (US $ 41 million). The main components of the project are the following:

- to develop infrastructure for production of breeders' seed in 16 agricultural universities and 7 institutions of the Indian Council of Agricultural Research (ICAR);
- to develop 20 farms and 11 processing plants for foundation seed in the agricultural universities;
- to construct 36 transit stores for the National Seeds Corporation and State Seeds Corporation;

- to set up eight vegetable seed packaging lines (National Seeds Corporation);
- to strengthen seed-testing laboratories;
- to strengthen seed-certification agencies;
- to provide higher training in seed technology and marketing in the developed countries;
- to develop large farms for production of seed at Suratgarh, Ladhowal, and Hisar

So far, the following components have been completed:

- facilities for production of breeders' seed are almost completed;
- five certified seed processing plants and two foundation seed processing plants have been commissioned;
- five transit stores have been constructed;
- eight vegetable seed packaging lines have been completed by the National Seeds Corporation

Phase II of this project is expected to be completed by the end of 1984.

In the dryland areas, seed of maize, sorghum, pearl millet, oilseeds, and pulses is required. While the first three are available, there is an acute shortage of certified seed of pulses and oilseeds, which leads to malpractices such as sale of substandard seeds in the name of truthfully labeled seed. The Government is trying to overcome these difficulties by issuing suitable statutory orders and increasing the production of seed.

Marketing of Seed

In the rainfed areas, the difficulty of marketing seed is similar to that of marketing fertilizer. When the rains come early, farmers face an acute shortage of seed. For example, during 1983 as a result of early rain in dryland areas of northern states, there was a shortage of pearl millet seed. Special measures have to be taken to supply seed, resulting in higher cost of transportation. The prepositioning of seed in these areas, as suggested for fertilizer, well in advance of the season, is absolutely necessary. The following suggestions are made for improving marketing of seed in dryland areas:

1. Large-scale minikit distribution of seed of pulses, oilseeds, and cereals among small and marginal farmers in dryland areas;
2. Prepositioning of seed in these areas and reimbursement for higher inventory-carrying costs;
3. Advance planning for seed distribution;
4. Fixing of seed prices at reasonable levels; and
5. Extending of subsidy on seed to cover cereal seed also.

Pesticides

The marketing of pesticides in rainfed areas is also beset with constraints of cost, uncertainty of weather, credit, etc. However, pesticides manufacturers may involve more institutional agencies which may be given adequate compensation for inventory carrying and distribution of pesticides

Credit

Credit plays a major role in input marketing. Even though the quantum of short-term credit disbursement has become considerable, it is not adequate for the dryland areas. This matter was recently discussed in great detail at a seminar organized by the National Bank for Agriculture and Rural Development, ICAR, and ICRISAT (ICRISAT 1984).[1]

In rainfed areas, depending on the weather conditions and the crop, the repayment period should be extended to 2 years. In the case of short-term credit, the scale of finance should also be increased. The short-term credit requirement per hectare ranges from Rs 925 to Rs 1650 per ha, depending on soil conditions and average rainfall, against about Rs 500/ha granted at present. Long-term credit for land development and purchase of implements should also be given on a liberal scale, especially in areas covered by micro-watershed development schemes.

1 See ICRISAT (International Crops Research Institute for the Semi-Arid Tropics) 1984 Proceedings of the NABARD-ICAR-ICRISAT Workshop on Watershed-Based Dryland Farming in Black and Red Soils of Peninsular India, 3-4 October 1983, Patancheru, AP, India.

Conclusion

In conclusion, it may be stated that the marketing of inputs in rainfed areas is a multidisciplinary activity and is dependent on various extraneous factors. Unless an integrated approach is taken to supply needed inputs, marketing constraints cannot be overcome.

It is therefore the policy of the Government of India now to integrate the supply of inputs. A beginning was made by observing National Input Fortnight in the first half of June 1983, during which an intensive campaign was launched throughout the country to ensure prepositioning of agricultural inputs; disposing of all pending applications for credit; distribution of credit for the rainy season; distribution of minikits; repairing of implements to be used during the rainy season; and scheduling of electricity and diesel supply. As a result of this campaign, consumption of fertilizer went up by 25% and of quality seed by more than 40%. Credit distribution also increased considerably. A similar fortnight was observed from 26 September to 10 October, before the commencement of the postrainy season, 1983/84 (October-March). This has again been very successful, and we recommend this measure for trial in other developing countries also to ensure that farmers get the inputs where they need and when they need and can use them profitably. Without input security, there cannot be food security.

Institutions, Infrastructure, and Regional Variations in India's Input Delivery System

K. Subbarao*

Summary

This paper presents an overview of the prevailing input delivery system for seeds, fertilizers, and pesticides, and examines the relative role of private and cooperative institutions in different states. Owing to its critical importance, the fertilizer delivery system is examined in greater detail. The evidence reviewed points to the prevailing interstate disparities in the physical access to rural retail outlets for fertilizers, and relates these disparities to the differences in infrastructure development. The socioeconomic implications of pushing cooperative institutions (as a matter of deliberate state policy) into infrastructurally weaker regions are discussed. The paper also attempts to quantify the impact of infrastructure on the fertilizer deliveries in some of the districts growing predominantly millet crops. The available policy alternatives for a more efficient and regionally equitable input delivery system are discussed.

Résumé

Les Institutions, l'Infrastructure et les variations régionales du système de distribution des intrants en Inde : *Cette étude donne un aperçu général du présent système de distribution des intrants, notamment des semences, des engrais et des insecticides. Elle examine le rôle relatif des institutions privées et coopératives dans les divers Etats de l'Inde. Une attention toute particulière a été accordée au système de distribution des engrais à cause de son importance critique. Si l'évidence fait apparaître l'existence des inégalités importantes d'un Etat à l'autre dans l'accès physique aux magasins ruraux d'engrais, cette étude fait ressortir la correspondance entre ces inégalités et les différences du développement de l'infrastructure. Les conséquences socio-économiques de l'extension poussée des institutions coopératives (dans le cadre d'une politique délibérée mise en oeuvre par l'Etat) dans les régions à faible infrastructure sont exposées. L'étude tente, en plus, de quantifier l'influence de l'infrastructure sur la distribution des engrais dans quelques districts essentiellement producteurs de mil. Sont également étudiées, d'autres possibilités disponibles permettant l'élaboration d'un système de distribution à la fois plus efficace et équitable du point de vue des régions.*

Introduction

Before the introduction of new seed varieties in the mid-1960s, most of the agricultural inputs were produced within the agricultural sector itself. Consequently, a delivery system for modern inputs (seed, fertilizer, and pesticides) did not emerge until recently. The spread of the distribution network for these inputs has been slow and uneven geographically. Indeed, it is now well recognized that fertilizer is more unequally distributed—interregionally and between small and large farms—than most other farm inputs. The literature on fertilizer use stressed the interregional inequity and underscored the factors on the demand side (irrigation ratio and high-yielding varieties adoption). The factors on the supply side comprising the delivery system—the spread of a retail network and its institutional com-

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position, the level of development of infrastructure, the impact of government intervention policies on fertilizer marketing, including the adequacy of the government-determined distributive margins, etc.—have generally been relegated to the "concluding observations" or "footnotes." This paper attempts to fill this gap.

The basic objective of this study is to explore the extent to which the functioning of the prevailing input delivery system restricted the physical access to rural retail outlets for modern inputs (fertilizer in particular) in different states and in some semi-arid tropical (SAT) districts. This paper is organized as follows: first, we present an overview of the prevailing input delivery system for seed, pesticides, and fertilizer. We then examine the changing relative roles of private and cooperative institutions in different states and trace the factors behind the interstate disparities in the retail network for fertilizer distribution as it has emerged in India in the recent past. In the next section we examine the impact of the level of infrastructure development on fertilizer consumption in some of the SAT districts in Andhra Pradesh, Maharashtra, Karnataka, and Tamil Nadu. This is followed by a review of the available evidence relating to operational efficiency and equity of the delivery system, including the impact of government policies. The available policy alternatives for a more efficient and regionally equitable input delivery system are discussed in the last section.

The Delivery System for Seed, Pesticides, and Fertilizer

Seed Delivery System

Since the establishment of the National Seeds Corporation (NSC), the production of certified seed has risen sharply in the recent past. A number of agencies are now involved in the production of certified seed including state seed farms, agricultural research stations maintained by the state departments, and selected agricultural universities. The seed multiplied on the state farms is also given to registered growers and progressive farmers for further multiplication. The parastatals and the National Seeds Corporation buy certified seed from the registered farmers who are, typically, large farmers. The quantity of seed thus procured is almost as much as the seed produced on the State Farms (NSC Annual Report), so that the dependence of parastatals for certified seed on large farmers is considerable.

The distribution of certified seed was generally done by the agriculture departments, block agencies, cooperatives, and private agencies. The relative shares of these agencies are not known. However, despite the growth of the National Seeds Corporation and the proliferation of the State Seeds Corporations and other parastatals, a major part of the seed requirements continue to be met by natural spread, by farmers themselves. This is because the total amount of seed supplied by these agencies together falls considerably short of the total requirements in different states.

Delivery System for Pesticides and Plant Protection Appliances

The distribution of plant protection chemicals has been in the hands of the state agencies, cooperatives, and private agencies. Gradually, state depots are withdrawing from this distribution function, leaving it to the cooperatives and private dealers who now control more than 60% of the business (National Commission on Agriculture, 1976).

According to the Pesticide Association of India (PAI), there were about 32 000 agencies in 1972 to serve 600 000 villages, or one depot for every 20 villages. The PAI studies in Maharashtra, Gujarat, and Bihar revealed that farmers have had to travel long distances to obtain their supplies of pesticides. It has also been observed by the PAI that distribution centers are opened in high-demand areas. Again, as with fertilizers, places accessible to roads and railways are preferred as new distribution centres by private dealers.

The Petroleum Corporation allocates a part of its output of pesticides to the cooperative sector, depending on past sales on a first-come-first-served basis, which is not a desirable procedure because, as is well-known, pesticide demand cannot be foreseen in time, region, or quantity.

Until the mid-1960s, the state governments made available plant protection appliances to farmers free of cost or for a small rental. With the introduction of high-yielding variety (HYV) seed, pesticide equipment began to be channeled increasingly through cooperatives. Gradually, the state governments began to subsidize ownership of these appliances by farmers, cooperatives, or panchayats. The financial assistance provided to

Table 1. Distribution, by state, of modern agricultural inputs in India.

State	Average value of ag output of major crops for 5 years ending 1980 (million Rs)	Value of agricultural output marketed by cooperatives during 1978-79 (million Rs)	Col 2 as percentage of Col 1	Total fertilizers distributed (1979-1981) (000 t)	Total fertilizers distributed by cooperatives (1979-1981) (000 t)	Col 5 as percentage of Col 4	Plant protection appliances in 1972 (Total No.)	Net sown area/ plant protection appliance (ha)	Area under pest-prone crops/ plant protection appliance (ha)	Subsidy (%)[1]
	1	2	3	4	5	6	7	8	9	10
Madhya Pradesh	14800	461.9	3.1	178.25	102.44	57.4	7100	2600	878	30
Rajasthan	9220	111.0	1.2	141.10	69.48	49.2	4700	3247	302	38
Uttar Pradesh	35270	3408.7	9.7	1079.85	408.88	37.8	96200	180	74	03
Bihar	13320	122.2	0.9	194.40	128.74	66.2	13200	627	470	36
Orissa	8760	105.5	1.2	71.90	34.50	47.9	28400	215	187	38
West Bengal	13040	126.4	1.0	231.75	36.11	15.6	2000	2856	2729	51
Haryana	9590	925.8	9.7	222.90	99.17	44.5	4000	892	217	01
Punjab	16060	1242.5	7.7	717.85	375.90	52.4	20600	198	68	04
Andhra Pradesh	15510	59.7	0.4	555.20	104.00	18.7	45400	248	135	67
Karnataka	11940	737.6	6.2	355.10	120.10	33.8	37300	278	103	14
Kerala	10170	420.7	4.1	101.55	60.60	59.7	25800	85	72	08
Tamilnadu	16410	341.2	2.1	514.60	162.30	31.5	29900	212	157	16
Gujarat	12000	570.0	4.7	367.20	354.50	96.5	41100	227	124	07
Maharashtra	15660	2697.7	17.2	421.05	295.00	70.1	45800	363	114	07

1 Subsidy on cooperative institutions, as a percent of total volume of business, computed on annual average for the years 1962-63 to 1981-82, from the "Annual Report 1981-82" National Cooperative Development Corporation, (p 106)

Source Columns 1, 2, 3, 4 and 5, "Annual Report 1981-82", National Cooperative Development Corporation
Columns 7, 8 and 9 Patel et al (1980)

farmers gave a substantial incentive to own needed equipment so that the number of appliances owned by farmers rose from 0.21 million in 1966 to 0.45 million by 1972.

The spread of plant protection appliances, like that of most other inputs, was also uneven among the states. On average, there is one appliance per 191 ha of area under special crops that are prone to pests (Patel et al. 1980). Interstate disparity is high (Table 1), Kerala having the widest network and Madhya Pradesh, Rajasthan, and West Bengal the lowest.

The manufacture of plant protection appliances is not statutorily controlled, and small-scale manufacturers in the private sector are the major suppliers. Almost all state governments now give varying amounts of subsidy for the manufacture of these appliances.

Fertilizer Delivery System

In terms of ownership, public sector, cooperative, and private agencies are now operating in the distribution of fertilizer.

Horizontal integration in the sense of central coordination in estimation of demand and control of supply, is also considerable, inasmuch as supply plans by state and source are decided upon by the central government.[1] However, while there is horizontal integration in the distribution of fertilizer up to the state level, the actual distribution of allocated quantities within a state is not subject either to central or to state control.[2]

Vertical integration—in the sense of combining many functions such as procurement of agricultural commodities and sale of all inputs in a package—has not developed to any great extent in India, except in the case of cooperative societies dealing with cash crops in Gujarat and Maharashtra. The virtual lack of vertical integration in the input delivery system and output marketing system in India is in sharp contrast to the situation in Korea where one finds complete vertical integration (Ban 1979).

1. For a description of the official procedure adopted in deciding upon the allocation of fertilizer by state, see Mahdi 1981.
2. The recent Block Delivery Scheme (discussed later) is an attempt to ensure that supplies actually reach desired locations within the state.

Vertical integration in the sense of combining of manufacturing and retailing functions, however, is now emerging, as is evident from the increasing involvement of some of the fertilizer manufacturers in providing marketing functions through directly appointed agents.

Figure 1 gives the distribution channel for indigenous and imported fertilizers. Imported fertilizer is distributed through the cooperative organization. For indigenous fertilizer, a manufacturer's marketing arrangements may range from direct selling to the farmer to selling in bulk to the cooperatives. The variations in these arrangements are significant in determining the nature and magnitude of the distributive margin.

Changes in the Composition and Spread of Retail Outlets for Fertilizer

Over the 1970s, cooperatives have more than doubled their fertilizer distribution in physical terms, from 1.17 million tonnes in 1970 to 2.9 million tonnes in 1982. In terms of both physical distribution of fertilizer and spread of retail outlets, the growth of cooperative organization has been characterized by wide interstate disparities. While in the western and northern zones the cooperatives distributed 87 and 53% of the fertilizers respectively in 1981, they distributed only about 40% in the central

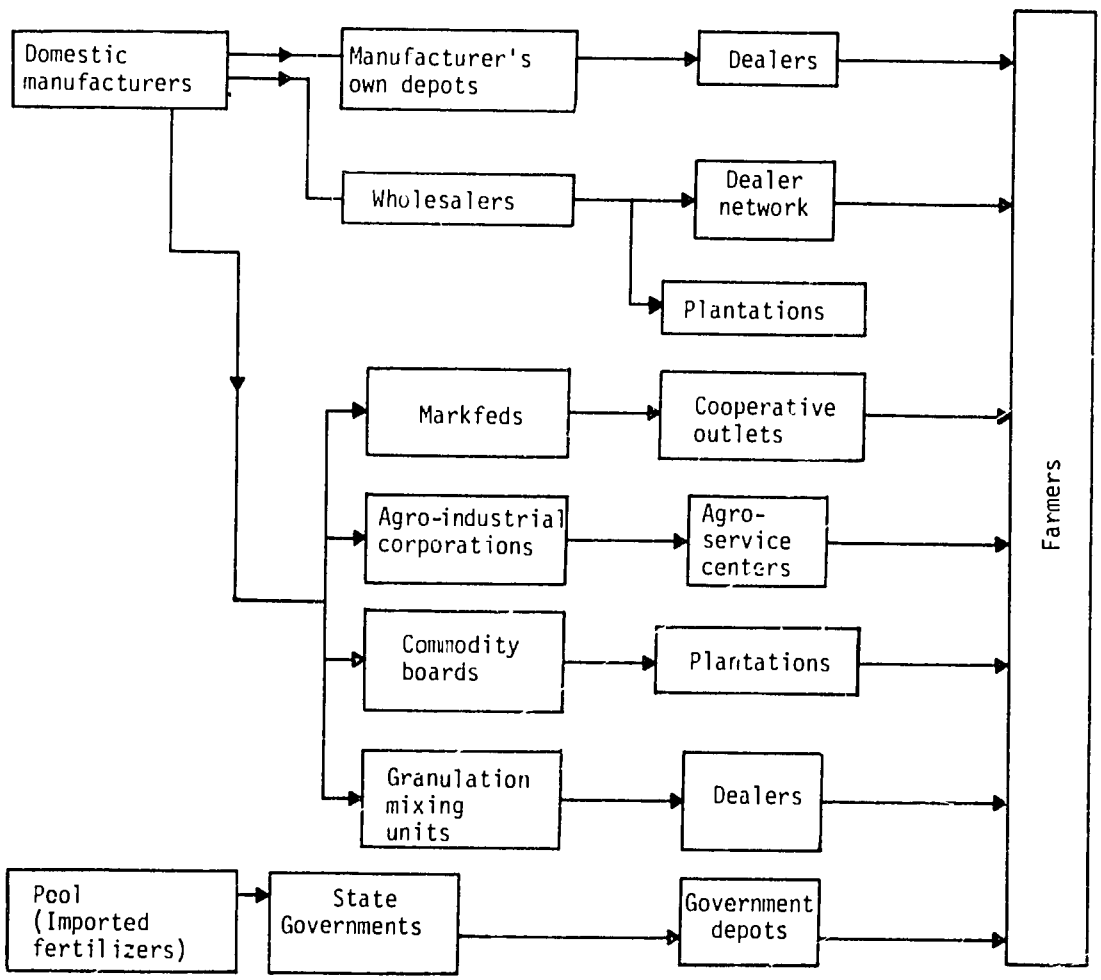

Figure 1. Distribution channels for fertilizer in India.

and eastern zones and only 30% in the southern zone (NCDC Annual Report 1981-82).

Although the proportion of cooperative outlets declined for the country as a whole during the 1970s, the cooperative retail outlets were expanded rapidly in states that are infrastructurally weaker (especially in the eastern zone) as a matter of deliberate government policy (see Table 2). Thus, the ratio of cooperative to private retail outlets rose substantially in Rajasthan, Uttar Pradesh, Bihar, Orissa, and West Bengal, whereas it declined in Punjab, Haryana, and Kerala, which are endowed with a highly developed infrastructure.

The spread of retail outlets (cooperative + private) for the country as a whole improved so that now every six villages are served by a retailer, as against 10 villages in 1970. However, it is interesting that there was no decline in the interstate disparity in the spread of retail outlets. Similarly, while fertilizer consumption per hectare improved during the 1970s, the interstate disparity did not decline (Table 2).

In order to explain the interstate disparity in the farmers' physical access to fertilizer, we made use of the available state-level data to test the following analytical relationships:

$$V/D = f(F/H;\ INF;\ F.INF) \quad \ldots\ldots \quad (1) \quad f_1, f_2, f_3, \ldots 0$$

$$V/D = g(F/H;\ INF) \quad \ldots\ldots \quad (2) \quad g_1, g_2 \ldots 0$$

$$F/H = h(IRR;\ RF;\ INF;\ F.INF) \ldots \quad (3)$$

where

V/D = Villages per retail dealer (intensity of coverage of dealers).
F/H = Fertilizer consumption per hectare of gross cropped area.
INF = Level of infrastructure development.
F.INF = Level of development of financial infrastructure.
IRR = Irrigation ratio.
RF = Normal rainfall.

The results are summarized in Table 3.

The density of retail dealers (villages per dealer) is, as expected, inversely related to the level of infrastructure and fertilizer demand as reflected by consumption per hectare at the beginning of the 1970s. It is interesting that the magnitude of the elasticity of infrastructure variable is higher at the beginning of the 1980s than the 1970s (Table 3, equations 1 and 3), reflecting the growing importance of infrastructure in the spread of retail outlets in the recent period. Furthermore, the percentage change in dealer density over the 1970s bears a significant positive association with the level of infrastructure (Table 3, equation 5), clearly reflecting the role of the latter in creating an additional demand for fertilizer via changes in the physical access.[3]

Most of the studies explaining cross-sectional variations in fertilizer consumption consider only the demand variables such as irrigation, HYV seed, etc. (Desai 1982; Jha et al. 1981). Introduction of infrastructure or dealer density as proxies for the supply bottlenecks seems to improve substantially the explanation for cross-sectional variation in fertilizer consumption (Table 3, equations 6 and 7) and all coefficients are statistically significant with the right signs. Again, the magnitude of the elasticity of infrastructure is greater for the more recent period.

To summarize, it appears that in the recent past, cooperative retail outlets expanded in the infrastructurally weaker states. Nevertheless, the spread of the retail network continues to be regionally inequitous. The expansion of the retail network during the 1970s can be explained by changes in fertilizer consumption and by changes in the physical infrastructure; the importance of the latter grew over time.

Infrastructure and Fertilizer Consumption in the SAT Region

We now extend the analysis of the previous section to the SAT districts in Andhra Pradesh, Maharashtra, Karnataka, and Tamil Nadu. Since data by district on retail outlets for fertilizer are not available, we can test only Equation 3 of the previous section for the SAT districts. This equation seeks to determine the impact of the rural road network on fertilizer consumption per hectare along with the usual demand variables.

We divided the districts in these four states into two categories: (1) those with an irrigation ratio of less than 25% and normal rainfall less than 970 mm; (2) all other districts. The former may be

3 For an earlier period, Desai (1979) found no statistically significant relationship between intensity of coverage of dealers and fertilizer consumption and concluded that the expansion of distribution of outlets seems to have taken place to facilitate consumption from growth in irrigation-induced demand, rather than to create additional demand. Our results suggest that the demand-creating effect can be captured if an infrastructure variable is introduced.

Table 2. Determinants of change in the composition and spread of distribution outlets for fertilizers in India (by state).

State	Ratio of cooperative to private outlets		No. of villages per dealer		Rural road length (km)/ 100 km² of area		Infrastructure index	Average consumption per na	
	1973-74	1980-81	1973-74	1980-81	1973-74	1979-80	1975-76	1971-73	1980-82
Madhya Pradesh	2.72	1.27	18.4	13.4	10.3	23	19.2	6.3	10.5
Rajasthan	0.8	2.16	13.3	9.8	9.6	18	15.4	4.5	8.0
Uttar Pradesh	0.47	1.36	13.2	7.5	20.8	63	7.5	21.8	50.8
Bihar	0.08	0.12	38.1	15.4	49.8	46	25.1	10.3	17.9
Orissa	0.48	1.35	21.2	10.6	23.3	74	1.8	6.3	9.8
West Bengal	0.01	0.08	2.9	2.6	49.1	158	41.1	13.7	34.4
Haryana	1.68	0.77	2.9	3.2	35.3	67	93.0	17.8	44.0
Punjab	4.23	0.34	2.5	2.6	28.9	90	93.2	55.5	120.8
Andhra Pradesh	0.59	0.18	6.5	3.6	31.1	38	36.2	21.8	48.0
Karnataka	1.73	0.79	4.8	4.2	42.2	55	26.1	17.1	32.8
Kerala	1.50	0.60	0.25	0.25	288.9	232	100.0	24.1	33.2
Tamil Nadu	0.47	0.40	1.8	1.2	71.0	130	71.1	46.8	65.0
Gujarat	2.10	3.69	3.1	2.8	19.1	27	52.4	17.7	36.5
Maharashtra	0.98	0.81	13.3	5.1	26.2	53	27.7	11.4	23.9
Mean	1.27	0.99	10.3	5.9	50.4	76.7	43.6	19.7	38.3
CV	88.1	94.2	96.3	77.1	135.1	74.9	73.4	72.7	73.5

Note: The northern hill states, Assam, and Himachal Pradesh are excluded from this study.

Sources: Cols. 2, 3, 4, 5, 9 and 10. Computed from Fertilizer Statistics (The Fertilizer Association of India, New Delhi), for 1974-75; 1975-76; 1981-82; and 1982-83.

Col 6. Computed from Statistical Abstract Punjab (The Government of Punjab, Chandigarh) for 1975 and 1976.

Col 7. Statistical Abstracts of different States, as given in Commerce Annual (Commerce Research Bureau, Bombay) 1980.

Col 8. Centre for Monitoring Indian Economy, Bombay: State-level Data (1982).

Table 3. Changes in the composition and spread of retail outlet—fertilizer use and infrastructure in Indian states.

	Equations[1]							
Variables[2]	LL	LL	LL	LL	L	LL	LL	L
V/DLR 1973-74	DEP	DEP						
V/DLR 1980-81			DEP	DEP				
ΔV/DLR					DEP			
NPK/H 1971-73	-.599*	-0.907*				DEP		
NPK/H 1980-82			-.325 ns	-.392 ns			DEP	
ΔNPK					.035			DEP
RRL 1973-74		-.159 ns						
RRL 1979-80				-.824*				
INF LEVEL	-.417*		-.51*		.521*	.313**	.34*	
GIA/GCA 1971-72						.633**		
GIA/GCA 1978-79							654**	
GIA/GCA								2.83**
RRL								.551*
INTERCEPT	0.215	-.159	.183	.264	55.6	-.126	.059	103.1
R^2	0.67	.56	.51	.58	.55	.70	.67	.52

1 DEP = dependent variable; L = linear; LL = log-linear; * = coefficient significant at 5% level; ** = coefficient significant at 1% level; ns = nonsignificant.

2 V/DLR = village per retail dealer, ΔV/DLR = percent change in retail dealer density, 1981-82 over 1973-74; NPK/H = consumption of N,P, and K/ha of gross cropped area; ΔNPK = percent change in NPK/H, 1981-82 over 1973-74; RRL = rural road length/100 km²; INF LEVEL = index of level of infrastructure development, 1975-76 computed by CMIE, GIA/GCA = gross irrigated area as a percentage of gross cropped area.

expected to represent the semi-arid districts in these four states. As Table 4 shows, there are significant differences in fertilizer offtake as well as infrastructure-related variables between the two sets of districts, but not so much in the structural characteristics (percent area under large farms, under cash crops, etc.).

In the SAT districts, physical infrastructure emerges as a significant determinant of fertilizer consumption, though its magnitude is understandably lower than the prime demand variable (irrigation ratio), (Table 5, Equations 1 and 2).

We also considered the determinants of the share of each district in fertilizer offtake in the SAT region (Equations 3 and 4). Physical infrastructure is again important, along with irrigation. Introduction of the infrastructure variable consistently improves the overall explanation for fertilizer offtake.

It is interesting that in the districts with an irrigation ratio higher than 25%, financial infrastructure emerges as a dominant explanatory variable (Equations 5,6,7, and 8). These districts have already attained a reasonably high level of physical and financial infrastructure, yet it appears more financial infrastructure is necessary to facilitate further fertilizer offtake.

This analysis suggests that in the SAT region, the low level of both physical and financial infrastructure may act as a barrier to realizing the demand potential for fertilizer absorption by creating bottlenecks in the delivery system.

Operational Efficiency and Equity of the Fertilizer Delivery System

Before we attempt to review the evidence on the efficiency and equity of the input delivery system, a few general comments on the nature of the cooperative and private organizations are in order. First, as already noted, cooperative retail outlets have expanded in the hinterland villages, whereas private dealers generally have operated close to railheads in order to save on the government-determined distribution margins. Second, the cooperative retailers in general seem to perform the various distributional functions (storage and transport in particular) to a greater extent than private dealers. The functions performed by different agencies,

Table 4. Basic characteristics of the SAT districts of southern India.

Characteristics	N P, K/ha gross cropped area	Gross irrigated area (% of gross cropped area)	Length of rural roads (km) per 100 km² of area	Per capita financial infrastructure (Rs)	Share of large farmers in cropped area (%)	Area under cash crops (%)	Index of urbanization
Irrigation ≤ 25% Normal rainfall ≤ 970 mm	2.74	12.4	69.3	259.8	20.8	22.3	1.07
Irrigation ≥ 25% Normal rainfall ≥ 970 mm	6.5	44.3	109.2	642.5	19.2	21.5	0.97

which have a bearing on the adequacy of the distributive margins allowed by the government, are described in Table 6.

In view of these qualitative differences in the services rendered by the two agencies, a straightforward comparison of cost-efficiency may not reflect the net social gains or costs.

Nevertheless, it is useful to summarize the available evidence on the relative efficiency of the two agencies. A study based on a sample drawn from Punjab, where cooperative organization is well entrenched, concludes that "the system of fertilizer supply through the cooperatives is relatively more efficient in terms of distribution costs or pricing efficiency. . . Considering the difficulties experienced by the farmers, the cooperative system had a slight edge over the private system of supply" (Sankhayan et al. 1973).

In a bid to reduce overhead costs and make the operations economically viable, cooperative retailers in Punjab and Haryana began to obtain supplies directly from the manufacturers without the intervention of wholesalers (Hiremath 1979). A similar trend is observable in Tamil Nadu. "Village cooper-

Table 5. Fertilizer offtake, irrigation, and infrastucture in the SAT region of India.[1]

	SAT districts with irrigation ratio ≤25%				SAT districts with irrigation ratio ≥25%			
Variables[2]	1	2	3	4	5	6	7	8
NPK/H 1980-81	DEP	DEP			DEP	DEP		
NPK % share			DEP	DEP			DEP	DEP
GIA/GCA 1976-77	.589**	.617**			.108**	.105**		
RAINFALL	.321*	.343*		-.352 ns	-.166 ns	-.88 ns		-.97
RRL/1976-77		.183*	172*	.137*		-.055 ns		-.099
FIN INF				.258**		.605**		.632**
GIA % share			.496**	.342**			1.09**	1.12**
Intercept	-3.2	-3.6	-.003	.576	-2.5	-1.8	-.141	1.24
R^2	.25	.32	.45	.53	30	54	.51	.71
n	45	45	45	45	26	26	26	26

1. DEP = dependent variable, * = coefficient significant at 5% level, ** = coefficient significant at 1% level, ns = nonsignificant, AN = equations are in log-linear form.
2. NPK/H 1980-81 = Consumption of N, P, and K/ha of gross cropped area, 1980-81.
NPK % share = Share of each district in consumption of N, P and K, 1980-81
GIA/GCA 1976-77 = Gross irrigated area as a percentage of gross cropped area, 1976-77.
RRL = Rural road length per 1000 km² area, 1976-77.
FIN INF = Per capita bank advance to the service sector (Trade and Commerce as a proxy for the level of development of financial infrastructure).

Table 6. Functions performed by different agencies in fertilizer distribution.

Functions	Agency			
	Cooperative	Agroindustry	Bulk marketeer	Private dealer (retail)
Inventory holding prior to season	Partial, average 2 to 3 months	Partial, less than 1 month	Partial, 1 month	Less than 15 days
Storage for 6 months	2 to 3 months	Less than 1 month	1 month	
Credit to farmer	Partial	Nil	Indirect, through dealer network	
Proportion	Partial	Nil	Indirect	Very little

Source: S. Venkataramanan (1981).

atives, which in April 1973 superseded the Panchayat unions are ordering directly through the Madras headquarters. If the scarcities grow more acute, the cooperative system should consider centralisation to taluk headquarters. A reduction in intermediaries would reduce opportunities for corruption. What is certain is that, as the small farmer grows more vulnerable, the cooperatives' roles in supplying inputs becomes more important." (Harriss 1977, p. 266.)

Even in the infrastructurally weak state of Uttar Pradesh, a recent study concludes that the "system of fertilizer supply through the cooperatives is relatively more efficient in terms of distribution costs" (Gurudutt 1982).

It is well known that cooperative organization is partially subsidized by the government. The subsidy as a proportion of the value of total business handled varied greatly between the states (Table 1); it is generally lower in states growing cash crops, which also have a higher turnover. Apparently, in backward regions growing food grains, output marketing has typically suffered from low turnover, especially because the surplus-growing large farmers preferred unregulated private marketing outlets for other reasons (Subbarao 1983). It has become difficult, therefore, to achieve a reasonable degree of vertical integration in order to lower costs. With the enlargement of the fertilizer business in the recent past, cooperatives in many states have now begun to reduce intermediaries and obtain supplies directly from manufacturers in order to keep costs down.[4]

On the question of interfarm equity, a number of studies[5] have pointed out the bias against small farms in the functioning of the delivery system for all inputs. In regions where cooperatives had not developed as healthy competitors to private outlets, the chief victims have been marginal farmers and tenants. It has been observed that, barring drought conditions leading to failure of crops, the large farmers presently consume the major proportion of fertilizers (see Table 7) and are also the worst defaulters in paying cooperative dues, which in turn retards fertilizer consumption through cooperatives (Wadia 1981).

The bias against marginal and small farms is not confined to fertilizer distribution alone. A recent study from western Uttar Pradesh (the scene of the green revolution) reports that the percentage of small farmers using the seed-store sources of supply of inputs was insignificant, and that "the small farmers did not even dare to see the seed store personnel." (Singh et al. 1973). A study from West Bengal reports that only a fringe of the

4. A comparative study of marketing costs in countries of South Asia revealed that in South Korea the costs of distribution were the lowest (Mittendorf 1982). One reason for this is the high degree of vertical integration of marketing of output of all commodities and supply of all inputs in the cooperative organization.

5. See the papers published in the conference number of the Indian Journal of Agricultural Economics, October-December, 1973, 28(4).

Table 7. Share of small and large farms in fertilizer use, by state, in India.

State	Percentage of farms using fertilizer		Area fertilized (% of total cropped area)		Area irrigated		Consumption of fertilizer/ha fertilized	
	Small (<1 ha)	Large (>10 ha)	Small farms (<1 ha)	Large farms (>10 ha)	Small farms (<1 ha)	Large farms (>10 ha)	Small farms (<1 ha)	Large farms (>10 ha)
Madhya Pradesh	9.9	40.6	5.9	14.6	21.1	11.9	67.7	41.3
Rajasthan	13.8	28.4	9.5	15.0	34.4	17.8	52.5	37.9
Uttar Pradesh	30.0	98.7	23.9	50.2	-	-	69.2	74.5
Bihar	29.1	90.6	25.0	50.5	21.7	46.4	49.5	33.2
Orissa	9.8	69.0	8.4	31.2	11.8	26.3	76.8	68.1
West Bengal	61.1	100.0	46.6	15.7	49.1	100.0	83.9	184.8
Haryana	44.1	95.4	24.8	62.3	65.7	87.1	69.1	89.1
Punjab	71.8	100.0	64.6	75.1	70.2	80.8	87.3	89.7
Andhra Pradesh	44.9	90.0	43.8	51.2	64.7	17.0	124.3	48.3
Karnataka	34.4	37.5	36.6	70.3	38.2	2.5	213.0	115.5
Kerala	77.8	-	89.8	-	72.3	-	94.5	-
Tamil Nadu	67.0	80.6	63.5	49.0	64.0	38.8	128.3	123.0
Gujarat	53.2	75.3	43.9	37.5	41.0	23.1	78.2	32.8
Maharashtra	38.7	63.1	31.4	26.4	15.5	10.9	83.2	67.7

Source: NCAER Consolidated Fertilizer Demand Study (Final Reports), Vols 7-11, and Hanumantha Rao (1983)

requirements of certified seed is met from various supplying agencies, including cooperatives (Das 1973). The delivery system for certified seed as much as fertilizer seems to be biased against the small farmer.

The shortcomings of the cooperative agencies pointed out by many studies include untimely supplies and delays and cornering of supplies by large farmers in times of scarcity. In the case of private agencies, black-market pricing even in normal years was noted (Gurudutt 1982). In times of scarcity, Singh reports that large farmers managed to obtain supplies without delay whereas small and marginal farmers could not (Singh et al. 1973). Even in the highly developed West Godavari districts of Andhra Pradesh, Parthasarathy (1975) noted that whenever inputs were in short supply, it was the tenants and small farmers who went short.

Government Intervention in Fertilizer Marketing

An important factor behind the observed regional inequity has been the policy of government in fixing identical distribution margins for every dealer, irrespective of his transportation costs, location, etc., which encouraged the concentration of private dealers near railheads.[6]

The distribution margin given to the fertilizer-marketing network is reassessed by government from time to time. This margin does not allow for preferential treatment of any institution. However, we noted that cooperatives opted for locating their outlets in the hinterland villages, thus incurring considerable costs on transport as well as storage. It appears there is a case for preferential treatment for cooperatives operating in hinterland villages. However, if two networks are performing similar functions in the same location, preferential treatment to one network would result in artificial (and unintended) channel conflict. In any case there appears to be a need to incorporate distance in the determination of the margin if farmers in infrastructurally weaker states are to get adequate supplies of fertilizer.

A recent innovation intended to serve farmers in the hinterland villages has been the introduction of the Block Delivery System by the government, whose main objective is to facilitate transport of fertilizer up to the block level. Additional expendi-

6 The transport cost per tonne of fertilizer varied from Rs 38-48 in the infrastructurally weaker states in the eastern region to Rs 18 in Punjab

ture on transportation from the railhead to the block headquarters will be borne by the government. This additional transport allowance is determined separately for each state and for each manufacturer. If this scheme is to be successful, it is important to oversee the activities of every dealer. If not, there is always the possibility of a dealer obtaining additional allowance but disposing of the fertilizer in or near the railway town. Such monitoring would involve administrative costs apart from further annual addition to the fertilizer subsidy, all in the interests of stimulating consumption. Needless to say, the interregional and interfarm distribution of the enormous subsidy will be exactly in proportion to the distribution of fertilizer.

Conclusions and Policy Alternatives

The evidence analyzed in this paper suggests that the spread of the rural retail network for modern inputs was unsatisfactory in regions with poorly endowed infrastructure; in such regions, the chief victims of inadequate retail network were the tenant and marginal farmers; the problem of inadequate agro-distributional infrastructure was more serious in rainfed eastern India and in the SAT region, where the potential for fertilizer absorption is least tapped; and the pre-empting of supplies by better-off regions and by large farmers within each region is the chief characteristic of the input delivery system in India. Although cooperatives in the recent period have penetrated into the interior areas, regional inequity in the retail network as a whole continues, owing essentially to the differential physical infrastructure in the states.

In terms of performance (efficiency and equity), the available evidence seems to indicate that the cooperatives have a slight edge over private dealers, and that their role may become critical as more small and marginal farms become vulnerable.

The recent governmental policy of encouraging fertilizer delivery to remote areas through the Block Delivery Scheme, which allows for additional subsidies, is likely to be misused in the absence of micro-monitoring, which is expensive and infeasible. In any case, the policy of pushing retail agencies into remote areas through subsidies should be regarded as a short-run, and expensive, palliative.

The prevailing inadequacies of the input delivery system can at least partly be traced to the inadequacy of public investment in agro-distributional infrastructure in relation to the needs of the eastern states and the SAT region. Inasmuch as 70% of the nation's small, marginal, and tenant farms are located in these states, reducing interregional inequity in the physical access to fertilizer may be expected to reduce interfarm inequity as well. Therefore, the longer-run solution appears to be (in contrast to the prevailing subsidy mania) to bring about a shift in the allocation of resources in favor of building agro-distributional infrastructure in the rural areas in the SAT region and in rainfed eastern India, where the potential for further absorption of fertilizer is highest.

Within the agro-distributional package, there are again choices. For example, the nature of the rural transport problem can be significantly affected by non-transport technology: where storage for inputs and output is made available close to the farmers, the peak traffic demands can be flattened by spreading the transport burden over a longer period of time. As such, there is a need for an integrated approach to the development of rural transport, input and output storage, and market-yards. Policies based on a consideration of the choices involved in this interdependent system should be preferred to short-run policies quickly formulated to meet crisis situations.

Given India's political economy, such a shift in the allocation of resources into agro-distributional infrastructure (including rural roads), after a careful consideration of the choices involved, appears unlikely, especially because such investments have very low political payoffs, in sharp contrast to "impact" programs and ad hoc policies.

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Market Channels and Growth of Fertilizer Use in Rainfed Agriculture : Conceptual Considerations and Experience in India

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Summary

Despite growing evidence on deficiencies in fertilizer supply and distribution systems, poor growth in fertilizer use under rainfed agriculture is commonly attributed to low and uncertain returns and lack of technological breakthroughs in dryland agriculture. This hiatus is mainly because growth in fertilizer consumption is considered as being driven by only growth in farmers' demand for this input. This paper shows the inappropriateness of such an approach by presenting a conceptualization and evidence from India's experience.

The economic potential of fertilizer use in a country is determined by fertilizer response functions, prices of crops, and cost of fertilizer. Actual fertilizer use is an outcome of the conversion of the economic potential into farmers' fertilizer demand and this being met by fertilizer supply and distribution systems. Since fertilizer use always begins way below the economic potential, it is incorrect to consider growth in fertilizer consumption as being governed only by changes in agroeconomic variables behind response functions-cum-price environment. Also important are behavioral and institutional variables behind the processes, which convert the potential into farmers' effective demand for fertilizers, establish and expand the fertilizer distribution system, and enlarge aggregate availability of fertilizers through domestic production and imports of fertilizers. Both a priori reasoning and empirical evidence suggest that there could be many, and quite different variables behind these processes.

India's experience in raising its fertilizer consumption from less than 100 thousand tonnes in the early 1950s to more than 6 million tonnes by the early 1980s demonstrates the usefulness of the above conceptualization. A bulk of this growth occurred on irrigated areas owing to greater profitability of fertilizer use under irrigated than under nonirrigated conditions. But even before diffusion of fertilizer use on irrigated land was complete, such use had begun on nonirrigated land. It was not confined either to a few crops or to areas sown with superior varieties. More significantly still, it was growing over time on all crops, albeit at a slower pace than on irrigated areas. This evidence clearly suggests that besides irrigation and high yielding varieties, other variables also played an important role in governing the past pace and pattern of growth in India's fertilizer use. Among them, variables behind supply and distribution systems were especially important. Wherever these systems were adequately developed, fertilizer use grew rapidly despite low irrigation, as revealed by the experience of Gujarat. In 1981-82, with less than 20% area irrigated and a relatively poor rainfall environment, Gujarat had the highest level of fertilizer use per hectare among all states with irrigation levels up to 40%. This remarkable performance of Gujarat was an outcome of faster diffusion of fertilizer use under rainfed conditions than in virtually all other states. This, in turn, was owing to many strengths of the fertilizer distribution systems and a push from the supply side in Gujarat.

Thus, to appreciate the true significance of the fertilizer marketing system for rainfed agriculture and to avoid stereotyped prescriptions for its development, it is important to treat it as an integral part of the overall process of growth in fertilizer use.

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Résumé

Circuits commerciaux et croissance de la consommation des engrais dans l'agriculture pluviale—considérations conceptuelles et expérience en Inde : *Malgré les preuves de plus en plus évidentes des lacunes dans les systèmes d'approvisionnement et de distribution des engrais, la croissance peu importante de la consommation des engrais en agriculture pluviale est souvent imputée aux bénéfices marginaux et incertains ainsi qu'à l'absence de percées technologiques en culture en milieu aride. Ce hiatus est essentiellement lié au fait que l'on considère l'accroissement de la consommation des engrais comme exclusivement consécutif à un accroissement de la demande en engrais par les paysans. La présente communication met en relief la faiblesse de ce point de vue en présentant une conceptualisation ainsi que des preuves tirées de l'expérience en Inde.*

Les fonctions de réponse aux engrais, les prix des récoltes et les coûts des engrais sont les facteurs déterminants du potentiel économique de la consommation des engrais dans un pays. L'utilisation réelle des engrais résulte d'une part, de la conversion du potentiel économique en demande d'engrais par des paysans, et d'autre part, de la satisfaction de cette demande par les systèmes d'approvisionnement et de distribution des engrais. Le départ de la consommation des engrais intervient toujours bien en deçà du potentiel économique; il est donc incorrect de croire que la consommation n'est déterminée que par les modifications des variables agro-économiques qui sous-tendent les fonctions de réponse et d'environnement des prix. Sont également importantes les variables institutionnelles et de comportement sous-tendant les processus qui convertissent le potentiel en une demande effective d'engrais par les paysans, qui établissent et élargissent le système de distribution des engrais et augmentent leur disponibilité globale tant par la production interne que par les importations. Le raisonnement a priori ainsi que l'évidence empirique donnent à croire que ces processus pourraient être sous-tendus par des variables bien différentes l'une de l'autre.

L'utilité de cette hypothèse est illustrée par l'expérience en Inde où la consommation des engrais a monté en flèche de moins de 100 mille tonnes au début des années 1950 à plus de 6 millions de tonnes au début des années 1980. L'essentiel de cette augmentation a eu lieu dans les régions irriguées grâce à une plus grande rentabilité de l'application des engrais qu'en conditions pluviales. Cependant, l'utilisation des engrais dans les zones non irriguées a commencé bien avant que sa diffusion n'ait été achevée en zones irriguées. L'usage des engrais n'était confiné ni à certaines variétés ni aux régions plantées en variétés performantes. Mais ce qui est encore plus remarquable c'est que l'usage des engrais pour toutes les cultures n'a cessé de croître, quoique plus lentement en régions irriguées. Il est donc évident qu'à part l'irrigation et les variétés à haut rendement, d'autres variables ont aussi joué un rôle important dans la détermination du taux et du mode de croissance de l'utilisation des engrais en Inde. Les variables particulièrement importantes ont été, entre autres, celles sous-tendant les systèmes d'approvisionnement et de distribution. Comme le démontre le cas de l'Etat de Gujarat en Inde, la mise au point adéquate de ces systèmes est généralement suivie par une croissance accélérée de l'utilisation des engrais malgré une irrigation peu importante. En 1981/82, avec moins de 20% de superficies irriguées et une pluviosité relativement faible la quantité d'engrais utilisée par hectare était plus élevée dans le Gujarat par rapport à d'autres Etats indiens où le niveau d'irrigation s'élevait à 40%. Cette performance remarquable du Gujarat provenait d'une diffusion plus rapide dans cet Etat de l'utilisation des engrais dans les conditions pluviales que dans pratiquement tous les autres Etats. Cette diffusion a été renforcée, à son tour, grâce à plusieurs atouts existants dans les systèmes de distribution d'engrais ainsi que par l'appui du système d'approvisionnement au Gujarat.

Donc, pour apprécier le sens exact du système de commercialisation des engrais pour l'agriculture pluviale et pour éviter des solutions stéréotypées pour son développement, il est important de le considérer comme partie intégrante du processus global de la croissance de l'utilisation des engrais.

Introduction

Empirical research on fertilizer use in developing countries is replete with evidence on deficiencies in fertilizer supply and marketing systems. But this evidence is usually bypassed in research that aims at identifying factors behind growth in fertilizer consumption, especially when the focus is on rainfed agriculture. Poor growth in fertilizer use under rainfed agriculture is commonly and more emphati-

cally attributed to low and uncertain returns and lack of breakthroughs in dryland technologies than to lack of adequate and efficient fertilizer marketing channels.

This hiatus in our understanding of forces behind growth in fertilizer consumption is mainly due to considering such growth as being driven by growth in farmers' demand for fertilizers. Factors behind fertilizer demand are usually identified by estimating some variant of a functional relationship between fertilizer consumption and such explanatory variables as prices of crops and fertilizer, level of irrigation, and nature of cropping pattern and crop varieties. Such an approach cannot but bypass the deficiencies in fertilizer supply and distribution systems, especially in developing countries, where supply and prices of fertilizers are seldom determined by free play of market forces.

This paper argues that identifying forces behind growth in fertilizer consumption by focusing only on changes in agroeconomic variables behind farmers' demand for fertilizers is not only a partial but also a quite inappropriate approach. Of course these variables and fertilizer demand are crucially important. But changes in agroeconomic variables are not the only determinants of the pace and pattern of growth in fertilizer consumption. Even when fertilizer price is administratively determined, the fertilizer supply and marketing systems could exert a causal influence on growth in fertilizer consumption.

The first section of this paper elaborates this argument with the help of a heuristic conceptualization which encompasses all essential elements involved in governing growth of fertilizer consumption.[1] Section 2 discusses India's experience of growth in fertilizer consumption, keeping in mind this conceptualization. In the third section, lessons emerging from past experience are presented to accelerate growth of fertilizer consumption under rainfed conditions.

Forces Behind Growth in Fertilizer Consumption: Conceptualization

The economic potential of fertilizer use in a country is determined by fertilizer response functions, prices of crops, and cost of fertilizer. Actual fertilizer use is an outcome of the conversion of the economic potential into farmers' demand for fertilizer and this demand being met by fertilizer supply and distribution systems.

Fertilizer use in any country begins with a few farmers at some locations; i.e., way below the economic potential. Over time it grows towards the potential, which itself could be changing due to shifts in fertilizer response functions and changes in prices of crops and fertilizers.

Viewed thus, it is incorrect to consider growth in fertilizer consumption as being governed only by agroeconomic variables behind response function-cum-price environment, or changes in them. Also important are the behavioral and institutional variables behind three processes. First, the processes that convert the potential into farmers' effective demand for fertilizers (generating knowledge about fertilizer response functions, spreading knowledge about profitability of fertilizer use among farmers, and enabling them to purchase fertilizers by providing credit). Second, the processes that establish and geographically expand the fertilizer distribution system as well as determine its *modus operandi*. And third, the processes that enlarge aggregate availability of fertilizers through domestic production and import of fertilizers.

The pace and pattern of growth in fertilizer consumption are an outcome of the initial conditions with respect to agroeconomic variables behind response function-cum-price environment, as well as behavioral and institutional variables behind the above three processes and how these variables change over time. Equally important are interactions among all these variables in the course of growth in fertilizer consumption.

Both *a priori* reasoning and empirical evidence suggest that there could be many, and quite different, variables behind the three processes. Accordingly, the pace at which these processes operate over time and the way they interact could also be quite different. Thus, for instance, the pace of conversion of potential into farmers' demand for fertilizer would vary with the crop and the agroclimatic situation, and such variation would be due to many factors besides differences in the profitability of fertilizer. Some of these factors are: effectiveness of the agricultural research and extension systems in generating and spreading the relevant knowledge; the priorities of the government in increasing fertilizer use; the promotion efforts of the fertilizer supply systems; and the working of the agricultural

1 For a complete exposition of the conceptualization, see Desai (1985).

credit system. Similarly, geographical expansion and workings of the fertilizer supply and distribution systems could differ over time and space, depending on the nature of the agencies involved and their motivations.

It could also be shown that the interactions among all elements involved in growth of fertilizer consumption could be quite different. Thus, for instance, dramatic increase in profitability of fertilizer use due to breakthrough in agricultural production technologies would not only accelerate growth of fertilizer demand but also induce rapid expansion in fertilizer supply and geographical spread of the distribution system. The chain reactions could work the other way also—substantial increase in fertilizer supply leading to acceleration in efforts to convert untapped potential into farmers' demand, expand the fertilizer distribution system and raise its efficiency in moving fertilizers from factories and ports to farms.

Appreciable fertilizer use in many developing countries is relatively recent. Their low levels of fertilizer use per unit of land suggest that much of the cropland is not yet fertilized.[2] Trials conducted in many countries indicate substantial untapped economic potential of fertilizer use.[3] There is also growing evidence of deficiencies in agricultural research, extension, and credit, as well as in fertilizer distribution and supply systems.[4]

Against such a backdrop, the above conceptualization seems appropriate to understanding the process of growth in fertilizer consumption because of four main reasons. First, it avoids a mechanistic interpretation of growth in fertilizer consumption. In fact, it reveals lacunae in such interpretations, especially in those based only on changes in agroeconomic variables, while at the same time it fully recognizes the importance of these variables. Second, it draws attention to the three behavioral and institutional processes that are no less important than the agroeconomic variables in influencing the pace and pattern of growth in fertilizer consumption. Third, it emphasizes the role of interactions among all essential elements involved in the process, showing that compartmentalizing our knowledge of different aspects of fertilizer use restricts our understanding of the forces behind growth in fertilizer consumption. Finally, it points out that the "causal" relationships behind growth in fertilizer consumption are not only complex but varied.

As for growth in fertilizer use in rainfed agriculture, the above conceptualization raises three pertinent questions for specific situations. First, how does actual fertilizer consumption compare with viable economic potential for its use? Second, to what extent could poor growth in fertilizer use under rainfed conditions be attributed to the relevant agroeconomic variables vis-a-vis inadequate efforts to convert the potential into farmers' fertilizer demand and various deficiencies in fertilizer supply and marketing systems? Third, what are the deficiencies in systems concerned with growth in fertilizer use in rainfed agriculture and what are their root causes? Obviously, we cannot meaningfully discuss the significance of fertilizer market channels for rainfed agriculture unless we address these questions.

India's Experience

By 1982/83 India's fertilizer consumption rose to about 6.4 million tonnes of nutrients. It now ranks fourth, after the USA, the USSR, and China. Although its consumption of 37 kg of nutrients per hectare of cropped land is considerably less than in these three and many other countries, India's performance in raising fertilizer consumption compares quite favorably with a majority of the developing, and even some of the developed, countries.

This section briefly reviews India's experience.[5] The focus is on some features of the past growth in fertilizer consumption under irrigated versus rainfed conditions. Particular attention is drawn to the varying pace of growth under rainfed conditions.

2 For a large majority of developing countries fertilizer consumption per hectare of arable land is less than 15 kg of nutrients. For details see FAO (1981b).

3 See FAO (1981a), and Ahmed and Ahmed (1980). Current consumption as a percentage of estimated potential ranges from 4 to 7 in Africa, 10 to 20 in Asia, and 20 to 30 in Latin America.

4 Literature on this subject is quite extensive. For illustrations see, Mathieu and de la Vega (1978) and various country studies published by TVA (Tennessee Valley Authority) and IFDC (International Fertilizer Development Center).

5 Vast literature exists on the subject, covering different facets of growth in India's fertilizer consumption. For selected bibliographies see Bumb (1979) and Desai (1982). A fairly detailed account of growth in India's fertilizer consumption is available in these publications, and in Desai (1979).

in different states, and also to the experience of one state where fertilizer supply and distribution systems have exerted a decisive influence on accelerating the growth in rainfed agriculture despite a poor rainfall environment.

Beginnings of Fertilizer Use

Fertilizer use in India began in the 1920s on tea plantations. There is no evidence of its use outside the plantation agriculture until the 1930s when it began to spread to sugarcane, tobacco, and rice at a few locations. Three factors were mainly responsible for this extension: (1) development of the domestic sugar industry due to tariff protection; (2) fixation of minimum sugarcane prices by the governments of Bihar and Uttar Pradesh; (3) efforts of the firms importing fertilizers to develop markets outside the plantations.[6] While the amount of total fertilizers used in British India was quite small (about 20 000 tonnes of nutrients in 1940), the period is also marked by the beginnings of domestic fertilizer production.

Broadening of the Base

With the Grow More Food Campaign (GMFC) launched by the Government of India in 1943, a new phase in growth of fertilizer use began. The campaign originated during the Second World War, when imports of rice from Burma were cut off, and gathered momentum due to the Bengal famine. The campaign aimed at accelerating food production in the quickest manner. Raising fertilizer use was one of the most important plank of the strategy behind the GMFC. Fertilizer supplies were enhanced and controlled, supplies were allocated between plantation boards and state governments, which were to promote its use in nonplantation agriculture; and a fertilizer distribution system was developed which included the use of the agricultural extension system to deliver fertilizer to farmers.

These efforts continued to grow after political independence in 1947, since partition of the country not only increased India's food deficit but also made it import-dependent in cotton and jute. Two early significant developments are also worth noting. First, a systematic large-scale program was undertaken to generate knowledge on crop response to fertilizer use under field conditions. Second, a many-fold expansion in the extension system was initiated under the Community Development Programme and the National Extension Service.

These developments had a decisive impact on the pattern of fertilizer consumption by the early 1950s, although total fertilizer consumption was less than 100 000 tonnes of nutrients (i.e., less than 1 kg/ha). Findings of the National Sample Survey for 1953/54 and 1955/56 reveal beginnings of fertilizer use on virtually all crops grown under irrigated as well as nonirrigated conditions.[7] This contrasts very sharply with the first two decades of growth in India's fertilizer consumption.

Growth in Consumption After the Mid-1950s

Total fertilizer consumption grew from less than 100 000 tonnes of nutrients in the early 1950s to about 300 000 by 1960; 1 million by 1967; 3.4 million by 1977; and 6.4 million tonnes by 1983. Whereas more data related to fertilizer consumption are available for India than most other developing countries, they are insufficient to answer all questions. For instance, time-series data on fertilizer consumption by crops, crop varieties, and irrigated versus rainfed areas are not available. Only findings of two nationwide surveys are available for 1970/71 and 1976/77.

The above findings confirm two major features of the fertilizer consumption pattern repeatedly revealed by many microstudies conducted in different parts of the country: (1) unequal share of different crops in total fertilizer consumption (Table 1); and (2) concentration of fertilizer use on irrigated areas and areas sown to improved and high-yielding varieties of crops (Tables 2 and 3). These features were mainly due to: (1) the uneven pace of diffusion of fertilizer use on different crops; (2) faster diffusion on the same crop under irrigated than in nonirrigated conditions; and (3) faster diffusion in areas sown to improved and high-yielding varieties than in areas sown to traditional varieties.

This is not surprising. What is instructive is that in nonirrigated areas fertilizer use was not confined either to a few crops or only to areas sown with

6. See Report of the Royal Commission on Agriculture in India (1928). Also see Knight (1954).

7. For details of these and subsequent discussion of the composition of total fertilizer consumption, see Desai (1982).

superior varieties. More significantly still, it was growing over time on all crops, albeit at a slow pace (Table 4). And this was so even though diffusion of fertilizer use on irrigated areas was not complete. By 1976/77, fertilizer use had spread to about 18% of total nonirrigated area, even though about one-third of the irrigated areas was still available for further diffusion of fertilizer. A similar pattern was true for each and every crop.

While these findings reveal the dominant influence of certain agroeconomic factors, they also suggest the importance of the three processes mentioned in the previous section in influencing the pace and pattern of growth in fertilizer consumption.

Under the prevailing conditions of fertilizer response functions and prices, there was sufficient scope for a faster growth in fertilizer use than actu-

Table 1. Share, by crop, in total cropped area, fertilizer consumption, and growth in total fertilizer consumption in India between 1955 and 1977.

Crop	Percent of total cropped area[1]	Total fertilizer consumption (%)			Growth of fertilizer consumption (%)
		1955/56	1970/71	1976/77	
Food Crops					
Food grains					
Rice	22.4	36.6	30.7	34.9	34.2
Wheat	10.7	3.2	17.0	21.7	22.1
Sorghum	10.5	1.5	1.7	3.9	4.0
Pearl Millet	7.3	0.6	1.8	1.2	1.2
Maize	3.2	0.6	2.4	2.4	2.5
Finger millet	1.5	0.6	0.6	1.4	1.4
Barley	1.7	0.4	0.6	0.2	0.2
Other cereals[2]	3.3	0.1	0.1	-	-
Pulses[2]	14.7	0.6	0.9	-	-
Subtotal	75.4	44.2	55.8	65.7	65.6
Other					
Sugarcane	1.5	12.4	6.5	7.5	7.4
Condiments and spices	1.1	5.1	2.6	2.9	2.9
Subtotal	2.6	17.5	9.1	10.4	10.3
Nonfood Crops					
Cotton	4.8	1.9	3.9	6.4	6.5
Jute	0.5	0.4	0.2	0.3	0.3
Groundnut	4.1	1.3	5.1	2.8	2.9
Tobacco	0.3	0.7	1.7	1.2	1.2
Subtotal	9.7	4.3	10.9	10.7	10.9
Other Nonplantation[3]	11.9	8.4	14.4	7.2	7.7
Plantation[4]	0.4	25.6	9.8	6.0	5.5
All crops	100.0	100.0	100.0	100.0	100.0

1 Average of 1955/56, 1970/71 and 1976/77

2 Included in "Other nonplantation" in the 1976/77 and in the growth of fertilizer columns

3 Includes vegetables and fruits, tapioca, oilseeds other than groundnut, fibers other than cotton and jute, fodder, and miscellaneous crops.

4 Includes tea, coffee, and rubber.

Source: Based on official area statistics, 11th and 26th rounds of NSS, and Fertilizer Demand Study of the NCAER. For methodology and details, see Desai (1982).

Table 2. Percent of crop area irrigated and share of irrigated area in total fertilizer consumption, 1970/71.

Crop	Percent of crop area irrigated	Share in fertilizer consumption	
		Irrigated area	Nonirrigated area
Food crops			
Food grains			
Rice	38.5	80.4	19.6
Wheat	54.3	90.1	9.9
Sorghum	3.6	26.8	73.2
Pearl millet	4.0	17.5	82.5
Maize	15.9	45.4	54.6
Finger millet	13.1	46.9	53.1
arley	52.0	72.8	27.2
Other cereals and millets	2.2	14.5	85.5
All cereals and millets	27.6	77.6	22.4
Chickpea	15.6	58.0	42.0
Pigeonpea	0.3	0.8	99.2
Other pulses	6.3	18.3	81.7
All pulses	8.8	29.8	70.2
All food grains, subtotal	24.1	76.9	23.1
Other food crops			
Sugarcane	72.4	91.8	8.2
Condiments and spices	35.4	54.7	45.3
Other food, subtotal	56.9	81.5	18.5
Nonfood crops			
Cotton	17.3	60.5	39.5
Jute	10.9	53.7	46.3
Groundnut	7.5	18.1	81.9
Rapeseed and mustard	25.2	84.5	15.5
Sesamum	2.6	6.9	93.1
Tobacco	23.7	31.1	68.9
Nonfood, subtotal	12.7	38.2	67.8
Other nonplantation	22.3	70.0	30.0
All crops	23.0	71.2	28.8

Source: Based on official irrigation statistics and 26th round of NSS. For methodology and other details, see Desai (1982).

ally occurred. This is indicated by substantially less than complete diffusion of fertilizer use on all crops, even in irrigated areas, by the mid-1970s. Slow but steady growth in fertilizer use under nonirrigated conditions, even on traditional varieties, clearly suggests a viable potential and farmers' willingness to use it. Thus, it is just as necessary to ask why the past growth in fertilizer use was not faster as it is to emphasize the importance of irrigation and high-yielding varieties in governing the past growth. The answer to this question lies in inadequate efforts to convert the potential of fertilizer use into farmers' demand for fertilizers, especially on food grains other than rice and wheat and oilseeds; slow expansion of and various inefficiencies in the distribution system, repeated shortfalls in domestic fertilizer production, and wide year-to-year fluctuations in fertilizer imports.[8]

The relevance of the above factors could also be shown from variation in the pace and pattern of growth in fertilizer use among different states of India. Once again while irrigation, cropping pattern, and crop varieties "explain" much of this variation, there are important exceptions. Among these, Gujarat stands out (Table 5). In 1981/82, with less than 20% area irrigated and a relatively poor rainfall

8 For details, see Desai (1982).

Table 3. Share (%) of indicated area categories in total fertilizer consumption, selected crops, 1976/77.

Crop	Category				
	IA-HY and IV	IA-TV	NA-HY and IV	NA-TV	Total
Rice	53.0	33.2	1.9	11.9	100
Wheat	80.3	17.5	0.8	1.4	100
Sorghum	21.0	23.4	33.6	22.0	100
Pearl millet	28.2	33.7	10.0	28.1	100
Maize	26.2	57.2	6.2	10.4	100
Sugarcane	50.7	47.3	1.3	0.7	100
Cotton	50.8	11.4	26.5	11.3	100
Groundnut	50.0	33.5	3.9	57.6	100
All crops	56.8	28.8	4.8	9.6	100

IA = Irrigated area; NA = Nonirrigated area, HY and IV = high-yielding and improved varieties; TV = traditional varieties.

Source: Based on Fertilizer Demand Study of NCAER. For methodology and other details, see Desai (1982)

environment, Gujarat had the highest level of fertilizer consumption per hectare among all states and territories with irrigation levels up to 40%.

Gujarat's Experience

Gujarat's remarkable growth in fertilizer consumption was due to relatively faster diffusion of fertilizer use under rainfed conditions than in many other parts of the country rather than to very high rates of application on limited irrigated area (Table 6). This conclusion, based on the survey data of the National Council of Applied Economics Research (NCAER 1978) is supported by Gujarat's Agricultural Census for 1976/77, according to which about 53% of total fertilizer consumption was on nonirrigated areas.

Rapid diffusion of fertilizer use in rainfed agriculture in Gujarat was mainly due to certain strengths of the fertilizer distribution system and pressure from the fertilizer supply side, especially from the fertilizer factories located in the state.

In 1981, for the country as a whole, there were 280 fertilizer distribution outlets per district. Against this, Gujarat had 325 outlets per district, 34 outlets per taluka (a unit comparable to a block), and one outlet per less than three villages.[9] These outlets were geographically well spread out within Gujarat and covered regions with high as well as low irrigation. For instance, about a quarter of the total outlets were located in one-third of the total talukas with less than 10% irrigation.[10]

As in other parts of India, Gujarat's fertilizer distribution system also comprises of different types of agencies, such as cooperative, private dealers, state agro-industries corporations, and outlets run by the fertilizer factories themselves. A large majority of talukas have at least three types of agencies involved in fertilizer distribution.

For the state as a whole, cooperatives dominate, with nearly three-fourths of the share in total outlets and total fertilizers supplied. In this respect also Gujarat seems unique, since cooperatives have lost ground to private dealers in all major fertilizer-consuming states after the mid-1960s, when fertilizer distribution policy was liberalized by the government. This has been so because of the following five major strengths of the cooperative sector's involvement in fertilizer distribution in Gujarat.

First, it is a reasonably well-knit system comprising village level credit societies like Primary Agricultural Credit Societies (PAC), taluka and district level marketing societies called Taluka Purchase Sales Unions (TPSU), District Purchase Sales Unions (DPSU), and a state-level federation of marketing cooperatives (Gujarat State Cooperative Marketing Federation, GSCMF). Fertilizer distribution is very important in the activities of the marketing cooperatives; thus, for instance, it accounted for 54% of the federation's total turnover of Rs. 2890 million in 1981/82.

Second, the federation nurtures involvement of the lower level of cooperatives in fertilizer distribution by passing on a substantial proportion of the distribution margin to them. It also passes on the "credit period" to them which it receives from fertilizer manufacturers for storage of fertilizers.

9 The average number of villages served by a fertilizer outlet in 1981 varied from less than three in Punjab, Tamil Nadu, Haryana, Gujarat, Kerala, West Bengal, and Manipur to more than ten in Bihar, Madhya Pradesh, Meghalaya, Rajasthan, Tripura, Assam, and Nagaland. Four of the seven states in the former category had higher per hectare fertilizer consumption than the all-India average, and it was only marginally lower in two of the remaining three. Against this, per hectare consumption in all seven states in the latter category was below half the national average.

10 Details such as this and the ones which follow emerge from the Report of the Working Group on the fertilizer distribution system in Gujarat (Government of Gujarat 1983). This study examines not only characteristic features but also the working of the fertilizer distribution system, with a view to identifying its strengths and problem areas. There is probably no other study that goes into these issues with block-level data.

Table 4. Estimates of diffusion and rates of application of fertilizer on nonirrigated areas sown to indicated crops and crop varieties, 1970/71 and 1976/77.

Crop	1970/71 Percent area fertilized	1970/71 Rate of application (kg/ha)	1976/77 (NCAER)[1] Percent area fertilized H/I	T	Both	Rate of application (kg/ha) H/I	T	Both
Food grains								
Rice	17.7	29	63.1	19.0	20.6	56	43	45
Wheat	11.5	35	19.4	9.1	10.5	47	28	33
Sorghum	4.7	27	61.8	7.6	13.0	64	37	50
Pearl millet	6.1	34	21.5	6.4	7.3	33	32	32
Maize	15.5	34	61.5	12.8	18.0	30	29	30
Finger millet	10.0	29						
Barley	4.7	58						
Other cereals	1.2	33						
Chickpea	0.6	61						
Pigeonpea	3.5	38						
Other pulses	1.4	34						
Other food								
Sugarcane	24.3	61	52.0	18.8	34.5	47	67	53
Condiments and spices	24.3	83						
Nonfood								
Cotton	11.0	41	76.9	13.5	27.0	87	56	75
Jute	9.0	34						
Groundnut	18.7	52	68.4	34.7	35.4	53	32	32
Rapeseed and mustard	3.7	35						
Sesamum	2.6	21						
Tobacco	76.3	75						
Other nonplantation[2]	3.9	101						
All crops above	9.3	38	53.3	15.7	18.8	64	39	45

1. H/I = high-yielding/improved varieties; T = traditional varieties.
2. Other nonplantation crops include vegetables; potatoes; tapioca; fruits; oilseeds other than groundnut, rapeseed, mustard, and sesamum; fibers other than cotton and jute, fodder crops; and miscellaneous crops.

Source: Based on 26th round of NSS and Fertilizer Demand Study of NCAER. For methodology and other details, see Desai (1982).

Third, fertilizers are supplied to PACs, TPSUs, and DPSUs in response to their indents. The bulk of these supplies are made directly from the godowns and silos of the fertilizer factories to the locations of indenting cooperatives. This minimizes storage cost and avoids storage at intermediate locations as well as cross transportation.

Fourth, the working capital requirements of PACs, TPSUs, and DPSUs are largely met either by the district cooperative banks providing them cash credit limits or under the bank guarantee scheme evolved by the federation. Experience reveals that the bank guarantee scheme has played a vital role in the fertilizer distribution system of the cooperative sector. Finally, because of its financial strength and the ability to handle a growing volume of fertilizer supplies, many fertilizer manufacturers have preferred to deal with the marketing federation rather than a large number of private dealers and appointed the federation sole or principal distributor of their products in Gujarat.

The strengths of the cooperative system plus the policy of multiple agency approach have played a crucial role in providing a well-spread and fairly efficient fertilizer distribution to Gujarat—a system which was capable of accelerating fertilizer consumption in response to either a pull from the demand side or a push from the supply side.

Table 5. Fertilizer consumption, rainfall environment, irrigation, and spread of high-yielding varieties (HYVs) in indicated states of India.

State/ Territory	Fertilizer consumption 1981/82 (kg/ha)	Percent cropped area with annual rainfall (mm) of <750	750-1150	>1150	Percent cropped area irrigated (1978/79)	Percent area covered by HYVs[1] (1980/81)
Pondicherry	256	0	0	100	77	NA
Punjab	124	85	15	0	83	91
Delhi	75	100	0	0	55	NA
Tamil Nadu	67	0	82	18	50	93
Uttar Pradesh	52	15	74	11	44	50
Andhra Pradesh	50	0	67	33	36	57
Haryana	46	93	7	0	54	71
Gujarat	39	68	25	7	19	54
Karnataka	34	65	25	10	15	51
Kerala	33	0	0	100	12	46
West Bengal	33	0	0	100	20	44
Goa	31	0	0	100	9	NA
Maharashtra	27	36	43	21	12	49
Jammu and Kashmir	22	11	51	38	41	59
Himachal Pradesh	20	0	81	19	17	59
Bihar	18	0	22	78	33	45
Manipur	15	0	0	100	35	30
Madhya Pradesh	11	4	39	57	11	33
Orissa	10	0	0	100	19	28
Meghalaya	10	0	0	100	22	NA
Rajasthan	8	87	13	0	20	25
Tripura	7	0	0	100	8	55
Assam	3	0	0	100	17	29
Nagaland	2	0	0	100	36	15
All India	35	32	36	32	28	48

1 Area under HYVs as percent of total area under rice, wheat, sorghum, pearl millet, and maize
NA not available
Source FAI (1982), and Ministry of Agriculture (1982)

Table 6. Diffusion of fertilizer use and average rates of application on selected crops in Gujarat, and all India, by 1977.

Crop	All India: Area irrigated (%)	All India: Area fertilized (%)	All India: Rate of application (kg/ha)	Gujarat: Area irrigated (%)	Gujarat: Area fertilized (%)	Gujarat: Rate of application (kg/ha)
Rice	38.3	44.9	78	29.9	63.4	54
Wheat	65.0	55.1	73	52.4	61.9	41
Sorghum	4.5	17.3	57	4.2	19.3	39
Pearl millet	5.4	11.5	39	11.2	26.8	33
Sugarcane	79.9	69.7	146	100.0	68.3	115
Cotton	21.8	42.4	85	12.7	33.9	60
Groundnut	6.0	38.5	40	2.4	57.2	29
All crops	26.8	28.7	76	13.5	38.2	44

Source: Based on NCAER Fertilizer Demand Study. For methodology and other details, see Desai (1982)

As in other parts of India, pull from the demand side in Gujarat has come from the processes which have converted untapped potential into farmers' demand for fertilizers. This includes a growing awareness of fertilizers among farmers, upward pressures on prices of crops, improvements in response function environment (especially for crops such as pearl millet, irrigated wheat, and irrigated cotton) and growth in the supply of production credit to farmers.

But in addition to this, the push from the supply side has also worked in Gujarat, mainly due to the location of a few major fertilizer companies in Gujarat (e.g., GSFC, IFFCO, and more recently GNFC). Total production of these companies plus some small companies far exceeds Gujarat's total consumption. This has created an environment in which the state government and the marketing federation perceive no constraints in fertilizer supply to raise its use rapidly, and the fertilizer manufacturers find it convenient to channelize their products through a well-spread and reasonably efficient fertilizer distribution system. What further adds to the supply pressure is IFFCO's policy of marketing their fertilizers through cooperative channels only, and the preference of many fertilizer factories located in other states for the expanding fertilizer market in Gujarat.

Emerging Lessons

Three major lessons emerge from the discussion in the previous two sections.

First, to appreciate the true significance of the fertilizer marketing system, it is important to have a conceptualization which treats it as an integral part of the overall process of growth in fertilizer consumption. In other words, it is important to avoid focusing on market channels alone.

Second, even when fertilizer prices are administratively determined, fertilizer supply and marketing systems could (and usually do) exert a causal influence on the pace and pattern of growth in fertilizer consumption. This is so because of the untapped viable potential of fertilizer use under both irrigated and rainfed conditions, and various deficiencies in the processes which convert this potential into actual consumption. Thus, market channels for growth of fertilizer use in rainfed agriculture can be more meaningfully discussed in the context of growth in fertilizer use under both irrigated and rainfed conditions.

Third, it is not enough to focus only on such features of the fertilizer marketing system as its density and the types of agencies involved in it. It is also important to take into consideration its *modus operandi* and interface with fertilizer demand on the one hand and the supply system on the other. This is especially necessary to avoid stereotyped prescriptions, such as increasing the number of outlets, encouraging the participation of some institutional agencies in fertilizer distribution, and raising the margins on fertilizer distribution. In themselves, these measures are often inadequate to remove the deficiencies in the fertilizer marketing systems for rainfed agriculture.

What may be more critically required is to accelerate the efforts to convince farmers about the profitability of fertilizer use under rainfed conditions and to improve the working of the agricultural credit system with a view to speeding up fertilizer diffusion, and thus to enlarge the volume of business for the marketing channels. Similarly, many deficiencies in the marketing channels for rainfed regions cannot be removed unless growth in total fertilizer supply keeps ahead of growth in the market for fertilizers under irrigated conditions.

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Quelques aspects du commerce céréalier dans l'Ouest-nigérien

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Résumé

Dans les pays sahéliens de l'Afrique de l'Ouest ce sont les plus grands marchés urbains qui jouent un rôle majeur dans l'organisation des marchés des céréales et dans le processus de la fixation des prix. Les résultats qui sont présentés ici, extraits d'une étude plus étendue des marchés des céréales autour de Niamey, Niger, réunissent une étude historique du commerce céréalier dans la région et une analyse des réseaux actuels de commercialisation des mils. Le mil a été choisi parce qu'il constitue le produit céréalier principal du Niger, et Niamey car il est le plus grand marché du Niger.

Jusqu'au milieu du XIXe siècle, le mil a été échangé principalement par la voie de redevances (offrandes) islamiques payées à l'aristocratie politique et religieuse, ainsi que par le troc contre les produits de chasse et de cueillette. Les circuits de commercialisation étaient courts : en effet, on a constaté l'absence d'un surplus en grains et d'un centre de forte demande dans la région. La colonisation et l'établissement associé de Niamey, la capitale, a permis de créer des circuits de commercialisation en rendant nécessaire les échanges céréaliers pour payer les impôts et pour approvisionner la ville.

Les réseaux actuels de commercialisation du mil sont très répandus dans la région sèche au sud-ouest de Niamey avec une pluviosité relativement élevée mais une densité démographique basse, qui exporte les produits céréaliers à la capitale. La démarche adoptée pour l'étude a consisté en des visites bimensuelles à 30 marchés répartis sur un rayon de 200 km autour de Niamey par trois enquêteurs qui ont séjourné dans les zones d'étude. Les enquêteurs ont étudié les prix et les quantités au niveau des marchés et ont interrogé les marchands. Les résultats des enquêtes sont présentés ici seulement pour la période mars au juillet 1983.

L'offre et la demande du mil ont trois caractéristiques majeures : (1) la production est extrêmement dispersée à cause de la densité démographique basse, (2) il y a une seule récolte annuelle en octobre-novembre, (3) la consommation se concentre à Niamey. Le commerce est constitué de trois types d'unités. Les petits détaillants – souvent les femmes – représentent à peu près 80% des commerçants et n'apportent généralement, que moins de 10 kg de grains au marché. Les détaillants moyens sont actifs principalement pendant la période de pré-récolte, et apportent 200 à 300 kg au marché. Il n'y a que quelques grands grossistes, apportant entre 500 kg et 1000 kg, qui n'interviennent que dans les plus grands marchés.

Le système de commercialisation présente deux niveaux distincts, liés par le marché principal de la capitale. Sur tous les 100 kg de mil échangés dans les marchés en dehors de la capitale, environ 28 kg sont consommés localement et 72 kg sont envoyés à Niamey. Les prix augmentent au fur et à mesure que l'on s'écarte des marchés primaires isolés vers Niamey où ils sont finalement doublés. Tandis que pour le riz, l'augmentation se fait dans le sens inverse, c'est-à-dire à partir de Niamey vers les marchés ruraux.

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Introduction

Depuis bientôt plus d'une décennie la question alimentaire se pose avec une constance et une gravité aux peuples des pays pauvres. L'intensité de ce phénomene et sa forme varient dans l'espace et dans le temps. Au Sahel les études consacrées à la question ont mis en exergue les carences du système de production et aussi celles du système de transfert (Arditi 1980; CRED 1977). Dans ce dernier secteur—la commercialisation—les Etats sahéliens ont mis au point des filières lourdes de commercialisation, dont la finalité était, bien souvent, de se substituer aux réseaux privés de distribution des céréales de base. Ces filières ont eu souvent des difficultés financières et n'ont pas, dans la majorité des cas, réussi à maîtriser les processus d'approvisionnement. Cet échec a été imputé en partie au monopole de fait dont jouit le commerce privé. Les mêmes études diagnostiques ont souligné la pauvreté de l'information concernant ce domaine du secteur informel.

La présente note se propose d'apporter quelques éléments de réflexion sur ces circuits privés, le cadre de travail de retenue est le Niger de l'ouest et le produit considéré étant, le mil. Bien que dans la réalité l'économie de ce produit soit étroitement liée à celle d'autres produits (riz, niébé, bétail), la pertinence du choix est due essentiellement à la première place qu'il occupe tant du point de vue de la production que du point de vue de la consommation.

Le plan de travail est le suivant. La première partie présente le cadre des échanges céréaliers. La deuxième présente les courants d'échange céréalier dans le département de Niamey. La troisième présente la commercialisation du mil dans l'arrondissement de Say et la partie finale est une réflexion sur les traits évolutifs des circuits privés céréaliers.

Le cadre des échanges céréaliers

Le département de Niamey

Le département de Niamey, est situé à l'extrême ouest du Niger et partage ses frontières internationales avec le Mali, le Burkina Faso et le Bénin. La zone sud du département connaît un climat soudanais (pluviosité annuelle de 700 mm) et la zone nord connaît un climat sahélien (pluviosité annuelle de 300 mm). Le département constitue 7% de la surface totale du Niger et abrite 23% de la population totale. Répartie en six arrondissements, la population de ce département est concentrée dans la vallée du fleuve Niger. Contrairement aux autres départements du Niger, la région de Niamey est située presque intégralement dans la zone agricole—97% du département sont situés en dessous de l'isohyète de 350 mm, contre 12% pour l'ensemble du pays.

L'agriculture est partout dominée par la céréaliculture avec notamment la culture du mil (environ 85 000 ha) et la riziculture (environ 20 000 ha). Le mil est cultivé en système extensif soit en monoculture soit en association avec le niébé. Les traits majeurs de cette agriculture sont d'une part la dégradation du sol et d'autre part le développement d'un travail agricole salarié. Si le premier phénomène tire son origine aussi bien de la pression démographique que du caractère extensif du système de production, le développement du salariat agricole est dû essentiellement à la croissance d'une agriculture urbaine conduite par les fonctionnaires et les commerçants, notamment dans la partie sud du département.

On peut schématiser la situation alimentaire dans le département en trois zones. Une première zone qui est normalement excédentaire en céréales, est constituée par les arrondissements de Téra, Say et Kollo. Une deuxième zone a un équilibre céréalier fragile incluant les arrondissements au Nord (Tillabéry, Ouallam et Filingué). La ville de Niamey et ses environs constituent une troisième zone. La présence de la capitale avec 300 000 habitants, représentant une poche de déficit permanent, est un facteur décisif du déséquilibre alimentaire régional. Ce déséquilibre est atténué partiellement par d'autres productions, telles que le riz et le niébé. La présence de ce déficit à travers l'histoire du département a favorisé l'émergence des réseaux marchands depuis bientôt des décennies.

Courants d'échanges céréaliers dans le département de Niamey

Les réseaux de commercialisation sont une invention de la population pour équilibrer les déficits et les surplus. Ils évoluent en fonction des données socio-économiques du contexte et le recours à l'histoire de leurs évolutions permet donc de mieux saisir leur dynamique actuelle.

L'économie domestique se caractérise par la prédominance de l'activité agricole née dans un cadre institutionnel limité (famille, village, communauté). L'objectif majeur poursuivi par le groupe est l'autosuffisance alimentaire et le surplus commercialisé reste faible; les échanges sont faibles, sinon nuls, en dehors de ce cadre. Dans ce contexte, le mil tout comme les autres denrées est autoconsommé par le groupe (famille ou village).

Deux éléments majeurs marquent cette économie d'autosubsistance : les conditions écologiques et la division de travail. Les conditions écologiques telles que la pluviosité faible et aléatoire, les coûts élevés du transport, et la faible densité démographique sont les causes principales de cette économie de subsistance. Ces conditions déterminent les systèmes de production. Les échanges d'abord rendus nécessaires par

les obligations religieuses et sociales (offrandes) sont accélérées par la division du travail au sein du groupe. Avec l'évolution ces échanges changent de contenu. En effet, outre la valeur d'usage, le mil acquiert une valeur marchande. En tant que marchandise il alimente des courants d'échange de dimension variable.

Pendant la période précoloniale, deux grands courants d'échange commercial ont vu le jour au Niger. L'un a relié l'Empire sonrai aux Etats haoussa et à l'Afrique du Nord par la vallée du fleuve Niger et par l'axe Tombouctou-Agadez, respectivement. L'autre a relié les Etats haoussa à l'Afrique du Nord.

Ces réseaux commerciaux ont connu des évolutions différentes souvent liées au développement des grands Etats sahéliens. Ainsi la vallée du fleuve était un carrefour par où transitaient le sel, le natron, les esclaves et le bétail. Des marchés importants (Sansanne Haoussa, Say Bourmba) jalonnaient ces circuits et le commerce interrégional était basé sur une complémentarité régionale. La chute de l'Empire sonrai au 16ème siècle entraîna la dislocation de ces grands réseaux. Jusqu'au 19ème siècle une économie de guerre s'installa dans cette région, le trafic étant alimenté par l'esclavage.

A cette époque il semble que l'économie du mil était caractérisée par l'autoconsommation et l'échange de proximité. La circulation du grain au sein du groupe était assurée par certaines voies : redevances et taxes à l'aristocratie politique et religieuse; troc contre les produits de chasse et de cueillette; troc des butins de guerre (esclaves, bétail) contre le mil.

Les guerres entre groupes ont pesé sur les activités agricoles en perturbant la production mais aussi en assurant une circulation de grain entre les membres des groupes et entre communautés. Ces échanges quoique étant une pratique assez généralisée dans la région, n'ont mis en oeuvre que de circuits courts (producteur-consommateur).

Cette absence d'un commerce interrégional du mil pendant la période précoloniale était une conséquence de la faiblesse de surplus, de la prédominance de troc, et surtout de l'absence d'un marché céréalier important.

En effet, si le commerce du mil a connu un développement notable dès le 17ème siècle dans le Damagaram (dans l'est du Niger), c'est en partie grâce à l'existence de deux marchés importants : au nord dans l'Air et au sud dans les villes précoloniales haoussa (Kano, Katsina). En outre, dans le commerce interrégional de cette époque c'est le troc du mil contre le sel et le natron qui constituait le fondement des autres transactions survenant après le long de ces circuits.

La pénétration coloniale a bouleversé cette situation en favorisant la naissance d'une économie de traite qui couvre aussi bien les cultures de rente que les céréales. On sait que l'une des particularités de ce type d'économie est son caractère médian entre l'autosubsistance et l'économie marchande. Cela s'est traduit notamment par la monétarisation des échanges portant sur des produits d'autosubsistance, le cas du mil étant assez typique de cette évolution. La conquête coloniale de l'Ouest nigérien s'est accompagnée d'une perturbation des activités agricoles. L'exode et les recrutements forcés ont amenuisé la force de travail disponible, tandis que la réquisition des denrées alimentaires (céréales et bétail) ont fini par faire disparaître les réserves familiales. Les famines de 1901 et de 1931 furent les manifestations de ce déséquilibre vivrier. Néanmoins, c'est dans un tel contexte qu'ont pu naître et se développer les échanges marchands de mil sous l'influence de deux facteurs : l'apparition d'une demande concentrée et croissante due aux centres urbains et la réquisition et l'imposition.

La création des postes administratifs coloniaux a lancé le processus d'urbanisation avec le problème sous-jacent d'approvisionnement vivrier. En effet, la naissance de ces postes administratifs exigeait des quantités croissantes de céréales. Leur ravitaillement se faisait par deux voies : un circuit colonial répressif, alimenté par des réquisitions et un circuit privé. Ce dernier bénéficiait doublement du système colonial puisque d'une part une fraction des céréales réquisitionnée était écoulée par son biais et d'autre part les pressions fiscales (impôts) obligeaient le producteur à brader son mil à la récolte pour le racheter plus tard parfois trois fois plus cher.

L'importance de Niamey dans ce circuit privé est due à la taille de son marché. En 1905, la ville ne comptait que 1 800 habitants et en 1945, le chiffre était de 7 000. Une des caractéristiques de ce circuit était sa concentration : en 1931, lors de la grande famine, les 350 tonnes stockées par les commerçants étaient pour l'essentiel détenues par un des grands traitants de la colonie (Derriennic 1977).

Les premiers courants d'exportation datent de cette époque. On estime qu'environ 45 000 tonnes de mil furent exportées vers le Nigéria entre 1928 et 1930. On peut donc dire que le mil, produit de troc et d'autoconsommation, était devenu une marchandise alimentant un commerce spéculatif régional et interrégional. Aux circuits courts qui assuraient le ravitaillement des groupes se sont ajoutés des circuits longs. La vitalité actuelle de ces réseaux privés est la preuve de leur capacité d'adaptation aux conditions socio-économiques.

Les réseaux contemporains

Bien que l'espace économique dans le département soit polarisé autour de la capitale, et bien que le marché soit une institution généralisée, la dynamique des circuits varie d'une zone à l'autre. Sur ce plan on peut distinguer trois sous-régions : les arrondisse-

ments du nord, la vallée du fleuve et les arrondissements du sud.

La première sous-région comporte quelques marchés qui assurent l'approvisionnement local. Une enquête effectuée entre juillet 1978 et juin 1979 (Godfrey 1979) fait ressortir des quantités assez importantes vendues (6,3 tonnes/mois/marché) et la faiblesse des mouvements céréaliers entre les arrondissements du nord et Niamey. Les échanges entre ces arrondissements et Niamey concernent principalement le niébé. Cette sous-région abrite deux marchés importants du bétail, (Mangaize et Abala) qui sont fréquentés par des commerçants venant de la Côte d'Ivoire, du Nigéria, du Mali et de Niamey. Une partie du bétail vendu provient du Mali.

La vallée du fleuve demeure toujours un axe important d'échanges. Ainsi, elle compte quelques 20 marchés importants, parmi lesquels figurent Ayorou, le troisième marché international du bétail du département. Un réseau important relie ce marché aux marchés côtiers du Nigeria, du Libéria, du Bénin et de la Côte d'Ivoire. On peut parler d'un second pôle d'échanges régionaux après Niamey. C'est un des lieux privilégiés d'approvisionnement du mil pour les nomades maliens, nigériens et burkinabé. Le mil provient en majeur partie de Niamey. Une des particularités de la sous-région est le lien étroit existant entre le commerce céréalier et celui du bétail.

La dernière sous-région comporte, outre un marché de bétail important (Torodi), le plus grand nombre de marchés céréaliers frontiers. C'est surtout la zone d'approvisionnement de la capitale en céréales, telles que le mil et le sorgho. A son tour, cette zone reçoit des produits de consommation et du riz de la capitale.

Au terme de ce survol des courants céréaliers du département on retient que la capitale demeure la plaque tournante de ce commerce aussi bien pour la collecte que pour la distribution. Afin de mieux cerner les mécanismes d'échange de mil le recours aux monographies des réseaux concrets est nécessaire. Une étude dans ce but est en cours et déjà certains résultats partiels concernant la zone de Say peuvent être exposés.

Méthodologie de l'enquête sur le terrain

L'objectif de l'étude est de décrire le réseau privé de commercialisation du mil autour de la capitale de Niamey. Pour ce faire, 30 marchés répartis sur un rayon de 100 à 150 km autour de Niamey ont été retenus, et des suivis bimensuels y ont été effectués. Après un recensement des vendeurs de mil et d'autres produits tels que le riz, le blé, 15 vendeurs et 15 acheteurs de céréales ont été interrogés sur leurs opérations d'achat et de vente. Sur les mêmes marchés on a relevé le prix de certains produits ayant une incidence sur les échanges de mil (bétail, seccos, natron, riz). Un relevé des prix de détail des céréales de base (mil, riz), du niébé et du bétail a été effectué mensuellement sur les marchés ruraux et urbains.

La description des circuits et l'étude des séries des prix peuvent permettre de préciser le degré d'efficacité du réseau privé. Mais pour l'heure, seuls quelques résultats partiels de l'étude seront exposés, concernant 9 des 12 marchés dans l'arrondissement de Say et couvrant la période de la soudure (mars à juillet 1983). La région est d'un intérêt particulier au Niger car c'est une région d'haute potentialité agricole qui est encore relativement peu peuplée. La période de la soudure est le moment critique pour les consommateurs durant l'année agricole parce que c'est en ce moment que les prix sont les plus élevés et les réserves de grains les plus basses.

Principaux résultats de l'enquête du marché de Say

L'offre et la demande du mil

L'arrondissement de Say est la zone des variétés à cycle long du mil (connues sous le nom de Maiwa en haoussa et Haini Somno en djerma) et il semble que ces variétés sont préférées, du point de vue du consommateur local à celles de cycle court cultivées plus au Nord.

L'offre et la demande du mil dans cette zone sont influencées par une série de facteurs :

- taux d'autoconsommation variable selon la saison;
- caractère saisonnier de la production;
- éparpillement des structures de production à travers un espace relativement peu peuplé (5 habitants/km²).
- enclavement de Say qui résulte de sa séparation avec le reste du pays par le fleuve Niger;
- importance et croissance de la demande en raison de la proximité de la capitale qui compte plus de 300000 habitants.

Typologie des marchés

Si l'on classe les marchés en fonction de certaines caractéristiques des agents et des volumes offerts (Tableaux 1 à 4), on distingue trois types de marchés :

- les marchés tertiaires (Kiki, Tientiergou, Tientien Foulbé et Makalondi) fréquentés par des

Tableau 1. Nombre de vendeurs selon les marchés principaux du départment de Niamey (mars-juillet 1983).

	Ethnie					Sexe		Catégorie		
Marché	Gour-mantche	Peulh	Djerma	Haoussa	Bella	Hommes	Femmes	Gros-siste	Demi-grossiste	Détail-lant
Tientien Foulbe	13	49	2	—	—	7	57	—	1	63
Allambaré	80	10	—	—	—	3	07	—	1	89
Kiki	59	17	1	—	—	13	64	—	—	67
Makalondi	58	9	—	—	—	4	63	—	—	67
Torodi	2	57	26	3	—	33	55	3	15	70
Kobague	—	74	2	—	—	36	50	—	43	63
Bokki	—	98	58	—	12	37	61	2	19	77
Say	—	31	58	2	4	4	91	—	1	94
Tientiergou	—	46	3	—	—	2	47		—	45

détaillants (98-100%), souvent enclavés et ne traitant que de faibles quantités (0,3-3,0 tonnes pour la période de cinq mois);

- les marchés secondaires, sur lequels interviennent en plus de détaillantes, une bonne proportion de demi-grossistes hommes (environ un tiers des effectifs). Ces marchés se répartissent le long des deux axes routiers de l'arrondissement. Les quantités traitées étaient de 6 à 27 tonnes pour la période de l'enquête;

- le marché principal de Niamey.

Les marchés secondaires ont des liens entre eux et servent de relai entre les marches tertiaires et le marché principal; l'ensemble forme deux réseaux distincts connectés à la capitale.

Les agents du marché

Le Tableau 1 résume les caractéristiques essentielles des vendeurs du mil dans la zone d'enquête. Ce sont :

- bien que le mil soit une culture généralisée dans la zone, il y a une nette prédominance ethnique selon la sous-zone : les Gourmas au sud (marchés d'Allambaré, Kiki et Makalondi), les Peulhs au centre-nord (marchés de Torodi, Kobague et Tientiergou) et les Djermas à l'est (marchés de Say et Bokki);

- la vente est une activité des femmes (62-96% des agents marchands, selon le marché), cependant il y a une présence d'hommes sur les marchés urbains et ruraux importants surtout à Torodi et à Bokki;

- la plupart des vendeurs sont des détaillants (79-100% selon le marché), mais on note également la présence des demi-grossistes. En fait le commerce de détail est une activité de femmes (productrices ou revendeuses) tandis que le commerce de demi-gros et de gros est une activité d'hommes. En général, le commerce en gros est assez faible dans la zone d'enquête.

La répartition des vendeurs en trois catégories selon le volume détenu masque une réalité sur le plan de la propriété du produit. Ainsi, les revendeurs peuvent être des commerçants ou de simples intermédiaires de vente. Le comportement varie selon les

Tableau 2. Classement des marchés au Niger, par quantités de grain offertes (mars-juillet 1983).

Ordre	Marché	Distance de Niamey (km)	Quantité offerte (kg)
1	Bokki	67	27293
2	Say	60	22837
3	Kobague	52	12689
4	Allambare	197	7806
5	Torodi	62	6980
6	Makalondi	97	3287
7	Tientien Foulbé	121	3170
8	Tientiergou	82	1063
9	Kiki	120	344

Tableau 3. Distribution des achats (en kg) dans les principaux marchés du département de Niamey, selon la destination.

	Source de vente								
Destination	Kiki	Tienti-ergou	Tientien Foulbé	Maka-londi	Torodi	Allam-baré	Kobague	Say	Bokki
Kiki	275	0	0	0	0	0	0	0	0
Tientiergou	0	913	0	0	0	0	0	0	0
Tientien Foulbé	0	0	104	0	0	0	0	0	0
Makalondi	0	0	0	318	0	0	0	0	0
Torodi	0	0	48	0	419	0	2095	0	0
Allambaré	0	0	0	0	0	2039	0	0	0
Kobague	0	0	0	0	0	0	13	0	0
Say	31	419	0	0	0	189	0	473	1306
Bokki	0	0	0	0	0	1276	0	200	2847
Niamey	0	0	0	0	1956	5752	6113	4309	1493
Dokimana	0	0	0	0	0	0	0	10	1007
Dabargat	0	105	0	0	0	0	0	0	0
Roubiré	0	0	0	0	0	0	963	0	0
Tamou	0	0	0	0	0	599	0	0	21
Maganga	0	0	84	0	0	0	0	0	0
Guessego	0	0	20	0	0	0	0	0	0
D'autres marchés	64	157	255	359	50	397	135	6	37
% Niamey	0	0	0	0	82	58	57	86	22
% Même marché	90	64	41	100	18	21	0	9	43
Total	305	1436	256	818	2375	9855	9183	4992	6674

Tableau 4. Pourcentage de la quantité totale de grain acheté dans les principaux marchés du département de Niamey en fonction de la destination.

	Source de vente								
Destination	Kiki	Tienti-ergou	Tientien Foulbé	Maka-londi	Torodi	Allam-bare	Kobague	Say	Bokki
Kiki	90	0	0	0	0	0	0	0	0
Tientiergou	0	64	0	0	0	0	0	0	0
Tientien Foulbe	0	0	41	0	0	0	0	0	0
Makalondi	0	0	0	100	0	0	0	0	0
Torodi	0	0	19	0	18	0	23	0	0
Allambaré	0	0	0	0	0	21	0	0	0
Kobague	0	0	0	0	0	0	0	0	0
Say	10	29	0	0	0	2	0	9	20
Bokki	0	0	0	0	0	13	0	4	43
Niamey	0	0	0	0	82	58	67	86	22
Dokimana	0	0	0	0	0	0	0	0	15
Dabargat	0	7	0	0	0	0	0	0	0
Roubiré	0	0	0	0	0	0	10	0	0
Tamou	0	0	0	0	0	6	0	0	0
Maganga	0	0	33	0	0	0	0	0	0
Guessego	0	0	8	0	0	0	0	0	0
D'autres marchés	10	36	59	0	82	79	100	90	57
Même marché	90	64	41	100	18	21	0	9	43

types d'agents. Ainsi, chez les producteurs les ventes semblent fonction des besoins familiaux et les femmes écoulent les quantités nécessaires pour l'achat des condiments. Les grosses ventes faites par les hommes sont occasionnées par les grosses dépenses cérémoniales (baptêmes, fêtes, mariages).

Les quantités de produits traitées

Le mil est commercialisé en petites quantités même pendant la période de soudure. Les quantités traitées par détaillant et par demi-grossiste sont respectivement, en moyenne, 10 et 250 kg. En général, les

marches tertiaires sont approvisionnés par des villages situés sur un rayon de 5 à 15 km. Quant aux marchés secondaires, les apports viennent souvent d'autres marchés; seulement 30% des apports sont obtenus sur le même marché. Le marché d'Allambaré (situé à peu près 200 km de Niamey sur la frontière burkinabè) se singularise par le fait que 65% des apports viennent du Burkina Faso.

Les Tableaux 3 et 4 montrent que 75% du grain acheté dans les marchés tertiaires reste dans le même marché. Tandis que la proportion de grain restant dans les marchés secondaires est de seulement 18%, 59% étant destiné à la capitale. Ceci démontre que les marchés secondaires servent de relai entre les marchés tertiaires et le marché principal de Niamey.

Conclusion

L'étude du commerce de mil dans l'arrondissement de Say pendant la période précédant la récolte ou la période de soudure, a révélé plusieurs caractéristiques qui dépendent des conditions de l'arrondissement. Le système est composé de deux réseaux. Le premier est constitué de détaillantes ne traitant que de petites quantités; elles sont pratiquement les seuls commerçants dans les marchés tertiaires étudiés. Ces marchés tertiaires où les quantités traitées sont restreintes, ont peu de liens avec les marchés secondaires

Le deuxième réseau est constitué de marchés secondaires liés au marché principal de Niamey par les axes routiers de Torodo-Niamey et de Say-Niamey. Les détaillantes restent toujours une catégorie principale, mais il s'y trouve également des grossistes et demi-grossistes hommes. Les quantités traitées dans les marchés secondaires sont cinq fois plus élevées que celles des marchés tertiaires. Le grain commercialisé est destiné essentiellement au marché principal de Niamey.

Ces résultats s'expliquent du fait de l'éparpillement des structures de production, de la période de l'enquête et l'importance de la demande dans la capitale. L'offre étant en baisse à cette époque de l'année, les marchés tertiaires sont presque dépourvus, l'offre ne répond qu'à une demande locale limitée. Les marchés secondaires servent de point d'approvisionnement pour la capitale même pendant la période de soudure, à cause de leur proximité, d'où une économie des frais de transport. On peut supposer que les marchés secondaires et tertiaires, quoique peu intégrés pendant la période de soudure, le seront à la récolte.

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Aspects of Grain Trade in Western Niger

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Summary

In the Sahelian countries of West Africa, the largest urban markets play a major role in the organization of grain markets and in the process of price formation. The results presented here, extracted from a larger study of grain markets around Niamey, Niger, combine a historical study of grain trade in the region with an analysis of current millet marketing networks. Millet was chosen because it is the principal grain product in Niger. Niamey was chosen because it is Niger's largest market.

Until the middle of the 19th century, millet was exchanged principally via Islamic tithes paid to the political and religious aristocracy and by barter with game and gathered goods. The market channels were short, a fact explained by the absence of a reliable grain surplus and of a major demand center in the region. Colonization and the associated establishment of the capital of Niamey helped create market channels by necessitating grain traders to pay taxes and to supply the city.

Currently millet trading networks are widespread in the dry region to the southwest of Niamey, with relatively high rainfall but low population density, which exports grain to the capital. The study method consisted of visits every 2 weeks to 30 markets within 200 km of Niamey by three investigators who resided in the study zones. The investigators surveyed prices and quantities in the markets and interviewed traders. Results of the surveys are presented here only for the period March to July 1983.

Millet supply and demand have three major characteristics: (1) production is highly dispersed because of low population density; (2) there is one annual harvest in October-November; and (3) consumer demand is concentrated in Niamey. Trade is composed of three types of units. Small retailers, usually women, form about 80% of the traders and usually bring less than 10 kg of grain to market. Medium retailers are principally active during the preharvest period, and bring 200 to 300 kg to market. There are only a few large wholesalers, who bring somewhere between 500 and 1000 kg, and are active only in the largest markets.

The marketing system has two distinct levels, connected by the principal market of the capital. For every 100 kg of millet presented in the markets outside of the capital, roughly 28 kg are consumed locally and 72 kg are sent to Niamey. Prices increase from isolated primary markets to Niamey by a factor of 1 to 2 for millet, while prices increase from Niamey to rural markets for rice.

Introduction

For more than a decade, food supply has become a regular and serious problem in the poor countries; its nature and intensity, however, vary in time and space. Studies conducted on the problem in the Sahel have shown shortcomings in the production and transfer systems (Arditi 1980; CRED 1977). In the marketing sector, large-scale marketing bodies were established in the Sahelian countries with the objective of replacing the private distribution networks for staple cereals. These bodies often faced financial difficulties that prevented them from organizing an efficient supply system. Their failure to do this is partly due to the power of private trade. Analytical studies have also stressed the lack of information concerning this private sector.

This paper examines certain aspects of this problem with reference to millet production in western Niger. Although the economics of millet production is closely related to that of rice, cowpea, and livestock production, it has been selected

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since it is the major crop in terms of production and consumption.

The System of Cereal Exchange

Department of Niamey

The department[1] of Niamey is situated in western Niger near the frontiers of Mali, Burkina Faso, and Benin. The southern part has a Sudanian climate with an annual rainfall of 700 mm and the north a Sahelian climate with an annual rainfall of 300 mm. This department accounts for 7% of the total area and 23% of the total population of Niger and is made up of six arrondissements.[2] The population is concentrated in the valley of the River Niger. Unlike the other departments, Niamey is almost entirely located in the agricultural zone—97% (compared with 12% of the country's total area) is situated below the 350 mm isohyet.

Agriculture is dominated by cereal cultivation, including millet (approximately 850 000 ha) and rice (20 000 ha). Millet is grown extensively, either as a sole crop or intercropped with cowpea. Soil degeneration and the development of salaried agricultural labor are important factors in this form of agriculture. Soil degeneration is a consequence of the rapid population growth and the extensive cropping system. The use of salaried manpower results from the growth of urban-oriented agriculture carried out by officials and traders especially in the southern part of the department.

The department can be divided into three food zones. The first zone, with surplus cereal production, is made up of the Tera, Say, and Kollo arrondissements. The second, with a precarious balance of food production and consumption, includes the northern arrondissements of Tillabery, Ouallam, and Filingue. The city of Niamey and the surrounding area make up the third zone. The city, with its 300 000 inhabitants accounts for a permanent food deficit, which has led to the establishment of the commercial network over the past few decades.

1 Department. The largest administrative subdivision in France, and in some of the former French colonies, presided over by a prefect.

2 Arrondissement. The largest administrative subdivision of a department.

Exchange Networks for Cereals in the Department of Niamey

The commercial network came into being to balance food deficits with surplus production. It has been modified according to the socioeconomic context and a study of its history will enable a better understanding of present trends.

During the precolonial period, the domestic economy was dominated by agricultural activity carried out within the limited institutional structure of the family, village, and community. The main objective of the farming group was food self-sufficiency; there was little marketable surplus and little or no commercial exchange outside the group. Thus millet like other food products is mostly consumed on-farm by the group (family or village). Environmental conditions—such as low and variable rainfall, high transport costs, and low population density—are the main reasons for this subsistence economy.

These conditions determine the farming systems. With division of labor within the group, exchanges required to fulfil religious and social obligations are increased, thus modifying the nature of these exchanges. Apart from its consumption value, millet now acquires a commercial value and enters marketing channels of varying size.

During the precolonial period, two large commercial exchange channels were established in Niger. One linked the Sonrai Empire to the Hausa States and northern Africa by the valley of the River Niger and the Tombouctou-Agadez axis, respectively. The other linked the Hausa States to northern Africa. The valley of the River Niger served as an artery for salt, soda,[3] and slave and cattle trade. Important markets (Sansanne Hausa, Say Boumba) arose along these circuits. Interregional trade was carried out on a complementary basis. With the fall of the Sonrai Empire in the 16th century, these large networks were dislocated. Until the 19th century the region was under a war economy marked by an increase in slave trade.

At this time the millet economy was apparently characterized by on-farm consumption and short-distance exchanges. Grain was circulated within the group by way of dues, and taxes paid to the political and religious aristocracy. Millet was also

3 Soda or "native soda" is a form of sodium carbonate given to animals. It is known as natron in French.

bartered for what the hunters and gatherers brought in or for booty (slaves, cattle). The wars between groups disrupted crop production and promoted grain circulation between members of groups and communities. Although these exchanges were a common practice in the region, the channels were short, linking only the producer and user.

This absence of interregional trade of millet during the precolonial era is due to the low surplus, the predominance of the barter system, and, above all, the absence of an important cereal market in western Niger. In contrast, the remarkable development of the millet trade in the 17th century in Damagaram (east Niger) was partly due to the existence of two large cereal markets in the Air (north) and the precolonial Hausa cities of Kano and Katsina in the south. Millet was bartered for salt and native soda, leading to other transactions along the trade channels.

Colonization disrupted this system, which gave way to a trade economy that covered cash crops as well as cereals, and was intermediary between the subsistence system and a trade economy. This led to a monetarization of exchanges of subsistence products, including millet. Moreover, the colonial conquest of western Niger disrupted agricultural activities. Rural depopulation and forced recruitment diminished available manpower and requisitioning of food supplies (cereals and cattle) drained family stocks. The famines of 1901 and 1931 are a consequence of this food imbalance.

It is in this context that commercial exchange of millet has developed, owing to an increased and concentrated demand from the urban centers and requisitioning of food supplies and taxes. The urbanization process, initiated by the establishment of administrative posts, increased the demand for cereals, causing a food supply problem. This demand was satisfied by a repressive circuit that obtained supplies through requisitions and by a private circuit that benefited from the colonial system, siphoning off part of the requisitioned cereals. Moreover, heavy taxes obliged the farmer to sell his produce at a low price at harvest, only to buy it back later, at a higher price.

The size of its market made Niamey an important center of the private network. In 1905, the city had a population of only 1800, by 1945 this had risen to 7000. The produce was concentrated in the hands of a few private traders; for example, during the famine of 1931, the 350-tonne commercial stock was held by one of the biggest traders in the colony (Derriennic 1977).

The first exports started in the mid-colonial era. About 45000 tonnes of millet were exported to Nigeria between 1928 and 1930. Millet, until then a subsistence and bartered product, had now become a major item in regional and interregional speculative trade. The short channels that supplied the original groups were supplemented by long channels. The present dynamism of these private networks is a proof of their ability to adapt to changing socioeconomic conditions.

Networks Today

Economic activity today in the Niamey department is concentrated around the capital city with markets dispersed over the region but the pattern of these trade channels varies from one area to another. Three such subregions can be distinguished: the northern arrondissements, the river valley, and the southern arrondissements. There are a few markets in the first subregion for local supplies. A survey made between July 1978 and June 1979 (Godfrey 1979), shows a large volume of sales (6.3 t/month per market) but with little movement of cereals between arrondissements and urban Niamey. The product mainly exchanged between these arrondissements and Niamey is cowpea. The two large cattle markets of Mangaize and Abala are located in this subregion, and are visited by merchants from the Ivory Coast, Nigeria, Mali, and Niamey.

The river valley remains an important commercial artery. In this subregion cereal and cattle trade are interrelated. About 20 large markets are located in this region, including that of Ayorou, which is the third largest international cattle market of the department. A large network links this market to the coastal markets of Nigeria, Liberia, Benin, and the Ivory Coast. It can be considered as the second regional exchange center after Niamey. The Ayorou market is also an important millet supply center for nomads from Mali, Niger, and Burkina Faso. Millet mainly comes from Niamey.

Apart from a large cattle market, the last subregion in the south has the largest number of markets along the frontier. This zone mainly supplies cereals, such as sorghum and millet, to the capital, and receives consumer goods and rice in return.

This overview of cereal exchanges within the department highlights the importance of Niamey as a key center for collection and distribution. A study of these exchanges would enable a better under-

standing of the exchange mechanisms for millet. Such a study is underway and preliminary results on the Say zone are available for discussion.

Methodology of Field Surveys

The objective of the study is to describe the privat marketing network for millet around the capital of Niamey. In this study, 30 markets located within a radius of 10 to 200 km around Niamey,were investigated every 2 weeks. After a census of sellers of millet and other crops such as rice, wheat, and cowpea, 15 sellers and 15 purchasers were selected to obtain information on their purchases and sales. Prices of millet and of other products that influence millet exchange were surveyed, including cattle, straw mats, native soda, and rice. Retail prices of staple cereals (millet, rice), cowpea, and cattle were recorded each month in the urban and rural markets.

The efficiency of the private network can be evaluated from a description of the channels and price records. This paper deals only with partial results of the study on 9 of the 12 markets in the Say arrondissement for the hungry season (March-July of 1983), the critical time of the agricultural year for consumers when prices are highest and grain reserves at their lowest. The high agricultural potential of this region and its relatively low population make it a particularly important region in Niger.

Main Results of the Say Market Survey

Millet Supply and Demand

The Say arrondissement is a region where long-duration millet varieties (known as *maiwa* in Hausa and *haini somno* in Djerma) are grown. These varieties are apparently preferred by consumers to short-duration varieties grown farther north.

In the Say arrondissement, millet supply and demand are influenced by several factors:

- a variable on-farm consumption rate according to season;
- the seasonal nature of production;
- dispersal of production structures over an area with a relatively low population density (5 inhabitants/km²);
- the isolation of the Say arrondissement, which is separated from the rest of the country by the River Niger;
- an increased demand due to the proximity of the capital (300000 inhabitants).

Type of Markets

Markets were classified according to certain characteristics of the marketing agents and the volume of supply (Tables 1-4). Three categories can be distinguished:

1. The tertiary markets (Kiki, Tientiergou, Tientien Foulbe, Makalondi) with a majority of retailers (90-100%), often isolated and handling only small quantities (0.3-3.0 tonnes for the 5-month period).
2. Secondary markets, with a high percentage (one-third) of male semi-wholesalers among the sellers. These markets (all others in total) are distributed along the two main roads of the arrondissement. Marketed quantities vary from 6 to 27 tonnes for the survey period.
3. The main market of Niamey.

The secondary markets are interlinked and also relay goods and produce to the tertiary and main markets, thus forming two distinct networks connecting the capital.

Marketing Agents

Table 1 presents a summary of the essential characteristics of millet vendors in the study:

1. There are definite ethnic predominances in trade by subzone—the Gourmas in the south (markets of Allambaré, Kiki, and Makalondi), the Peulh in the north central zone (markets of Torodi, Kobague, and Tientiergou), and the Djermas in the east (markets of Say and Bokki).
2. Millet is sold by women: 62 to 96% of the vendors are women, depending on the market. However, there are also male vendors in the large rural and urban markets, especially at Bokki and Torodi.
3. Most of the vendors are retailers (79-100% depending on the market) but some are also wholesalers. The retailers are women, who produce or resell the crop, whereas the semi-

Table 1. Number of vendors in the main markets of the department of Niamey, March-July 1983.

Market	Ethnic group					Sex		Category		
	Gourmantche	Peulh	Djerma	Hausa	Bella	Male	Female	Wholesaler	Semiwholesaler	Retailor
Tientien Foulbé	13	49	2	-	-	7	57	-	1	63
Allambaré	80	10	-	-	-	3	87	-	1	89
Kiki	59	17	1	-	-	13	64	-	-	67
Makalondi	58	9	-	-	-	4	63	-	-	67
Torodi	2	57	26	3	-	33	55	3	15	70
Kobague	-	74	2	-	-	36	50	-	43	63
Bokki	-	98	58	-	12	37	61	2	19	77
Say	-	31	58	2	4	4	91	-	1	94
Tientergou	-	46	3	-	-	2	47	-	-	45

wholesale and wholesale traders are men. Generally, wholesale trade is not very common in the study area.

A grouping of vendors according to the volume of their stocks does not give an entirely realistic idea of ownership of the goods, as resellers may be actual traders or just intermediaries. Trading patterns also vary with the type of primary marketing agent. For producers, sales depend on family requirements and women sell the quantities required to buy condiments. Large sales by men are required to pay for ceremonial expenses (baptisms, feasts, marriages).

Among resellers, those vendors having some capital and storage facilities start collecting at harvest (Sept-Oct; in this case, just after the present survey period). Generally, the grain is collected from villages or from secondary markets. When the grain is collected through wholesale purchase, it is sold either wholesale or retail.

The small retailers rarely keep stocks, often buying and reselling in the same market and on the same day. Out of all the quantities recorded, 2.5 tonnes were held by 45 resellers.

Marketed Quantities

Millet is traded in small quantities even during the hungry season. Average quantities traded per retailer and semi-wholesaler were 10 kg and 250 kg respectively. Supplies in tertiary markets were generally obtained within a radius of 5 to 15 km. Supplies in secondary markets were more often obtained from other markets; only 30% of secondary market supplies were obtained in the same markets. A particular characteristic of Allambaré market (located nearly 200 km from Niamey on the Burkinabè border) is the high incidence (65%) of supplies coming from Burkina Faso.

Tables 3 and 4 show that 75% of grain purchased in the tertiary markets remains in those markets. Only 18% of grain purchased in the secondary markets remains there, with 59% going to Niamey, which shows clearly the intermediate role of the secondary markets between the tertiary markets and Niamey.

Conclusion

A study of millet trade in the Say arrondissement in the preharvest period (hungry season) showed several characteristics of trade that depend on the characteristics of the arrondissement. The system

Table 2. Ranking of markets in Niger, according to the quantity of grain supplied (March-July 1983).

Order	Market	Distance from Niamey (km)	Grain supply (kg)
1	Bokki	67	27 293
2	Say	60	22 837
3	Kobague	52	12 689
4	Allambaré	197	7 806
5	Torodi	62	6 980
6	Makalondi	97	3 287
7	Tientien Foulbé	121	3 170
8	Tientiergou	82	1 063
9	Kiki	120	344

Table 3. Grain purchased (kg) in the main markets of the department of Niamey, and distributed by destination.

	Market where purchased								
Destination	Kiki	Tientiergou	Tientien Foulbé	Makalondi	Torodi	Allambaré	Kobague	Say	Bokki
Kiki	275	0	0	0	0	0	0	0	0
Tientiergou	0	913	0	0	0	0	0	0	0
Tientien Foulbé	0	0	104	0	0	0	0	0	0
Makalondi	0	0	0	818	0	0	0	0	0
Torodi	0	0	48	0	419	0	2095	0	0
Allambaré	0	0	0	0	0	2039	0	0	0
Kobague	0	0	0	0	0	0	13	0	0
Say	31	419	0	0	0	189	0	473	1306
Bokki	0	0	0	0	0	1276	0	200	2847
Niamey	0	0	0	0	1956	5752	6113	4309	1493
Dokimana	0	0	0	0	0	0	0	10	1007
Dabargat	0	105	0	0	0	0	0	0	0
Roubire	0	0	0	0	0	0	963	0	0
Tamou	0	0	0	0	0	599	0	0	21
Maganga	0	0	84	0	0	0	0	0	0
Guessego	0	0	20	0	0	0	0	0	0
Other markets	64	157	255	359	50	397	135	6	37
% Niamey	0	0	0	0	82	58	67	86	22
% Same market	90	64	41	100	18	21	0	9	43
Total	305	1436	256	818	2375	9855	9183	4992	6674

Table 4. Percentage of total grain purchased in the main markets of Niamey department, according to its destination.

	Market where purchased								
Destination	Kiki	Tientiergou	Tientien Foulbé	Makalondi	Torodi	Allambaré	Kobague	Say	Bokki
Kiki	90	0	0	0	0	0	0	0	0
Tientiergou	0	64	0	0	0	0	0	0	0
Tientien Foulbé	0	0	41	0	0	0	0	0	0
Makalondi	0	0	0	100	0	0	0	0	0
Torodi	0	0	19	0	18	0	23	0	0
Allambaré	0	0	0	[illegible]	0	21	0	0	0
Kobague	0	0	0	0	0	0	0	0	0
Say	10	29	0	0	0	2	0	9	20
Bokki	0	0	0	0	0	13	0	4	43
Niamey	0	0	0	0	82	58	67	86	22
Dokimana	0	0	0	0	0	0	0	0	15
Dabargat	0	7	0	0	0	0	0	0	0
Roubire	0	0	0	0	0	0	10	0	0
Tamou	0	0	0	0	0	6	0	0	0
Maganga	0	0	33	0	0	0	0	0	0
Guessego	0	0	8	0	0	0	0	0	0
Other markets	10	36	59	0	92	79	100	0	57
Same market	90	64	41	100	18	21	0	9	43

is composed of two district networks. The first consists of women retailers, dealing in small quantities, who are practically the only traders in the tertiary markets surveyed. These tertiary markets deal in small quantities and have apparently little link to secondary markets.

The second network consists of secondary markets linked to the primary markets in Niamey by the Torodi-Niamey roads and the Say-Niamey roads. Women retailers, while the most numerous category of traders in these markets, are complemented by male wholesalers and semi-wholesalers. The quantities traded in the secondary markets are nearly five times as great as those in the tertiary markets. The principal destination of grain purchased in secondary markets is the primary market at Niamey.

The geographic dispersion of the area, the period during which the survey was conducted, and the demand provided by the capital of Niamey explain much of these results. Supplies being relatively short in this period, the tertiary markets tended to "dry up" and to supply only very limited local demand. The secondary markets, because of their proximity to Niamey and hence their transport cost advantage, continue to serve as collection points, even during the hungry season. One can hypothesize therefore, that the lack of integration observed between the tertiary and secondary markets in the hungry season, will ease in the harvest season and the markets will become more integrated.

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Commercialisation des céréales et des animaux d'élevage au niveau des unités de production agricole dans la zone de Cinzana au Mali

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Résumé

L'étude porte sur le mode de commercialisation pratiquée par 80 unités de production agricole (UPA) près de Cinzana dans le centre du Mali. Certains paramètres ont été étudiés en détail, à savoir, le nombre, l'époque, les raisons et les partenaires de ces échanges.

L'aire d'étude est la zone de la station de recherche agronomique de Cinzana où la pluviométrie annuelle est de 700-800 mm. A peu près 80% des 80 UPA pratiquent la culture attelée. Les céréales comptent pour 90% de l'assolement. L'utilisation des engrais chimiques ainsi que les cultures de rente telles que le coton et l'arachide sont rares.

Les 80 unités de l'échantillon ont été choisies au hasard de quatre villages. Les interviews hebdomadaires concernant la production agricole et la commercialisation ont été entreprises de mai 1982 à juin 1983 auprès des personnes actives des UPA.

La plupart (80%) des ventes sont réalisées dans les marchés hebdomadaires en quantités allant de 30 à 200 kg. Les ventes pendant la période suivant immédiatement la récolte comptent pour 35% de la quantité et 30% de la valeur totales; celles entre février et avril comptent pour 49% puisque les prix sont 20% plus élevés qu'après la récolte. Seulement 25% de toutes les ventes ont lieu de mai à octobre. Le mil qui compte pour 79% des ventes est la plus importante céréale échangée.

Dans 75% des cas la raison avancée pour les ventes est l'achat des produits de consommation. Les impôts et les dépenses pour cérémonies comptent pour 18% et l'achat de matériel agricole pour 3% des ventes. La plupart des ventes sont effectuées dans les marchés proprement dits où les partenaires dans 67% des cas sont les commerçants. Presque tous les achats sont faits en période de soudure entre août et octobre. La quantité totale achetée dans l'échantillon est de 10,3 tonnes par rapport à 13,2 tonnes de céréales vendues. Le mil constitue un peu plus de 70% des céréales vendues. Les céréales achetées sont destinées à la consommation quotidienne plutôt qu'à la consommation aux cérémonies ou la revente.

Les quantités troquées sont faibles, les 19 échanges en troc enregistrés dans l'échantillon n'impliquent que 1,96 tonnes dont les rémunérations en nature aux membres de l'échantillon constituent 66%.

Les principales conclusions sont : (1) la part des céréales échangées dans la production totale n'est pas très importante; (2) la plupart des échanges sont effectués dans les marchés hebdomadaires organisés; (3) la plupart des échanges sont effectués avec des commerçants et non directement entre producteurs et consommateurs; (4) le troc non monétarisé compte pour moins de 5% des quantités échangées; (5) la plupart des ventes sont réalisées dans les six mois qui suivent la récolte; (6) presque tous les achats sont effectués dans les trois mois précédant la récolte; (7) la vente annuelle des céréales dépasse l'achat de 28% en quantité et de 12% en valeur.

Introduction

La commercialisation des céréales, bien qu'un paramètre très important des systèmes de production agricole au Mali, souffre d'un manque d'information. Nous tenterons d'aborder ce sujet à travers les résultats d'une enquête menée pendant la campagne agricole de 1982-83 par une équipe de l'Institut

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d'Economie rurale (IER) dans la zone de Cinzana au centre du Mali. Ce rapport commence par une présentation de la zone et son agriculture ainsi que la méthodologie de l'enquête. Suit une analyse des échanges de céréales et des animaux d'élevage dans l'échantillon. L'étude se termine par une synthèse aboutissant à la conclusion.

Présentation de la zone

La zone de Cinzana est située à 40 km est de Ségou dans une zone semi-aride où la pluviométrie annuelle varie de 700 à 800 mm. L'agriculture y est concentrée sur la culture pluviale des céréales sans aménagements hydrauliques. Les cultures principales sont : petit mil, sorgho, maïs, fonio, arachide et niébé. La densité démographique est de 20 à 40 habitants/km². La culture attelée est un élement important des techniques agricoles. Le seul amendement au sol est la fumure, les engrais chimiques ne sont pratiquement pas utilisés.

L'échantillon comporte 80 unités de production agricole (UPA) pris au hasard dans quatre villages. La plupart des UPA, dont la taille moyenne est de 15 personnes, appartiennent à l'ethnie bambara. La superficie cultivée moyenne est de 9,2 ha dont environ 90% est semée en mil, sorgho et arachides. Le rendement moyen du mil et du sorgho dans les quatre villages est de 600-700 kg/ha. La production en grain par personne est de 384 kg.

Méthodologie de l'enquête

Les 80 UPA de l'échantillon ont été suivies de mai 1982 à juin 1983 par des interviews hebdomadaires effectuées auprès des chefs des UPA et d'autres paysans par des enquêteurs résidant dans les villages. Les informations recherchées portent sur les échanges de céréales, d'animaux d'élevage et d'intrants agricoles afin d'en décrire les caractéristiques telles que la quantité, la valeur, l'époque, les prix, l'emplacement et les partenaires. Les enquêteurs ont également interrogé les agents commerciaux tels que les commerçants et les intermédiaires. Les questionnaires utilisés sont ceux élaborés par l'ICRISAT pour les études au Niger et au Burkina Faso.

Echanges de céréales

L'objectif de cette étude des échanges de céréales est de déterminer leur fréquence, leur volume ainsi que leur valeur. L'étude pose les questions concernant : (1) les quantités échangées, (2) la fréquence et l'époque des échanges, (3) le lieu d'échange, (4) les partenaires des échanges.

La vente

Les produits sont vendus essentiellement aux marchés hebdomadaires où se réunissent les habitants des différents villages. D'après le Tableau 1, 84% de la quantité vendue des céréales principales (mil, sorgho et fonio) et 73% du nombre d'échanges sont réalisés en période post récolte allant de novembre à avril. En termes quantitatifs, seulement 10% des ventes ont lieu entre mai et juillet et 6% d'août à octobre. Cette tendance s'explique par le caractère saisonnier de la production; les céréales étant abondantes après la récolte et en baisse par la suite.

Parmi les céréales faisant l'objet des ventes, le mil occupe une place de choix (68%), suivi du sorgho (30%) et du fonio (2%). La valeur des ventes d'arachide et de niébé ne représente que 27% de celle des céréales. L'arachide a perdu sa place privilégiée de culture de rente dans la zone à cause des mauvaises conditions pluviométriques pendant ces dernières années et du retrait du service d'encadrement qui a interrompu l'approvisionnement en intrants.

Les prix de vente

Les prix suivent une tendance saisonnière et augmentent à partir d'un point bas pendant la récolte en octobre-novembre, vers un point haut avant la récolte en août prochain. Par exemple, les prix de mil et de sorgho à Samine (le plus grand village de l'échantillon) et à Cinzana (marché important) passent de 50 et 100 francs Maliens (FM) à 150 FM (Tab. 2). On peut constater la même tendance pour le fonio.

Raisons courantes pour les ventes et les partenaires d'échange

Le Tableau 3 présente quelques caractéristiques des ventes des produits principaux. Les ventes sont réalisées pour la plupart (67%) aux marchés hebdomadaires à Cinzana et à Samine avec des commerçants, 11% dans d'autres marchés et 10% dans le même village. Les échanges avec une agence publique sont limitées à un seul village qui dispose d'une coopérative.

Les raisons avancées par les paysans pour les ventes concernent essentiellement les besoins directs de consommation (75%). A ceux-ci s'ajoutent les nécessités monétaires (18%), en particulier les impôts et les cérémonies. L'investissement en matériel agricole ne représente que 3% et l'achat

Tableau 1. Ventes d'animaux et de céréales selon les périodes ainsi que le nombre (N), la quantité (Q) et le prix des ventes (P) à Cinzana au Mali.[1]

	Août à oct			Nov à janv			Fev à avril			Mai à juil			Annuel Total		Annuel Moyenne
	N	Q	P	N	Q	P	N	Q	P	N	Q	P	N	Q	P
Mil	7	375	125	51	1604	100	99	5635	120	51	1315	130	208	8929	118.1
Sorgho	3	282	120	32	2898	100	8	764	120	1	25	125	44	3969	105.4
Fonio	9	126	80	5	131	50							14	257	64.7
Arachide	3	75	90	12	759	105	10	3329	90				25	4163	92.7
Niebe	3	65	190	1	25	150							4	90	178.9
Betail	5	6	45 420	12	12	69 750	6	6	63 375	4	4	98 750	27	28	67 313
Ovins	43	45	7 290	5	6	12 180	9	8	15000	3	3	17 500	60	62	9264
Caprins	14	15	5 520	2	2	5 750	6	6	12 560	2	2	8 750	24	25	7486

1 Les quantités de céréales, arachide et niebe sont en kilogrammes et les prix en Francs maliens/kg; les quantités pour les animaux sont en têtes d'animaux et les prix en Francs maliens/tête. Il s'agit de prix de vente demandés par les paysans.

Tableau 2. Cours mensuels (FM/kg)[1] aux marchés de Cinzana et de Samine au Mali en 1982/83.

	Cinzana					Samine				
	Mil	Sorgho	Arachide	Fonio	Voandzou	Mil	Sorgho	Arachide	Fonio	Voandzou
1982										
Juil.	150	150	450	165		90	90	400	200	
Août.	150	150	480	150		80	90	300	100	
Sept.	125	125	500	200		80	80	500	200	
Oct.	100	400		150		75	80	540	200	235
Nov.	100	100	465	200	200	70	75	500	125	200
Dec.	90	90	480	200	200	75	75		150	250
1983										
Janv.	100	100	465	250		80	75		200	250
Fev.	100	100	480	200		80	75		225	235
Mars	125	125	480	200	200	80	80	450		235
Avril	130	130	480	250		80	80	0		
Mai	150	150	550	250	300	90	90	540		
Juin	125	125	500	300	300	80	80	540		
Maximum	150	400	550	300	300	90	90	540	225	250
Minimum	90	90	450	150	200	70	75	300	100	235
Etendue	60	310	100	150	100	20	15	240	125	15

1 Les cours sont les moyennes mensuelles. Les blancs indiquent que la culture n'est pas vendue pendant cette période. Le mil et le sorgho sont battus, les arachides ne sont pas décortiquées et le fonio n'est pas pilé.

Tableau 3. Nombre de ventes enregistrées entre un membre d'UPA et son partenaire.

Article vendu	Membre vendeur							Partenaire					
											Connaissance		
	Chef d'UPA	1ere femme	Enfant 1ere femme	2eme femme	Enfant 2eme femme	Père du chef	Autre	Commerçant	Coopérative	Parent	Même village	Autre village	Autre
Mil	88	84	11	5	6	0	14	194	1	0	2	9	2
Sorgho	41	5	0	1	6	0	8	17	1	0	24	10	4
Arachide	16	1	2	0	2	0	5	17	0	0	6	5	0
Fonio	2	8	0	0	2	0	3	11	0	0	2	2	0
Betail	20	0	0	0	0	0	4	10	0	2	2	10	0
Ovins	44	4	8	3	1	0	1	15	1	0	4	41	3
Caprins	18	1	0	2	1	0	4	18	0	0	2	0	2

d'animaux (à revendre ou à augmenter le cheptel) seulement 2% des ventes

L'achat

Le Tableau 4 résume certaines données des achats des principaux produits agricoles. Les achats, tout comme les ventes, sont parcellaires.

Répartitions des achats selon les périodes de l'année

La plupart des achats ont lieu pendant la période de soudure entre mai et octobre, lorsque les stocks de la récolte précédente diminuent et on attend la prochaine récolte. Le mil fait l'objet de 81% des achats et le sorgho 19%. Les achats des autres produits sont rares et sont limités à ceux des semences, surtout pour le niébé, avant le semis.

Raisons courantes des achats

Le Tableau 5 présente certaines caractéristiques des achats dans l'échantillon. Les achats de céréales pour la consommation courante sont d'une grande importance suivis des achats pour les cérémonies. Dans 38% des échanges le partenaire, c'est-à-dire le vendeur, est le commerçant au marché hebdomadaire; d'autres partenaires sont les personnes non parentées du même village (26%) et des parents (26%). Il y a peu d'échanges à l'intérieur de l'UPA (7% du total). D'après le Tableau 5, le chef de l'UPA effectue la quasi-totalité des achats (64%) suivi de sa première femme (16%).

Le troc et les échanges en nature

Le troc tend à disparaître à Cinzana, mais se pratique parfois. On n'a constaté que six échanges de ce genre, du grain contre le grain; ils étaient effectués tous avant la récolte. La quantité échangée, soit 296 kg, représente moins de 1,5% de la quantité totale vendue et achetée dans l'échantillon.

Le mil est souvent donné pour rémunérer le travail en nature. La quantité totale ainsi reçue est de 698 kg dont 18% entre août et octobre et 77% entre novembre et janvier. Le paiement représente la rémunération pour le sarclage pendant la première période et pour le battage pendant la deuxième période. Les données sur la rémunération en nature sont prélevées des questionnaires sur les échanges et non pas sur les parcelles; elles pourraient donc être une sous-estimation de la quantité totale de ces paiements en particulier pour le battage.

Tableau 4. Achats de céréales et d'animaux selon les périodes ainsi que le nombre (N), la qualité (Q) et le prix (P) des achats, a Cinzana au Mali.[1]

	Août a oct.			Nov a janv			Fev a avril			Mai à juil.			Annuel Total		Annuel Moyenne
	N	Q	P	N	Q	P	N	Q	P	N	Q	P	N	Q	P
Mil	145	7211	135	4	610	100	3	260	110	2	300	150	154	8381	132.2
Sorgho	35	1727	135							2	156	145	37	1883	135.8
Niébé										2	2	300	5	2	300
Betail	2	2	55625	3	3	64000	9	9	60945	3	3	46835	17	17	53368
Ovins	8	8	9970	6	6	10410	4	6	12890				18	20	10978
Caprins	5	7	4785				1	1	7000	4	9	7610	10	17	6411
Asinins				1	1	15000							1	1	15000

1. Les quantites de cereales et de niebe sont en kilogrammes et les prix en Francs maliens/kg; les quantites pour les animaux sont en têtes d'animaux et les prix en Francs maliens/tête. Il s'agit de prix d'achat payés par les paysans.

Tableau 5. Nombre d'achats enregistrés entre un membre d'UPA et son partenaire.

	Membre d'UPA						Partenaire						
											Connaissance		
	Chef d'UPA	1ère femme	Enfant, 1ère femme	2ème femme	Enfant, 2ème femme	Père du chef	Autre	Commer-cant	Coope-rative	Parent	Même vil-lage	Autre vil-lage	Autre
Mil	90	31	18	4	1	6	4	75	4	0	22	52	1
Sorgho	32	6	0	0	0	3	3	6	0	0	31	4	3
Riz	16	0	0	0	0	1	n.d.[1]	0	0	15	2	0	n.d.[1]
Bétail	10	3	1	0	0	2	1	12	0	1	4	0	0
Ovins	9	2	0	2	0	5	0	8	1	6	3	0	0
Caprins	2	0	5	1	0	2	0	6	0	2	1	0	1

1. n.d. = donnée non disponible

Dons

Le *djaka*, obligation religieuse musulmane, est le principal don fait par les UPA de l'échantillon. Il constitue 62% du nombre et 63% de la quantité des dons effectués. Les produits donnés en djaka par la plupart des UPA (68%) sont le mil, le maïs ou le sorgho. La quantité donnée de 13,01 tonnes est donc presque égale à la quantité vendue. Le djaka est normalement donné (85%) après la récolte.

Les destinataires du djaka sont les *marabouts*, prêtres musulmans, et les personnes nécessiteuses. Cependant, la quantité reçue déclarée est inférieure à la quantité donnée. Cette divergence s'expliquerait par une erreur d'évaluation (certains destinataires sont embarrassés de révéler leur pauvreté) ou bien une erreur d'échantillonnage. La dernière se produit lorsque la plupart des dons sont offerts à quelques individus non compris dans l'échantillon.

Echanges d'animaux d'élevage

La vente

Les ventes d'animaux, bien que peu fréquentes, représentent une grande valeur. Le Tableau 1 démontre qu'on n'a enregistré que 115 ventes d'animaux dans l'échantillon. Pourtant la vente des principaux animaux (bétail, ovins, caprins) représente une valeur de 2,645 millions de FM, ce qui correspond à peu près à la valeur totale des ventes et des achats des céréales (respectivement 1,489 et 1,364 millions de FM).

La valeur des ventes d'animaux avant la récolte (août-octobre) est de 0,683 millions de FM, soit 26% des ventes annuelles de la valeur des achats des grains durant la même période. Environ 35% des ventes d'animaux ont lieu entre novembre et janvier et 22% de février à avril.

Dans 71% des cas, les animaux sont vendus par les chefs d'UPA. Les partenaires de ces échanges sont normalement des commerçants, en particulier pour la vente des caprins qui approvisionnent un important marché pour la consommation directe. Souvent les partenaires dans les ventes de bétail et, en particulier, d'ovins, sont des connaissances habitant le même village ou les villages avoisinants qui achètent plutôt pour la consommation que la revente.

L'achat

L'achat des principaux animaux est inférieur à la vente en ce qui concerne le nombre, la quantité et la valeur. La valeur des achats de bétail, de caprins et d'ovins représente 50% de celle des ventes. Seulement 17% des achats ont lieu entre août et octobre, période de pointe pour la vente des animaux et l'achat des céréales. Environ 20% des achats sont effectués de novembre à janvier après la récolte, et 48% de février à avril. Il y a une différence entre la distribution saisonnière des achats et des ventes selon le type des animaux.

Conclusion

Les échanges de céréales et d'animaux suivent une nette tendance saisonnière. Ceci est évidemment lié au fait qu'il n'y a qu'une seule récolte en octobre-novembre; qu'il faut s'approvisionner durant toute l'année; et que l'état sanitaire et la valeur des animaux varient selon les saisons. Les UPA ayant un surplus de production ont vendu leurs céréales sans nécessité de recourir aux rachats. Les autres ayant une production insuffisante ont vendu leurs animaux afin de financer l'achat des céréales.

On peut distinguer trois classes d'UPA en fonction du type d'échange des céréales : exportateurs (vendeurs), importateurs (acheteurs) et ceux n'entrant pas dans le commerce des céréales. En général, ces derniers n'achètent ni ne vendent des céréales. Nous nous proposons en vue d'approfondir l'analyse, de définir la production de ces différents groupes dans l'échantillon et d'étudier les éléments qui déterminent les stratégies de commercialisation de chaque groupe.

La valeur des ventes de céréales est approximativement égale à celle des achats. Cependant, la quantité vendue est 28% supérieure à la quantité achetée; 72% de ce surplus provient des ventes de sorgho surtout dans le village de Samine. Il n'y a donc pas d'indication précise d'un bilan positif du revenu provenant des ventes de céréales. Dans l'ensemble, la région semble être un exportateur de céréales à petite échelle. La valeur des ventes d'animaux dépasse la valeur totale des ventes et des achats de céréales; il en suit que, dans l'échantillon, les ventes d'animaux financent la majorité des investissements et des achats des produits importés.

La plupart des échanges de marchandises ont lieu dans les marchés hebdomadaires. Le plus grand marché, celui de Cinzana, est situé sur la principale route nationale (pavée) dans le centre du Mali, avec accès à toutes les régions productrices des principaux produits et aux marchandises venant d'ailleurs. Les membres de l'échantillon y ont donc un accès plus facile à l'information. Le fait qu'ils préfèrent effectuer les échanges au marché plutôt que dans les villages ou même entre UPA, indique que le marché permet un meilleur accès par rapport aux autres formes d'échange. Cependant, il reste à savoir si ces marchés ne sont que relativement efficaces.

Household Grain and Livestock Transactions Near Cinzana in Central Mali

Ousmane Coulibaly*

Summary

The general problem addressed in this study is the primary marketing behavior of 80 farm households near Cinzana in Central Mali. In particular, several individual problems were addressed: the numbers of transactions, the periods of transactions, the reasons for these transactions, and the partners in these transactions.

The study zone is the area of Cinzana research station in Central Mali, where annual rainfall is 700 to 800 mm. About 80% of the 80 sample households use animal traction. Cereals constitute 90% of the cropping pattern. Chemical fertilizers are rarely used, and cash crops (such as cotton and groundnuts) are rare.

The sample consisted of 80 households chosen randomly in four villages. Weekly interviews with economically active members of the households were carried out from May 1982 to June 1983 on crop production and marketing.

Most sales (80%) took place in weekly markets in quantities ranging from 30 to 200 kg; 35% of the quantity and 30% of the value of all sales was in the immediate postharvest period and 49% between February and April, when prices were roughly 20% higher than at harvest time. Only 25% of all sales took place between May and October. Millet (79% of all sales) was the most important grain traded.

In 75% of cases, the declared reason for the sale was to provide for consumption goods. Taxes and ceremonial expenses accounted for 18%, and investment on agricultural equipment accounted for 3%. Most sales took place in formal markets, and traders were the declared partner in 67% of all sales. Nearly all purchases took place in the hungry season between August and October. The total quantity purchased in the sample was 10.3 tonnes, compared with 13.2 tonnes sold. Slightly more than 70% of grain sold was millet. The principal reason cited for grain purchases was daily consumption, not ceremonial consumption or resale.

Bartered quantities were very small. Only 19 barters, involving 1.06 tonnes, were recorded, of which 66% were labor payments in kind given to sample members.

Principal conclusions are: (1) the share of traded grain is small in total production; (2) most trades take place in organized weekly marketplaces; (3) most trades take place with traders, not directly between producers and consumers; (4) nonmonetized barters are less than 5% of traded quantities; (5) most sales take place in the 6 months after harvest; (6) virtually all purchases take place in the 3 months before harvest; and (7) annual grain sold exceeded that purchased by 28% in quantity and by 12% in value.

Introduction

Although grain marketing is an important aspect of Malian agricultural systems, there is little information about it. This paper treats the subject using results of surveys done by a group from the Institut d'Economie Rurale (IER) in the area of Cinzana, in central Mali, in the 1982-83 cropping season. The study first presents a description of the zone and its agriculture, followed by a description of the survey methods. The third section is an analysis of grain and livestock transactions in the sample. The fourth and final section is a summary and conclusion.

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ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 1985. Agricultural markets in the semi-arid tropics. Proceedings of the International Workshop, 24-28 October 1983, ICRISAT Center, India. Patancheru, A.P.502324, India: ICRISAT.

The Survey Zone

The Cinzana zone is 40 km east of the city of Ségou in a semi-arid zone of 700 to 800 mm annual rainfall. The zone is one of rainfed cereals and has no irrigation works. Its principal crops are pearl millet, sorghum, maize, fonio (*Digitaria exilis*), groundnut, and cowpea. Population density is 20 to 40 persons/km^2. The main agricultural techniques involve animal traction. The use of chemical fertilizers is virtually nil, and animal manures are the principal soil enrichment.

The majority of the 80 agricultural production units (APU) in the random sample drawn from 4 villages were of the Bambara ethnic group. The average APU size was 15 persons. The average cultivated area was 9.2 ha, of which roughly 90% was in millet, sorghum, and groundnut. Crop yields for millet and sorghum were 600 to 700 kg/ha on average across the four villages. Mean grain production per person was 384 kg.

Survey Methods

The transactions survey followed 80 sample APU from May 1982 to June 1983. Weekly interviews were conducted with heads of APU and with other economically active members by investigators resident in the villages. Data were collected on exchanges of grain, livestock, and agricultural inputs to describe such characteristics as quantities, values, timing, prices, locations, and partners. Interviews were also conducted with market agents, such as traders and intermediaries. The questionnaires used were those developed by ICRISAT in Niger and Burkina Faso.

Grain Transactions

The main purpose of studying grain transactions was to determine their frequency, quantity, and value in the sample. Questions posed by the analysis were: (1) what are the quantities exchanged? (2) what is the frequency and timing of transactions? (3) where do transactions take place? (4) who are the partners in transactions?

Sales

Most sales took place in weekly markets at which people from various villages were present. Table 1 shows that 84% of the quantity of the principal grains (millet, sorghum, and fonio) sold and 73% of the numbers of transactions were in the postharvest period from November to April. Only 10% of sales took place from May to July, and 6% from August to October. This is obviously due to the seasonal pattern of production, in which grain becomes abundant in the harvest period and gradually scarcer thereafter.

Millet was the most commonly traded grain and constituted 68% of sales. Sorghum constituted 30% and fonio 2%. The value of sales of groundnut and cowpea was only 27% of that of cereals. Groundnut has lost its privileged position as a cash crop in the zone because of recent poor rainfall and the withdrawal of the groundnut extension service, which disrupted the supply of inputs.

Sale Prices

The general seasonal pattern of prices is to rise from the harvest low in October and November to the preharvest high in the following August. Table 2 shows that millet and sorghum prices at Samine (the largest village sampled) and at Cinzana (a major market) were from 90 and 100 Malian francs (MF) to 150 MF/kg. The same seasonal phenomenon was observed for fonio.

Reasons for Sale and Trading Partners

Table 3 describes characteristics of the trading partners in the principal commodities sold. Most sales (67%) took place in the weekly markets at Cinzana and Samine, with traders cited as the partners. Eleven percent of sales took place in other markets, and 10% within the same village. Only in the village with a cooperative did a sale take place with a public agency.

Purchase of consumer goods was cited as the principal reason for grain sales in 75% of the numbers of sales. Other monetary necessities—taxes and ceremonies, especially—were cited in 18% of sales. Agricultural investment was cited in only 3%. Sales to purchase animals (to resell or to increase stocks) were only 2%.

Purchases

Table 4 reviews some of the survey evidence about purchases of principal agricultural commodities.

Table 1. Crop and animal sales by period: number (N), quantity (Q), and price (P) Cinzana, Mali.[1]

	Aug to Oct			Nov to Jan			Feb to Apr			May to July			Annual Total		Annual Average
	N	Q	P	N	Q	P	N	Q	P	N	Q	P	N	Q	P
Millet	7	375	125	51	1604	100	99	5635	120	51	1315	130	208	8929	118.1
Sorghum	3	282	120	32	2898	100	8	764	120	1	25	125	44	3969	105.4
Fonio	9	126	80	5	131	50							14	257	64.7
Groundnut	3	75	90	12	759	105	10	3329	90				25	4163	92.7
Cowpeas	3	65	190	1	25	150							4	90	178.9
Cattle	5	6	45 420	12	12	69 750	6	6	63 375	4	4	98 750	27	28	67 313
Sheep	43	45	7 290	5	6	12 180	9	8	15000	3	3	17 500	60	62	9 264
Goats	14	15	5 520	2	2	5 750	6	6	12 560	2	2	8 750	24	25	7 486

1. Grain, groundnut, and cowpea quantities are in kg, and prices are in MF/kg. animal quantities are in head and prices are in MF/head. Prices are farmers' reported sale prices.

Table 2. Monthly prices (MF/kg)[1] at Cinzana and Samine markets in Mali, 1982/83.

	Cinzana					Samine				
	Millet	Sorghum	Groundnut	Fonio	Bambara nuts	Millet	Sorghum	Groundnut	Fonio	Bambara nuts
1982										
July	150	150	450	165		90	90	400	200	
August	150	150	480	150		80	90	300	100	
Sept	125	125	500	200		80	80	500	200	
Oct	100	400		150		75	80	540	200	235
Nov	100	100	465	200	200	70	75	500	125	200
Dec	90	90	480	200	200	75	75		150	250
1983										
Jan	100	100	465	250		80	75		200	250
Feb	100	100	480	200		80	75		225	235
Mar	125	125	480	200	200	80	80	450		235
Apr	130	130	480	250		80	80	0		
May	150	150	550	250	300	90	90	540		
June	125	125	500	300	300	80	80	540		
Maximum	150	400	550	300	300	90	90	540	225	250
Minimum	90	90	450	150	200	70	75	300	100	235
Range	60	310	100	150	100	20	15	240	125	15

1. Prices are monthly means. Blanks indicate that no samples of the crop were offered for sale in the period. Millet and sorghum were threshed. Groundnuts were unshelled. Fonio was unpounded.

Table 3. Number of sales recorded by APU member and partner.

Item sold	Member selling							Partner					
	Head of APU	First wife	Child of first wife	Second wife	Child of second wife	Father of head	Other	Trader	Cooperative	Relative	Acquaintance: Inside village	Acquaintance: Outside village	Other
Millet	58	84	11	5	6	0	14	194	1	0	2	9	2
Sorghum	41	5	0	1	0	0	8	17	1	0	24	10	4
Groundnut	18	1	2	0	2	0	5	17	0	0	6	5	0
Fonio	2	8	0	0	2	0	3	11	0	0	2	2	0
Cattle	20	0	0	0	0	0	4	10	0	2	2	10	0
Sheep	44	4	8	3	1	0	4	15	1	0	4	41	3
Goats	18	1	0	2	0	0	1	18	0	0	2	0	2

Purchases, like sales, generally took place in small quantities.

Timing of Purchases

Most purchases took place in the hungry season between May and October, when stocks from the previous harvest were low, and before the principal grain harvest. Millet was purchased in 81% of all transactions and sorghum in 19%. Purchases of other crops were rare and consisted mainly of seed (especially cowpea) before planting time.

Reasons for Purchases

Table 5 describes some characteristics of purchases in the sample. Daily food consumption was the principal reason for grain purchases, followed by purchases for ceremonial consumption. The principal partner (i.e., the seller) was a grain trader in a weekly market in 38% of the transactions. Others were unrelated people in the same village (26%) and relatives (26%). Transactions within APU were few (7% of all purchases). As Table 5 shows, the head of the production unit undertook the majority of purchases (64%), and first wives undertook 16%.

Barters and Payments in Kind

Barters are becoming rarer in Cinzana, but are still occasionally practiced. Only six barters of grain against grain were observed, all before the pre-harvest period, in which a total quantity of 296 kg changed hands. This is less than 1.5% of the quantity purchased and sold in the sample.

Payments in kind were received principally as millet for work. The total quantity thus received was 698 kg, of which 18% was received in the August-October period, and 77% from November to January. In the earlier period, payments were received for weeding; in the latter, for threshing. The data on in-kind payments are derived from the transactions questionnaires, not from the plot questionnaires; therefore, they are probably underestimates of the total quantity of such payments, especially for threshing.

Gifts

The Islamic tithe (*djaka*) was the principal gift observed in the sample constituting 62% of the

Table 4. Crop and animal purchases by period: number (N), quantity (Q), and price (P), Cinzana, Mali.[1]

Crop/ animal	Aug to Oct			Nov to Jan			Feb to Apr			May to July			Annual Total		Annual Average
	N	Q	P	N	Q	P	N	Q	P	N	Q	P	N	Q	P
Millet	145	7211	135	4	610	100	3	260	110	2	300	150	154	8381	132.2
Sorghum	35	1727	135							2	156	145	37	1883	135.8
Cowpeas										2	2	300	5	2	300
Cattle	2	2	55625	3	3	64000	9	9	60945	3	3	46835	17	17	53368
Sheep	8	8	9970	6	6	10410	4	6	12890				18	20	10978
Goats	5	7	4785				1	1	7000	4	9	7610	10	17	6411
Donkeys				1	1	15000							1	1	15000

1. Grain and cowpea quantities are in kg, and prices are in MF/kg; animal quantities are in head, and prices are in MF/head. Prices are farmers' reported purchase prices.

Table 5. Number of purchases recorded by APU member and partner, Cinzana, Mali.

Crop/ animal	Member purchasing						Partner						
											Acquaintance		
	Head of APU	First wife	Child of first wife	Second wife	Child of second wife	Father of head	Other	Trader	Cooperative	Relative	Inside village	Outside village	Other
Millet	90	31	18	4	1	6	4	75	4	0	22	52	1
Sorghum	32	6	0	0	0	3	3	6	0	0	31	4	3
Rice	16	0	0	0	0	1	n.a.[1]	0	0	15	2	0	n.a.[1]
Cattle	10	3	1	0	0	2	1	12	0	1	4	0	0
Sheep	9	2	0	2	0	5	0	8	1	6	3	0	0
Goats	2	0	5	1	0	2	0	6	0	2	1	0	1

1. n.a. = not available.

number of gifts given, and 63% of the quantity. Sixty-eight percent of all APU gave millet, maize, or sorghum as djaka. The quantities thus given were 13.01 tonnes, almost exactly equal to the quantity sold. Eighty-five percent of the djaka was given in the postharvest period.

The principal recipients of the djaka were Islamic priests (*marabouts*) and poor people. The quantities declared to be received were very much smaller than those given. This imbalance suggests both measurement error (probably because receivers were ashamed to admit to their poverty) and sampling error. Sampling error would have occurred if most gifts were given to a few individuals not sampled.

Livestock Transactions

Sales

Sales of animals were infrequent, but large in value. As Table 1 shows, the entire sample recorded only 115 sales of major animals (cattle, sheep, goats). The value of these sales constituted roughly 2.645 million MF, which is nearly equal to the combined value of cereal sales and purchases (1.489 and 1.364 million MF respectively).

The value of animal sales in the preharvest period (August to October) was 0.683 million MF, equal to 26% of annual sales of the value of grain purchases in the same period. About 35% of animal sales took place from November to January and 22% from February to April.

Livestock sales were done by heads of APU in 71% of all sales. Partners in those transactions were usually traders, notably for goat sales, which nourished an important fast food market. Acquaintances (probably buying animals for meat consumption, not for resale) in the same or in neighboring villages were common partners in cattle and sheep sales, especially sheep.

Purchases

Purchases of the principal animals were smaller in number, quantity, and value than sales. The value of purchases of cattle, sheep, and goats was 50% of the value of sale of the same animals. Only 17% of purchases took place in the August to October period, when animal sales and grain purchases were at their peak. About 20% of purchases were in the postharvest period (November to January), and 48% from February to April. The seasonal distribution of purchases by type of animal differed somewhat from the seasonal distribution of the sales of the same animals.

Conclusions

There is a definite seasonal pattern to transactions in grain and livestock. The pattern is clearly linked to the facts of a single grain harvest in October and November; of a need for self-provision throughout the year; and of seasonal variations in the health and value of animals. APUs with sufficient grain production to sell did so and generally did not repurchase grain. APUs with insufficient production sold livestock in order to finance grain purchases.

There seemed to be three classes of APU with respect to net grain transactions: net exporters, net importers, and those with no net trade; i.e., those who, in general, neither bought nor sold grain. It is our intention in further analyses to estimate the sample fractions of these groups and to examine the determinants of marketing strategies of each group.

The value of grain sales was roughly equal to that of grain purchases. The quantity of grain sales was 28% greater than that of purchases. Of the excess of sales over purchases, 72% was constituted by net sorghum sales, principally from Samine village. There was, therefore, no clear indication from the survey that the region has a positive net balance in income from grain sales. On the whole it appears to be a small net exporter of grain. The value of livestock sales was greater than that of grain purchases and sales combined, so it is evident that for the sample as a whole, animal sales finance most investment and most consumption of imported goods.

The majority of transactions in all commodities took place in weekly markets, the most important of which, Cinzana, is on the main national (paved) road in central Mali, with access to the producing regions of all major commodities in the country and to imports. It is likely, therefore, that sample members have quite good access to information. In fact, their willingness to undertake transactions in markets, rather than within villages or even between APU, suggests that those markets provide better terms of access than other forms of exchange. Whether those markets are efficient in anything but a relative sense, however, is another question.

Food-Grain Marketing in Burkina Faso

J.R. Sherman*

Summary

This paper examines the marketing system for food grains in Burkina Faso (formerly Upper Volta), including both private and public sector trade. It draws on recent research conducted in the Manga region and in the eastern ORD to support conclusions about the performance of the marketing system. The author approaches the marketing system as a subsector. The national marketing network is described, using applied typologies of the actors and markets. Links between different vertical levels of trade and coordination between them are considered. The geographical distribution of production and of consumption and interregional trade are discussed. Data on farmer decisions about the quantity, timing, and location of marketings, in the context of the household economy are presented. The paper concludes with a discussion of the major issues and policy options for Burkina Faso.

Résume

La commercialisation des céréales alimentaires au Burkina Fâso : *Cet article fait le point sur le système de commercialisation actuel des céréales alimentaires au Burkina Fâso, traitant du commerce tant au niveau du secteur privé qu'au niveau du secteur public. Il fait appel aux résultats des dernieres recherches effectuées dans la région Manga, ainsi que dans l'ORD de l'Est, afin de pouvoir appuyer les conclusions sur la performance de ce système. Dans cet article, l'auteur aborde le système de commercialisation en le considerant comme un sous-secteur et décrit le réseau national de commercialisation, notamment à l'aide de typologies appliquées des participants et des marchés. Par ailleurs, les articulations mises en jeu entre les divers niveaux verticaux du commerce et la coordination entre ceux-ci sont étudiées. On aborde également la répartition géographique de la production et de la consommation ainsi que le commerce inter-régional. Les données sur les décisions prises par les paysans sur la quantité, la date et la localisation des commercialisations dans le cadre global de l'économie domestique sont présentées. Enfin, l'article s'achève par une discussion sur les questions majeures et les options politiques qui s'offrent au Burkina Fâso.*

Introduction

Burkina Faso has the potential to be self-sufficient in food grains, but achieving this goal depends on having a marketing system that effectively redistributes grain from those who produce a surplus to those who need to purchase.

Millet and sorghum are cultivated on 90% of the arable land and account for 70% of the gross value of crop production.[1] As is typical of the Sahelian region, grain is grown on many individual farms that combine subsistence and commercial production. Following the customary settlement patterns, land quality, and climate, production is spread unevenly through the country—the south and west are surplus zones; the north and east, deficit. Only about 20% of the millet and sorghum produced is marketed, of which 70 to 80% is handled entirely by the private sector. The rest is handled by a government parastatal, the Office Nationale des Céréales (OFNACER).

Production and population figures indicate that in the aggregate, national grain production is margi-

1 The other important crops are maize, cowpea, groundnut, cotton, rice, and sesame

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ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 1985. Agricultural markets in the semi-arid tropics. Proceedings of the International Workshop, 24-28 October 1983, ICRISAT Center, India. Patancheru, A.P.502324, India: ICRISAT.

nally sufficient to meet minimum consumption requirements.[2] We know, however, that farmers do not sell all their surplus, and that grain is not necessarily redistributed equitably to those who need it.

The government's fixed-price policies reflect its concern that in certain areas producer prices are too low to stimulate production and that consumer prices are too high for poorer people to afford the grain they need. These policies are based on the conventional wisdom that poorer farmers sell grain at harvest, when prices are low, and purchase during the hungry season, when prices are high; and that traders have monopoly or oligopoly positions that enable them to exploit both consumers and producers by trading at prices that do not reflect their costs.

Through price incentives, the marketing system plays an important role in affecting production and redistribution. A first step toward improving its effectiveness is to understand how it functions. This paper will describe the grain marketing system in Burkina Faso. It draws heavily on my own research in the Manga region (1978-1981), research done by I. Ouedraogo[3] on marketing in the eastern ORD (1983),[4] and ongoing research on the national marketing network.[5] As yet there is not enough detailed information to evaluate the grain marketing network. I hope that this description will clarify where we must focus attention to evaluate the effectiveness of the grain distribution system. The paper begins with a description of the major marketing channels--including public and private sector participants and the market institutions that operate in all regions. It briefly discusses interregional trade, presents data on producer marketing behavior, and concludes with the major issues facing researchers and policy makers.

2 Using figures for total grain production in the years 1974-1981 presented in Enger (1981, pp VII 3) and a resident population of 6.5 million, we obtain grain production per capita of 140 to 165 kg. The minimum consumption requirement figures used by the FAO and others range between 150 and 180 kg/capita.

3 Ouedraogo's results are reported with his permission.

4 ORDs (Organisme Régional de Developpement) are the regional development organizations through which the government administers agricultural policy. The country is divided into eleven ORDs or regions.

5 In July 1983 the Center for Research on Economic Development at the University of Michigan and the Agricultural Economics Department at the University of Wisconsin began field research, under a contract from the U.S. Agency for International Development (USAID), to study the entire grain marketing system of Burkina Faso.

Major Marketing Channels

The variety of participants, methods of sale, and locations makes it difficult to generalize about the grain marketing network. Each area's ethnic mix, geography, climate, and infrastructure affect the marketing process.

The marketing network moves grain from producer to consumer. There can be numerous levels of exchange between them. Finally, the government usually participates by regulating who may trade and what credit is available, by affecting the availability and condition of transportation facilities, or by trading directly. Private and public sector marketing channels coexist, and in fact overlap and benefit from each other at certain points in the chain. We discuss them separately.

Private Sector Trade

Trade in millet and sorghum has been a part of survival in the Sahel for centuries. The rise to prominence of local merchants, however, is linked more to colonialism. In 1954, the French trading companies, established to export cash crops, pulled their agents out of the rural areas, and ran their trade from Ouagadougou and Bobo-Dioulasso. They contracted with local merchants to buy and bulk for them. As these local traders accumulated capital, they expanded into, and now dominate, the marketing of grain. Even the public sector purchases their services.

We usually categorize market participants by their function—retailer, wholesaler, assembler, transporter, etc. However, this does not work well for Africa, where markets are less distinctly segmented. Most participants perform more than one task, and different types of grain traders often perform similar functions. We need to categorize intermediaries in such a way as to capture the relationships between buyers and sellers, which affect market power and price. Here are some important characteristics:

- **Ownership of capital or title to the product**: A trader owns the grain he trades; an agent operates on behalf of a trader.
- **Remuneration of the agent**. The agent may work for a commission, or may be an employee or an apprentice of a trader.
- **Length of storage time**: Intermediaries may

store grain between market days or may purchase and resell on the same day.

- **Trading range and location:** Intermediaries may trade in one village, one market, several villages, many markets, an entire region, or several regions.

Using these characteristics we obtain the following categories of middlemen—market participants other than the producer and the final consumer.

- **Village resident buyers** buy grain on a trader's behalf, operating only in their own village. Their importance in the village hierarchy makes residents more willing to sell to them. The trader provides the capital and pays the buyer a commission.
- **Commission agents** purchase grain in villages, not marketplaces, using the capital of a trader, and earn a commission. They usually work only during the buying season (postharvest).
- **Trader's apprentices,** usually relatives of a trader, are those learning the business. They buy in both villages and markets. The trader gives them living expenses, perhaps a bonus based on the quantity they accumulate, and later, partnership, or the capital to establish an independent enterprise.
- **Assemblers** are independent traders or agents. They buy on market day and resell at the end of the day to regional or national traders. Often an assembler begins as an agent, amasses some capital, and becomes independent.
- **Local traders** use their own capital to buy grain around their own villages. They may employ apprentices or agents, own a small warehouse, or rent storage space. They rarely own trucks, but use carts, bicycles, and motorbikes to transport grain. They are almost always very successful farmers.
- **Regional traders** are based in the major market town of a region, but trade throughout the area. They have one or many agents, can store grain for long periods, transport and resell within the region, usually trade in other commodities, (cash crops, cattle, or consumer items), and may have their own trucks. They often own bars and mills as well.
- **National traders** have a large capital base, are located in the major market centers, and trade across several ORDs. Many own their own trucks and transport large quantities, purchased either through agents or from other traders in smaller markets. They sell wholesale outside their base of operation, but may retail in their home market.
- **Urban wholesaler-retailers** buy from national or regional traders to sell to urban consumers. They have shops and usually sell other goods also. Some are agents of the national or regional traders.
- **Urban retailers** operate in the smaller urban markets. Some are independent traders, others are agents of national or regional traders. They usually engage in some other petty commerce.
- **Cereal banks,** run cooperatively by members of a village group, buy grain from local farmers and resell it at a marginal profit. The groups get starting capital from joint projects, membership dues, and loans from the ORD and private voluntary agencies. A building is usually built by the members, the construction material donated by an agency. They exist mainly in marginal and deficit areas.

Major Redistribution Channels

Figure 1 illustrates the many different paths by which grain can travel from producer to consumer. Obviously not all exchanges occur in markets, but they all involve some transportation and marketing effort. Some grain is bought in one market and resold in another, and some leaves its region of origin. Except for direct sales from farmers to consumers, all the channels involve storage and/or bulking activity, and all these activities affect the exchange price.

We trace the major channels for redistributing grain within a region, for taking grain out of an area, and for transferring it from one region to another.

Grain which stays within a region follows one of five general channels, from producer to:

1. consumer;
2. cereal bank to consumer;
3. local trader to consumer;
4. trader's apprentice to local trader or regional trader, and back down a channel to consumer; or

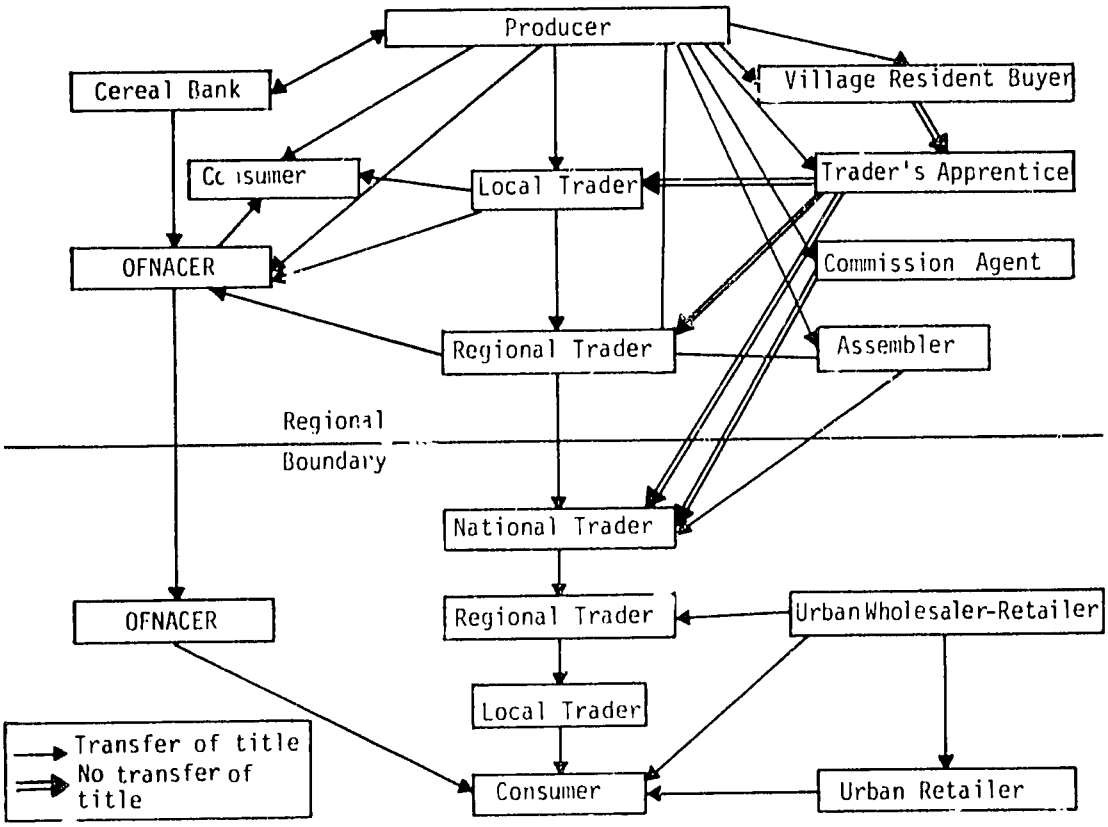

Figure 1. Marketing channels for grain in Burkina Faso.

5. village resident buyer to regional trader, and back down a channel to consumer.

Grain that follows channel 4 or 5 to the regional trader may also be sold to a national trader and leave the region. Other channels by which grain is transferred between regions are from producer to:

6. commission agent to national trader;
7. assembler to national trader.

When a national trader takes grain out of the producing region, it can go to another rural area or to an urban market. In an urban area, the grain will reach the final consumer or processor through one of two channels; national trader to:

8. urban wholesaler-retailer to consumer; or
9. urban wholesaler-retailer to urban retailer to consumer.

If the grain goes to a rural area, the channels are similar to the ones that take grain out of a region; from national trader to:

10. consumer;
11. regional trader to consumer;
12. regional trader to local trader to consumer;
13. regional trader to trader's apprentice to consumer; or
14. regional trader to cereal bank to consumer.

Not all of these channels operate in every area of the country. The specific channels in an area depend on the geographic and temporal pattern of markets, the road conditions, and demand and supply conditions.[6] For example, there are fewer

6 Channels and participants may change during different times of the year, according to supply and demand, and weather and road conditions

village resident buyers in areas with a well-developed network of markets, because market access is easy. In the eastern ORD, an area where markets are sparse, village resident buyers are prevalent. This purchasing arrangement allows the trader to collect more easily, and eliminates the need to frequent markets where access is difficult and costly. By purchasing through a village resident, the trader needs only to collect grain once or twice during the season, thus lowering his costs.

The Public Sector

From 1964 to 1970 all public sector marketing efforts concentrated on export crops.[7] In 1964 the government established the Caisse de Stabilisation des Prix de Produits Agricoles (CSPP) to stabilize prices, increase production, and promote exports of groundnut, cotton, shea nuts, sesame, and paddy rice.[8] The CSPP licensed private and public institutions to assemble, bulk, transport, and export.

In 1968, in an effort to break from single product development activities, the government established Regional Development Organizations (ORDs or Organisme Regional de Developpement) in each of the 11 administrative departments. Each ORD was to coordinate all the development activities in its region. In the hope that they would be self-financing, the government encouraged them to engage in revenue-generating activities by granting them monopoly rights to purchase export crops from producers. For various reasons—primarily lack of financial, managerial, and infrastructural capacities—this experiment was a complete disaster, and the monopoly rights were repealed in 1970.

In 1971, during the Sahelian drought, the government established OFNACER. Its mandate was threefold:

1. to stabilize intraannual grain prices by buying in surplus areas and selling in deficit ones;
2. to smooth interannual prices, by purchasing in good years and selling in deficit ones; and
3. to establish an emergency grain reserve system.

In its early years OFNACER mainly distributed food aid, and this remains one of its major responsibilities.[9]

In 1974 the government gave the ORDs monopoly rights to purchase grain for OFNACER, but because of insufficient personnel and equipment, they had to contract with local traders to purchase for them. In 1978 the government repealed the monopoly rights and officially sanctioned the parallel existence of private and public sector grain trading.

OFNACER has regional headquarters and warehouses in each ORD, and secondary warehouses in major centers throughout the ORDs. It opens the buying campaign after the harvest, once the government establishes official prices; buys in selected areas where the price is lower than the official price; stores or transports the grain for storage; and sells it in cities and deficit regions.

The public sector has five basic marketing channels:

1. Producer to OFNACER to consumer. This is the most direct of the public sector channels, with OFNACER buying directly from producer and selling directly to consumer. Unlike traders, OFNACER does not like to purchase small quantities—it prefers to buy in 100 kg sacks. Where producers transport large quantities to the market, OFNACER purchases directly form the producer. In some areas an OFNACER agent will commission a village resident to buy from a village and assemble small quantities. He is remunerated according to the number of sacks collected and the number of days the grain is stored.

Where village groups (groupement villageois) exist, OFNACER agents try to purchase through them. The group buys and bulks, and is paid a commission for each bag. OFNACER may also purchase from cereal banks.

2. Producer to cereal bank or village group to OFNACER.

7 See Ouedraogo (1983) for a concise history of Voltaic government participation in agricultural marketing.

8 Allegedly, one motive for the CSPP's mandate was the belief that too much competition, owing to too many traders competing for the farmer's output, was the cause of producer price fluctuations.

9 Its history and its problems are similar to those of the other government grain marketing agencies throughout the Sahel. See CRED (1977).

In many areas, because of lack of manpower and vehicles, the local OFNACER agent commissions local traders to purchase for him.

3. Producer to commission agent (who is a trader) to OFNACER, or
4. Producer to local trader or regional trader to OFNACER

The purchased grain is stored in local OFNACER warehouses and then transported to regions where production falls short of demand. Food aid imports are also distributed from regional warehouses.

Usually the sales channeled is direct to the consumer.

5. OFNACER to consumer

Where OFNACER has a warehouse, consumers can simply go there to purchase grain. For areas without a warehouse, an OFNACER agent will take grain by truck to sell in certain markets on designated days. OFNACER sells most grains in 50 and 100 kg sacks. If agents do not screen buyers, local traders can buy large quantities to resell on the private market. Some OFNACER agents are careful about this, others are not.

Institutions that Affect Marketing Channels

Marketplaces

Although urban and rural markets have very different characters, they serve similar purposes and share the same hierarchical structure.

Each market has a physical plan. The sellers of similar products congregate together. Grain traders are usually located in a few prominent places around the market. In larger markets, there may also be a special area where most of them trade.

Women who are petty traders sell their grain from stalls inside the market.[10] There is also a separate area for selling sprouted grain used for brewing beer.[11]

Every region and ethnic group lends a specific character to its markets; this necessarily affects the way in which the markets in an area function. For example, at weekly markets, the level of activity, trading practices, and opportunities for arbitrage may differ from those at markets that meet more frequently. Similarly, the distance between markets may also affect how these markets function.

Regardless of regional differences, we can identify four broad categories of markets: small bush market, large bush market, regional market, and city market. Although the distinctions between them are not always clear, we can categorize each by its location, size, type of participants, and product line. Within a region the spatial pattern of markets conforms to Lösch's hexagonal hierarchy. Many small bush markets will exist within the sphere of one large bush market, and similarly for regional markets.

Small Bush Markets

These are either village markets, or small markets that serve several villages in a limited geographic area. They are generally located on the edge of a village or in an area between several villages.[12] They are most easily characterized by the types of goods available: typically household items such as soap, batteries, sugar, and cigarettes. On any particular day, one will usually find sellers of different grains, groundnut, condiments, and some fabric and clothing.

Petty traders who usually live in one of the nearby villages sell the staple items. Women are the major market participants. These markets are less often frequented by traders, though many have a resident grain trader or two. Often traders from the surrounding area will come to purchase there during the harvest season.

Large Bush Markets

These draw clientele from several surrounding small bush markets. They are usually located on a major road or path, and are accessible by bush taxi or truck. Typically, they offer a greater variety of items than the smaller markets. For example, you

10. Women often buy grain to resell in smaller quantities.

11. In some regions, Manga for example, there is a major trade in sprouted sorghum, which has a well-established market.

12. The specific location (piece of land) of a market is determined by custom. As developers have found, choosing a site for a market requires consulting local chiefs, and the choice is important to the success of the market.

can almost always find some kind of meat, moped supplies, gasoline, flashlights, and a tailor, as well as the staple items mentioned above. Usually there is a mill and/or a bar near these markets.

Regional Markets

These are usually located in the main towns of a region, on a main road. They are considerably larger than the bush markets, and have stores, bars, and mills. On market days, traders from other markets come to the regional markets, and bush taxis bring traders from the capital or other cities.[13] These are markets from which products enter and leave the region.

City Markets

City markets reproduce the entire hierarchy of bush markets, with usually at least one retail market in each area of the city, and specialized markets for different types of products: wood, animals, heavy housewares, kola nuts, tobacco, etc. Central city markets are the most extensive and have the most complete line of products. The traditional market place is surrounded by commercial enterprises, mostly shops—much like the regional markets.

Licenses and Taxes

The right to trade in large quantities is given by the government. Each trader who wishes to trade within a sous-prefecture must purchase a license (Patente). Its cost depends on the trader's warehouse capacity, the extent of his trade, the number of registered agents, and the extent of the area in which he trades.[14] The price is not an insignificant sum, and since all intermediaries must have this license, it is definitely a barrier to entry into the market.

All the traders I interviewed in Manga were emphatic about the need to have the Patente. When asked whether anyone with enough money could come to buy grain in the market, they each indicated that as long as the person purchased a license there would be no problem. If not, "he will have to go down to the sous-prefecture office and pay before he can come into the market." A new trader might be able to buy once without having the license, but traders would not allow him to buy a second time without the proper credentials. One trader explained that the regular merchants gave his agents trouble until he purchased a license; and he was forced to obtain one.[15]

The only way to avoid buying the license is to purchase outside the markets. Often there are people along the market access roads prepared to purchase grain from farmers before they arrive at the market, or merchants who simply set up shop at a crossroads. Some are licensed traders; often they are not. Those who do not have a license are considered "thieves" by the licensed merchants.

Each market has a controller or market representative, who collects the tax (*droit de place du marché*) each market day from all sellers who do not have yearly licenses. The sum depends on the value of the goods being sold,[16] and the size of the market. One can avoid the tax by selling very early in the day, before the representative arrives, or by dealing outside the marketplace.

Traders' Associations

Traders in Burkina Faso have a powerful national union. In recent years the government has had to reckon with its pressure. Grain traders have an association within that union. They are also a local political force, organized at the sous-prefecture level. In each sous-préfecture the grain traders' association tries to oversee the trading environment in all markets. In each individual market there is also an association. Any grain trader can belong; paying the fees for the Patente is the only requirement for membership. Association members meet early in the trading day to discuss market conditions, particularly prices. As a group they can be quite influential.

In Manga, for example, before 1977 it was possible for any merchant in the ORD to come from

13. Generally, the schedules for bush taxi trips are designed to coincide with market day.

14. Traders who own vehicles must also register them and pay yearly taxes for them.

15. I experienced this when I tried to have a young man purchase grain in the market. He was threatened by the market traders, who thought he was trying to trade. They told him he would not be allowed to load even one sack into the trucks leaving for Ouagadougou.

16. The different bush market controllers explained that women who sell small amounts of condiments were charged a lower tax than people who sell grain, animals, and prepared foods.

Ouagadougou, enter the market, and purchase grain directly from peasants. As a result of an agreement between the assemblers and the Manga traders, this no longer occurs. Manga traders negotiated a monopsony on retail purchase. Other merchants must now purchase from locally licensed traders. An assembler explained that this agreement was made to avoid driving Manga grain prices too high. There were too many buyers in the market and they were getting in each other's way.[17]

Units of Measure

Throughout Burkina Faso all grains are traded in units of volume.[18] Although a *tine* can be found everywhere it is not really standardized.[19] The shape and size of the receptacle varies. The particular subunits are also region-specific. They vary in size and shape. Prices are quoted in Communauté Financiere Africaine (CFA)/local unit.

Transportation

Feet, donkeys, carts, bicycles, motorbikes, motorcycles, pickup trucks, and freight trucks are all used to transport grain. The choice of mode depends on the quantity being moved, the distance, and the road conditions.

Transporters are one group of market participants not yet discussed. We do not include them in the marketing channels because they do not take possession of the grain at any time. Many merchants have their own transport; others, however, must rent or contract for vehicles. Transportation costs vary considerably. It is the transporter who usually must negotiate with the police and customs officials. They are also in a position to arrange smuggling.[20]

17 A similar accord was reached between the buyers of sprouted red sorghum. As their number increased they were afraid of driving up the price of red sorghum, so they divided into two groups, each buying every other market day.

18 The only notable exception is rice sold by the kilogram, by government stores and in large marketplaces.

19 The ORDs introduced a standardized "tin" in the mid-1970s, but, it is not widely used.

20 Large quantities of grain have been smuggled out of Burkina Faso on bonded trucks traversing Burkina Faso from Togo—the seal is broken, the grain is loaded, and they are resealed (Richard Swanson, personal communication).

Interregional Trade

Because of the climate, soils, and geographical distribution of population, Burkina Faso has chronic grain deficit, surplus, and swing zones (Fig. 2), which can be explained by rainfall, soil conditions, and population density. The major population centers are generally deficit areas. The extreme north is deficit because of desert-like soils and low rainfall. The central area, called the Mossi Plateau, is deficit because of poor soils and high population density. In the south, the population density is sparser and the soils richer. The east has relatively poor soils, and low population density, so the region is deficit, surplus, and marginal in different places. The west and southwest are the breadbasket. Soils along the Volta rivers are rich, and population density is low. They are surplus areas experiencing in-migration.

Cropping patterns follow the rainfall lines shown in Figure 3. Moving northeast, the predominant crop mixtures change from sorghum/maize, to sorghum/millet, to millet/sorghum.

Figure 4 shows the interregional trade patterns. The Volta Noire and Hauts Bassins regions supply grain to themselves, the Yatenga, the center (near Ouagadougou) and the east. The origin and destination of specific flows depend on relationships and liaisons between individual traders. Many residents in the surplus regions have migrated (not necessarily recently[21]) from deficit regions. Often they send grain back to their villages of origin or purchase for family members. There are specific trading connections between particular villages and towns in deficit and surplus regions. These routes may be outside the more large-scale trading routes. Traders from the Yatenga and from the Ouagadougou area travel to the west to purchase and transport grain. Many have migrated there as well.[22]

Farmer Marketing Behavior

The farmer is the first link of the marketing chain. Two studies on marketing in Burkina Faso explicitly analyze data on household marketings: Ouedraogo's study of the eastern ORD, and my study of

21. There have been regular migrations since the drought of 1932.

22. Many well-established traders in Bobo-Dioulasso and Dedougou are migrants.

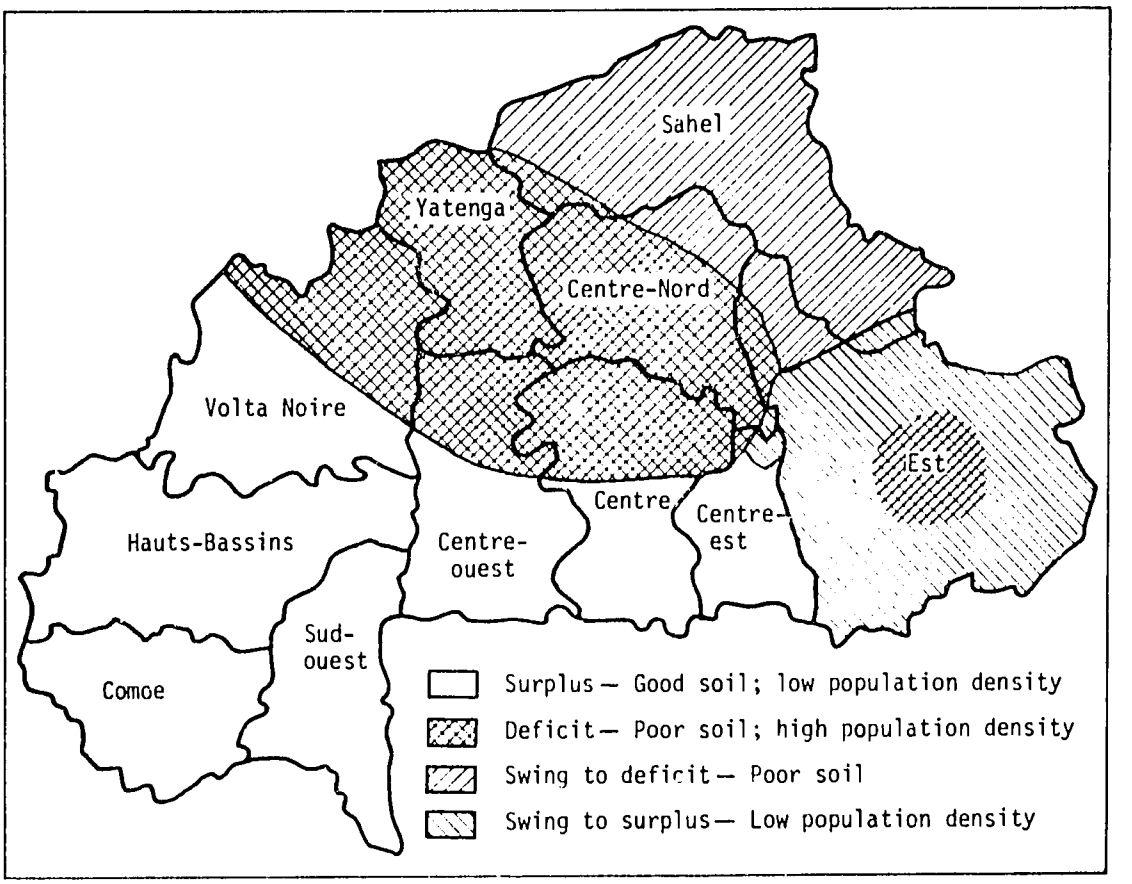

Figure 2. Regional food balances in Burkina Faso.

Manga.[23] This section discusses some of the findings.[24] It is tempting to try to make many comparisons. Unfortunately, the results are not entirely comparable, both because of the form in which they are presented, and because the studies are for different years and cover different periods within the year. Nevertheless, some comparisons are possible and enlightening.

It seems clear from both studies that grain production is the primary determinant of the amount of grain sold. Farmers who produce more sell more, and farmers who produce less buy more. Regression anlysis for the Manga sample indicates that the total quantity sold during the year increases with the availability of grain (harvest plus carry-over stocks), decreases as family size increases, and decreases as sales of animals and cash crops increase. Farmer behavior in the eastern ORD seems to be consistent with this. In both regions grain sales are not the most important source of revenue for the household.

Ouedraogo categorizes farmers according to their grain transactions: no transactions, sold only, bought only, and both bought and sold. Table 1 presents data for the two regions using these categories.

There are some interesting results. In Manga the average quantities traded by households are considerably less than in the eastern ORD. Perhaps this is because eastern ORD families are two or three times as large as Manga households.

23 In this section, all data on the eastern ORD come from Ouedraogo (1983), and all data on Manga come from Sherman (1981)

24 This analysis is rather rough and ready, but it seems important to include some analysis on household behavior, even though the data do not yet permit highly sophisticated analysis

The eastern ORD sample also has a much higher percentage of farmers who either did not trade, or only purchased; in Manga, these groups together account for less than 10% of the sample. In the eastern ORD only 25% of the sample both bought and sold; in Manga this category represents 82% of the sample. This may be because markets in Manga are very accessible, the roads are good

Table 1. Household grain transactions in two regions of Burkina Faso.

Category of household	Average annual transaction quantity		Village characteristics						
			Manga (N=118)			Eastern ORD (N=196)			
	Manga (N=118)	Eastern ORD (N=196)	Main road near	Minor road	Main road far	Market	No market	On road	Off road
No transactions	1.7%	14.3%	9%	9%	0%	6.6%	7.7%	5.6%	8.7%
Sold only	8.5%	9.6%	9%	7.6%	0%	4.1%	5.6%	3.6%	6.1%
Average sales	90 kg	181 kg							
Purchased only	7.6%	50%	0%	1.6%	5.9%	30.6%	20%	9.7%	40.8%
Average purchases	112 kg	405 kg							
Sold and purchased	82.2%	25.5%	33.9%	22.9%	25.4%	13.2%	12.2%	8.2%	17.3%
Average sales	129 kg	288 kg							
Average purchases	60 kg	345 kg							

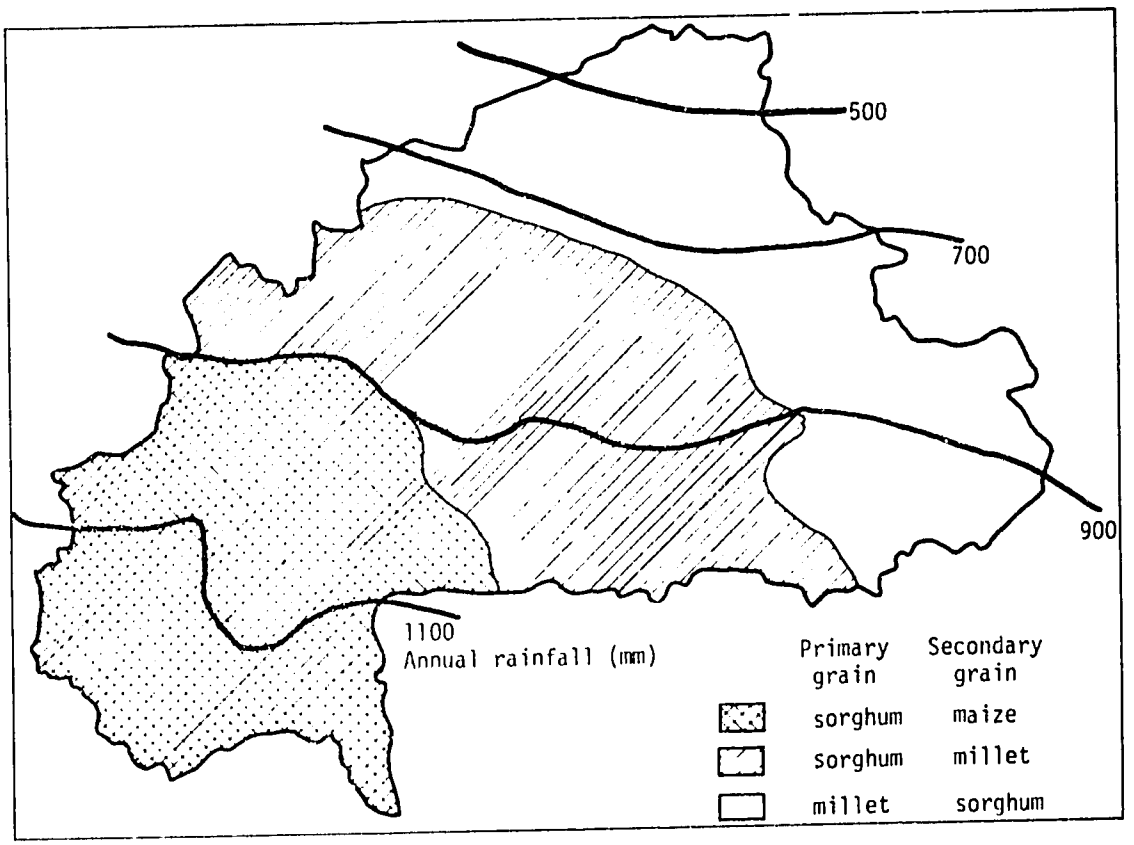

Figure 3. Major crop and rainfall zones of Burkina Faso.

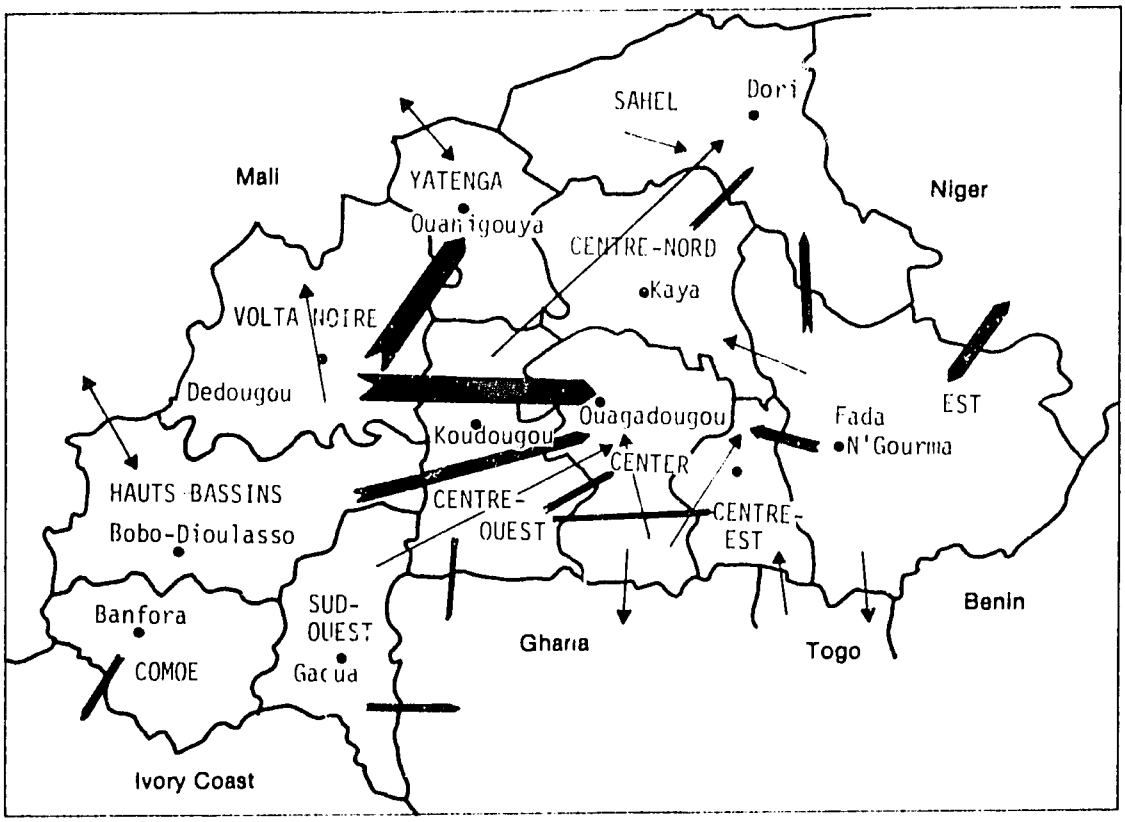

Figure 4. Interregional trade patterns in Burkina Faso (thickness of arrow indicates magnitude of trade).

and there are markets at least every 5 to 8 km.

Amongst the farmers who both purchased and sold, Manga farmers sold more than they bought, in the eastern ORD it is the reverse. This difference undoubtedly reflects the facts that the eastern ORD had an overall cereal deficit in the year of the study, and that Manga was either marginal or surplus. For the eastern ORD, where data was available by zones, surplus zones and deficit zones showed opposite patterns.

This aggregate data may be misleading, however. Within the "both" group it is important to consider net buyers and net sellers separately. Unfortunately, the present form of the data is not sufficiently detailed to permit such separate analysis.

The right side of Table 1 illustrates the effect of roads and market density on transactions. The data are somewhat inconclusive. For Manga, it appears that market access may affect the types of transactions, although the casuality is not clear. These data lend further support to the finding that sale is directly related to production, where soils are better, more households sold only, or bought and sold. Since harvest quantity appears to be a major determinant of transactions behavior, it is difficult to draw any conclusions for the eastern ORD because the zones are so different.

The Manga study also found that farmers travel further to get a better price when they are trading large enough quantities. They are willing to travel further in the dry season than in the wet season. This indicates that arbitrage is promoted by farmers as well as traders.

Finally, we consider the timing of different transactions. The conventional wisdom is that most grain sales occur at or just after harvest, when prices are low, and that most purchases occur during the hungry season, when grain prices are high. Figures 5a, 5b, and 5c show sales and pur-

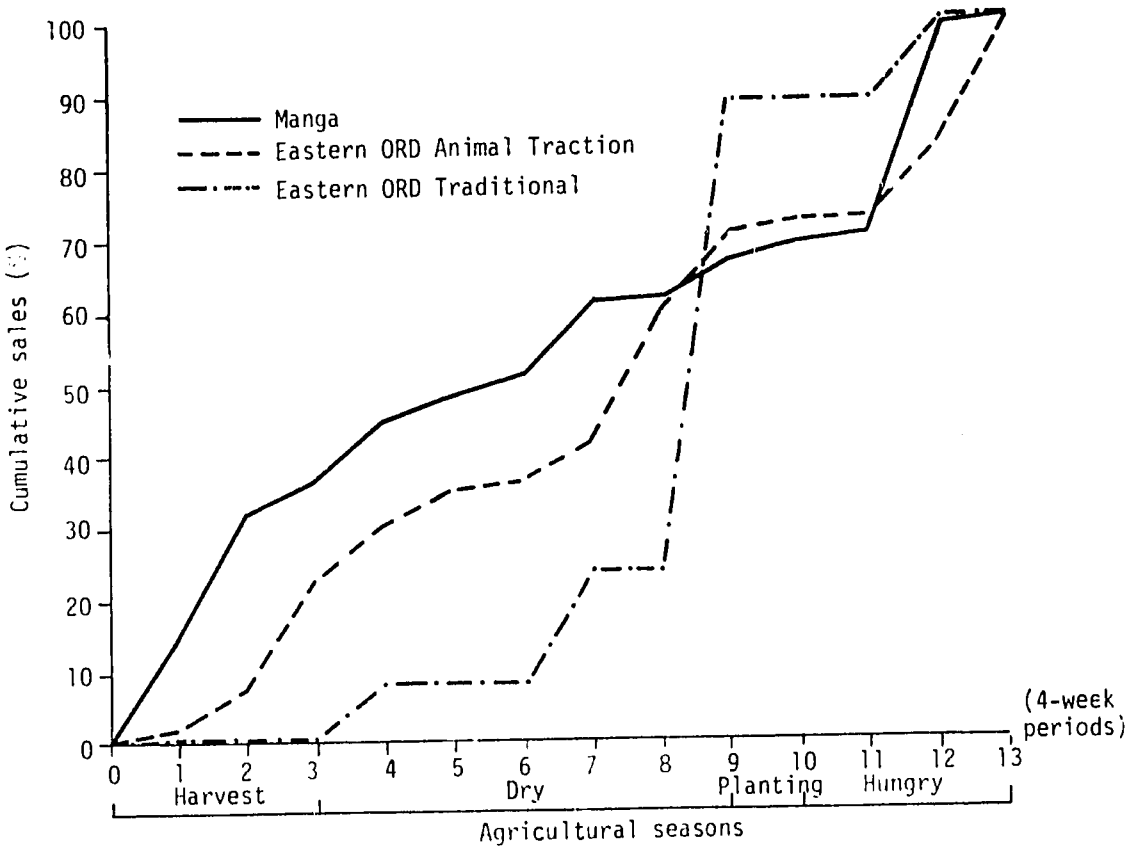

Figure 5a. The timing of sales for households that only sold grain, Burkina Faso.

chase patterns for the three groups of farmers who traded in the two samples.[25] For each group the behavior of farmers in the two regions is remarkably similar. Perhaps the most notable distinction is within the eastern ORD, between farmers who used animal traction and those who did not.[26]

25 I chose to use these graphs as a simple and approximate way to compare the only data available on intertemporal farmer marketing behavior. Two caveats are necessary. (1) The data from the two studies are not entirely comparable--they are from two different years, and span different periods: for Manga, October 1979 to September 1980, and for the eastern ORD, May 1978 to April 1979. (2) The lines graphed for the eastern ORD are synthetic--October 1978 to April 1979 and then May 1978 to September 1978. This implicitly assumes that behavior in one year is the same as in another.

26 A major part of the eastern ORD study focused on differences between animal traction and traditional farmers. The Manga study did not focus on this. We present these details because they show interesting differences in behavior patterns, which can give insights into the consequences of policy.

Amongst households that sold only (Fig. 5a), the sales trend shows a slight S pattern—a greater proportion of sales at harvest, tapering off during the dry season, and greater sales again during the hungry season. Traditional farmers in the eastern ORD seem to sell most of their grain during the hungry season, the opposite of what we expect. For the others, the diagram indicates a steadier flow of sales.

From Figure 5b we see that amongst households which purchased only, the pattern is relatively steady, with a slightly lower proportion of purchases in the harvest season for traditional households in the eastern ORD.

Last we consider the households which both purchased and sold (Fig. 5c). In Manga their purchase and sales patterns are both relatively steady. In the eastern ORD the patterns are more variable. Farmers sold a greater proportion during the post-harvest season, and bought proportionally more

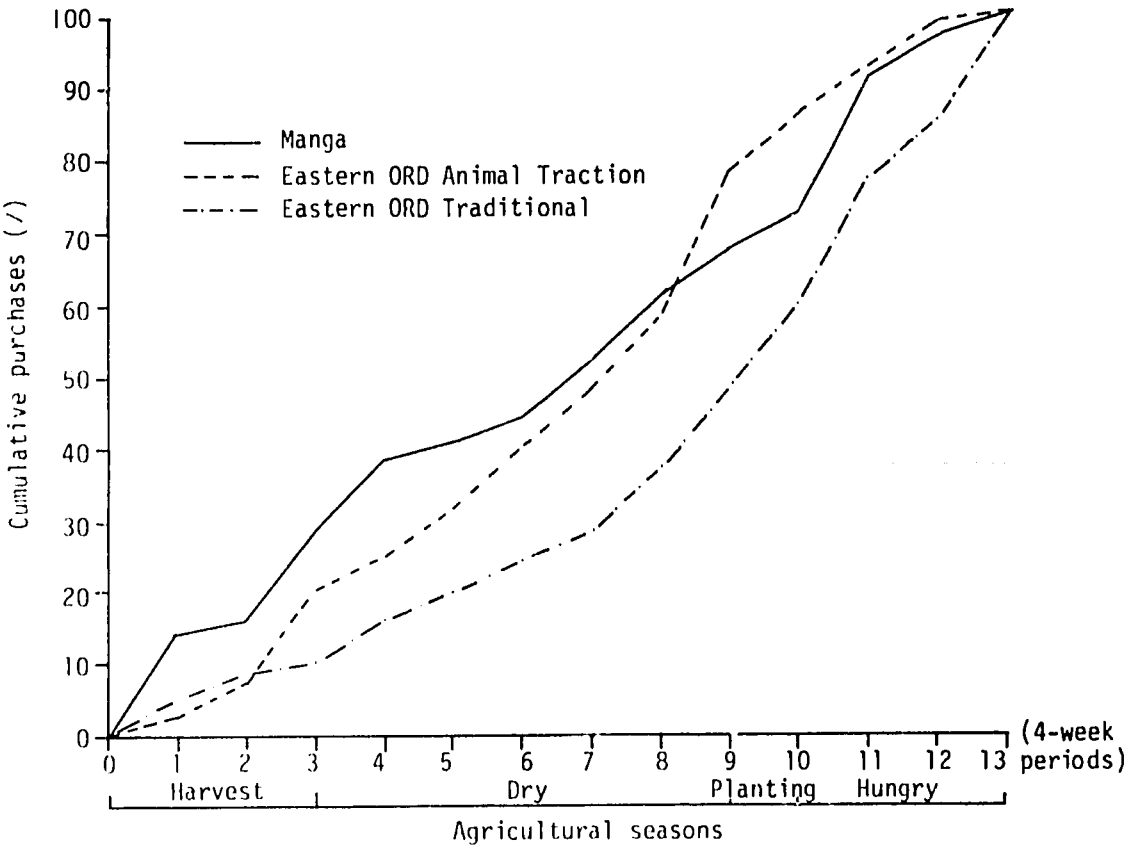

Figure 5b. The timing of purchases for households that only bought grain, Burkina Faso.

during the hungry season. Since the difference in average quantities bought and sold was greater in the eastern ORD, the effect of the differential in price for sales and purchases will be more important.

This prompts us to ask, why do farmers choose these exchange patterns and what, if anything, should be done to change them? In future research it is important to consider these transaction patterns in relation to other revenue-generating and expending activities for all categories of farmers.

Conclusions: Major Issues for Policy and Research

We infer several general characteristics about grain marketing in Burkina Faso, and suggest questions for policymakers to consider when formulating future interventions. We also recommend areas for future research.

The description in this paper points out the variety of marketing channels. It is clear from the analysis of Ouedraogo (1983) and Sherman (1981) that in areas where markets meet frequently and roads are passable, markets operate effectively[27] for both producers and consumers. In areas with poor road infrastructure and sparse markets, private traders adapt trading techniques that bypass established marketplaces, yet succeed in moving grain from point of supply to points of demand.

These channels are also adapted for the small quantities in which producers, at least in the areas discussed, prefer to trade. In the heavily surplus areas we expect that producers trade in much larger quantities, and therefore assemblers and low-level middlemen would be less necessary.

The channels that move grain out of a region are

27. This does not necessarily mean perfectly competitive. The presence of many traders in a market with low levels of supply and demand is not necessarily efficient

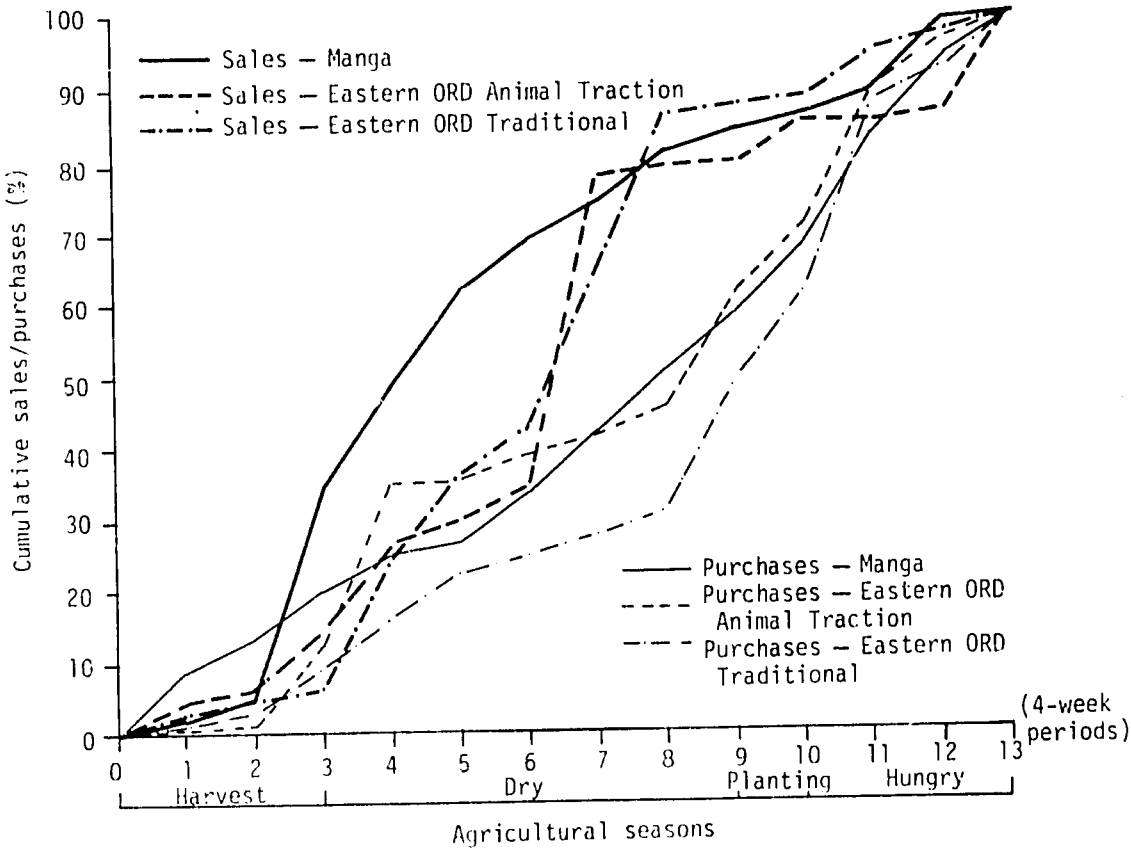

Figure 5c. The timing of transactions for households that both bought and sold grain, Burkina Faso.

better developed than those that move grain into a region, even in the deficit zones. Undoubtedly this is because of the original export orientation of the marketing channels.

The history of direct government intervention in the grain market since independence indicates that all the governments believed they should play a direct role in grain marketing. The frequent changes in intervention technique, however, suggest that the governments have not been pleased with their performance, and have continued to search for more effective ways to intervene.

I have deliberately tried not to evaluate the marketing network. To do so would require going back to basic principles and asking the question: "What do we want the system to accomplish?" Put differently, what do we consider as "good performance"? The answer must combine economic notions with the government's goals.

To be useful and implementable, the answer must be realistic. In the past it seems that the government has had conflicting objectives, as well as insufficient means to achieve them using the techniques chosen.

Every producer must ask himself how best to use his resources—his output—both to survive and to earn the income he needs to live within a certain standard. The government must ask the same question. To achieve its goals, should it use its resources to trade directly in the market, or would these resources be better used to improve the conditions that would allow the private sector marketing channels to operate at lower cost and more efficiently?[28]

28 I do not mean to ignore the obvious benefits to the government itself of direct intervention—political support from the beneficiaries of low-priced, regular stocks of grain. But it is possible to retain and manage security stocks if the government decides it is desirable, without maintaining a parastatal that functions as a marketing board.

There are other market interventions, aside from OFNACER, which affect the grain market. Most notable are direct and indirect subsidies, which cause price distortions, both within the market for food grains and for grains in relation to other products. By supporting the production of wheat and rice through subsidies, the government encourages substitution of grains which are more expensive to produce, for less expensive ones.

A similar issue concerns the effect of subsidized grain prices on the offtake rate in cattle-producing zones. When millet prices in the north of Burkina Faso are held artificially low through a fixed government sale price, herders need not sell as many cattle to buy grain for consumption. We must consider what effect this has on the offtake rate and the ecological balance in those zones.

These conclusions point to the need for realistic planning and coordination at the national level. In addition, they suggest areas where research would be useful.

One lesson learned from development projects everywhere is the need for local participation in change, and that the recipients perceive the need for the change. In the area of marketing, it is important to know farmers' and traders' perceptions of the ways in which the market network does not work well, and how it might be improved. Ouedraogo collected some data on this for the eastern ORD, but I know of no other study that has.

We need more-detailed information about the farmer's marketing behavior,[29] considering the household economy as a whole, so that grain marketing can be viewed in the context of the household's other economic activities. It is important to collect information about farmers' marketing decisions—how they say they decide about marketing. The household economy is very complex; it is not easily handled by economists' mathematical models and we cannot simply apply such models assuming that we understand the farmer's decisions.

We also need to analyze the farmers' grain-marketing behavior within the context of the rest of their household economy, to understand why farmers choose a particular marketing pattern. In areas like Manga and the eastern ORD, where grain sales are not the primary source of revenue, the farmer obviously has other revenue-producing activities—how do his alternatives for grain marketing fit in with his other economic alternatives?

To understand better the demand side of the market, we need to study purchase patterns of nonagricultural consumers. But, like producer-level marketing data, such data are expensive to collect. Researchers must develop a less intensive, yet accurate, data collection method.

At the level of the market, we need to understand the relationship between traders at different levels of the marketing chain. This will help determine concentration ratios, which are important for understanding how market power is concentrated.

29. The CRED/Wisconsin study is collecting household data in the Yatenga and Volta Noire regions.

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Marketing of Fodder in Rural and Urban Areas of India

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Summary

The three main sources of cattle feed in India are: natural grasslands, cultivated fodder crops, and crop residues. Crop residues contribute an important part to feed intake, especially in the semi-arid regions of India, where large parts of the land are cultivated, and relatively little pasture and natural grazing ground is left. For the plant breeder whose aim it is to improve crop production, it is important to realize the value of fodder, because to the farmer it is the total value of production of grain plus fodder that counts. In breeding superior grain crops that will be acceptable to farmers the breeder needs to know how much emphasis he must also place on fodder quantity and quality. The fodder markets in and around Hyderabad were studied to gain a clearer idea of the relative grain and fodder values in traditional and improved varieties of sorghum under rural and urban conditions of demand.

This study focuses on the modes of transaction, types of fodder sold, and prices received in three important fodder markets in Hyderabad as well as in their hinterland. The markets drew their supplies from villages 15-70 km from Hyderabad. Sorghum stalk was found to be by far the most important fodder sold in these markets; besides sorghum, paddy straw, green grass, and jungle grass are also traded. It was found that in sorghum, yellow varieties were most preferred, both in absolute terms and in relation to grain value. The ratio of fodder to grain price for yellow varieties was 25%, while it was 20% for white local varieties. Negligible quantities of sorghum fodder from high-yielding varieties were found in the markets. In absolute terms, HYV sorghum fodder sold at 30% lower prices than the local sorghum fodder. These same price relationships were found to exist also at the village level. Using village-level data on grain and fodder yields, we found that the fodder value of local sorghum was 35% of the total value of production; for HYV sorghums, it was only 18%. It is felt that improving the fodder quantity and quality of HYV sorghum would increase the value of total production for farmers and thereby induce a more widespread adoption.

The study of fodder markets gives important insights into the spatial and temporal variation of prices, which have implications for planning and research in various regards; plant breeders and agronomists derive information on the relative importance of fodder versus grain for designing breeding strategies and location-specific cropping systems; research scholars gain from studying the interaction of supply and demand of a relatively bulky commodity and the ensuing patterns of price variation; and policymakers may find the inferences useful.

Résumé

La commercialisation des fourrages aux niveaux rural et urbain en Inde : *Les prairies naturelles, les plantes fourragères cultivées et les résidus de récolte constituent les trois sources principales des aliments des bovins en Inde. Les résidus de récolte représentent une partie importante de la consommation des aliments, surtout dans les zones semi-arides de l'Inde, où des surfaces importantes sont cultivées et où il ne reste que des superficies peu répandues de pâture et d'herbages naturels.*

Devant l'objectif de l'amélioration de la production des cultures, le phytosélectionneur doit prendre conscience de la valeur des fourrages parce que c'est la valeur totale de la production de graines plus celle du fourrage qui est d'une importance primordiale pour le paysan. Dans la

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sélection de cultures céréalières de meilleure qualité qui seront acceptables aux paysans, le sélectionneur a besoin de savoir quelle importance il doit accorder à la quantité ainsi qu'à la qualité des fourrages. Dans cet article, on a étudié les marchés de fourrages à l'intérieur de et autour de Hyderabad dans le but d'obtenir une idée plus claire des valeurs relatives céréalières et fourragères des variétés de sorgho améliorées et traditionnelles dans les cadres de demande ruraux et urbains.

Cette étude est axée sur les modes de transaction, sur les types de fourrages en vente, et sur des prix constatés dans trois grands marchés de fourrage à Hyderabad ainsi que dans leur arrière-pays. Les marchés s'approvisionnent dans des villages qui se trouvent dans un rayon de 15 à 70 km autour de Hyderabad. On a constaté que les tiges de sorgho constituent, de loin, le fourrage le plus important vendu dans ces marchés. A part le sorgho, la paille de paddy, l'herbe verte ainsi que l'herbe sauvage sont aussi commercialisées. Par ailleurs, on a trouvé que chez le sorgho, les variétés jaunes étaient les plus préférées, tant en termes absolues qu'en relation avec la valeur des graines. Le rapport fourrage-prix de graines était de 25% pour les variétés jaunes, alors qu'il était de 20% pour les variétés locales blanches. Dans les marchés, on n'a constaté que de très faibles quantités de fourrages de sorgho obtenus des variétés à haut rendement. En termes absolus, les fourrages obtenus de telles variétés se sont vendus à des prix moins importants de 30% par rapport aux fourrages locaux de sorgho. Ces mêmes relations entre les prix ont été également constatées au niveaux des villages. A l'aide de données recueillies au niveau des villages sur les rendements en graines et en fourrages, on a pu constater que la valeur fourragère des sorghos locaux était 35% de la valeur totale de production. En effet, elle n'était que de 18% pour les variétés de sorgho à haut rendement. On pense que l'amélioration de la quantité et de la qualité fourragères des variétés de sorgho à haut rendement aurait pour résultat d'augmenter la valeur de l'ensemble de la production des paysans, et d'inciter ainsi à une adoption plus étendue de ces variétés.

L'étude des marchés de fourrages permet de comprendre la variation spatiale et temporelle des prix, qui comportent des implications pour la planification ainsi que pour la recherche à plusieurs égards. Par ailleurs, elle permet aux phytosélectionneurs et aux agronomes d'obtenir les informations sur l'importance relative de fourrages vis-à-vis graines afin de faciliter la mise au point des stratégies de sélection et des systèmes de culture adaptés à l'emplacement. De plus, les étudiants universitaires peuvent approfondir leurs connaissances à travers l'étude de l'intéraction qui a lieu entre l'offre et la demande d'un produit relativement encombrant, et des variations des prix qui en résultent. Enfin, les conclusions qui se dégagent de cette étude peuvent intéresser d'une façon importante l'élaboration des politiques.

Introduction

Cattle play an important role in Indian agriculture; not only do they produce meat and milk, they also provide draft power. With improved agricultural systems being adopted, leading to increasingly productive farming, the fodder supply for suitable draft animals assumes major importance for sustained crop production.

In 1978, of the total available farm power, 42% was contributed by draft animals such as bullocks and buffaloes (Ghodake 1982). In a country where foreign exchange is limited, farm size is moderate, and labor supply not a limiting factor, the balance of advantage lies with the bullocks (Inns 1980).

The other important area where livestock could make a significant contribution in India is in meat and milk production. The per capita consumption of calories and proteins in India is by world standards relatively low, with 1967 calories and 49 g of protein per capita per day. The corresponding world averages are 2563 calories and 68 g of protein. The level of calorie and protein derived from meat and milk is particularly low in India: 6 and 0.6 from meat and 73 and 3.9 from milk respectively. The world average figures are 190 and 11 from meat and 120 and 7 from milk. These figures are averages for the year 1972-74 (FAO 1977).

Thus there would appear to be considerable scope for increasing calorie and protein intake by a more intensive exploitation of livestock resources. As the country develops, increased incomes will also bring an increased demand for meat and milk. The income elasticity of demand for meat and milk is positive and high—1.04 for meat and 1.59 for milk—in India (Murty and Radhakrishna 1982).

Principal Sources of Animal Nutrition

One way to maintain livestock productivity at a high level is through the provision of proper nutritious

feed. Presently in India the three principal sources of animal nutrition are natural grasslands, crop residues, and cultivated fodder crops, supplemented to a very limited extent by feed concentrates. A balanced salt mineral supplement is regularly required but not always given. Cattle may be quite productive without consuming large amounts of grain and other concentrated feed, and they compete only marginally for foodstuff suited for human consumption.

Let us examine these three sources. Table 1 shows that the share of total grazing land in total reported area in India has declined over time. Total grazing land has declined from around 97 million ha in 1956 to 78 million ha in 1976-77. The situation, however, is not so alarming when we include forests in total grazing land. On the other hand, the livestock population has increased from 179 million units in 1956 to 283 million in 1972. Thus the livestock grazing land ratio has increased from 2.5 livestock units/ha of grazing land in 1956 to 3.4 in 1972. A similar pattern is observed in Andhra Pradesh and in Hyderabad district. The increasing cattle population has also led to a degradation of grazing land of arid regions in India (Jodha 1983).

Secondly, in India only 4% of the arable land is used for growing cultivated fodder crops, as compared with 25% in the UK and 60% in the USA. Most of the grazing land in India is wasteland or communal land or fallow land (Mogens 1978). The scope for increasing the area under fodder crops is limited, and is possible only where it does not compete with area under food crops. At present the area-expansion potential, even for food-grain production, is already quite limited in India.

Thirdly, crop residues are an important source of animal nutrition in India. Among the crops that provide food for human consumption and also fodder for cattle are rice paddy and wheat in irrigated areas. In dry areas—for instance, the semi-arid tropics (SAT) where the dry season is 5 to 7 months long—sorghum is by far the most important. Stocks can be stored at little cost, so that cattle can be fed even through the dry season. Residues of other cereal crops, besides sorghum, and of some pulse crops are also important sources of fodder in dry regions of India.

However the fodder sources available at present cover only about one-fourth to one-third of the actual requirements. Annual fodder requirements for the present cattle population are estimated at about 800 million tonnes of dry fodder and about 615 million tonnes of green fodder. The overall deficit in dry fodder is estimated to be about 615 million tonnes and of green fodder 388 million (Das and Reddy 1982). Cereal and pulse crops grown for fodder only can be as profitable as cereals and pulses grown for grain; however, such expansion should not be at the cost of grain production (it can, for example, be done on kharif, or rainy-season, fallow land, where late rainfall is likely, making the harvesting of grain crops impossible).

Table 1. Ratio of total livestock units[1] to grazing land[2] in India, 1956-1977.

Year	Total grazing land: Without forests (m ha)	Total grazing land: With forests (m ha)	Livestock units (million)	Ratio of livestock units to total grazing land: Without forest	Ratio of livestock units to total grazing land: With forest
1956	97.5 (33)[3]	148.8 (51)	244	2.5	1.6
1961	96.5 (32)	150.5 (51)	269	2.8	1.8
1966	94.6 (31)	156.1 (51)	274	2.9	1.8
1972	82.7 (27)	146.6 (48)	283	3.4	1.9
1977	78.3 (26)	144.7 (47)			

1 Livestock units were calculated thus: 1 full-grown animal (cow/bullock, buffalo, horse, mule) = 1 animal unit, 1 young animal = 0.75 animal units, 1 sheep/goat = 0.15

2 Total grazing land includes permanent pastures, forests, wastelands, cultivable wastelands, and fallow lands.

3 Figures in parentheses indicate percent of grazing land to total reporting area.

Objectives of the Study

With increasing commercialization of Indian agriculture, large quantities of grain are marketed locally and also over long distances, involving interdistrict and interregional trade. Fodder, however, is grown mainly for home consumption, small quantities being sold at the village level or marketed in nearby urban centers to feed growing milch animals. Being a bulky commodity, fodder is traded over long distances only in times of scarcity, owing to drought or other natural calamities. Thus fodder marketing is a localized activity as compared with grain marketing.

The present study aims to provide some informa-

tion on fodder markets and fodder prices in rural and urban areas, particularly for three of the ICRISAT mandate crops—i.e. sorghum, pearl millet, and pigeonpea—and their substitutes, such as paddy straw. ICRISAT's breeding programs are aiming at the development of superior high- and stable-yielding grain types of varieties which should be acceptable to the farmer and the consumer. Besides grain, however, the straw of these crops, particularly of sorghum and pearl millet, is an important source of animal feed. In evaluating a new variety, how much weightage should be given to quantity and quality of grain in relation to straw? With the broad objective of assessing this, the following aspects were also included in the study:

1. seasonal variation in fodder prices;
2. variation in fodder prices among crops and varieties;
3. variation in fodder prices between village and central market; and
4. ratio of fodder to grain prices.

Hyderabad city, with a bovine population of 44000 (1972 census) requiring about 500 to 600 cartloads of straw per day, draws fodder from nearby villages.

Methodology

Three important fodder markets are located in the greater Hyderabad-Secunderabad area, Puranapul market, Sitarambagh market, and Bowenpalli market. Besides these, there are a few small markets dealing only in green grass during the wet season. Daily visits to the markets revealed that fodder prices do not vary much from day to day, and it was decided to visit these large fodder markets once a month for a period of at least 1 year. It was not possible to obtain weekly or daily average prices for previous years, because no records of prices are kept. Since it was not possible to interview all traders attending the market, only a few traders were interviewed every month at random.

The major limitation of this first study is that in Hyderabad no data could be collected on pearl millet, groundnut, and pigeonpea stalks; these are not sold in the Hyderabad market as there are not enough areas growing these crops within the vicinity of Hyderabad to produce a fodder surplus. Thus data could be collected only on sorghum straw—by far the most important fodder in Hyderabad markets. A few substitutes were examined, such as paddy straw, dry field grass, and green grass.

Description of the Markets

Fodder markets studied are not organized or regulated as are major district and subdistrict grain markets in India. The transactions of fodder are not officially recorded. The market yard is a piece of land belonging to a group of persons who also act as commission agents. Storage facilities are not available. In several respects, the fodder markets studied are comparable to firewood markets in Hyderabad city (Dunkerley and Gopi, these Proceedings, pp 109-118).

Sitarambagh market deals only in sorghum straw and has active business only from November to July. Bowenpalli market also deals in sorghum straw and a limited quantity of paddy straw. This market too does active business from November to July. The Puranapul market in old Hyderabad city deals in sorghum straw, dry field grass, green grass, and any other type of straw that may come to the market, and is open throughout the year.

Mode of Transaction

The owner or owners of the land act as commission agents, i.e., intermediaries between the seller and the buyer. The seller displays a few bundles of his straw in front of the cart for the buyers to inspect. The commission agent proposes a price to the satisfaction of the buyer and the seller. The transactions usually take place between 0600 and 0800 hrs. There is no compulsion for the seller to part with his straw if he does not get a fair price. The commission agent allows the seller to park his cart on the land for several days if necessary. Sorghum stalk or fodder is brought in carts to these markets, mainly from surrounding villages lying 15 to 70 km away. However, in 1978—a dry year for Hyderabad—fodder also started to come in lorries over distances of 200 to 300 km, i.e., from places such as Cuddapah and Kurnool in the Rayalseema region of Andhra Pradesh. Fodder is sold on the basis of one cartload consisting of 100 bundles of stalks. Paddy straw and green grass are sold on a

per bundle or per cartload basis; the number of bundles per cart is not fixed. The commission agent charges per cart Rs. 2.50 plus five bundles of stalk (in the case of sorghum) as his fee.

As already mentioned, fodder is not sold by weight but by the cartload or bundle. A series of weighings was carried out to arrive at average bundle weights for deriving the weight per cartload.

The market treats five categories of sorghum straw in distinct fashion and they are not mixed with each other:

1. white sorghum stalk (short);
2. white sorghum stalk (medium);
3. yellow sorghum stalk (short);
4. yellow sorghum stalk (medium); and
5. yellow sorghum stalk (tall);

Seasonal Variation in Fodder Prices

There is a fairly wide variation in fodder prices across seasons, as shown in Figure 1. The vertical axis measures the price of fodder in Rs/tonne and the months are shown on the horizontal axis. Only the five varieties of sorghum have been included in this graph, as observations for paddy straw, field grass, and green grass were not sufficient to study the seasonal variation in their prices. For all the varieties of sorghum, fodder prices are highest during the dry months of May and June, and also in July. During the postharvest months of November, December, and January, prices, as expected, are lowest. Thus seasonal variation in prices of sorghum fodder is caused mainly by varying supply. Owing to the constant population of draft and milch cattle in Hyderabad (at least in the short run), demand is more or less staple throughout the year.

The graph also shows that variation in fodder prices was higher in 1977 than in 1978, because from January 1978, fodder supplies began to be drawn from a wider area, from as far away as Kurnool and Cuddapah districts, which are 300 km distant. Previously fodder was drawn only from a radius of 80 to 90 km around Hyderabad. Chopped sorghum stalks were being transported in bags by lorries and sold at the rate of Rs. 300 to 350/tonne. Buyers prefer fodder in this form, because it is convenient to store, and because there is less wastage by animals during eating. Thus fodder imported from distant places has to some extent reduced the

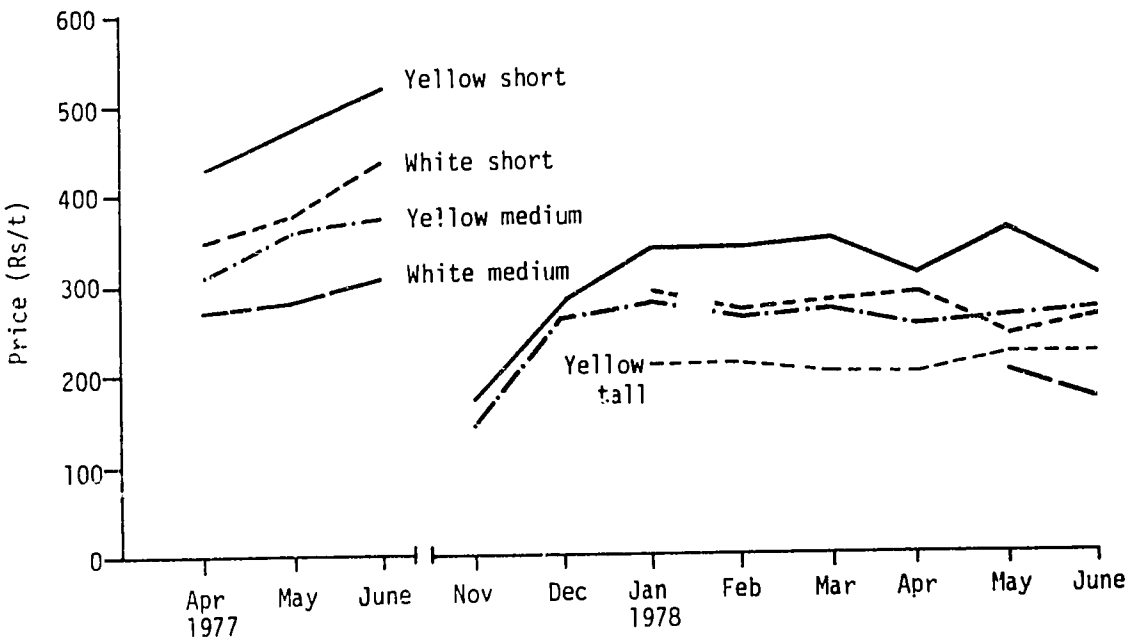

Figure 1. Seasonal variation in sorghum fodder prices in Hyderabad markets.

demand for fodder brought by cart. It also appears to have helped reduce wide fluctuations in fodder prices, particularly the steep climb during the dry months.

Comparison of Fodder Prices for Crops and Varieties

The average prices of different types of fodder for the months of April and May in 1977 and 1978 and in November 1977 are given in Table 2; prices per tonne are calculated using the per bundle weights. The average price was higher in 1977 than in 1978 during the months of April and May. Price per tonne is highest for yellow short and lowest for yellow tall, because the long, hard stalks of yellow tall sorghum cannot be fed directly to animals. They must be machine-chopped into small pieces before it can be consumed: the cost of cutting is Rs.12 for 100 bundles of straw; i.e. about Rs.25 per tonne.

Table 2 also shows the prices of paddy straw, and of dry jungle grass, which are higher priced than sorghum stalks. A very limited quantity of paddy straw comes to the market and this could be one reason for its high price. Jungle grass is used mainly for feeding horses and at its high price does not form a substitute for sorghum stalks in cattle feeding. The second part of the table shows the prices of green grass, yellow sorghum stalk, and high-yielding variety (HYV) sorghum stalk in November 1977. Green grass is sold throughout the year, except during the very dry months, and serves as a substitute for sorghum stalk during the monsoon. The price of hybrid sorghum stalk is about 30% lower than that of local sorghum stalk. Despite the large quantity of hybrid sorghum grown around Hyderabad, only negligible quantities of its straw reach the market. According to the commission agents, at least in this region, consumers are willing to buy green stalks of hybrid sorghum, but feel the feed value drops with drying and the animals are reluctant to eat the dry stalks. Similarly in this region, maize and pearl millet stalks are preferred in the form of green fodder. The common practice is to chop pearl millet, maize, and hybrid sorghum stalks into small pieces (known as "kutty") and to mix these with chopped stalks of local sorghum varieties. Yellow sorghum stalks are considered to be the most nutritious of all fodders.

Table 2. Average fodder price in Hyderabad fodder markets, 1977 and 1978

	Per cart (Rs)		Per tonne (Rs)	
Fodder type	1977	1978	1977	1978
	April May			
Sorghum Stalk				
White Short	109	80	360	270
White medium	125	92	280	200
Yellow short	108	83	430	330
Yellow medium	134	100	340	250
Yellow tall		115		210
Jungle grass	125	120	500	480
Paddy straw (per bundle)	3	2.5	540	450
	November			
Sorghum stalk				
Yellow short	70		280	
Yellow medium	105		260	
HYV	50		200	

Variation in Fodder Prices Across Space

The variation in fodder prices over space was analyzed with the help of a simple linear regression model, expressing price difference between village and Hyderabad market as a function of distance, for different sorghum types jointly.

The equation fitted was

Y = f(X, d1, d2, d3, d4)

Y = margin in Rs/tonne i.e., the difference between Hyderabad market price and village price.

X = distance from the village to the market in km.

d1, d2, d3, d4, d5 = variety dummies for different types of sorghum straw, i.e.,

d1 = white short; d2 = white medium; d3 = yellow short; d4 = yellow medium; and d5 = yellow tall (not included in the regression).

The results of this equation are shown in Table 3. We get a distance coefficient of 0.15, which means that for every 16 km, the margin increases by Rs.15.0 per tonne. In other words, as distance increases the village price decreases and eventually should equal the transportation cost. Thus the fodder prices in villages around Hyderabad are

Table 3. Regression coefficient (t-values in parentheses) explaining the difference in price between Hyderabad and village for sorghum straw as a function of distance to the urban fodder market, with dummies for quality.

Distance (km)	White short	White medium	Yellow short	Yellow medium	Intercept	R^2
0.95	34.4	5.6	18.9	1.2	19.2	0.35
(7.6)	(6.1)	(0.8)	(3.3)	(0.2)		

responding to the market prices of fodder in Hyderabad. The dummies indicate that compared with yellow tall (the excluded dummy) the two short types are significantly higher valued across space.

Relation of Fodder and Grain Prices

The relationship between fodder and grain price for different months is shown in Table 4. These data provide an estimate based on monthly average prices. The exact ratio would be derived from a given plot harvested and sold. However, this could not be obtained because the quantities and prices of grain and fodder from a particular plot are not available. As Table 4 shows, for white sorghum the fodder price is around 20% of the grain price; for yellow sorghum, around 25%. As fodder prices vary more from season to season than grain prices do, the ratio is lower during the harvest season and rises during the dry months.

The variation in monthly prices of grain and fodder is further discussed below. Table 5 gives a picture of the coefficient of variation in fodder and grain prices for white and yellow sorghum. We compare fodder prices in the Hyderabad markets with grain prices in Osmangunj market, Hyderabad, and in Kandi market (a weekly market) in Kandi village, about 50 km from Hyderabad. The coefficients of variation in monthly fodder prices are high, compared with the coefficients of variation in monthly grain prices particularly in Osmangunj market. The grain prices in a central market like Osmangunj in Hyderabad are more stable than in a local market like Kandi, because the central market draws its supplies from a wider area, grain being less bulky and thus transportable over longer dis-

Table 4. Fodder price vs. grain price[1] in Hyderabad markets.

Year/month	White sorghum			Yellow sorghum		
	Average fodder price (Rs/t)	Grain price (Rs/t)	Fodder price as % of average grain price	Average fodder price (Rs/t)	Grain price (Rs/t)	Fodder price as % of average grain price
	1	2	3	4	5	6
1977						
April	309.9	1430	21.67	370.4	1080	34.30
May	334.2	1340	24.94	362.5	1080	33.56
June	376.2	1360	27.66	370.8	1080	34.33
July	-	1360	-	-	1080	-
August	-	1390	-	-	1080	-
September	-	1400	-	-	1080	-
October	-	1450	-	-	1080	-
November	-	1460	-	156.2	1080	14.46
December	-	1520	-	252.2	1080	23.35
1978						
January	285.8	1500	19.05	309.3	1080	28.64
February	265.3	1440	18.42	282.5	1090	25.92
March	283.3	1360	20.83	306.1	1090	28.08
April	291.7	1360	21.45	280.5	1080	25.97
May	223.0	1430	15.59	356.0	980	36.33
June	218.0	1410	15.46	288.0	1090	26.42

1 Average grain price in Osmangunj market, Hyderabad

Table 5. Coefficient of variation (%) in average monthly sorghum grain and fodder prices.

Fodder/grain type	1977	1978	1977-78
White sorghum			
Fodder short	12	8	23
Fodder medium	7	9	20
Grain			
Osmangunj market	3	4	4
Kandi market	5	14	14
Yellow sorghum			
Fodder short	44	5	25
Fodder medium	34	5	24
Grain			
Osmangunj market	0	4	2
Kandi market	13	19	13

tances than fodder, which fetches per unit weight only 20 to 25% of the grain price.

Rural Fodder Markets

There are no organized rural fodder markets; however, informal transactions do take place both at the wholesale and at the retail level. Farmers with surplus fodder or grain sell small quantities to landless laborers or needy farmers from time to time. The situation with regard to availability of fodder is somewhat different at the village level than in the urban areas. Plenty of grazing land is available, besides fodder from pulse crops and other minor crops. In Table 6 we report retail grain and fodder prices for local and HYV sorghum, as compared with prices for rice paddy and paddy straw in three villages of India. These prices are for the years 1980-83 and were obtained from the Village-Level Studies (VLS) of the ICRISAT Economics Program.

Grain and fodder prices are highest in Shirapur village; the ratio of fodder to grain price is also highest in Shirapur village (28%), while it is 19% in Aurepalle, and only 13% in Kanzara. Prices are probably high in Shirapur because soil and rainfall conditions are less favorable (rainfall below 700 mm) than, for instance, in Kanzara, which has more assured and higher rainfall (above 700 mm). Biomass productivity is higher in high-rainfall areas; also, in low rainfall areas, the dependence on fodder for use and marketing may be high. Although the data set is small, we have plotted fodder prices against rainfall in Figure 2. We find a

Table 6. Retail prices (Rs/t) of grain and fodder of local sorghum, HYV sorghum, and local rice paddy in three villages of SAT India, 1980-83.

	Sorghum local			Sorghum HYV			Rice paddy local		
Village/year	Grain	Fodder	FP[1] (%)	Grain	Fodder	FP[1] (%)	Grain	Fodder	FP[1] (%)
Kanzara, Maharashtra									
1980	1300	140	11	1140	120	10			
1981	1880	320	17	1620	300	19			
1982	1570	140	9	1250	100	8			
1983	1570	190	12	1280	130	10			
Mean	1580	200	13	1320	160	12			
Shirapur, Maharashtra									
1980	1570			1170					
1981	2010	560	28	1750	260	15			
1982	2060	550	27	1690	290	17			
1983	1960	460	23	1590					
Mean	1900	520	28	1550	270	18			
Aurepalle, Andhra Pradesh									
1980	980	220	22	830			1260	340	27
1981	1330	280	21	1140			1520	460	30
1982	1290	190	15	1020			1440	290	20
1983	1310	200					1530	450	29
Mean	1230	230	19	1000			1440	380	27

1. indicates fodder price as % of grain prices.

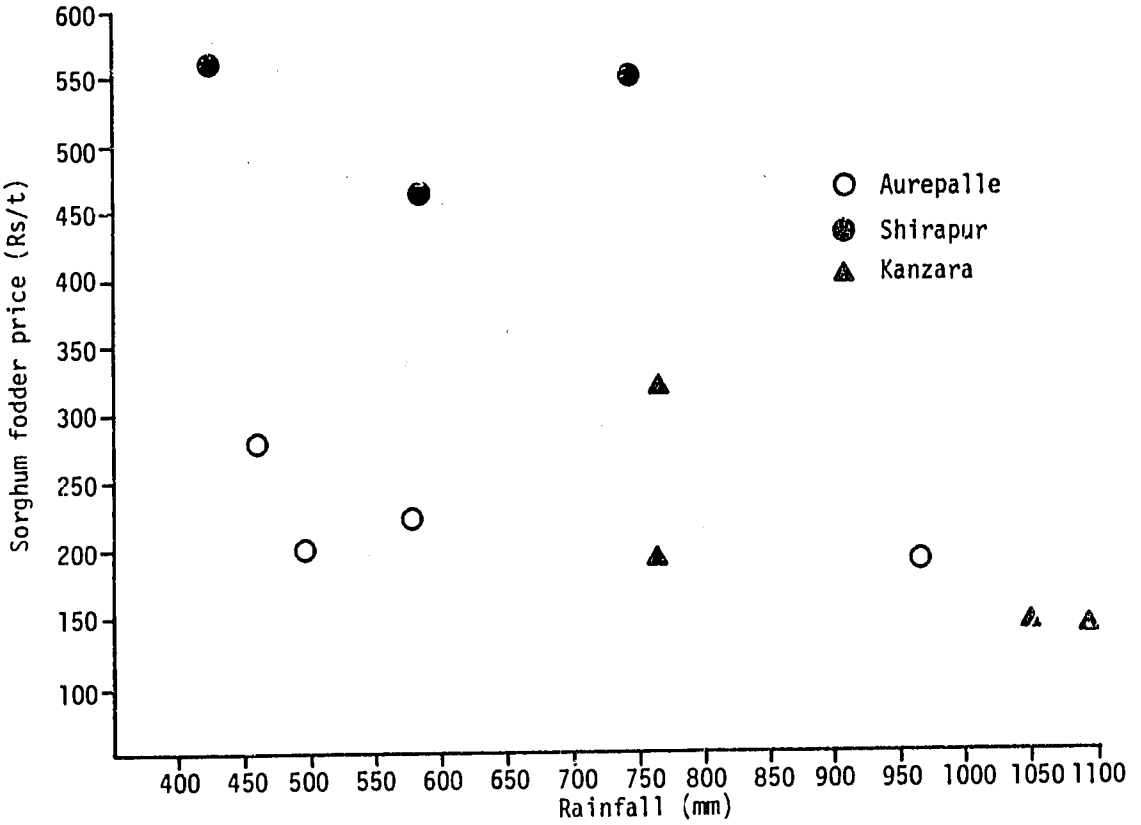

Figure 2. Relationship between sorghum fodder price and rainfall in three SAT villages in India.

strong negative correlation between fodder prices and the amount of last year's rainfall (1 year lagged rainfall). This relationship is not so strong with respect to grain prices. Table 6 also shows sorghum HYV grain and fodder prices for Kanzara and Shirapur. On an average, HYV sorghum grain prices are 16% lower than local sorghum grain prices in Kanzara and 18% lower in Shirapur. Fodder prices are 20% lower in Kanzara and 47% in Shirapur. These price differences between HYV and local sorghum grain and straw could be owing to differences in quality; this needs to be investigated. The prices of paddy straw in Aurepalle are higher than local sorghum straw.

Value of Grain and Straw of Sorghum

One of the objectives of this study was to assess the relative values of grain and fodder. Once we know the yield of sorghum grain and stalk from a particular plot, the total value of output can be worked out. In Table 7 we report data on sorghum grain and fodder yields for both locals and HYVs in Kanzara village in Maharashtra state, average for the years 1975-78. The figures were obtained from VLS data schedules collected by the ICRISAT Economics Program. The farm harvest prices prevailing in those years in Kanzara village are used to arrive at the value of produce. We find that the total value of produce for local sorghum is about Rs 971/ha, grain contributing 64% and fodder 36% to total value. The comparable figures for sorghum HYV's are Rs 1323 for total value of produce, 82% from grain; only 18% from fodder. The additional Rs 351/ha of total value for HYVs is not high, considering the additional cost of growing them. The higher grain value is to some extent offset by the lower fodder value.

While the absolute quantity of fodder produced from HYV sorghum may not be less than that of

Table 7. Comparison of fodder and grain values between local and high-yielding varieties of sorghum in Kanzara village, 1975-1978.

Product	Item	Sorghum variety	
		Local	HYV
Grain	Yield (t/ha)	0.56	1.14
	Price (Rs/t)	1100	950
	Value (Rs/ha)	616.0	1083.0
		(63)[1]	(82)
Fodder	Yield (t/ha)	2.63	2.18
	Price (Rs/t)	135	110
	Value (Rs/ha)	355.0	239.8
		(37)	(18)
Total (Grain and fodder)	Value (Rs/ha)	971.0	1322.8
		(100)	(100)

1 Figures in parentheses indicate percentage of total value of production

local types, the nutritive value of the HYV straw is considered to be so low that it has only very limited value as a fodder. In a study conducted by the Home Science College, Hyderabad, for Andhra Pradesh state, it was found that farmers' selection of a sorghum variety was based not only on grain yield and quality but also on fodder yield and quality. The height of plant and stem thickness are preferred characteristics of sorghum straw mentioned by the cultivators (Pushpamma et al. 1981).

Conclusion

There is a well-functioning fodder market in Hyderabad and in the villages. To supply the large cattle population in the city with fodder, sorghum straw is being transported by bullock cart from villages 15 to 70 km and recently, by truck from regions more than 200 km away. The fodder market reveals a number of important aspects for planners and decisionmakers, as well as researchers. The fodder market permits us to estimate the relative values of fodder and grain from sorghum; the importance that farmers attach to sorghum fodder should be of concern to plant breeders who develop improved varieties. Selection criteria ought to include fodder value, as well as level and stability of grain yield and value.

The fodder market in Hyderabad may—in the long run—get reduced, as milk suppliers from centrally organized milk collection schemes increase and replace the more expensive system of transporting fodder for local milk production. On the other hand, cheaper means of long-distance fodder transport by truck may extend the viability of urban milk production.

Fodder is a relatively bulky commodity and consequently the spatial and temporal variability of fodder prices is relatively higher than, for instance, of food grains. As with firewood, fodder shows price patterns that clearly reflect the local conditions determining supply (soil, rainfall) and demand (population densities). These patterns need study for the formulation of location-specific plans, for designing cropping patterns, etc., and for determining priorities.

Acknowledgements

The author acknowledges comments on earlier drafts of this paper by N.S. Jodha and M. von Oppen. The usual caveat holds.

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Fuelwood Markets in Hyderabad

Joy Dunkerley and K. N. Gopi*

Summary

Surveys were undertaken of the distribution chain of firewood and charcoal from forest or charcoal maker to final consumer, incorporating the wholesale and retail trades and household purchases. The study focused on (a) estimating the quantity of firewood and charcoal arriving in Hyderabad in 1981, (b) analyzing the organization and structure of the trade, (c) analyzing household energy consumption, and (d) projecting fuelwood consumption to the year 2000. In this paper we concentrate on the methodology of the survey and the organization of the trade. We conclude that the fuelwood trade is predominantly in private hands, without much evidence of government regulation, and that it is highly organized with several specialized branches. An examination of the efficiency of these markets suggests that they work well, although there could be some improvements.

Résumé

***Les marchés du bois de chauffage à Hyderabad** : Des travaux ont été effectués afin d'étudier l'ensemble du circuit de distribution du bois de feu et du charbon de bois—à partir de la forêt ou du fabricant de charbon jusqu'au consommateur final—comprenant aussi bien les commerces de gros et de détail que les achats domestiques. L'étude a été axée sur : a) évaluation de la quantité de bois de feu et de charbon de bois arrivant à la ville de Hyderabad pendant l'année 1981; b) analyse de l'organisation et de la structure du commerce; c) analyse de la consommation énergétique au niveau des ménages; d) projection de la consommation en bois de chauffage jusqu'à l'an 2000.*

Cet article traite essentiellement des méthodes d'étude utilisées et de l'organisation du commerce. En conclusion, on constate que la quasi-totalité du commerce de bois de chauffage est dirigée par le secteur privé, la réglementation gouvernementale étant peu évidente, et que ce commerce représente une organisation très élaborée avec plusieurs branches spécialisées. Un examen de ces marchés du point de vue de leur efficacité laisse à croire qu'ils fonctionnent bien, quoiqu'on pourrait y apporter quelques améliorations.

Introduction

Fuelwood, in the form of firewood or processed into charcoal, is a major form of energy in the developing world. It is estimated to provide about 30% of total energy consumption, second only to petroleum, which accounts for 40%. In most developing countries the share of fuelwood is declining but consumption, in absolute terms, continues to rise, probably in line with population growth.

There are potentially two major problems associated with fuelwood consumption—deforestation and the burden of energy costs on the poor who are the main users of firewood. These problems have been exacerbated by the rise in oil prices. Before 1973, cheap, often subsidized, kerosene could substitute for fuelwood and thus relieve pressures on forest resources and on urban and rural poverty. Since 1974, the sharp rise in oil prices means that this is no longer an affordable option. Even worse, the rise in kerosene and other energy prices might be expected to encourage substitution in the opposite direction thus aggravating the deforestation and social problems.

* Resources for the Future, Washington DC, USA, and Osmania University, Hyderabad, India, respectively.

ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 1985. Agricultural markets in the semi-arid tropics. Proceedings of the International Workshop, 24-28 October 1983, ICRISAT Center, India. Patancheru, A.P.502324, India: ICRISAT.

Despite the importance of these problems, little is known about fuelwood use and markets, particularly in urban areas. The purpose of this study of the fuelwood trade in Hyderabad is, therefore, to fill part of this gap in knowledge of urban fuelwood use. Although the study is restricted to one city, its conclusions may throw light on urban firewood use in other areas owing to similarities in fuelwood problems observed across many countries. Additional information on fuelwood use is needed at this time, because many countries and international organizations are planning to make major investments in this area.

The large study had four main purposes—estimating the quantity of firewood and charcoal arriving in Hyderabad in 1981, analyzing the organization and structure of the trade, analyzing household consumption of cooking fuels and projecting consumption to the year 2000. In this paper we shall focus on the estimated amount of fuelwood entering the city and the organization and structure of the trade.

Methodology

Data were gathered through survey methods and questionnaires described below.

The Entry Point Survey

The objective of the entry point survey was to establish the quantity of firewood and charcoal entering the city, to be used as an independent check against data derived from other surveys.

This was achieved by administering a short questionnaire to drivers of trucks and bullock carts entering the city. Four questions were asked—the quantity of firewood or charcoal transported, the value of the firewood and charcoal, the place of origin (the nearest village) and the type of wood (whether logs or chipped bundles). Data on mode of transport (whether trucks or bullock carts) were also recorded.

The questionnaire was administered at ten entry points—one on each of the ten major roads leading into the city. All entry points were located on the periphery of the city. At each location on the ten arterial roads, a round-the-clock count of vehicles carrying firewood and charcoal was made on 21 randomly selected days spread over all the seasons of the year, winter, summer, and monsoon.

Some types of supplies were not covered by the point-of-entry survey; these include supplies arriving by rail and by minor roads. Reliable data on quantities of firewood and charcoal brought in by rail, in practice almost entirely charcoal, were obtained directly from the railway authorities. There was no feasible way to survey fuelwood traffic on minor roads. It is therefore quite possible that a considerable number of vehicles carrying fuelwood on these roads are not included in the count. This may be particularly true of bullock carts coming from the nearby villages. Furthermore, the entry-point survey did not cover supplies generated within the area defined by the entry points.

Survey of Commission Agents

Commission agents, who meet the trucks and bullock carts carrying wood entering the city and auction their contents to retailers, fulfill the initial step of the distribution chain. A questionnaire was administered to all 15 commission agents. The objective of this questionnaire was to establish the amount of wood entering the city—it was assumed that by far the larger part of the total passed through their hands.

The original questionnaire was designed to elicit data on what are usually considered to be characteristics of the wholesale trade—type of ownership, capital investment, number of employees, etc. It was quickly found, however, that the wholesale function as carried out by the commission agents is rather different from the traditional mold. Acting as intermediaries between buyer and seller, they have no permanent office space, virtually no capital invested, and no permanent employees. Many of the original questions were found, therefore, to be irrelevant and information was sought solely on quantities bought and sold and on prices.

Charcoal Wholesaler Survey

The purpose of the charcoal wholesale trade questionnaire was to find out how much of the total quantity of charcoal entering the city of Hyderabad passed through the hands of wholesalers and to elicit data on their scale of operations, and their financial and other relations, with both sources of supply and customers. As there are only six licensed charcoal wholesalers in the city, all were interviewed.

Retail Traders Survey

The objective of the retail traders survey was to find out how much of the total quantities of firewood and charcoal used within Hyderabad passed through the hands of the retail traders, to obtain data on the structure of the trade and to find out about the conditions of purchase and sale, including credit.

A complete census was made of the retail traders in firewood and charcoal in the city. A census rather than a sample was preferred, because it could provide an additional check on the volume of firewood and charcoal arriving in the city. A list of all firewood and charcoal retail traders was obtained from the Hyderabad Municipal Corporation. Such establishments deal exclusively in one or both of these fuels, but do not include the much greater number of general stores that carry wood and charcoal as well as a wide range of other goods. It was felt that if only the wood/charcoal establishments were surveyed, the survey would be seriously incomplete and in practice would cover only the large and more specialized establishments whose functions in the distribution chain might be more akin to wholesale functions. It was, therefore, decided to identify and survey all retail establishments selling charcoal and firewood, including those not appearing on the municipal list.

Commercial Consumers Survey

In surveying final consumers of charcoal and wood we distinguished between commercial and household consumers and administered a different questionnaire to each group. Commercial consumers include hotels, restaurants, bakeries, sweetmeat shops, artisans, etc. The objective of the commercial consumers' questionnaire was to elicit information on quantities of firewood and charcoal used, including sources and prices. Inquiries were also made on preferences for other fuels. A sample of 299 commercial consumers, or about 18% of all commercial establishments were surveyed.

Household Consumers Survey

The objective of this questionnaire was to elicit information on the type of cooking fuel used in the household (firewood, charcoal, gas, kerosene, coal, coke, others), the source, and prices of these fuels. In addition, information was gathered on socioeconomic characteristics (caste, religion, educational level, income and occupation, household facilities and appliances) which can be related to patterns of energy consumption.

Given the large number of households and the need to keep the sample size as low as possible for cost and time considerations without sacrificing accuracy of data, a rigorous probability sampling frame was used. We were able to benefit here from an earlier social area analysis of the city carried out by the Department of Geography, Osmania University.[1] Using this preliminary study, we felt justified in holding down the sample to 1809 households, chosen randomly but on a population-weighted basis from the four social areas, representing 0.48% of the total households in the city in 1981. In selecting the sample households we included only those houses which bear municipal numbers. As a result a large number of dwellings located in slum areas, which do not have these numbers, were excluded from the sample. This fact has been taken into account in estimating the domestic consumption of firewood in the city.

Size and Flows of the Markets

The information derived from these questionnaires on firewood and charcoal flows (Figs. 1 and 2) may be summarized as follows:

- About 137 000 tonnes of firewood was consumed in Hyderabad, about 65 kg per capita. These figures seem low, compared with estimates for other cities. Given the visible absence of trees, however, experienced observers in the Hyderabad area are surprised at how high it is.
- About 21 000 tonnes of charcoal are used.

These estimates are arrived at through reconciling the often very different results yielded by the individual questionnaires. For firewood, the gap between estimated consumption and supplies was some 35 000 tonnes (attributed to cart entries on minor roads, supplies generated within Hyderabad, and "unaccounted"). With charcoal, the estimate of arrivals was substantially higher than estimated consumption.

- Private sources (i.e. nongovernment reserve

1 S. Manzoor Alam and Waheeduddin Khan 1972. Metropolitan Hyderabad and its Region. Bombay, India: Asia Publishing House.

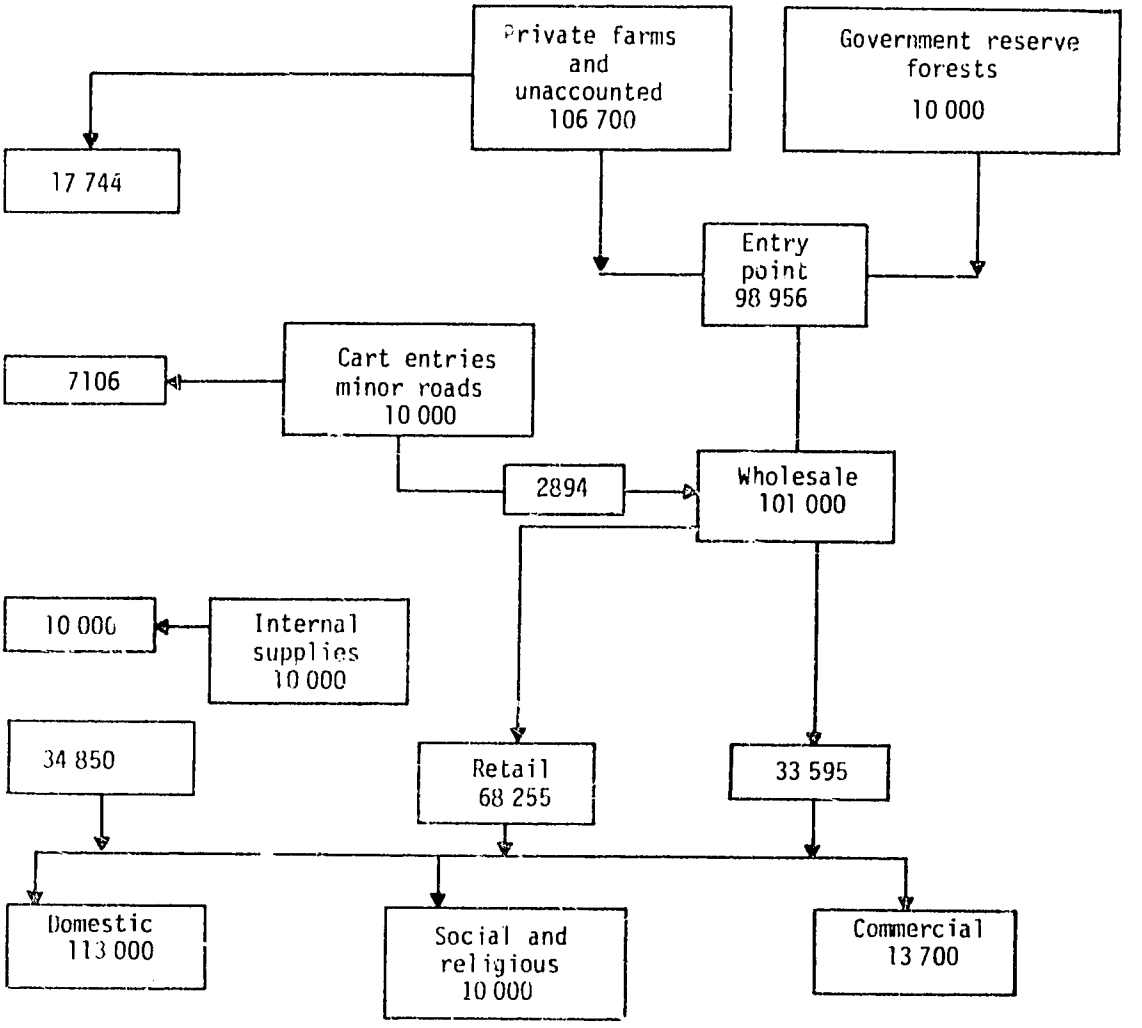


Figure 1. Flow of firewood (tonnes) into Hyderabad city, India, 1981.

forests) are by far the major source of firewood. Most pass through the wholesale center (less through the retail market), but substantial supplies (about 25%) arrive directly from producers to consumers.

- Most charcoal supplies pass directly from "producer" to consumer, even though retail centers are also a major source of supply. Wholesale centers are relatively unimportant.
- Trucks are the major form of transport for wood; rail for charcoal.
- In firewood, domestic consumers are the largest of the final consumers. In charcoal, commercial consumers are the largest. The household survey indicated that firewood was a major source of fuel only in the lower income households. Relatively small amounts of charcoal are consumed in households over a wide range of incomes.
- For firewood there are many (139) sources of supply, geographically dispersed in all directions from Hyderabad. Those areas of supply to the south of Hyderabad are much closer to the city than those to the north, and provide the bulk of firewood supplies. Sources of supply vary considerably in distance from Hyderabad. Firewood supplies originate both close to Hyderabad (i.e., under 50 km) and also from a much further distance (over 150 km).

- There are fewer sources of supply of charcoal—17, compared with 139 sources of supply for firewood. The distances from Hyderabad are much greater—a weighted average of 224 km, compared with 88 km for wood. As costs of wood transport are high, there is, after a certain distance, a strong incentive to convert wood into charcoal which weighs less in relation to the caloric value.

The Structure of Wholesale Markets

Firewood

The firewood centers have no permanent structure, nor are they open yards like a rural marketplace. These are merely areas adjacent to major roads where sellers, buyers, and the commission agents (in effect auctioneers) meet traditionally to transact business. The business transactions take place in the early hours of the day. In less than 2 hours, depending upon the volume of firewood on a particular day, the area is cleared of the stock of wood.

The 15 commission agents, acting as intermediaries, auction the firewood by the truckload in these wholesale centers. It is an informal activity, completely free from any regulatory control. Most commission agents operate individually. There is only one case of a partnership. The commission agents maintain no establishments like an office, nor do they have any investment in the activity. Their hiring is limited to the services of one man for a few hours. Their earnings on a particular day will depend on the number of trucks and bullock carts carrying firewood arriving at the center. The sellers pay a fixed commission (currently 10 rupees per truckload) to the commission agent for his services.

There are six wholesale centers in the city—Mushirabad, Chadarghat, Dabirpura, Yakutpura, Chatrinaka, and Jumerat Bazaar (Fig. 3). Five of these centers are situated to the south of the city. Dabirpura and Jumerat Bazaar, both located near the historical core of the city, are the leading wholesale centers of firewood in the city. Each accounts for about 35 000 tonnes, or about 35% of the total firewood arrivals in the city. Musheerabad and Chadarghat are medium-sized markets dealing with about 10 000 tonnes each, or 10% of the total.

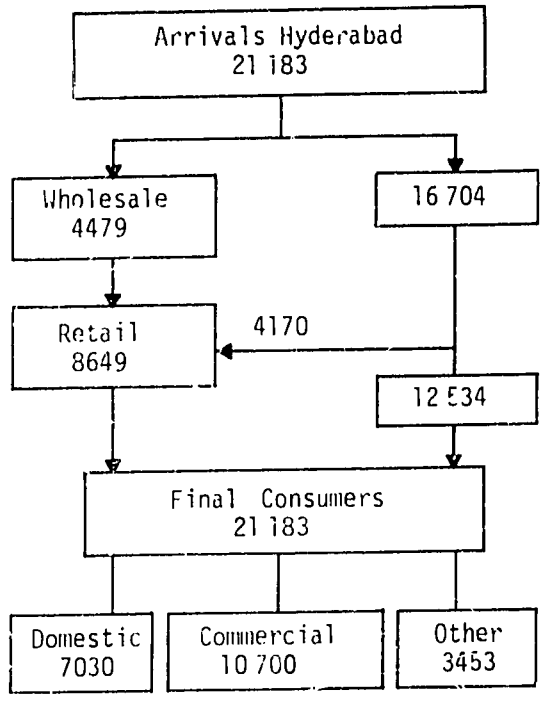


Figure 2. Flow of charcoal (tonnes) into Hyderabad city, India, 1981.

The other two, Chatrinaka and Yakutpura are very small, handling only 1000 to 2000 tonnes annually of low-quality wood delivered mainly in bullock carts.

Because of the importance of transportation costs, the location of these markets is influenced by proximity to both sources of supply and markets. Thus one of the major markets, Dabirpura, and three of the smaller markets are situated on the south and east side of the city at the convergence of roads carrying about 60% of all arrivals. These markets benefit not only from being relatively close to source of supply, but also from being near to final consumers in the densely populated areas of the city. On the other hand, Jumerat Bazaar, also a major market, is to the west of the city, across town from the major arrival roads. In this case the major locational consideration must be proximity to a major market—again a poor, densely populated part of the city. In addition, Jumerat Bazaar is close to the Hindu cremation ghat near the bank of the river, which uses significant quantitites of firewood.

There is some variation in price among the different wholesale centers. Chatrinaka, which handles

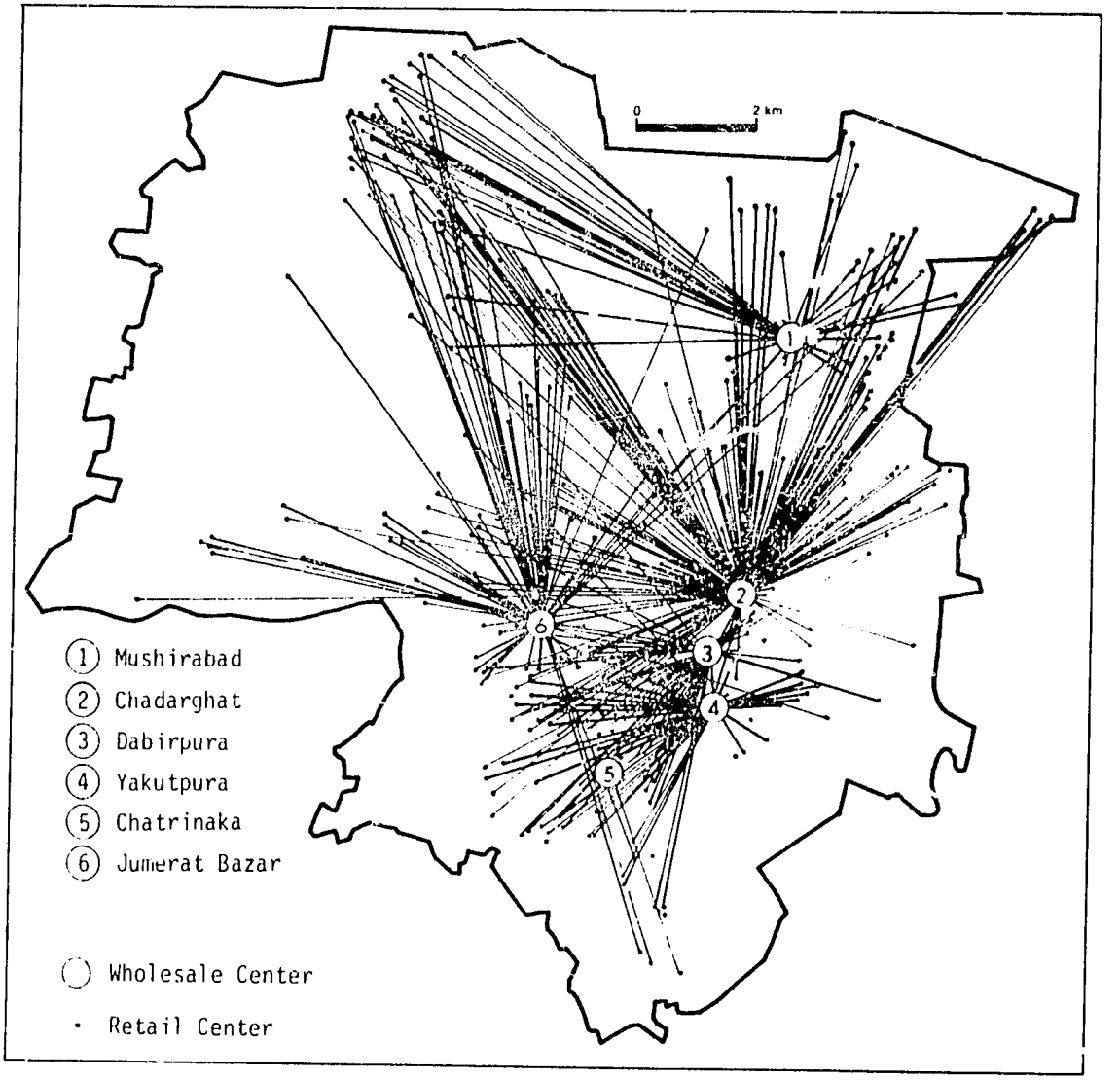


Figure 3. Fuelwood supply to retail outlets by whosesale centers, Hyderabad, India, 1981.

poor quality wood—twigs and chipped bundles—is

the early 1970s, but has risen steadily since 1975;

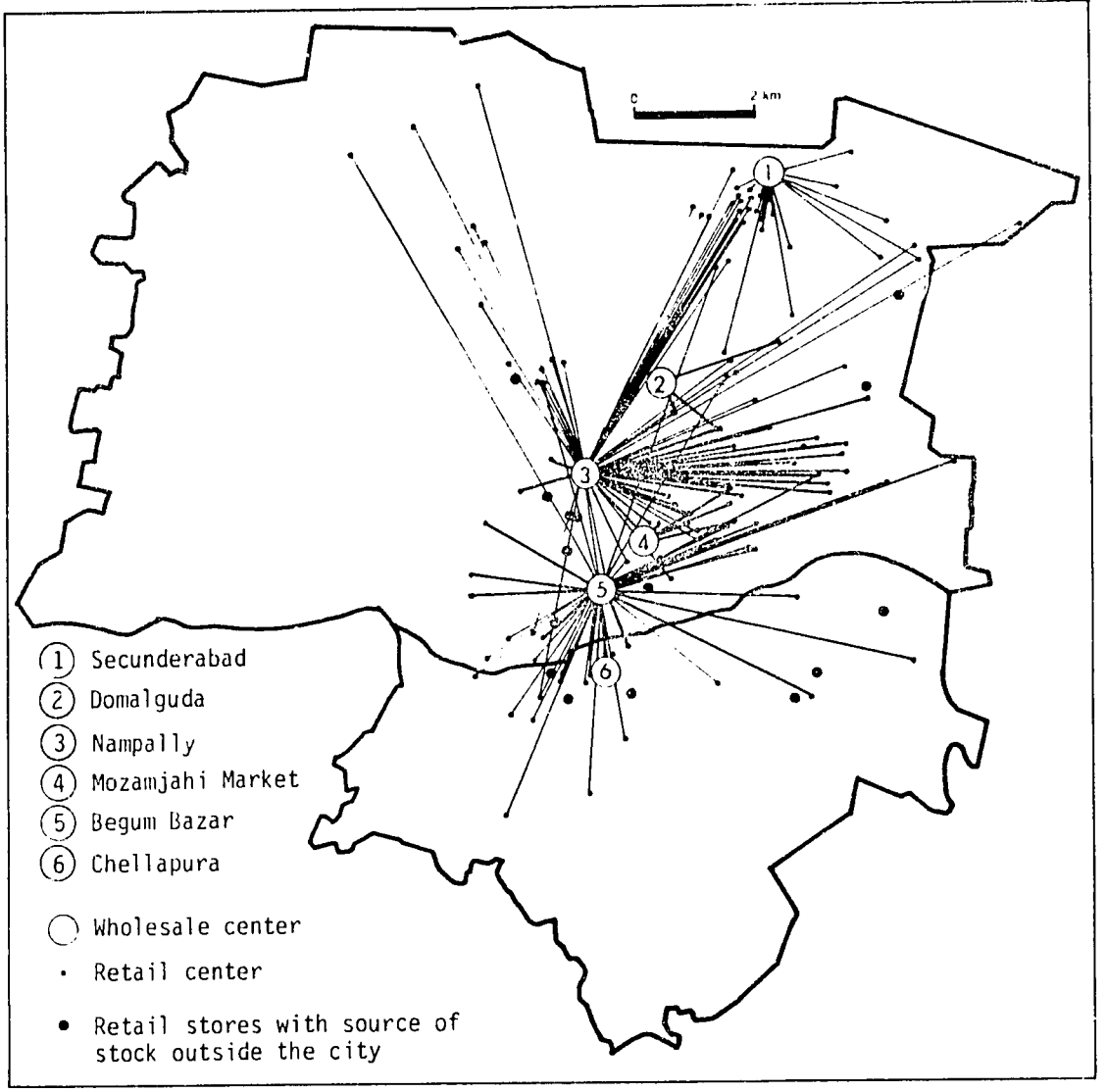


Figure 4. Charcoal supply to retail outlets by wholesale centers, Hyderabad, India, 1981.

far, the largest charcoal wholesale center is Nam-

wholesale centers are clustered. Most of the char-

nership. All the shops have substantial space (over 200 m^2), both covered and uncovered. Only one shop space is owned by the shopkeeper, while the remaining six are in rented premises. The monthly rent paid by the wholesalers for shop space varies from Rs 18 to 400 per month. The investment in the wholesale trade ranges from Rs 3000 to 25000, with an average of Rs 9700. Four of the shops employ regular workers, while the others engage workers periodically as and when required. All of the traders have been in business for a long time—five for more than 10 years, and the other two for more than 5 years.

There is considerable variation in prices of charcoal between the different centers. The highest-price center, Mozamjahi Market, has average prices 40% higher than the lowest-price center, Nampally. Some of these variations may be owing to quality differences, but this is unlikely to be as important a factor as in the case of firewood. By far the lowest charcoal prices are at Nampally, the largest of the charcoal centers. This could be owing to the center's location close to the railway station, well situated to buy charcoal at much lower transport costs. Prices at the Secunderabad wholesale center, also close to the railway station, are relatively low, though still higher than Nampally. The Nampally center may also benefit from high turnover, which permits lower wholesale margins.

As with firewood, prices of charcoal at wholesale centers declined in real terms from 1972 to 1975. In subsequent years the price of charcoal rose, though by much less than firewood and, owing to a 7% decline in 1981, is currently not much higher (in real terms) than in 1975.

The Structure of Retail Markets

Firewood

number of establishments, the scale of operations is typically small. The average investment is Rs 2800. About 75% of the retail outlets are owned by individuals, and 25% by families. Less than 1% are owned and managed on a partnership basis. A large number of the retail shops are managed by women. In general, the income from the firewood trade supplements the family income rather than providing the main source of family income.

As in other branches of the firewood trade, the location of retail establishments can be related both to their sources of supply and to the location of the final consumer, mainly households. Figure 3 shows the spatial relationship between retailers and sources of supply, the wholesale center. While many retailers clearly buy at the wholesale center closest to their establishments, a substantial number buy from wholesale centers much farther away. Thus, several retailers in the southeast buy from Dabirpura even though Jumerat Bazaar is much closer. Similarly, many retailers in the northeast bypass Musheerabad to make their purchases at Chadarghat, 6.4 km further across town. This could be because of lower prices, and furthermore, the costs of transport may be less critical here than in other stages. As we have seen, the purchaser at the wholesale center—that is, the retailer—takes delivery of his truckload of wood and it is transported to his premises by the same truck. The cost of extra distance traveled—say the difference between 2 and 4 km—may be relatively unimportant.

Figure 3 also indicates that retail outlets are not located at regular intervals in metropolitan Hyderabad, but are clustered in the center of the city, the poorest part.

There is a close correlation between socioeconomic status and location of retail shops. The retail outlets are, as might be expected, clustered in those areas of relatively low income where the demand for firewood is greatest. In that area, few

well as 57 retailers who sell both charcoal and wood. Their average investment appears to be much higher, at about Rs 4000, than in firewood retailing. As in firewood, though there are retail locations throughout the city, there is greater concentration in the central city.

Most retailers obtain supplies from relatively distant wholesale centers—Begum Bazaar and Nampally as can be seen in Figure 4. This is most noticeable to the north of Secunderabad, where retailers within 0.5 km of Secunderabad will travel 6 km to Nampally for their supplies. The vast majority of retailers, seemingly regardless of distance, obtain their supplies from Nampally and Begum Bazaar. The reason for this preference is partially based on price—Nampally is the cheapest, but may also be based on the services—casual labor, transport, etc.—available in a large center. As far as we know, there is no credit relationship between wholesaler and retailer which plays a role in determining sources of retailer supplies.

Unlike the retail price of firewood, the retail price of charcoal shows considerable variation. Except for 1972 and 1973, retail prices in Hyderabad south were much lower than in other areas, and prices in Secunderabad were consistently higher than those in Hyderabad north, especially in recent years. It is not clear whether the prices in Secunderabad are because of higher quality of product or pricing strategies that take advantage of a more affluent market.

Table 1 Estimated components of final consumer price (Rs) of 1 metric tonne of firewood, Hyderabad City, India, 1981.

	Cost component	Rs
1.	Cost price at Warangal forest circle (150 km from the city)	61.3
2.	Cost of transportation	85.5

as marked as the rise in wood prices. Two reasons can be advanced for the difference in trend. First, because of the large element of value added in charcoal production, even a sharp increase in the costs of fuelwood input will be much diluted in the cost of the manufactured charcoal, and, because charcoal can bear heavy transport costs, it is possible to bring it from distant areas, where costs may be significantly lower than in Hyderabad. Second, the growth of the retail purchases directly from producers may have kept prices down. If a retailer buys directly from the producer, the margin charged by wholesalers is avoided.

The Efficiency of These Markets

As firewood is the staple fuel of the poor, it is very important that prices should be as low as possible, and not inflated either by excessive profits or by an otherwise inefficient distribution system. As background to our discussion, we present in Table 1 the estimated components of the final consumer price (in rupees) of 1 tonne of firewood. The cost of the wood at the forest is about 18% of the consumer price. Transport from the forest to the city gate accounts for 25%, retailers overhead charges for 12%, and the remaining 45% is accounted for by the profits of forest contractors, commission agents, and retailers. In the absence of comparative data, it is difficult to assess the significance of these percentages. However, the mark-ups of the forest contractor and commission agents combined, which add 62% to the cost of the firewood in the low-overhead wholesale auctions, seem high.

The broad question is therefore: are firewood and charcoal markets competitive and thus able to provide consumers with wood fuels that are as cheap as possible, consistent with efficient service? As we have seen, there are several stages in the marketing process of both firewood and char-

that, consequently, it would not be possible for a few suppliers to dominate prices.

On the other hand, as firewood is a bulky commodity that can be carried for long distances only with difficulty, consumers have every incentive to buy at the outlet nearest to their house. In this sense, a firewood retailer could be said to have something of a spatial monopoly. Even this monopoly is limited by the possibility of transporting firewood from a more distant market, which may not in fact be so expensive, given the large variety of transport modes available for short haul.

Furthermore, there is evidence that final customers can bypass firewood and charcoal markets by buying directly from wholesalers. We estimate, for example, that retail markets handle only 50% of total firewood supplies, and 40% of charcoal.

The consumer has an additional protection of switching to other forms of fuel if firewood and charcoal are considered to be too expensive. This may not be a viable solution for the poor because of the cost of changing appliances, though they could benefit indirectly by the switching of other, higher-income groups. All this assumes, of course, that supplies of other fuels can be made available.

While there may be some competitive protection for consumers at the retail level of the fuelwood trade, the position is more ambiguous at the wholesale level for firewood. On the face of it, this process is quite competitive. Supplies from all sources arrive at the informal auction sites for immediate disposal by the commission agents. However, very little is known about the working of this market, or whether there is complete freedom of entry into the auctioneering business. One way of achieving greater knowledge of the process, without damaging the existing system, would be for the Forest Service to sell its wood directly in the auction markets rather than through a forest contractor. This would have the advantage of avoiding some of the difficulties experienced by the Forest Service in

fuelwood market by Manzoor Alam and K.N. Gopi of Osmania University and Joy Dunkerley and William Ramsay of Resources for the Future, sponsored by the Rockefeller Foundation. The authors wish to express their thanks to Elizabeth Davis of the University of Michigan for assistance in the research, and to Angela Blake of Resources for the Future for manuscript preparation.

Summary

Marketplaces may be defined as "an authorized public gathering of buyers and sellers of commodities meeting at an appointed place at regular intervals." One of their main characteristics is a large number of simultaneous person-to-person transactions of relatively small quantities. Marketplaces perform three basic functions: (1) the import of goods to the local region and their retail distribution; (2) the bulking and export of goods from the local region; (3) the exchange of goods within the local region.

The role of marketplaces varies not only between industrial and developing countries, but also within the Third World. It depends to a great extent upon the general socioeconomic and political pattern of the respective region, and may alter considerably as economic and technological development takes place. Closely related to this is the question of periodicity and, more generally, the hierarchical order of marketplaces as part of a central place system.

In regions of small farmers' agricultural production and traditional transport facilities, many small periodic markets will supply the rural population with (industrial) goods not produced within the region. Simultaneously, the marketplace will serve as a bulking point for any excess production of food or of cash crops for export. With modern road transport, however, the hierarchy of the market system will change; the wholesale function will be reduced as traders can collect cash crops directly from farmsteads and the rural population can also visit larger market centers.

In this connection the social stratification of marketplace participants (vendors and customers) is an important aspect. For instance, not all of the part-time traders are local producers selling their goods; they may be persons supplementing a meager income through part-time trading.

Although the marketplace has been ideally described as open, free, and rational—the economist's "perfect market" where price is determined only by the forces of supply and demand—public administration interferes in most countries in one way or another.

Thus, although it is certainly true that in Third World countries the markets are very important elemental components in the spatial articulation of economic and social activities, their changing role for wholesale and retail trade, in rural and urban environments, and for different strata of the population should be evaluated in the context of the general stage of development in any particular country or region.

Résumé

Le rôle des marchés dans les pays en développement : Le marché peut être défini comme "un rassemblement public autorisé d'acheteurs et de vendeurs de produits, se réunissant à un lieu convenu à des intervalles régulières." Une caractéristique principale des marchés est le nombre très élevé des transactions simultanées entre personnes de quantités relativement peu importantes. Les marchés accomplissent trois fonctions essentielles : (1) l'importation des biens à la région locale et leur distribution en détail; (2) l'entassement et l'exportation des biens à partir de le région locale; (3) l'échange des biens à l'intérieur de la région locale.

Le rôle des marchés varie non seulement entre les pays industrialisés et les pays en voie de développement, mais aussi à l'intérieur même du Tiers-Monde. Il est déterminé, dans une grande

de cultures commerciales destinées à l'exportation. Cependant, les moyens de transport modernes auront pour effet de modifier l'hiérarchie du système de marchés. Par ailleurs, la fonction de gros sera réduite car les commerçants peuvent ramasser les récoltes directement sur les fermes, et la population rurale peut aussi visiter les centres de marché plus importants.

La stratification sociale des participants au marché (vendeurs et clients) constitue un aspect important. Par exemple, les commerçants à temps partiel ne sont pas tous des producteurs locaux vendant leurs marchandises; ils peuvent constituer des personnes qui supplémentent leur revenu insuffisant grâce au commerce à temps partiel.

Quoique le marché soit idéalement qualifié d'ouvert, libre et rationnel—le "marché parfait" où les prix ne sont déterminés que par les influences de l'offre et de la demande—l'administration publique y intervient d'une façon ou d'une autre dans la quasi-totalité des pays.

Par conséquent, bien que les marchés constituent des composantes élémentaires très importantes dans l'articulation spatiale des activités sociales et économiques des pays du Tiers-Monde, le rôle de ces marchés pour le commerce de gros et de détail, dans le milieu rural et urbain, ainsi que pour les diverses couches de la population, doit être évalué dans le cadre du développement global de n'importe quel pays ou région.

While most papers presented at this workshop deal with either the marketing of single commodities or the general marketing system of a certain area or country, this paper deals with the marketplace in general. The marketplace may be defined as a public gathering of buyers and sellers of commodities meeting at an appointed or customary location at regular intervals (Hodder 1965). One of its main characteristics is a large number of simultaneous person-to-person transactions of relatively small quantities each.

In the last two decades, numerous studies concerning periodic markets have been published by geographers and other social scientists (cf. Bromley 1974, 1979), many of whom take part in the International Geographical Union Working Group on Marketplace Exchange Systems. Among the major research themes are: the network and hierarchy of marketplaces; the periodicity of market meetings; the social and economic characteristics of participants in marketplace trade; the rationale, and particularly the various theoretical expositions, of periodic marketing, the role and the future of periodic markets in an increasingly commercialized world, etc.

The first part of this paper summarizes a number

Marketplaces perform three basic functions with respect to physical produce:

- the import of goods to the local region and their retail distribution;
- the bulking and export of goods from the local region; and
- the exchange of goods within the local region.

However, the relative importance of these functions may be quite different from one marketplace or market system to another. Therefore, the economic and social role of marketplaces in developing countries is not straightforward or easily generalized.[1] Differences in this role are also very pronounced within the so-called Third World. These differences depend to a great extent upon the general socioeconomic and political pattern of the region, and they may alter considerably over time, with economic and technological development.

Cultural anthropologists have traditionally considered the evolution of trading as beginning with small-scale interperson exchange on an intracommunity level. In time there occurs an expansion in the scale of trading and in the size of the

In connection with the three main functions of marketplaces mentioned above, market traders may conveniently be divided into two groups according to each of three important variables: (1) source of merchandise, (2) time spent trading, and (3) mobility. For source of merchandise, the division is between "producer-traders," who are selling their own produce, and "intermediaries," who are dealing in goods produced by others. For time spent trading, the basic division is into "full-time" and "part-time" traders. The third division, on the basis of mobility, is essentially between "fixed" traders who deal only at one market center, and "mobile" traders, who deal at various market centers.

Obviously, in an early stage of development, a great deal of the intraregional exchange of goods is carried out by part-time producer-traders, i.e., peasant farmers who take their own produce to the nearest marketplace and sell it there directly to the consumers. This simple relation changes in time with the development of a marketing chain (Fig. 1). As internal market systems become more complex, the importance of direct producer-to-consumer transactions decreases and that of trading intermediaries increases. This change may be attributed to increasing specialization by producers and to a general increase in the average distance between the homes of producers and consumers. Within a market chain there may be a marketplace as a bulking center at one end and another marketplace as a center for retail distribution at the other end of the chain (Fig. 2).

When any single intermediary has large amounts of capital, he can buy directly from many producers, and then sell directly to the consumers. Individual traders in underdeveloped countries, however, frequently have very little capital, and no single intermediary can afford to deal throughout such a long and expensive marketing process alone. It is more likely that each trader will form a link in a long chain of intermediaries, making only a small profit

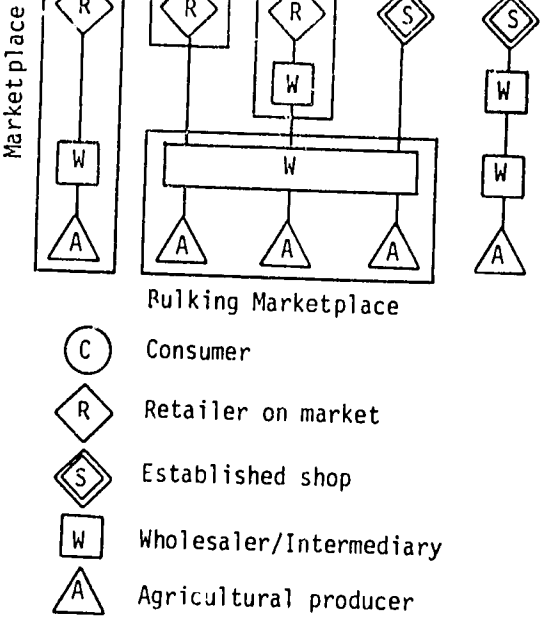


Figure 1. Commercial activities in market places.

employment to a large sector of the population which might otherwise be unemployed. Eventually, however, increasing demand and bulk transport facilities lead to the shortening of the marketing chain as the small-scale, mainly rural, intermediaries are undercut and bypassed by large urban wholesalers using a high input of capital and having a high turnover but a relatively low profit margin.

Closely related to this evolution is the question of periodicity of market trade and, more generally, the hierarchical order or marketplaces as part of a central place system. In regions of small-farm agricultural production and traditional transport facilities, many small periodic markets will supply the rural population with goods not produced within the region. Simultaneously, the marketplace will serve as a bulking point for the limited

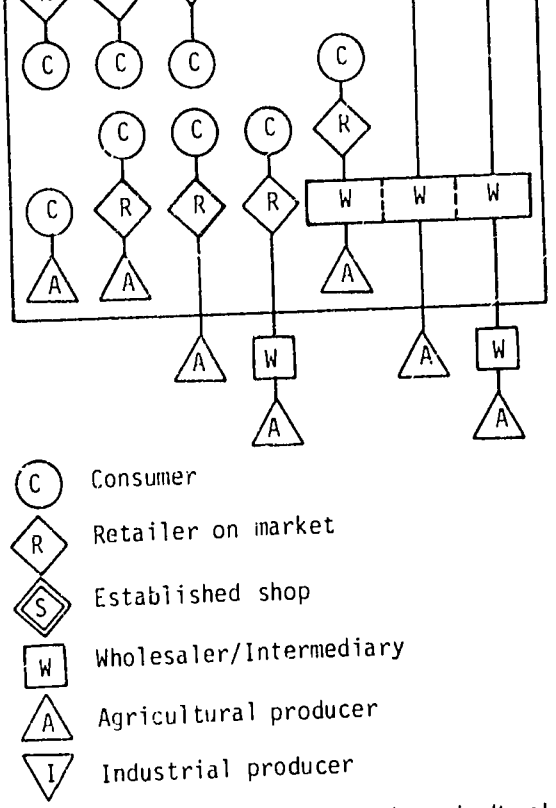


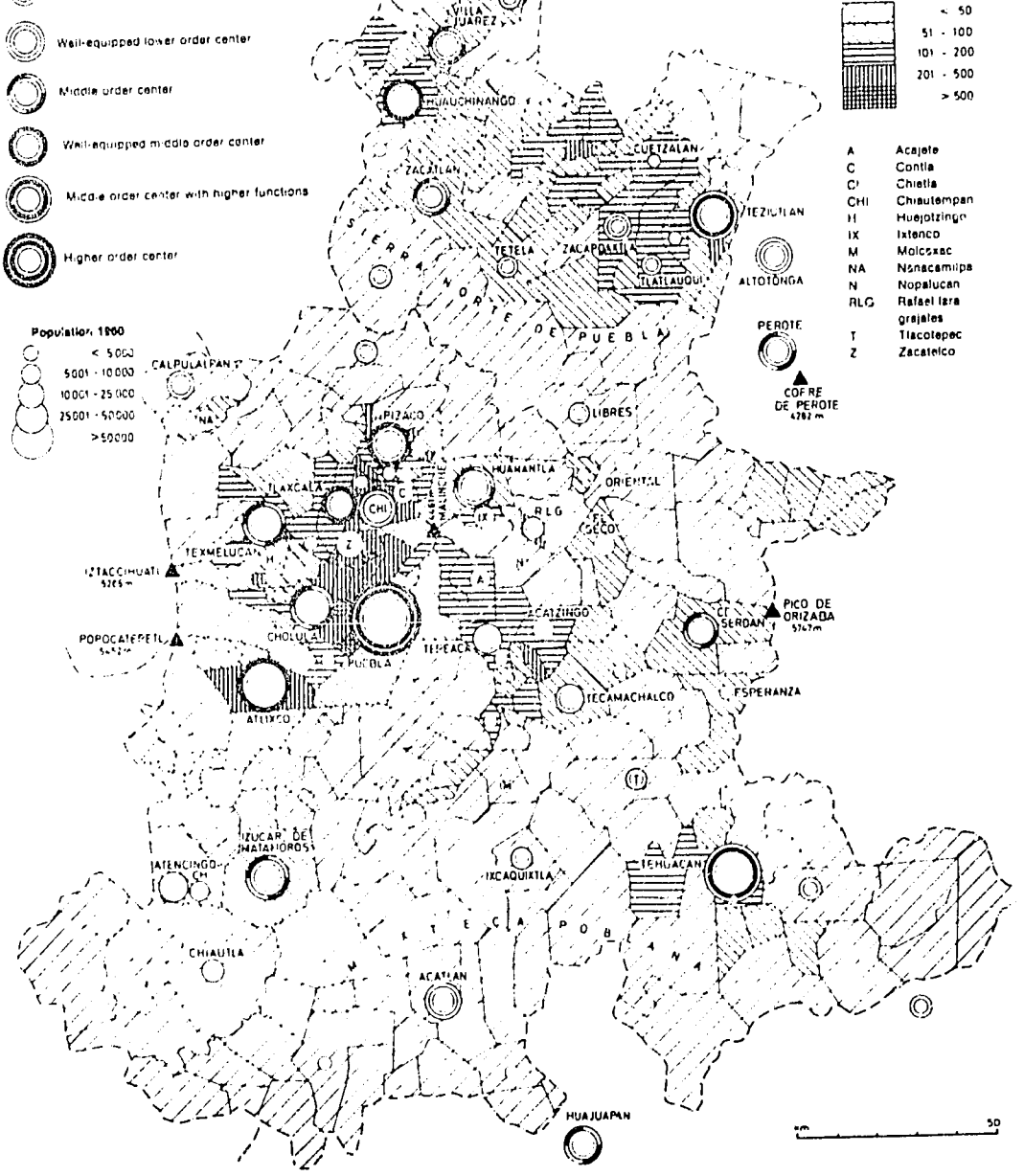
Figure 2. Roles of marketplaces in agricultural marketing.

which enables the traders to collect cash crops directly at the farmsteads. At the same time, the rural population will have more possibilities of visiting larger market centers, and hence consumers concentrate their purchases in these centers, to the neglect of the smaller ones. The larger centers increase in size and number while some of the smaller markets are eliminated. This tendency toward a continual restructuring of the hierarchy of market centers is reinforced by the modern trend

Mixteca Poblana—an arid, sparsely populated area, with higher concentrations of population only in a few better irrigated valleys. Towards the northeast of Puebla, we find some wide highland basins of more than 2400 m, leading to the Sierra Norte de Puebla. Here the density of population is low because relatively large farms are dominant, in spite of the land reform. On the contrary, the extremely abrupt descent of the Sierra towards the coastal lowlands is densely populated by Indian subsistence farmers (Fig. 3).

In the whole region, the original system of markets has changed little since the colonial period, when every main parish had its weekly market, the size of which varied merely with the extent and the population of the *municipio*. The selection of goods in such small markets still corresponds to the modest needs of peasants who are producing most of their subsistence themselves. A certain surplus of agricultural or handicraft production is taken to the market, which is also a place to exchange news, thus serving also a social function. This type of semiself-sufficient economic organization is still very common in remote areas, e.g., the Sierra Norte de Puebla. During recent years a few branch roads have been constructed, but the steep landforms do not allow any truck or bus traffic on unimproved tracks. Therefore, goods are transported largely on human backs. In this area, only a very few inhabitants of the market towns themselves have higher demands that can be satisfied only in better equipped centers (Fig. 4).

More significant alterations have taken place in the Mixteca Poblana, in the south, for two reasons. On the one hand, the Mexican revolution of 1910 caused the destruction and partition of most of the large haciendas and monasteries; on the other hand, the advent of the automobile made it possible to travel over longer distances in a day, even on dirt tracks, at least during the dry season. As a result of both events, many villages have lost their former importance, whereas others moved up to a higher


Well-equipped lower order center
Middle order center
Well-equipped middle order center
Middle order center with higher functions
Higher order center
Population 1960
< 5000
5001 - 10000
10001 - 25000
25001 - 50000
> 50000
< 50
51 - 100
101 - 200
201 - 500
> 500
A Acajete
C Cuetla
Cl Chietla
CHI Chiautempan
H Huejotzingo
IX Ixtenco
M Molcaxac
NA Nanacamilpa
N Nopalucan
RLG Rafael Lara Grajales
T Tlacotepec
Z Zacatelco
VILLA JUAREZ
HUAUCHINANGO
CUETZALAN
ZACATLAN
TEZIUTLAN
TETELA
ZACAPOAXTLA
TLATLAUQUI
ALTOTONGA
SIERRA NORTE DE PUEBLA
PEROTE
COFRE DE PEROTE
4282 m
CALPULALPAN
LIBRES
TIPIZAPO
HUAMANTLA
ORIENTAL
TLAXCALA
TEXMELUCAN
IZTACCIHUATL
5265 m
ACAJINGO
PICO DE ORIZABA
5747 m
SERDAN
POPOCATEPETL
5452 m
CHOLULA
PUEBLA
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TECAMACHALCO
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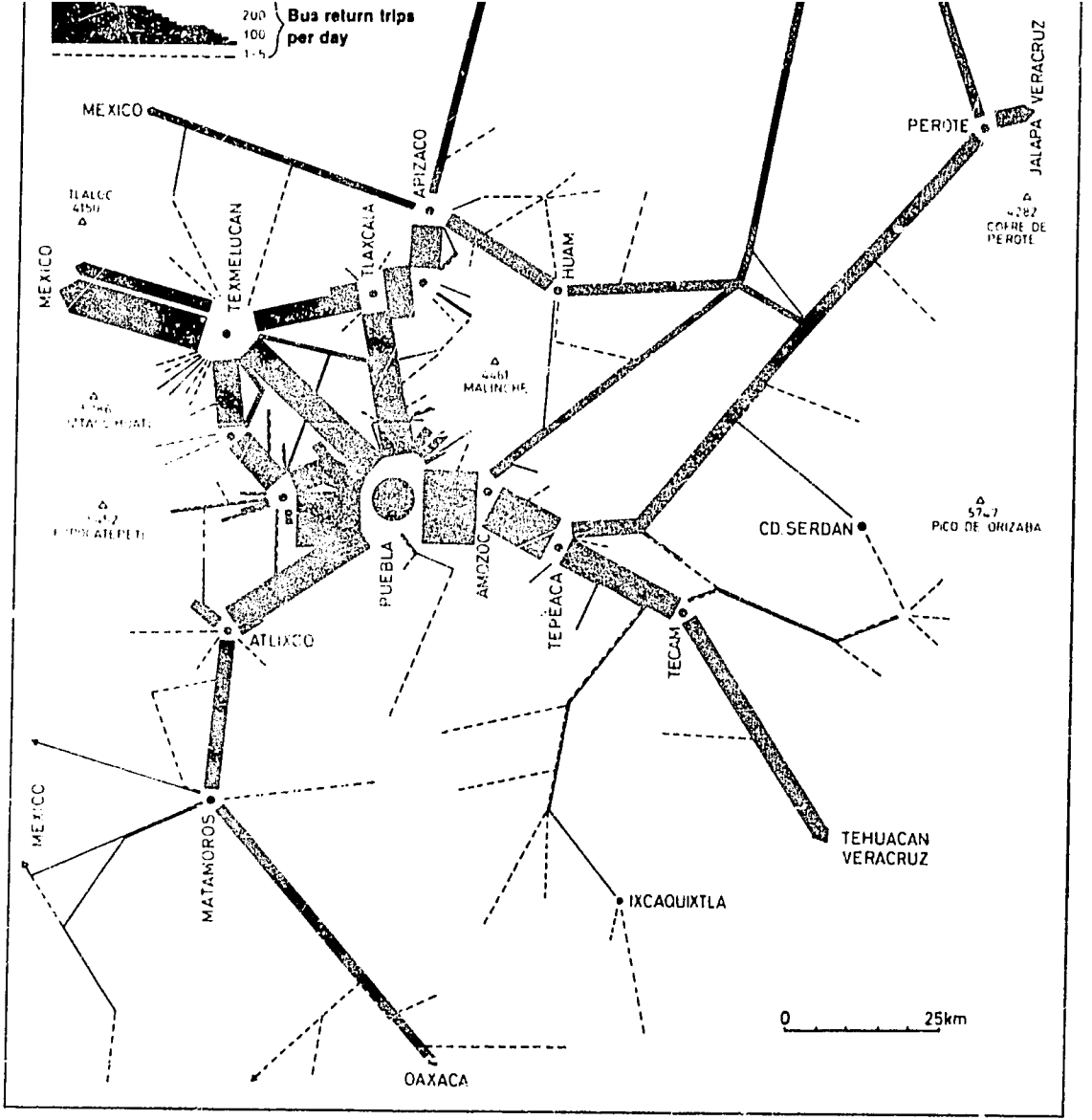

Figure 4. Bus traffic in the Puebla-Tlaxcala area, Mexico, 1965 (based on information supplied by 70 bus companies).

point out urban-rural relations in the central area of Puebla-Tlaxcala that are comparable to those of central Europe. The starting point was the textile industry, dating back to 1834. It not only remolded the city of Puebla itself, but also the surrounding area of about 30 to 40 km. The factories attracted more and more workers from the vicinity of the cities, thus changing their entire way of life.

Even in this central area, however, an important part of the population does not participate in the urban standard of living. Only a few kilometers to the north of Puebla, some conservative Indian villages exist where many people do not speak Spanish, and the percentage of illiteracy is far above average. Furthermore, the traditional market network still survives in the whole area. Many small marketplaces, however, have disappeared, while others have grown tremendously.

As a first conclusion, we can demonstrate different stages of development of the market network in two neighboring areas. In the north, most of the markets are of medium size and their tributary zones are of similar dimensions, taking into account the landform problems. In the south, many peasants tend to visit not only the local market, but also more distant places like Tepeaca, a small town of some 7000 inhabitants (1970), which gets more than 20 000 visitors every Friday, when buses commute uninterruptedly between the large marketplace and villages up to 100 km away.

If we now classify the towns of our region into a central place system of lower, medium, and higher order according to criteria normally used in industrialized countries, we find certain discrepancies compared with the traditional market network. Important market towns like Tepeaca have almost no centralizing function besides the weekly market, whereas others show all the characteristics of a center of medium order with its clearly defined zone of influence, although their weekly market is relatively small. Obviously, the traditional exchange system, which is not static itself, is superimposed upon by a modern structure of rural-urban interrelations, and only a part of their respective tributary zones is congruent (Fig. 5).

A closer interpretation leads to the further conclusion that not all groups of the population use the different systems in the same way (Fig. 6). Most of the needs of small farmers and farm hands are provided for by the weekly markets except a few special services, such as the district court, notary's office, and dispensary, which can be found in centers of lower order. These centers meet the common necessities of the more or less urbanized working class as mentioned above. Sometimes these people visit the centers of medium order with wider selections, including—besides a few simple shops of durable goods—banking, hotel, and cinema facilities; an automobile repair shop; a secondary school; a small hospital; and a dentist; as well as a few members of liberal professions. These services meet the needs of the recently developing middle classes, including teachers, employees, foremen, rancheros (small farmers mainly producing for the urban market), etc. Finally, the few upper-class people who live in the countryside (hacendados) or in small towns, taking advantage of modern roads, bypass all smaller centers formerly important to them and go directly to the big city of Puebla or even to Mexico City, where they can satisfy their wants. Moreover, Mexico City is not only the center of highest specialization for the whole country but also for the upper classes of the other Central American republics.

This example suggests that, in developing countries with great class differences, these classes can be correlated with the main levels of central place systems coexisting in neighboring areas and partly superimposed upon each other.

A further aspect of the social stratification of marketplace participants concerns traders. For instance, not all part-time traders are local producers selling their goods. In Third World countries with high levels of underemployment, market trading provides an opportunity for persons to supplement their income on a part-time basis, even though the actual demand of the urban population could easily be met by full-time established commerce. A considerable proportion of the petty traders sitting in the streets adjacent to urban marketplaces and largely impeding any car traffic in these areas belongs to this category and thus forms part of the so-called "informal sector."

The marketplace has been normatively described as open, free, and rational, or in other words, as the economist's "perfect market," where price is determined only by the forces of supply and demand. Yet the public administration actually interferes in marketplace trade of most countries. In many cases such an influence is limited to certain controls (prices, hygienic conditions, etc.). It seems necessary, however, to strengthen state intervention, at least in areas densely populated with small farmers.

Marketplace locations that have adequate population thresholds should be taken into account for

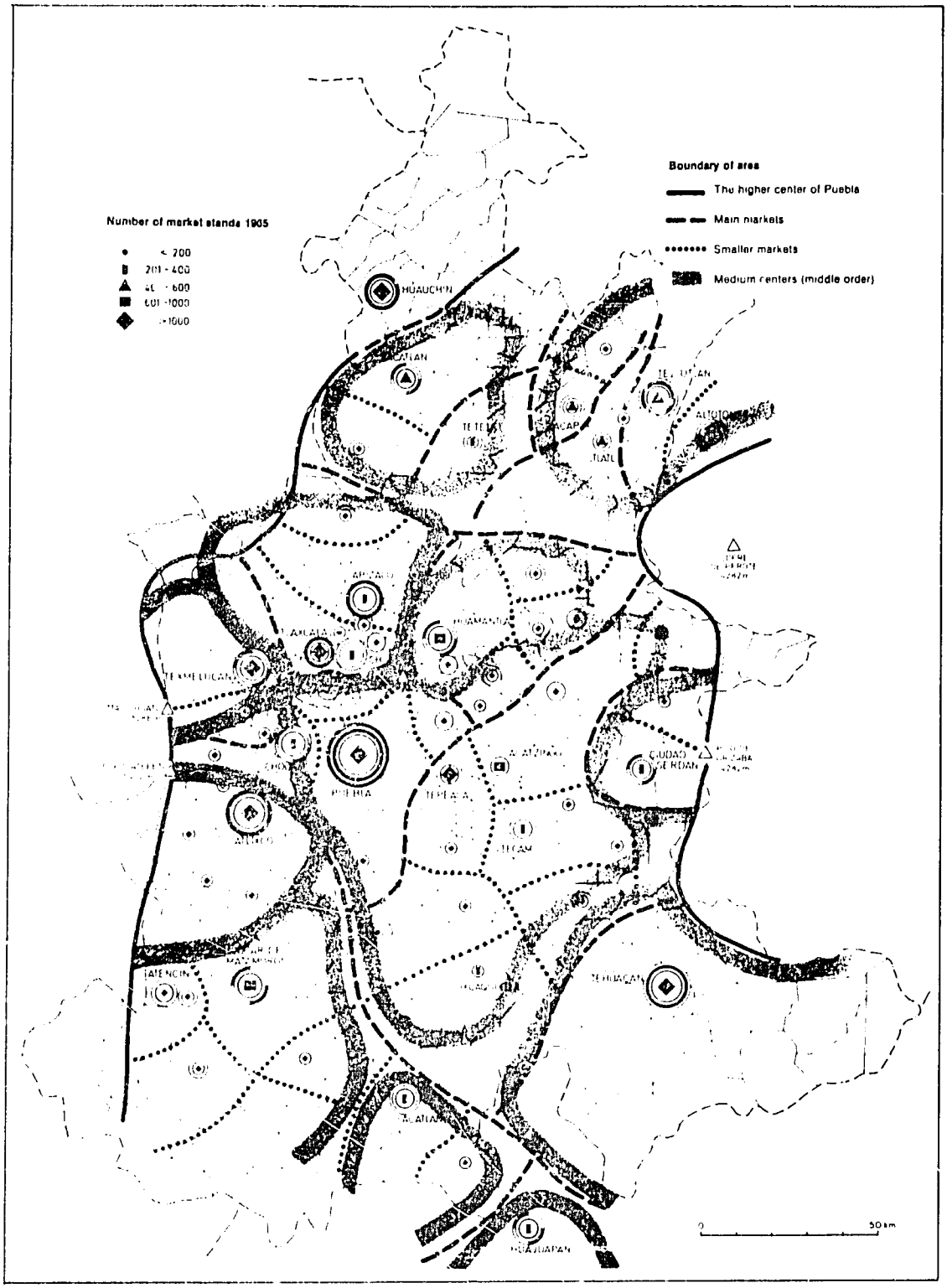

Figure 5. Central places and weekly markets in the Puebla-Tlaxcala area, Mexico. (For explanation of rings in this Figure, see Figure 3).

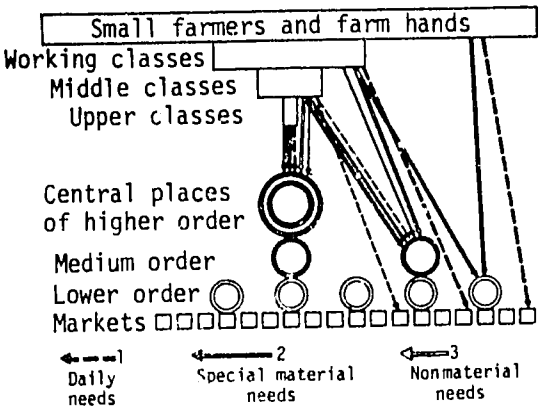

Figure 6. Relationship between major groups of the population and different levels of central marketplaces.

any future improvement in the marketing and transport system, as well as in the promotion of development activities that would benefit the rural poor for whom these markets represent the major points of contact with the outside world. Marketplaces should fulfill a double role: as centers for bulking of the local produce and for retailing of manufactured goods at reasonable prices, and as centers for education, health, administration, and other purposes in the sense of fully developed small-scale central places.

In conclusion, although it is certainly true that in Third World countries the marketplaces are very important elements in the spatial organization of economic and social activities, their changing role for wholesale and retail trade, in rural and urban environments, and for different strata of the population should be evaluated in the context of the general stage of development in any particular country or region, in order to determine how they could be used for the benefit of the population.

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The Future Role of Markets in the Development of Semi-Arid Rural Regions of Nigeria

Jerry A. Gana*

Abstract

The paper seeks to understand the process of rural development in the semi-arid rural regions of Nigeria, and tries to analyze the role of an efficient agricultural marketing system in this process. The first section of the paper reviews the meaning of rural development, so as to place the discussion in proper perspective.

Subsequent sections focus on the role of markets and marketing in rural development. The arguments here are summarized in a model that shows the effects of efficient marketing on producer prices and farm incomes. It is argued that improved real incomes would consolidate effective demand for goods and services, thereby encouraging the expansion of local industries. Improved farm incomes would also facilitate the modernization of living conditions in the rural areas.

The final section focuses on the political economy of price formation, both in the marketplace and within the marketing system. The effects of government intervention through marketing boards are also analyzed. The paper concludes by stating that efficient marketing alone cannot bring about real development, and argues that some economic transformation, especially the organizing of farmers is needed. The marketing system has an important role to play in effecting this change.

Résumé

Le rôle futur des marchés dans le développement des régions rurales semi-arides du Nigéria : *L'article examine le processus de développement rural dans les régions rurales semi-arides du Nigéria, et fait une analyse du rôle d'un système efficace de commercialisation agricole dans ce processus. La première partie de la communication étudie la signification du développement rural, afin de pouvoir situer la discussion dans le perspective approprié.*

Les autres parties portent sur le rôle des marchés et de la commercialisation dans le développement rural. Les hypothèses présentées ici sont résumées dans un modèle qui montre les effets d'une commercialisation efficace sur les prix au niveau des producteurs ainsi que sur les revenus agricoles. Les revenus réels améliorés consolideraient la demande utile de biens et de services, encourageant de ce fait, l'expansion des industries locales. Des revenus agricoles améliorés faciliteraient également la modernisation des conditions de vie dans les zones rurales.

La section finale porte sur l'économie politique de la formation des prix tant au niveau du marché qu'à l'intérieur du système de commercialisation. Sont également analysés, les effets de l'intervention gouvernementale par l'intermédiaire des agences de commercialisation. Enfin, l'article constate que la commercialisation efficace ne peut entraîner toute seule le vrai développement, tout en soulignant que la transformation économique—en particulier, l'organisation des exploitants—est nécessaire. C'est le système de commercialisation qui peut jouer un rôle important dans l'opération de ce changement.

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ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 1985. Agricultural markets in the semi-arid tropics. Proceedings of the International Workshop, 24-28 October 1983, ICRISAT Center, India. Patancheru, A.P.502324, India: ICRISAT.

Networks of Distribution of Goods and Services in Rural India: Some Spatial Considerations

Sudhir Wanmali*

Summary

Networks of distribution of goods and services are categorized as those provided by the government and the private sector. And there are also periodic markets in the private sector, which facilitate the movement of urban consumer goods and rural products. These networks tend to overlap in their area of operation and cannot be adequately understood unless studied in an integrated manner. Spatial and temporal characteristics of the three networks are noted from empirical evidence of Singhbhum district of Bihar, India, and it is suggested that the complementarities in the networks be used as a basis for planning a comprehensive system of distribution of goods and services in rural India.

Résumé

Réseaux de distribution des biens et des services en milieu rural en Inde—quelques considérations spatiales : *Les réseaux de distribution des biens et des services sont classés suivant qu'ils sont assurés par le gouvernement ou par le secteur privé. Il y a, par ailleurs, dans le secteur privé, des marchés périodiques qui facilitent la circulation des biens de consommation et des produits ruraux. Ces réseaux ont une tendance à se chevaucher dans leur zone d'opération et ne peuvent être bien compris qu'à travers une étude intégrée. L'article étudie les caractéristiques spatiales et temporelles des trois réseaux à partir des données empiriques obtenues de la région de Singhbhum dans l'État de Bihar en Inde. Il est suggéré que les complémentarités des réseaux peuvent servir de base pour la mise au point d'un système globale de distribution des biens et des services au niveau rural en Inde.*

Introduction

Goods and services in rural India are provided in a typical district by two major agencies: the government and the private sector. The government provides them through a network of institutions and within the framework of its development program; the private sector provides them through shops and establishments. Another method of distribution of goods in the private, but traditional, sector is through periodic markets. Sometimes it happens that in area of coverage (in terms of population served and/or locations of outlets) these three networks overlap.

It must be emphasized, however, that this is not a watertight compartmentalization of the networks under study. It is recognized, for example, that there are a number of people who are in the business of providing many services in an informal manner at the village level. This provision is different from that of private sector noted above in that it does not form an organized entity at least over extensive territories involving a large number of villages. But this does not mean that it is completely independent of the two major networks. Indeed, in some instances the village-level informal expertise in banking, credit, transport, and storage can make these facilities available to managers of both the government and private sector networks. These are indeed the "wheels within wheels" of service provision in rural India.

Farmers' access to effective marketing and ser-

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vice facilities is crucial if increases in agricultural productivity are to translate into successful rural development. Although the importance of farmers' access to farm inputs, agricultural marketing, and processing facilities is well established, much less is known about the significance of their location and about farmers' access to consumer goods and services.

Previous research has shown that government investment in local infrastructure is an important determinant of both the type and location of complementary services provided by the private sector (Wanmali 1981, 1983a, 1983b). Unfortunately, government planning for rural development is often biased in favor of establishing industrial units in urban areas, with inadequate consideration of the kinds of marketing and service infrastructure required for a dynamic agriculture. This can, and does, lead to obvious differences in farmers' access to publicly controlled market and service facilities (Wanmali 1981, 1983a, 1983b). It can also lead to important distortions in the type and location of services offered by the private sector. This paper attempts to describe and critically examine the functioning of government, private sector, and periodic market networks with empirical evidence from Singhbhum district, Bihar, India, obtained during the period 1972 to 1978 (Wanmali 1973, 1981; Wanmali and Ghosh 1975). The paper also suggests a spatial model that will incorporate the strengths of these networks for future provision of services in rural India.

Institutional Development (Government Network)

In India, the district administration is responsible for revenue, as well as for development functions. The development wing of the district administration provides, among other things, various socioeconomic services to the villages through the channels of the development programs. Such services consist of education, health, communication, transport, credit, banking, animal husbandry, agricultural input distribution, and marketing facilities. These are made available at specific locations within the district.

Services are made available in some settlements, and are availed of by almost all other settlements; hence, in terms of spread and access, their total impact over a region can be differential. This impact is influenced by a number of factors, such as the total area that such settlements serve; the number of other settlements having similar, and other, services in that area; and the socioeconomic status of people using them.

In Singhbhum district, the seats of administration have tended to be the centers around which the network of institutional development appears to revolve (Wanmali 1981; Johnson and Wanmali 1981). Thus, Chaibasa, the district headquarters, and Jamshedpur, the steel-manufacturing town, exhibit better standards of service provision than other centers. There is also some sort of a distance decay in service provision standards, which become progressively lower as one goes away from Jamshedpur or Chaibasa. The spatial pattern of service provision is hierarchical and reflects the administrative arrangement within the district (Wanmali 1973).

In the hierarchy of institutional development, the most important center (where importance is a function of type, level, and number of services performed) is Jamshedpur, followed by other centers that are administrative headquarters of revenue and development administration. Below these are settlements which in the past were seats of tribal administration, though they have no function today. Thus, lower down the hierarchy, it is the level of administrative authority which tends to govern the level of institutional development. It is noted that centers with higher levels of institutional development have larger populations, larger service populations, bigger service areas, and more services (Wanmali 1973) (see Table 1).

Urban Consumer Goods (Private Sector Network)

Retail goods are distributed by the organized industrial part of the private sector. The goods are manufactured by units in big cities, and each of these units has an exclusive, or jointly owned, marketing network based on towns and other settlements in the districts of the country.

The major center of supply of all consumer goods in Singhbhum district is Jamshedpur. This is because the location of the steel works and the continued expansion of its production capacity had attracted a large number of commercial, trading, transport, warehousing and financial firms to the city in the past. This process is still continuing.

Table 1. Spatial characteristics of rural delivery system in India.

Service category	Number of settlements	Settlement	Average value of institutional development index[1]	Average turnover of consumer goods ('00 000 Rs)[2]	Average auction value of periodic markets ('000 Rs)[3]
Regional center of institutional development/ urban consumer goods distribution/periodic marketing network	1	Jamshedpur	33.0	200.0	45.0
Subregional centers of institutional development/ urban consumer goods distribution/periodic marketing network	4	Chaibasa Chakradharpur Ghatsila Seraikela	14.7	51.0	21.0
Local centers of institutional development/urban consumer goods distribution/ periodic marketing network	9	Barajanda Charulia Gua Jadugoda Jhinkpani Kharswan Manoharpur Musabani Noamundi	7.6	13.0	7.0
Periodic markets	185	For names see Wanmali (1981)	4.4	3.5	5.5
Dependent settlements	4200	For names see Das (1972)	1.5	0.5	-

1 For details see Wanmali (1973)
2 For details see Wanmali and Ghosh (1975).
3 For details see Wanmali (1981)

Besides, the city's population of nearly 1 million people constitutes a major center of demand for various kinds of urban consumer goods.

It is noted elsewhere that urban consumer goods such as tea, coffee, cigarettes, matchboxes, toiletries, textiles, ready-made garments, utensils, plastic and leather goods, jewelry, hardware, home remedies, transistors, radios, watches, electrical goods, photographic equipment, transport accessories, automobiles, refrigerators, aircoolers, air conditioners, agricultural inputs, farm machinery, and many other products of the organized urban industrial sector are sold throughout the district from Jamshedpur (Wanmali and Ghosh 1975).

The spatial pattern of distribution of urban consumer goods also operates in a hierarchical fashion. The most important center in the district (where importance is a function of turnover of goods per year) is Jamshedpur, followed by four others, Chaibasa, Chakradharpur, Ghatsila, and Seraikela (Wanmali and Ghosh 1975). These together act as break of bulk points in the regional retail distribution system. Below these, there is yet another group of nine centers which are major retail outlets in the district. In retail distribution too, higher order centers have a wider range of services, more shops, larger numbers of brands of goods, larger population, larger service population, and larger turnover of business than the smaller centers (Wanmali and Ghosh 1975) (see Table 1). Further, there are thresholds of turnover, crossing of which facilitates the entry of a particular type of good (or a brand of product) in the regional retail distribution network.

Within a district, the spatial pattern of marketing of these consumer goods may be a combination of

the following: (1) salesmen of the companies go around the district from Jamshedpur to sell the products to owners of locationally fixed shops; (2) the manufacturing company appoints for the district a dealer, usually located at Jamshedpur, who is responsible for selling the company's goods in that district through shops and mobile vans; and (3) the owners of the locationally fixed shops from all over the district come to Jamshedpur to purchase their own stocks of goods (Wanmali 1981). The first two are the more common; however, all three involve contact between dealers in Jamshedpur on the one hand and owners of locationally fixed shops in the district on the other. Thus, although the economic life in Singhbhum is influenced by the existing administrative structure in the sense that it uses the services made available by the government sector in distributing the goods, it does not necessarily reflect a similar arrangement (Wanmali 1981).

Periodic Markets (Traditional Network)

Periodic market meetings are held once a week in about 199 settlements of the district; of these, 14 are towns and the rest are villages. These markets are significant from social, economic, and ethnic points of view, and the rural life in the district tends to revolve around them. Almost all rural produce of all types, and many of the urban-based consumer goods, get exchanged at these markets. Since the government or the organized private sector is unable to compete with them in their regularity, frequency, and informality, the periodic markets form a unique operational service system in rural India.

The Singhbhum district *Gazetteer* describes periodic markets (*haats*) as "the primary markets held daily or weekly" in which "the sale of agricultural products and consumer goods takes place" (Roy Choudhury 1958). It further notes that "there are a number of weekly markets in the district where local communities make their purchases and sales while merchants from outside come in to ply their own trade" (Roy Choudhury 1958).

In a recent study of periodic markets in Singhbhum district, it was noted that these markets, considered individually, have emerged as a result of the prevailing ethno-economic and politico-administrative factors. The marketing system as a whole, however, has emerged as a consequence of an urban demand for rural products, as well as rural demand for urban products (Wanmali 1981).

Systems of markets are defined as those where consumers and traders meet during the market week; where the full-time traders predominantly come from one base; and where the system has at least one point of contact with another system. Wanmali (1981) mentions 15 systems of periodic markets in the district, which serve almost all rural areas.

There are two subtypes of periodic market networks, one relating to the consumers and the other to the traders. It was noted that both consumers and traders are aware of the "shifts" in the location of markets during the week, and that they also take cognizance of the varying importance of periodic markets. Thus, consumer and trader decisions on the use of markets are influenced not only by the access to the markets (nearest market to be held on that day) but also by their hierarchical arrangement (Wanmali 1981). However, it was also noted that the space-time arrangement of periodic markets, although facilitating interaction in space, tends to create conditions of "local" monopoly and monopsony in which the transactions take place (Wanmali 1981). It is worth noting that centers around which networks of periodic markets revolve are also important centers of retail trade and institutional development (see Table 1).

Policy Implications

As the above discussion shows, the settlement system of a district provides the spatial framework within which the various networks of distribution of goods and services are located. There exist hierarchies of institutional development, retail trade, and periodic marketing, even "nested" hierarchies, in the area under study. What needs to be emphasized is that such hierarchies are extremely local in nature, reflect a spatial form of functional specialization, and operate in a given socioeconomic context. Thus, locationally fixed services and shops and spatio-temporally integrated periodic markets are the components of a hierarchically organized settlement system.

The now-familiar flow diagram of movement of agricultural or rural products with producers at one end and consumers at the other, with various types of traders ranged between the two, can become more meaningful if it also incorporates the spatial dimension noted above. Thus, locations of produc-

ers, traders, and consumers and the distances between them are no less important in determining the access to and from a network. Some aspects of the networks that can be used to strengthen their effectiveness (coverage) and efficiency (access) are noted below.

Services such as banks, post offices, health facilities, veterinary facilities, agricultural input distribution, credit, and marketing can be provided to rural areas through the networks of rural markets also (Wanmali 1981). Since these services are used less than 12 times a year, the intervals at which these are to be made available can be increased or decreased to match the pattern of their maximum use (or that of periodic market meetings, or both). This will make the current urban-based network a little more accessible to rural areas than before.

The marketing of urban consumer goods in rural India is hampered by a lack of knowledge of the spatial organization of the rural market as a sector. Further, only a few companies have their own rural marketing networks. Some of the early views in the organized urban industrial sector recommended that the "gaps" in rural marketing be filled by locating more shops in areas which are inadequately served (Mathias 1968; Patwardhan 1969).

Various combinations of filling of "gaps" are used by the wholesalers and retailers through locationally fixed shops. Some of the consumer goods companies have a policy of selling their products to the owners of locationally fixed shops with the help of a mobile salesman. This pattern can be extended to include the sales to consumers who gather once a week at the weekly markets. These weekly markets provide facilities for the location of services of part-time and full-time traders, who open their "stalls" for a day and come back to the same location after a gap of a week to provide the same set of services to their consumers. Such a temporal staggering of transactions does not require a locationally fixed shop and, therefore, rural marketing of urban consumer goods can be conducted from the back of a van or minibus in the periodic markets.

The complementarity and usefulness of dovetailing the procurement of food grains and other agricultural produce through a rural system of periodic markets and an urban system of regulated markets, have been noted elsewhere (Wanmali 1980). Suffice it to say here that such a dovetailing is likely to reduce the physical distance, and associated problems, of selling food grains and other agricultural produce in the rural areas.

Conclusions

Studies on systems of distribution of goods and services in rural India have tended to consider only the patterns that are based on the analysis of "single" services or of "single" systems. The present analysis has demonstrated that there are at least three different systems of a distribution of goods and services in rural Singhbhum, and that there are large areas of spatial overlap and divergence amongst them. The spatial features of the distribution systems do have several points in common. Viewed from the angle of the village, the periodic markets appear to be the base of a system of provision of goods and services in rural India upon which other systems are built. For example, the other top levels of service (government sector) and goods (private sector) distribution in the district are obtained in the same settlements though admittedly not at the same level. Further, some of the centers at the lowest levels, providing goods and services from fixed locations, are also focal points of the systems of periodic markets, which are 'fixed' in space and 'unfixed' in time. This spatiotemporal dovetailing of the networks could be used for making the mobile services available in the rural areas.

Marketing channels for individual commodities do not operate in isolation from the networks described. Food grains, firewood, cattle, and urban consumer goods all tend to use not only one or more networks but also one or more of the same centers through which other goods and services are made available. Further, all three networks jointly increase the "accessibility" of the region, where it then becomes easier to market a commodity. The producers and consumers are located at both ends of such spatial networks, and so are the traders who help move the commodities.

The existence or lack of such networks influences the ease or difficulty of moving goods from one end to another, and has serious repercussions on the question of access to the networks of distribution of goods and services in rural areas. An analysis of the geographical characteristics of such networks is likely to fill an important gap in the current literature on delivery systems in the rural areas of the Third World.

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Periodic Markets as Growth Centers in the Rural Hinterland of Metropolitan Hyderabad*

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Summary

Periodic markets have emerged as central places in their respective market catchment areas in the rural hinterland of metropolitan Hyderabad. These markets exhibit distinct levels of socioeconomic development and hierarchy. It has been suggested in this paper that periodic markets that have a relatively high level of socioeconomic development can be used as instruments of growth, with improved accessibility in the rural hinterland. They will thus emerge as effective transmitters of growth impulses in the rural hinterland, and will consequently accelerate the socioeconomic development of the entire region and integrate the hinterland economy with the metropolitan market.

Resumé

Les marchés périodiques en tant que centres de croissance dans l'arrière-pays rural du métropole de Hyderabad : *Les marchés périodiques sont devenus des centres de convergence dans leurs zones d'approvisionnement respectives dans l'arrière-pays rural du métropole de Hyderabad. Ces marches présentent des niveaux distincts de developpement et de hiérarchie socioéconomiques. Les marchés périodiques témoignant d'un niveau relativement élevé de développement socioéconomique pourraient servir d'instruments de croissance, permettant un meilleur accès à l'arrière-pays rural. Ils joueront ainsi le rôle de transmetteurs efficaces des impulsions de croissance dans l'arrière-pays rural. Cela aura pour resultat d'accélérer le développement socioéconomique de l'ensemble de la region, ainsi que d'integrer l'economie de l'arrière-pays et le marché métropolitain.*

Introduction

Periodic markets represent an elementary stage in the growth and development of central places in India. They are the natural centers for the convergence of people from within an average distance of 8 km for the local exchange of their marginal surpluses. They also play an important social role by bringing together rural people from within their catchment areas. In view of these roles, it is thought that they may be used as growth centers from which the accumulated resources of settlements are put to productive use and from where growth-enhancing innovations may be diffused.

In this paper we present a case study of the rural hinterland of metropolitan Hyderabad which extends to a radius of 40 miles (64 km). There are wide intraregional disparities in the levels of development in the rural hinterland of metropolitan Hyderabad (Alam and Khan 1972). In order to minimize them, we have explored the possibility of inducing the development of growth centers.

The rural hinterland covers an area of 12 258 km², including 1 569 rural and 13 urban settlements (Government of Andhra Pradesh 1973). By the 1961 census, its population was 1 320 000; by 1971

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it had risen to 1819026—a 37.8% increase. There has been explosive growth of periodic markets in the region from 35 in 1961 to 72 in 1971. Consequently, the average number of settlements declined from 40 in 1961 to 22 in 1971; the population served per market declined from 37714 in 1961 to 2[illegible]264 in 1971. The region also includes 23 regulated markets, 17 of them rural. It is predominantly a single-crop region, the principal crops being paddy, sugarcane, onion, and castor.

Data Base and Analytical Techniques

In order to classify the periodic markets according to their levels of development, we have used two sets of census data for 1961 and 1971. One set, called the reflective variables, relates to demographic and socioeconomic aspects in the settlements with periodic markets. The other, called the principal or direct variables, pertains to government-financed services and infrastructure located in villages with periodic markets.

Reflective Variables

1. Growth rate of population
2. Percent literate, 1971
3. Sex ratio, 1971
4. Worker : nonworker ratio, 1971
5. Percent of workers in secondary occupation, 1971
6. Percent of workers in trade and commerce, 1971
7. Percent of workers in transport and communications, 1971
8. Percent of workers in other services, 1971
9. Change in the proportion of workers in secondary occupation, 1961 to 1971
10. Change in the proportion of workers in trade and commerce, 1961 to 1971
11. Change in the proportion of workers in transport and communications, 1961 to 1971
12. Change in the proportion of workers in other services, 1961 to 1971

Principal or Direct Variables

1. Education: (a) middle school, and (b) high school
2. Health: (a) family planning centers, (b) maternity and child welfare centers, (c) dispensary, (d) primary health center, and (e) hospital
3. Communications: (a) post and telegraph offices, (b) telephones, and (c) post offices
4. Administrative functions: (a) police station, and (b) taluq administrative office
5. Amenities: (a) electricity, and (b) piped water supply.

Measurement of Development Levels

In order to measure the levels of development of these market settlements, we have adopted a weighted rank score method, assigning rank scores to the respective settlements; this minimizes the bias that would be introduced in a simple unweighted rank score method. This has been achieved by employing a multiplying factor for each variable, derived by dividing the number of settlements in that variable with the highest value of a specific variable.

Where variables involve temporal changes, values are first scaled up before applying the multiplying factor techniques. For ranking of settlements based on their services, we have used the threshold margin as the base. The midpopulation size of the entry of a function in a group of settlements has been treated as threshold margin.[1] The methods adopted by Briggs (1979), Bhat et al. (1974), and Haggett and Gunwardhana (1965) were found inadequate when applied.

The final weighted rank score has been derived by adding the scores obtained by each settlement in its reflective and principal variables (Table 1).

The scatter diagram on semilog graph brings out a linear relationship between the cumulative weighted rank score and population size of settlements (Fig. 1). This is further confirmed by the correlation coefficient, and student 't' test values of population size and cumulative rank scores of settlements (rho = 0.520 and t = 5.09). The population of a settlement seems to be significantly related to rank score under principal variables (rho = 0.705, student 't' test value 8.02).

1. Entry point or threshold margin of a function is determined by the midpoint of population between the minimum size of population for the entry of the function and that size of population above which the function is ubiquitous. Only those settlements endowed with a particular function have been considered for ranking in the corresponding group.

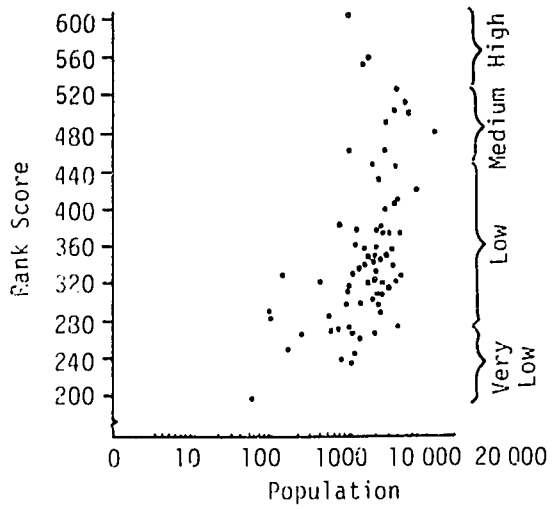

Figure 1. Scatter diagram of population size and functional rank score of periodic markets in the rural hinterland of metropolitan Hyderabad, India.

Classification of Market Settlements

The weighted rank scores of these market settlements range from a minimum of 200 to a maximum of 594, and reflect the wide disparity in their levels of development. We have classified the market settlements into four levels of development, but this does not imply a nested hierarchy with the implication of functional interdependence between small and large markets.

1. High level of development or with high growth potential ($\bar{X}$ + 2 SD).
2. Medium level of development or with medium growth potential ($\bar{X}$ + 1 SD)
3. Low level of development or with low growth potential ($\bar{X}$ - 1 SD)
4. Very low level of development or centers with low growth potential ($\bar{X}$ - 2 SD).

Such a classification reveals that despite its proximity to the metropolis, the rural hinterland of Hyderabad is characterized by periodic markets in settlements with low levels of development. We assume that potential to act as a growth center is positively related to present rank scores and proceed to discuss each level of development.

Levels of Development and Growth Potential of Market Centers

High Level

There are only four markets with high level of social, economic, and infrastructure development and three of these viz., Taranagar, Serilingampalle, and Ramachandrapuram are located in the periphery of the 20 km zone (Fig. 2). Narsapur, the taluq headquarters, is the only exception. It had a population of nearly 5000 in 1971, is located approximately 48 km to the northwest of the metropolis, and is linked to it by a state highway. Narsapur has already developed a reasonably high level of facilities in medical, postal, electricity, educational, and administrative services. Its market facilities have markedly improved and its hinterland seems to have considerably expanded, as indicated by a ring of smaller markets around it.

Unlike Narsapur, the other three market centers with high levels of development are overshadowed by the proximity of the metropolis. They will eventually be absorbed into the expanding metropolitan areas and have therefore not been identified as growth centers.

Medium Level

Eight market centers have been identified as being at the medium level of development: Gajwel, Ibrahimpatnam, Choutuppal, Patancheru, Megaligidda, Yadigiripalle, Narsingi, and Nalgondla (Fig. 2). Sectorally these markets are dispersed in the Kurnool-Sholapur and Nizamabad-Vijayawada sectors, each having three such markets. Zonally, however, they are distributed among all the zones but mostly beyond the 20 km radius, the maximum number being in the 40 to 60 km zone. Of these eight centers, two (Narsingi and Nalgondla) are located within the surburban 20 km ring of the metropolis, and will be absorbed in the metropolitan vortex of growth in due course. The remaining six are potential growth centers because of their functional importance, economic growth tendency, and infrastructure facilities and could be developed further. Gajwel and Ibrahimpatnam are taluk headquarters with a population of approximately 6000 and 11 000 respectively in 1971. They are also well provided with electricity, medical, educational, and

Table 1. Periodic markets in the rural hinterland of metropolitan Hyderabad: composite rank scores.

Settlement code no.	Market settlement	Taluk	Distance from Hyderabad city (km)	Market day	Population 1971	Principal variables (rank score)	Reflective variables (rank score)	Final rank (7+8) (rounded off)	
1	2	3	4	5	6	7	8	9	
1.	Taranagar	Hyderabad W	19.00	Fri	1125	7.03	587.08	594	High level of development: settlements with high growth potential ($\bar{X}$ + 2SD)
2.	Serilingampalle	Hyderabad W	18.50	Fri	1715	11.36	541.71	553	
3.	Ramachandrapuram	Sangareddy	23.00	Sun	1646	4.33	539.32	544	
4.	Narsapur	Narsapur	43.25	Fri	4836	55.32	463.66	519	
5.	Gajwell	Gajwell	56.00	Wed	5916	49.83	463.06	506	
6.	Patancheru	Sangareddy	28.50	Thu	4393	29.87	467.73	498	
7.	Choutuppal	Ramannapet	40.00	Sun	3231	36.27	449.63	487	Medium level of development: settlements with medium growth potential ($\bar{X}$ + 1SD)
8.	Ibrahimpatnam	Ibrahimpatnam	28.75	Wed	10850	80.38	397.74	478	
9.	Narsingi	Hyderabad W	12.00	Fri	3016	40.79	418.31	469	
10.	Nalgonda	Hyderabad W	19.25	Fri	1080	7.03	448.84	456	
11.	Yadigiripalli	Bhongir	56.00	Wed	2186	23.64	421.42	446	
12.	Magalgidda	Shadnagar	49.00	Sat	4109	20.82	417.22	438	
13.	Dowlatabad	Narsapur	45.25	Mon	2446	14.14	414.59	429	
14.	Amangal	Kalvakurthi	59.25	Fri	7845	57.86	356.37	414	
15.	Pochampalle	Bhongir	36.50	Mon	4614	19.31	389.66	409	
16.	Ismailthoupat	Sangareddy	42.50	Mon	4115	19.31	385.09	405	
17.	Tupran	Gajwell	50.25	Tue	2422	19.31	376.74	393	
18.	Venkatapur	Chevalla	28.00	Sat	798	16.53	362.21	379	
19.	Gummadiddla	Narsapur	33.50	Wed	2673	12.28	367.07	379	
20.	Jagdevpur	Gajwell	55.50	Sat	2044	19.31	356.68	376	
21.	Kishanguda	Hyderabad W	16.75	Thu	272	7.03	367.91	375	
22.	Chandanagar	Hyderabad W	18.50	Fri	1207	7.03	367.68	375	
23.	Alur	Chevalla	42.50	Wed	3114	19.31	354.23	374	
24.	Kodthala	Kalvakurthi	44.75	Tue	4589	22.14	351.54	374	
25.	Jilled	Shadnagar	60.50	Thu	3026	0.00	374.28	375	Low level of development: settlements with low growth potential ($\bar{X}$ - 1SD)
26.	Tondhapalle	Hyderabad W	18.00	Thu	1276	11.36	349.31	361	
27.	Kowdipalle	Narsapur	67.00	Sat	1742	25.57	334.05	360	
28.	Sirpuram	Narsapur	57.25	Thu	2205	7.11	350.83	359	
29.	Surangal	Chevalla	25.00	Mon	1781	0.00	357.08	357	
30.	Kondi	Sangareddy	44.25	Sat	3651	19.31	337.05	357	
31.	Chilkoor	Hyderabad W	19.25	Fri	3101	16.53	337.87	355	
32.	Aziznagar	Hyderabad W	16.00	Fri	2359	12.39	336.85	349	
33.	Maheshwaram	Ibrahimpatnam	28.50	Fri	2873	35.40	310.61	346	
34.	Kondamadgu	Bhongir	33.50	Tue	1972	12.20	333.62	346	

1	2	3	4	5	6	7	8	9	
35.	Thadlapalle	Chevalla	39.00	Wed	2293	15.64	329.66	346	
36.	Kondurg	Shadnagar	55.75	Wed	3874	32.17	310.19	342	
37.	Chandiapet	Medak	60.75	Fri	1680	9.60	331.60	341	
38.	Rangareddiguda	Shadnagar	62.50	Wed	1324	16.53	319.67	336	
39.	Donthi	Narsapur	47.25	Fri	2495	14.14	321.13	335	
40.	Chongemal	Pargi	48.50	Mon	2392	9.50	325.05	335	
41.	Himayatnagar	Hyderabad W	17.75	Fri	1313	12.20	321.56	334	
42.	Neknampur	Hyderabad W	9.75	Fri	475	0.00	330.24	330	
43.	Yedurthi	Medak	58.50	Sat	4529	39.44	289.09	328	
44.	Amerpet	ibrahimpatnam	30.00	Wed	2047	9.50	315.42	325	
45.	Gomaram	Narsapur	39.50	Sat	2074	12.28	311.22	324	
46.	Kankunta	Narsapur	34.25	Thu	2951	16.53	306.45	323	
47.	Gandipet	Hyderabad W	15.50	Fri	467	12.39	310.16	322	
48.	Masaipet	Medak	57.25	Mon	3574	14.14	302.58	317	
49.	Papalguda	Hyderabad W	10.00	Fri	1002	7.03	307.73	315	
50.	Shivampet	Narsapur	45.50	Thu	2773	25.49	287.15	313	
51.	Chillasagar	Gajwell	37.00	Sat	2569	12.28	391.16	313	
52.	Kothapet	Shadnagar	46.00	Mon	2181	12.28	299.79	312	
53.	Almaipet	Andole	59.75	Sat	1456	5.17	297.48	303	
54.	Mutrajpalle	Narsapur	53.75	Fri	909	0.00	301.82	302	
55.	Keshampet	Shadnagar	50.00	Wed	2516	30.96	269.27	300	
56.	Udithayal	Shadnagar	59.00	Mon	2795	9.50	283.70	293	
57.	Ottapalle	Hyderabad W	17.50	Thu	496	7.03	282.71	290	
58.	Muqtabahadur	Hyderabad W	16.00	Thu	131	7.03	282.02	289	
59.	Poshettiguda	Hyderabad W	19.25	Thu	193	7.03	280.87	288	
60.	Pelluta	Narsapur	48.75	Thu	1094	9.50	268.67	278	
61.	Veljala	Kalvakurthi	62.5	Tue	3532	12.24	264.55	278	
62.	Maharajpet	Chevalla	25.25	Mon	750	12.20	263.27	276	
63.	Nagireddiguda	Hyderabad W	17.25	Fri	643	0.00	273.87	274	
64.	Kokapet	Hyderabad W	14.75	Fri	1163	7.03	264.94	272	
65.	Kuknoor	Medak	61.25	Thu	2203	16.61	253.30	270	
66.	Gandiguda	Hyderabad W	20.75	Fri	244	7.03	261.31	268	Very low level of development settlements with very low growth potential ($\bar{X}$ - 2SD)
67.	Mandhirayal	Hyderabad W	12.00	Fri	1572	12.39	251.38	264	
68.	Sadasivpet (R)[1]	Sangareddy	60.75	Wed	175	36.79	215.49	282	
69.	Mangalaparthi	Medak	50.25	Sun	1261	9.50	239.50	249	
70.	Ippalpalle	Shadnagar	48.75	Thu	840	0.00	242.05	242	
71.	Yenkepalle	Hyderabad W	18.00	Fri	1149	7.03	233.40	240	
72.	Bangaliguda	Hyderabad W	17.75	Fri	58	7.03	193.12	200	

1. (R) = Rural
Source: Government of Andhra Pradesh (1973).

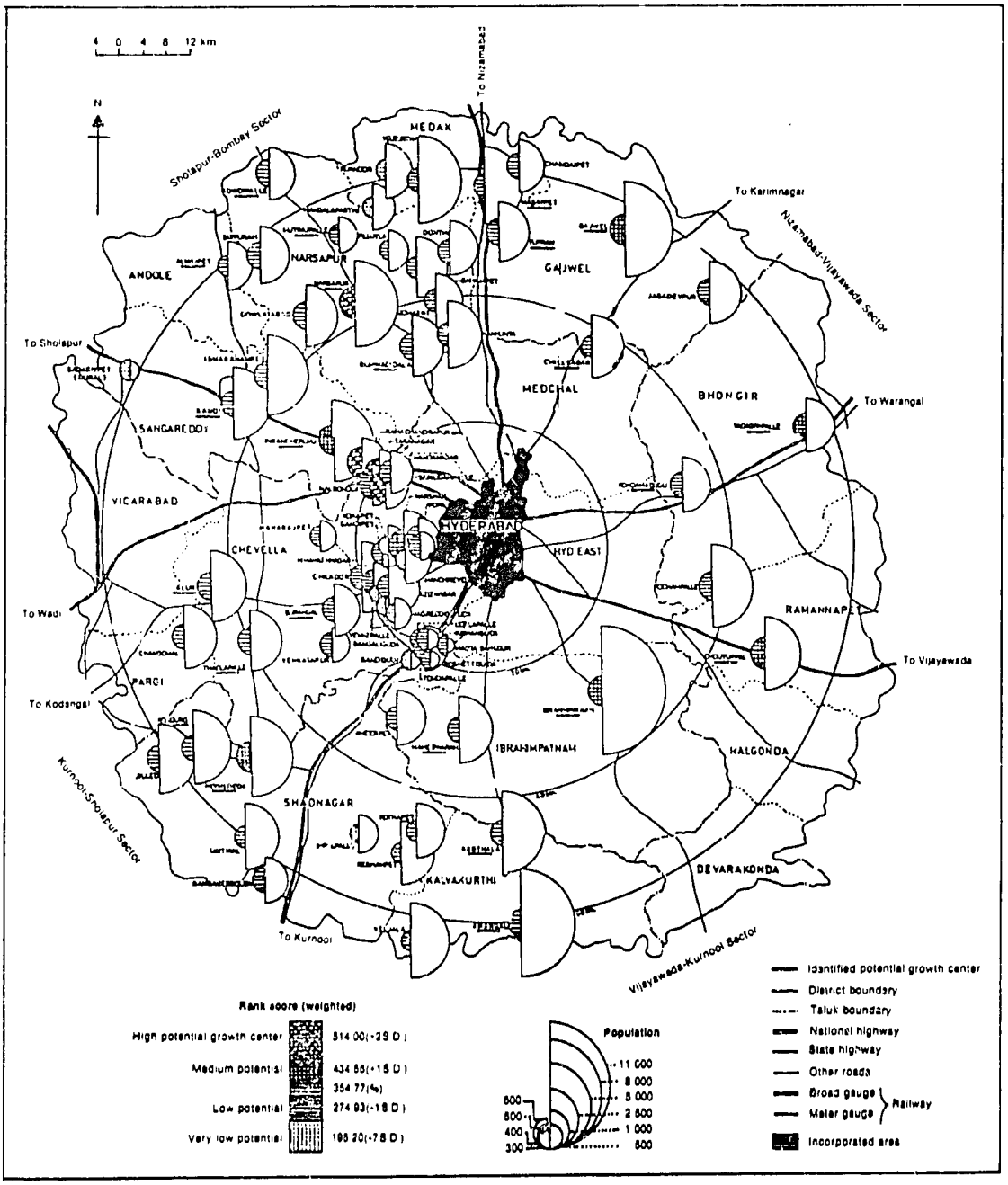

Figure 2. Periodic markets in the rural hinterland of Hyderabad: population size and functional rank score.

postal facilities. The remaining four medium-level market centers, though not so well endowed with facilities, possess dynamic functional and demographic tendencies and are easily accessible (Table 1).

Low Level

The largest number of market settlements—51 have been identified as being at a low level of development, since their standard deviation values

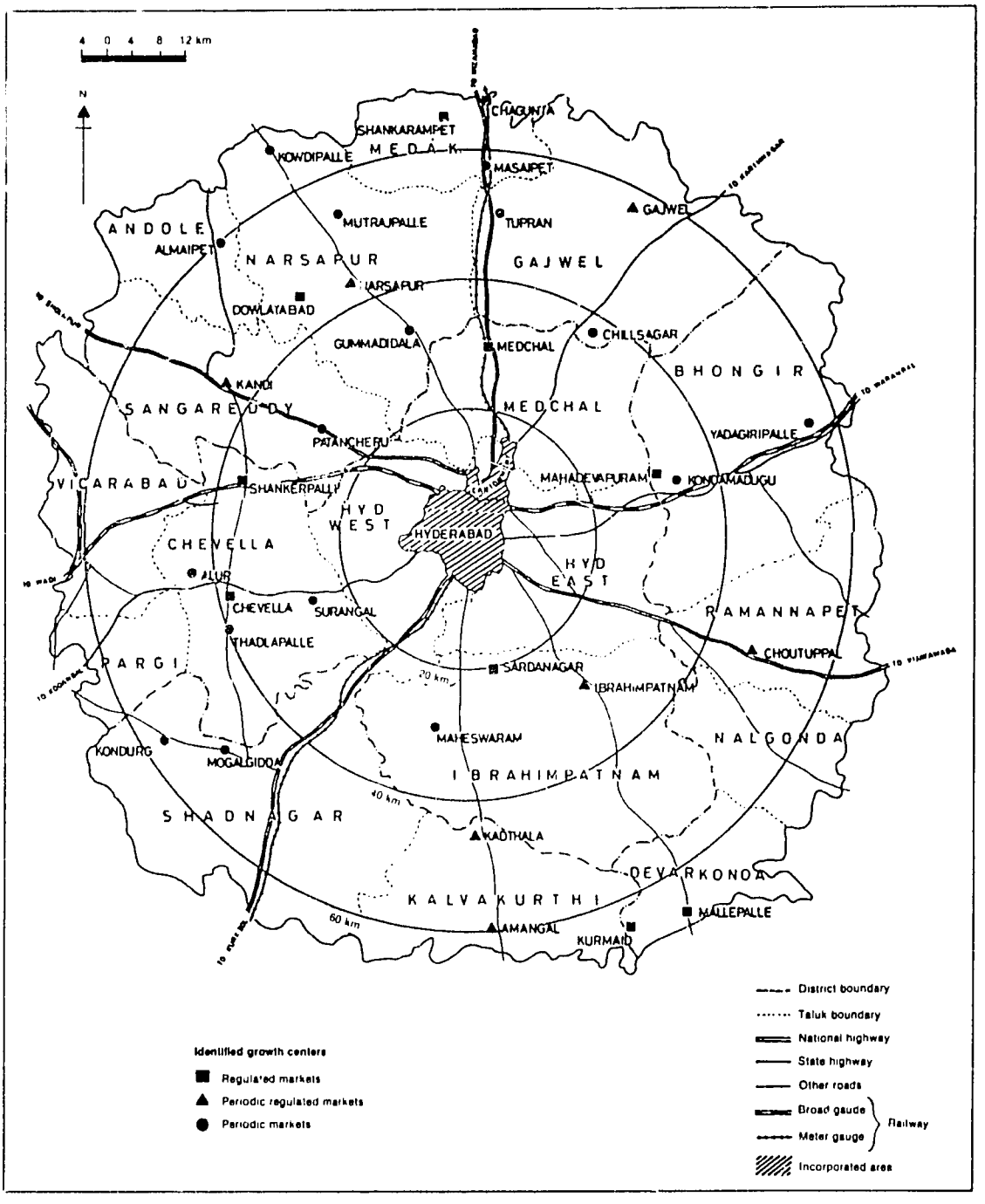

Figure 3. Identified growth centers in the rural hinterland of metropolitan Hyderabad.

range between mean and -1. Most of these settlements are located in the 20 to 40 or 40 to 60 km radius (Fig.2). Despite their present low level of development, 16 of these settlements have either dynamic demographic and economic characteristics or are endowed with fairly good infrastructure facilities and are easily accessible. Excepting for Mutrajapalle, Almaipet, Suranga', and Kowdipalle,

each has a population exceeding 2000. They can therefore be considered as second priority growth centers.

Lowest Level

There are only nine market settlements at the lowest level of development, concentrated in the Kurnool-Sholapur sector (Fig.2). These are all located on cart tracks, have weak demographic and economic structure, are poorly served with infrastructure facilities, and are generally stagnating.

Conclusions

All these periodic markets are central places and some of them are even well-endowed with central functions. We have 23 such market settlements, located outside the suburban zone of a 20-km radius from Hyderabad, which could be induced to develop as growth centers and as sites for further government financed infrastructure and services (Fig. 3). They are widely dispersed and well spread out; together with the 10 rural regulated markets, they can play a key role in diffusing innovations and in integrating the hinterland economy with the metropolitan market.

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Whither Central Wholesale Markets?

H.S. Gopala Rao and A. Maheswari*

Summary

In the developed countries of the West, central markets no longer play a key role in the movement of agricultural produce, particularly food grains. In fact, central markets are almost disappearing in many of those countries.

Is the same trend beginning in India also? This is investigated in the present paper with data from selected wholesale markets of Karnataka. The central wholesale markets in the state are not receiving produce commensurate with the increase in agricultural production; neither are the rural markets coming up. So either the processors are bypassing the wholesale markets or the trade is being diffused throughout the market area. This trend has policy implications for market development, particularly in the context of providing physical infrastructure in central wholesale markets at huge cost through borrowings from the World Bank and other lending agencies. The study also indicates the scope for further research in this vital area.

Résumé

Où vont les marchés centraux de gros?: *Dans les pays avancés occidentaux, les marchés centraux ne jouent plus un rôle clé dans le circuit des produits agricoles, en particulier des céréales. En effet, ces marchés sont en voie de disparition dans beaucoup de ces pays.*

Est-ce qu'on va voir se manifester en Inde aussi cette même tendance? Le présent article examine ce phénomène à l'aide de données obtenues des marchés de gros sélectionnés dans l'Etat de Karnataka. La quantité des produits reçus aux marchés centraux de gros dans l'Etat ne s'accroît pas en fonction de l'amélioration de la production agricole; d'autre part, les marchés ruraux ne se développent non plus. Par conséquent, ou les transformateurs contournent les marchés de gros, ou le commerce se fait partout dans la zone du marché. Cette tendance peut influencer d'une manière importante l'orientation de la politique pour le développement des marchés, étant donné, en particulier, que l'infrastructure physique est fournie aux marchés centraux de gros à un coût énorme grâce à des emprunts à la Banque mondiale et à d'autres agences de crédit. L'étude indique également les possibilités de recherches plus approfondies dans ce domaine vital.

Introduction

In the developed countries of the West, central wholesale markets are now almost extinct as processors and wholesalers purchase directly from farmers except perhaps for perishables: fruits, vegetables, and livestock. With growing evidence of a rapid change in the structure of agricultural marketing in the developing countries, it is possible that in these countries too, wholesale markets will become less important (Gopala Rao and Maheswari, 1982). If this is so, it has important implications for government policy. In India some state governments, including that of Karnataka, have developed market yards at huge cost. If the wholesale markets are declining in importance, is this investment worthwhile? In the present paper the trends in agricultural production and market arrivals have been analyzed to see if such a trend of decline in the importance of central wholesale markets is already visible, however slight it may be.

First, the state-level production and arrivals are

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ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 1985. Agricultural markets in the semi-arid tropics. Proceedings of the International Workshop, 24-28 October 1983, ICRISAT Center, India. Patancheru, A.P.502324, India: ICRISAT.

Table 1. Proportion of selected crops marketed in selected regions and estimated proportion for Karnataka (in % of production).

Crop	Mysore taluk	Hubli, Shiggaon, Kalghatgi taluks	Davangere taluk	Average proportion	Estimated proportion for Karnataka
Paddy[1]	58.4	45.1	80.6	61.4	60
Sorghum	16.7	24.1	55.4	32.1	30
Finger millet	16.1	52.6	62.8	43.8	44
Groundnut	85.0	75.9	95.4	85.4	85
Cotton	-	99.2	100.0	99.6	100

1. Paddy arrivals alone have been considered, excluding rice. This is for two reasons first, if both paddy and rice are included there would be double counting, secondly, producers do not bring rice to the market, it is only the traders who do so

analyzed. Then arrivals in selected markets in each revenue division are compared with the production in the concerned district. Finally, the policy implications for government are discussed and areas requiring further research are suggested.

State-Level Analysis of Production and Arrivals

In Karnataka cereals, minor millets, oilseeds, and fibers account for 77.4% of gross cropped area (average for 1975-76 to 1977-78) and 69.9% of recorded market arrivals. Of these, rice, sorghum, finger millet, groundnut, and cotton were selected for the study, and account for 69.5% of the total area under the crops mentioned above and 75.3% of arrivals.[1]

The proportion of marketed output of each commodity for the state as a whole was estimated on the basis of village surveys conducted in Davangere, Mysore, Hubli, Kalghatgi, and Shiggaon taluks,[2] drawn from three of the four administrative divisions of the state. Table 1 gives the data collected on recall basis for 1980-81. The same proportion of marketed output has been used for all the years. The state production of rice, sorghum, finger millet, groundnut, and cotton is shown for 1971-72 to 1981-82 in Appendix I. Also shown are the arrivals of these commodities for the same years and the marketed output. The proportion of marketed output passing through regulated markets is shown in the last column for each commodity.

The yearly production, marketed output, and arrivals of all the five commodities are shown in Table 2. Data for arrivals include supplies which do not arrive in the regulated market yard, yet upon which a market fee is collected. Such fees can be collected at the processors' premises, in the villages, or at road checkposts. Thus actual arrivals to the yard are far less than implied by data. The tables show that production has a secular upward trend interrupted in 1972-73, 1976-77, and 1980-81 by unfavorable seasonal conditions.[3] The marketed surplus has also been almost a constant proportion of output, reflecting the fact that cropping pattern has not changed much.

Arrivals were highest in 1972-73, when production was low; the proportion of marketed output passing through regulated markets was highest in the same year. It is evident that the proportion was high in bad years. The arrivals were higher in the second half of the period under consideration, but the proportion of produce passing through regulated markets declined.

The relative performance of production and arrivals from 1971-72 to 1981-82 can be summarized in terms of its two component quinquennia. Average production increased by 10%, whereas arrivals increased only by 7%. Hence, arrivals did not keep pace with production. What is equally significant is

1. The source of data on agricultural production is the State Bureau of Economics and Statistics and the various District Statistical Offices. For market arrivals and other information pertaining to market committees, the source is Karnataka State Agricultural Marketing Board and the various market committees.

2. For details of methodology of village survey, see the project reports on "Facilitative Services to be provided by Agricultural Produce Marketing Committees: Davangere, Hubli and Mysore," Institute of Development Studies, University of Mysore, (forthcoming)

3. Annual Season and Crop Reports, Bureau of Economics and Statistics, Government of Karnataka, Bangalore.

Table 2. Total production, arrivals, and marketed output of rice, sorghum, finger millet, groundnut, and cotton in Karnataka.

Year	Production (million tonnes)	Marketed output (million tonnes)	Marketed output as % of production (Col.3 as % of Col. 2)	Arrivals (million tonnes)	Arrivals as % of marketed output (Col. 5 as % of Col. 3)
1	2	3	4	5	6
1971-72	6.64	3.60	54.3	0.99	27.5
1972-73	5.59	2.99	53.5	1.21	40.4
1973-74	6.95	3.66	52.6	0.72	19.7
1974-75	6.32	3.34	52.4	0.70	20.9
1975-76	6.99	3.69	52.8	0.94	14.6
1976-77	4.76	2.49	52.2	0.85	34.1
1977-78	7.34	3.85	52.4	0.75	14.3
1978-79	7.26	3.83	52.8	1.04	13.7
1979-80	7.56	3.95	52.2	1.08	14.3
1980-81	6.48	3.44	53.0	1.07	16.4
1981-82	7.06	3.79	53.2	0.96	15.6

that the average proportion of marketed output handled by regulated markets (Col.6, Table 2) declined during the two periods; it was 25% in the first quinquennium and fell to 14% in the second.

This aggregate conceals a counterwailing in the case of cotton, where production has increased only by 6% while arrivals have gone up by 62%. The increase in arrivals is independent of production, since the cotton trade in Karnataka receives imports from other states via the regulated markets.

The rates of increase of arrivals of major commodities in the regulated markets of Karnataka have lagged behind those of production. This is so despite the fact that infrastructure has improved between 1971-72 and 1981-82.[4] It is thus clear that there is an inverse relationship between the improvement in communication infrastructure and rate of market arrivals.

4. Figures relating to communication infrastructure are available only up to 1977-78 and in some cases up to 1978-79. The road length under P.W.D. went up by 23.45% between 1971-72 and 1977-78. Number of villages not connected by any road declined from 4558 to 2011 in the same period. Post offices went up by 7%, telephone exchanges more than doubled. Number of telephones and telegraph offices nearly doubled. Licensed radio sets increased by 57% between 1971-72 and 1975-76, after which the numbers show a decline owing to a relaxed licensing procedure of the government. Number of goods vehicles increased by 57%.

Analysis of Production and Arrivals in Selected Markets

To analyze the effect of regulated market infrastructure on arrivals, individual markets have been taken up for analysis. Four old and established markets with developed market yards are considered, one from each administrative division (Table 3). Arrivals in these markets were compared to those of a nearby market in the same district, this market not having assembly of produce in the regulated market yard, and the market fee being collected in the villages, mills, or at checkposts (see Fig. 1 and Table 3).

The total arrivals of the five selected commodities, i.e., rice, sorghum, finger millet, groundnut, and cotton in each market can also be compared with the total production of the district in which the market is located, because the district contributes

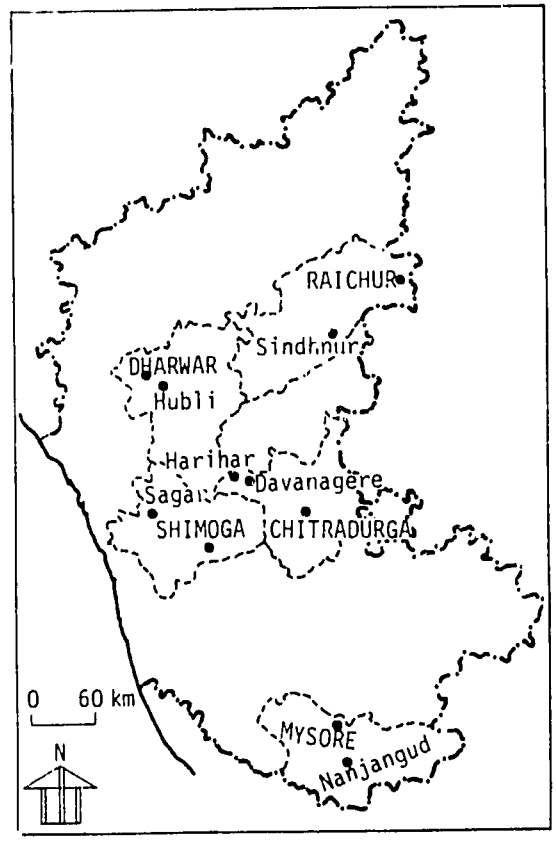

Figure 1. Location of selected markets in Karnataka.

Appendix 1: Production, marketed output and arrivals of rice, sorghum, finger millet, groundnut and cotton in Karnataka.

Year	Rice				Sorghum				Finger Millet				Groundnut				Cotton		
	Production	Marketed output	Arrivals	Col. 4 as % of Col. 3	Production	Marketed output	Arrivals	Col. 8 as % of Col. 7	Production	Marketed output	Arrivals	Col. 12 as % of Col. 11	Production	Marketed output	Arrivals	Col. 16 as % of Col. 15	Production	Marketed output	Arrivals
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1971-72	32.4	19.5	2.8	14.40	14.7	4.4	0.97	22.0	10.6	4.7	0.53	11.27	7.6	6.5	3.78	58.15	1.05	1.05	1.84
1972-73	29.7	17.8	4.8	26.90	12.4	3.7	1.15	31.0	8.2	3.6	0.47	13.05	4.4	3.7	3.02	81.62	1.10	1.10	2.64
1973-74	33.2	19.9	1.6	8.04	20.2	6.1	1.34	22.0	7.8	3.4	0.40	11.76	6.9	5.9	2.62	44.40	1.27	1.27	1.25
1974-75	28.8	17.2	2.4	13.90	17.6	5.3	1.13	21.3	8.5	3.7	0.55	14.86	7.4	6.3	2.54	40.31	8.87	0.87	0.36
1975-76	33.3	19.9	2.2	11.05	15.7	4.7	1.14	24.2	13.4	5.9	0.50	8.47	6.6	5.6	3.82	68.21	0.86	0.86	1.7
1976-77	22.7	13.6	3.7	27.20	12.0	3.6	0.69	19.16	8.4	7.7	0.68	18.37	3.7	3.1	1.71	55.16	0.87	0.87	1.7
1977-78	35.7	21.4	1.9	8.87	6.2	4.9	1.14	23.2	15.1	6.6	0.60	9.09	5.5	4.7	1.84	39.14	0.90	0.90	2.0
1978-79	32.5	19.5	3.4	17.43	16.2	4.9	0.85	17.3	16.0	7.0	0.58	8.28	6.0	5.1	2.67	52.35	0.90	0.90	2.9
1979-80	35.7	21.4	3.9	18.22	18.0	5.4	0.70	13.0	14.8	6.5	0.66	10.15	6.0	5.1	2.84	55.68	1.08	1.08	2.7
1980-81	34.0	20.4	4.0	19.60	14.3	4.3	0.68	15.8	10.9	4.8	0.66	13.75	4.4	3.7	2.73	73.78	1.20	1.20	2.6
1981-82	33.9	20.3	3.2	15.76	14.6	4.4	0.56	12.7	14.4	6.3	0.58	9.20	6.1	5.2	2.85	54.80	1.38	1.38	2.4

1. For cotton, market arrivals exceed production, except in 1972-73 and 1973-74 when the percentage of arrivals was 98.43 and 41.38 respectively.

Sources: (i) Bureau of Economics and Statistics, Govt. of Karnataka, Bangalore.

(ii) Karnataka State Agricultural Marketing Board, Bangalore.

Table 3. Names of markets selected for analysis of product arrivals.

Division	Regulated market selected	Year of regulation	Average arrivals of selected commodities (78-79 to 81-82)	Nearby market for comparison
Bangalore	Davangere	1948	107 505 tonnes	Harihar
Gulbarga	Raichur	1933	136 000 tonnes	Sindhnur
Belgaum	Hubli	1943	22 167 tonnes	Dharwar
Mysore	Mysore	1950	24 528 tonnes	Nanjangud

a major share of arrivals to the market.[5] In every case, the rate of increase of production and of arrivals to the control set of market towns exceeds that of arrivals to the regulated market yards.

Markets with well-developed yards do not necessarily attract an increasing quantum of produce. It does not necessarily follow that markets which have no yards receive more produce over time as is shown in a further study of Shimoga district (Fig. 2). Shimoga's commodities do not flow through the regulated market yard. The consolidated production in the district has gone up from .14 m tonnes in 1971-72 to .72 m tonnes in 1980-81, but arrivals have declined from .029 m tonnes in 1971-72 to 0.0045 m tonnes in 1980-81.

Compared to the Shimoga market, the market at Sagar, 75 km from Shimoga, is much smaller. This market was regulated in 1959. There is no assembly of produce in the yard but Figure 2 reveals that there is a slight upward trend in arrivals.

Some explanations as to why regulated markets are handling a smaller percentage of agricultural production than earlier is necessary. First, commodity flows may be increasingly decentralized to villages all over the market area, with an improvement in communications.

Second, the processing units could be increasingly entering into direct contract with the producers. The Royal Commission on Agriculture of 1928 found that producers sold their produce mostly to a particular processor-manufacturer (who was often also a commission agent) and was tied to him by various types of credit. Regulated markets were recommended to end this practice and to increase competition; however, processors still are major channels of disposal for produce, particularly for

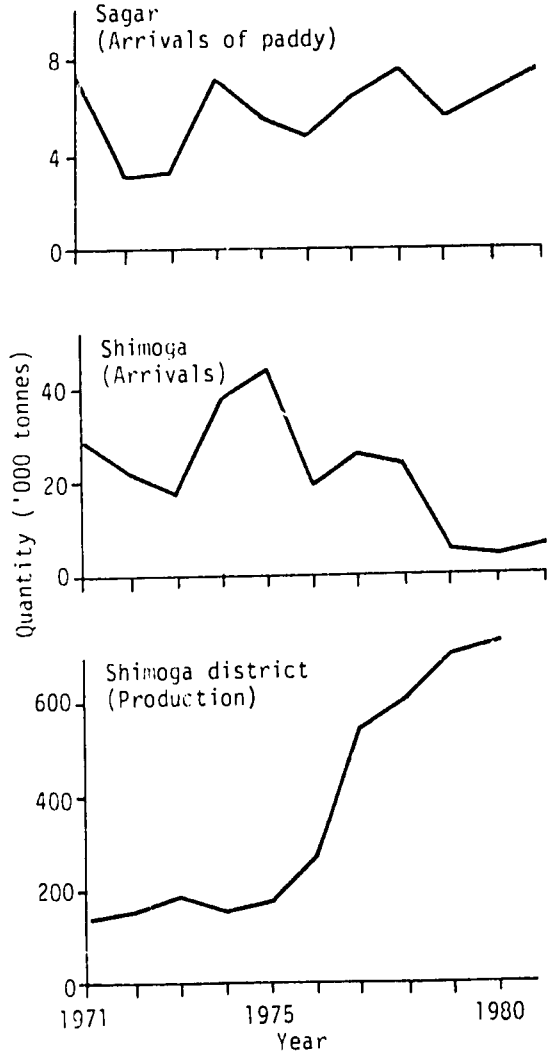

Figure 2. Arrivals in indicated markets and production of selected crops in Shimoga district, Karnataka.

5 See IDS Project reports cited in footnote 2 and Cotton Market Township, H S Gopala Rao et al 1983, IDS, Mysore

paddy. Changes in incomes, tastes, preferences, and food habits have a great impact on market channels. Greater affluence brings about a shift in demand for finished and ready-to-use products, favoring manufacturers who contract out with primary producers for their raw material supply and thus bypass the central market. Certain government policies may also unwittingly be responsible for reducing sales in market yards. The levy system is one such. While the government operates the levy system for sound reasons, it may be scaring away buyers/sellers from bringing produce to market yards in order to evade payment of levy produce to the government.

Third, rural markets which are not regulated could become important outlets for agricultural produce. This is unlikely to have taken place in Karnataka, because all the wholesale outlets for agricultural produce in the state are regulated. Outside the regulatory fold are small marketing centres, which function mainly as retail outlets and whose volume of wholesale transactions is below the economic threshold for the provision of regulated market infrastructure.

Central wholesale markets may either disappear or lose their importance; their decline is manifest even though the process may take a long time. These markets are showing sure (if slow) signs of going the way of their counterparts in the advanced countries of the West. How soon this would happen can only be assessed through in-depth studies on the trends of arrivals in the various markets. Studies on the channels through which produce passes, and the relative efficiency of these channels, can throw more light on the subject. The fact that the analysis of data in 17 of the main markets taken up for development with financial assistance from the World Bank has revealed that the trend in arrivals was downward in all but two cases shows that the matter deserves serious investigation. What is ironical in this context is that from their inception in the 1930s up to the 1970s the markets grew in size when investments to develop them were low; and when the markets are showing signs of shrinking, expenditure on providing physical infrastructure in these yards is sought to be expanded. In order to finance this market development, the market committees need to enhance the rate of market levy, which is their most important source of income. If the investment does not produce the desired results, the fee becomes a tax, and also results in other undesirable effects, such as a price spiral.

The objective of finding out whether central markets are shrinking helps not merely to decide the quantum of expenditure to be incurred on their development. Such a study will also indicate the structural changes that are taking place and suggest suitable improvements/changes in the marketing set up. More research needs to be directed to establish the optimum levels of investment in market development. The results of such investigations, including studies on hinterland delineation, the analyses of commodity flows and of the operational efficiency of the regulated markets, would help governments take appropriate policy decisions to bring about qualitative changes in the structure of agricultural marketing.

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Behavioral Characteristics of Marketplace Participants in the Tarai Region of Uttar Pradesh

V.K. Srivastava*

Abstract

The assumptions that consumers use the nearest facility and that notions of time and space are culturally invariant are replaced by the hypothesis that consumers' perceptions remodel Cartesian space. Access is perceived not only in spatial terms but also in terms of transport infrastructure, cost, prices, the range of objectives of travel, ties of credit, accommodation, and other social bonds. Data from the Tarai region of Uttar Pradesh state in India illustrate these points.

Résumé

Caractéristiques de comportement des participants aux marchés dans la région du Tarai de l'Etat d'Uttar Pradesh : *Les suppositions que les consommateurs fréquentent le marché le plus proche et que les notions de temps et d'espace sont culturellement invariantes, sont remplacées par l'hypothèse que les perceptions des consommateurs remodèlent l'espace cartésien. L'accès est perçu non seulement au point de vue spatial mais aussi en fonction de l'infrastructure de transport, du coût, des prix, de la diversité des objectifs de voyages, des liens de crédit, du logement, ainsi que d'autres liens sociaux. Les données obtenues de la région du Tarai de l'Etat d'Uttar Pradesh en Inde viennent illustrer les questions évoquées ci-dessus.*

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Spatial Organization of Market Centers in the Umland of a Metropolis: Kanpur. A Case Study

R.S. Dixit*

Abstract

The spatio-economic importance of a market center can be gauged from a number of indicators: population, number of traders, periodicity of market, attendance at market, retail and wholesale functions, degree of commodity specialization, and access to road and rail transport. These indicators are combined and subjectively weighted to form a score from which five hierarchical settlement levels are empirically derived. In the region of Kanpur, there are 1 regional center (Kanpur), 8 subregional market centers, 16 small urban market centers, and 219 major and 382 minor rural market centers. The system is bottom heavy and the paper describes it in detail.

Résumé

Organisation spatiale des centres de marché dans le hinterland d'un métropole—Kanpur, une étude de cas : *L'importance spatio-économique d'un centre de marché peut-être évaluer à partir de plusieurs indicateurs, à savoir la population, le nombre de commerçants, la périodicité d'un marché, l'assistance au marché, les fonctions de gros et de détail, le degré de spécialisation au niveau des produits et l'accès au transport routier et ferroviaire. Ces indicateurs sont réunis et pondérés subjectivement afin de constituer une cote: cinq niveaux hiérarchiques d'établissement sont dérivés empiriquement. Dans la région de Kanpur, on a pu constater 1 centre régional (Kanpur), 8 centres de marche sous-régionaux, 16 petits centres urbains, 219 centres ruraux majeurs et 382 centres ruraux mineurs. Le système est trop lourd du bas et l'article le décrit en détail.*

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3

The Economic Efficiency of Agricultural Markets

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Impact of Market Access on Agricultural Productivity in India

M. von Oppen, P. Parthasarathy Rao, and K.V. Subba Rao*

Summary

The paper highlights the results of a series of macrolevel and microlevel studies that quantify physical and institutional infrastructure as a proxy for farmers' access to markets, which in turn conditions aggregate productivity of agriculture in India. The implications of the findings of these studies are summarized as follows:

- *A food policy which supports free movement of trade within the country has a measurable effect (with a lag of 2 years) of increasing agricultural productivity.*
- *The density of surfaced roads and the density of regulated markets have positive effects on productivity. The effect of markets on productivity increases at a decreasing rate; in areas of low market densities, returns from investments into markets can be expected to be very high.*
- *As with any new input that is in scarce supply, large farmers are the first to take advantage of access to markets where such access is limited. But as availability increases, small farmers also gain access. Thus, apart from its efficiency effect, better market access above a minimum level also has a desirable equity effect.*

Résumé

L'Impact de l'accès aux marchés sur la productivité agricole en Inde : *L'article présente les résultats d'une série d'études macro- et micro-économiques quantifiant l'infrastructure tant physique qu'institutionnelle en tant que simulacre de l'accès des paysans aux marchés. Cet accès conditionne, à son tour, la productivité agricole globale en Inde. Les résultats et les conclusions de ces études sont résumés comme suit :*

- *Une politique alimentaire souscrivant au libre-échange à l'intérieur du pays a un effet appréciable (avec un délai de deux ans) d'accroître la productivité agricole.*
- *La densité des rues utilisables ainsi que celle des marchés réglés ont des incidences positives sur la productivité. L'effet des marchés sur la productivité s'accroît à un taux décroissant; dans les régions où la densité des marchés est faible, il y a beaucoup de chances pour que les rentabilités des investissements dans les marchés soient très élevées.*
- *De même qu'avec tout nouvel intrant qui fait défaut, ce sont les grands paysans qui sont les premiers à tirer profit de l'accès aux marchés ou un tel accès est limité. Mais, au fur et à mesure que la disponibilité augmente, les petits paysans obtiennent également l'accès aux marchés. Donc, à part son impact sur l'efficacité, un meilleur accès aux marchés au-dessus d'un niveau minimum a aussi un effet d'équité souhaitable.*

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Introduction

Agricultural activities are spread over space and seasons. In a developing country the transition from a more or less self-sufficient, home-consumption oriented agriculture to a more commercially oriented agricultural economy can mobilize considerable resources by allocating crops and scheduling cropping patterns according to the regional and seasonal differences within that country, based on the principle of comparative advantage. While in international trade theory this principle has been studied and described at length (e.g., Thompson 1981), there is little evidence to date on how agricultural productivity within a developing country is affected by interregional trade and exchange.[1]

Objective

This paper highlights the results of a series of macrolevel and microlevel studies in India, which quantify physical and institutional infrastructure as a proxy for farmers' access to markets which, in turn, conditions aggregate agricultural productivity. On comparison the effects measured by these studies are of the same magnitude.

Exploratory Research

We first explored those data sources which could easily be assembled, in order to verify whether measurable effects on agricultural productivity could be identified by an analysis of variables determining market access and exchange.

The simplest model employed actual data on two production possibility frontiers representing two different villages with land of different yield potentials for two crops, sorghum and chickpea (see Table 1). Assuming that farmers in both villages wanted to fulfill their home consumption requirements for chickpeas at a level of 7% of sorghum they produced, then both villages together, but without exchange, would produce a certain amount, say 100. Under the same conditions, if the two villages exchanged part of their produce, each village tends to emphasize production of that crop for which it has a comparative advantage and total production increases to 101. If exchange of products is enhanced and specialization driven to a point where only marginal amounts of chickpeas are produced in one village, the output would increase to 102. Despite its many shortcomings, the value of such a simple model is that it indicates the magnitudes of such market-derived specialization effects; these cannot be expected to be very large or easily visible. Also, the reallocation of cropping patterns in response to changes in market access would take time and this would further cloud such effects.

Based on this model, a spatial equilibrium model

Table 1. Area, yield, and production of sorghum and chickpea in two villages, Shirapur and Kalman, in India (based on averages 1975-1977) at different degrees of specialization.

	Degree of specialization		
Village/crop	I	II	III
Shirapur			
Sorghum			
Area (ha)	84	80	77
Yield (kg/ha)	240	240	240
Production (kg)	20160	19200	18480
Chickpea			
Area (ha)	6	10	13
Yield (kg/ha)	240	240	240
Production (kg)	1440	2400	3120
Kalman			
Sorghum			
Area (ha)	95	100	104
Yield (kg/ha)	270	270	270
Production (kg)	25650	27000	28080
Chickpea			
Area (ha)	10	5	1
Yield (kg/ha)	180	180	180
Production (kg)	1800	900	180
Total sorghum production (kg)	45810	46200	46560
Total chickpea production (kg)	3240	3300	3300
Index	100	101	102

Source: Data from ICRISAT's Village-Level Studies.

1. A recent review (Antle 1982) of such evidence in quantitative form based on empirical data, quotes four sources: Easter et al (1977), Antle (1980), Liang (1981), and Antle (1983), there are other studies based on normative models—Sherbiny and Zaki (1974) and Heady and Srivastava (1975)—or descriptive analyses of historical developments (McAlpin 1975), but these do not provide quantitative measurements of the contribution of market access to productivity per se, nor do they address the issues of equity across regions and across farm size.

for interregional trade—using quadratic programming—was built for three regions and three crops. Supply and demand in each region were assumed to be linear functions of price, and traditional as well as improved technologies were simulated. The data were derived from secondary sources. Restricting the trade flows between regions in this model to 10% of the level of free trade caused a decrease in productivity of about 2% of the weight of all crops produced when traditional technologies were employed, and of 4% when improved technologies were adopted (von Oppen 1978).

These findings were empirically tested with cross-sectional time-series data on 13 Indian states over 10 years. The dependent variable was average food-grain production in t/ha. In addition to the explanatory variables, such as use of high-yielding varieties, fertilizer, irrigation, and annual rainfall, other variables that determine market access, i.e., availability of trucks and an index for food zoning, were included.[2] Prices were not included in this model, as they are endogenous to the system, acting as information signals on comparative advantages; similarly other sources of information such as extension services were also not included. Using a generalized least-squares regression technique in pooling cross-section and time-series data, freedom of interstate trade was found to significantly affect aggregate productivity with a lag of 2 years.[3] In fact, other things being equal, a shift from the average degree of food zoning to free trade across all 13 states implied an increase in aggregate productivity of 5% (von Oppen 1978).

Microeconomic Analysis

In order to test whether there is a measurable impact of market access and trade on productivity by observation at lower levels of aggregation, two studies—one using district and the other farmer-level data—were carried out.

Analysis of Time-Series, Cross-Sectional Data at the District Level

A data base was created, which comprises the monetary value at constant farm prices of production from 22 major crops in 94 districts (of four states in India: Andhra Pradesh, Karnataka, Madhya Pradesh, and Tamil Nadu) for the years 1956-57 to 1978-79. Further, data on inputs such as fertilizer, high-yielding varieties, irrigation, and rainfall were also included. An ordinary least-squares regression model was formulated expressing aggregate productivity per area as a function of inputs used and market infrastructure (see Table 2). Based on prior information the infrastructure variables were lagged by two years.[3] After computing annual averages of per capita production (in value terms) across all districts, they were grouped as follows:

1. far below average, if more than one standard deviation below average per capita production (13%);
2. all other districts (87%).[4]

In parentheses above is the percentile distribution of districts in the two groups.

Dummy variables were assigned accordingly and these dummies were interacted with three market access variables, i.e., road density (in length of surfaced road per unit of geographical area), market density (in number of regulated markets per geographical area), and trade freedom (index: see footnote 2). The regression results are summarized in Table 2.

Overall, the variables included explain 79% of the variation in aggregate productivity. All input variables are highly significant and carry the expected signs. Among infrastructure variables, road density had a significantly positive effect on

2. Food zones were established in India to control the interstate trade of food grains; the degree of food zoning varied for wheat, rice, coarse grains, and pulses. While at times in some states all four groups of food grains could be privately traded only within one state (index value 4), there were other years when 3 crops were freely tradable among 10 states (index value 30), and years without food zoning when 13 states could trade all 4 food grains (index value 52).

3. Lags from t-1 to t-4 were incorporated and the variable lagged t-2 had highest significance; the sum of the parameter values of these lags was almost equal to that of lag t-2, if included as the only variable.

4. This grouping initially comprised 4 different groups, i.e. within and outside of one standard deviation above and below per capita productivity. However, statistical tests showed that only the small group of districts with 'far below average' per capita production had a statistically different response to infrastructure, so the other three could be regrouped together, which we did.

Table 2. Aggregate productivity[1] as a function of market infrastructure and inputs.

Variable (unit)	Time lag	Coefficient	(t-value)	Mean (mean in 1976-77)	Elasticity at mean	Optimum value
Road density (km/10 km²)						
Far below average	t-2	-0.1611	(-0.34)	3.04 (4.27)	-0.008	-
Others	t-2	2.360	(8.7)***	1.87 (2.73)	0.07	-
Market density (No./100000 km²)						
Far below average	t-2	0.108	(3.3)***	52.60 (91)	0.054	132
Far below average squared	t-2	-0.00041	(-2.9)**			
Others	t-2	0.0773	(4.5)***	(57.5) (115)	0.045	161
Others squared	t-2	-0.00024	(-2.9)**			
Freedom of trade (index)						
Far below average	t-2	0.038	(0.6)	30.7 (25.7)	0.018	
Others	t-2	0.236	(8.4)***	27.8 (24.4)	0.104	
HYV (% of total cropped area)	t	0.193	(3.7)***	6.3 (16.5)	0.02	
NPK (kg/ha)	t	0.305	(8.9)***	11.7 (21.0)	0.06	
Irrigation (% of total cropped area)	t	1.184	(47.2)***	19.2 (21.1)	0.36	
Rain (1000 mm)	t	8.692	(4.9)***	1.084	0.14	
Rain squared	t	-0.257	(-0.6)	1.489		
Intercept		13.58				
R		0.79				

1. Aggregate productivity measured in 10 Rs/ha; mean value 62.77.
** significant at 1% probability level; *** = significant at 0.1% probability level.
Data base: 94 districts of India, 23 years (1956-57 to 1978-79).

productivity; however in districts of 'far below average' per capita production, it has no impact. This finding is quite plausible, considering that more surfaced roads in a deficit area are likely to lead to more imports and thereby depress prices and local production as much as they may stimulate productivity at the local level.

The density of organized markets shows positive effects across all districts.

Freedom of trade had little or no effect in districts of 'far below average' per capita production, but it had a significantly positive effect in all other districts. The same explanation holds for trade freedom as for roads; policies allowing free movement of food grains lead to imports into regions of deficit and thereby depress prices and production there, thus offsetting the stimulating effect of trade freedom. (In both cases the effects are not negative!)

Effects of Market Variables on Productivity

The above results from district-level data are consistent with our earlier tentative explorations

Roads. Taking the elasticities around the mean value, these imply that an increase in road density of 10% would, after two years, increase aggregate

productivity by 0.7% in all districts except those with 'far below average' productivity, where no effect on productivity would be observed.[5]

Regulated markets.[6] The squared term in the function permits us to derive information on optimal levels of market density which range from 13 to 16 markets per 10000 km^2. In both regions the average level of market density in 1976-77 was about 25% below optimum. This finding complements our earlier findings based on time-series data ending in 1974-75, which showed that market density—like roads—contributed to continuous increases in productivity. On updating this data set by another four years, the results showed that a saturation point in market density is being approached in many places and has probably been reached during the second half of the 1970s (see Appendix Table 1).

Freedom of trade. Relaxation of all trade restrictions (index value 52) from the average in the past (28) would lead to an increase in productivity of about 9% in all districts except the 'far below average' districts. Thus trade freedom clearly induces farmers in most areas to achieve higher levels of productivity.

The policy implications of these relationships will be discussed in connection with the results from the microlevel study.

Analysis of Cross-Sectional Data at Farm Level

This data base was created in surveys of 300 farmers in each of 2 regions, in Mahbubnagar district of Andhra Pradesh and Nagpur district of Maharashtra. In each region, 20 villages of an average type were purposively selected at varying distances from a market network.[7] In each village 15 farmers were selected from a stratified population, i.e. 5 small (<4 ha), 5 medium (5-8 ha), and 5 large (>10 ha) farmers, based on operated land area adjusted for irrigation. Farms of sizes falling in between these groups were left out, to get a clear differentiation between the size groups included. Data were collected to measure the variables listed in Table 3. The variable of access to the nearest market was interacted with dummy variables for the farm-size groups.

In expressing total productivity as a function of inputs and market access, a simultaneous equation problem arises: market access affects productivity directly (through cropping pattern allocation) as well as indirectly (through input use); but input use also directly affects productivity. Hence, a framework is needed to solve these equations simultaneously. The three-stage, least-squares technique was applied. The results for the two data sets are presented in Tables 4 and 5. They show that generally the inputs and resources included have the expected signs. Regarding market access, the signs in all instances—except for three insignificant cases—are negative. This implies that with increasing distance to the nearest market center, productivity decreases when all other resources and inputs are constant; also with increasing market distance, input use decreases. Measuring the effects of market access on productivity and simultaneously on input use allows us to separate the direct allocation effect of market access on the land-use system from the indirect effect of allocation of inputs (for a more detailed discussion see von Oppen et al. 1982).

In the Mahbubnagar region, there is no statistically significant difference between the market access available to small, medium, and large farmers and their farm productivity. In the Nagpur region, only small and medium farmers are significantly and positively affected by market access while large farmers are not. Market access affects fertilizer use by small and medium farmers in Nagpur and Mahabubnagar, and use of high-yielding varieties by medium farmers in Mahbubnagar. However, market access does not affect input use by large farmers in both regions.

From these results we infer that in Nagpur (average distance to nearest market. 11 km) a threshold level of market density may have been reached, which permits small and medium farmers to take advantage of market participation and corresponding land use allocation. In Mahbubnagar (average distance to nearest market: 21 km) only large farmers respond to better market access with

5. This magnitude is slightly lower than the values measured by Easter, Abel, and Norton (1977) and interpreted by Spriggs (1977).

6. Regulated market yards are markets where institutional arrangements are enforced, ensuring a generally competitive price formation and an orderly procedure to settle disputes and price reporting. Since market regulation is generally introduced in already existing market places, density of regulated markets offers a measure of the institutional investment into market infrastructure.

7. As confirmed by a statistical test on the variables included, there were no significant differences between these villages, except for market access.

Table 3. List of variables considered in regression equations and their mean values in the two selected regions.

Abbreviation	Description of variables	Unit	Mean value	
			Mahbubnagar	Nagpur
TP	Total productivity, value at average prices per acre	Rs	478	437
HYV	High yielding varieties, area	%	5.1	12.3
FERT	Fertilizer, value per acre	Rs	30.7	57
FYM	Farmyard manure, value per acre	Rs	21.5	27.7
PEST	Pesticides, value per acre	Rs	1.6	18.9
CR	Carts per acre	No.	0.07	0.12
IRR	Irrigated area	%	23.8	27.9
HLAB	Human labor, value per acre	Rs	77.7	136
FS	Family size per household	No.	5.8	6.5
CT	Cattle	No.	5.3	6.9
SMK	Nearest market distance, small farmers	km	20.4	10.9
MMK	Nearest market distance, medium farmers	km	20.4	10.9
LMK	Nearest market distance, large farmers	km	20.4	10.9
MS	Value of market surplus per acre	Rs	225	248
UV	Weighted unit value per kg	Rs	1.08	n.a
SZ	Farm size	Acres	11.5	11.5
NAL	Attached laborers	No.	0.47	0.98

n.a. = not available

Table 4. Simultaneous equation model and estimated parameters of gross productivity and input use in Indian farms as a function of resources given and of distance to the nearest market by farm-size group — Mahbubnagar district.

Variable[1]	Equations				
	1	2	3	4	5
TP	[DEP][2]	-[3]	-	-	-
HYV	2.16 (2.9)***	[DEP]	0.781 (3.8)***	-	0.252 (10.7)***
FERT	2.26 (9.2)***	-	[DEP]	-	-
FYM	1.67 (4.1)***	-	0.118 (1.4)	[DEP]	-
PEST	5.7 (2.7)**	-	-	-	[DEP]
CR	50.1 (2.1)*	-	-	0.091 (0.03)	-
IRR	3.37 (7.3)***	0.187 (8.6)***	0.896 (11.1)***	-	-
HLAB	0.51 (2.2)*	-	-	0.065 (2.4)*	-
FS	-	-0.58 (-1.6)	-	0.99 (1.2)	-
CT	-20.3 (-1.3)	-	-	15.3 (6.9) ***	-
SMK	-1.12 (-1.4)	-0.05 (-0.9)	-0.405 (-1.9)*	-	-0.03 (-1.1)
MMK	-0.62 (-0.8)	-0.11 (-1.9)*	-0.289 (-1.4)	-	-0.01 (-0.4)
LMK	-1.31 (-1.8)*	-0.075 (-1.3)	-0.089 (-0.4)	-	0.009 (0.3)
Derived elasticities of distance to market based on 21-km distance					
Small farms	-0.087	-0.048	-0.533	-	-2.04
Medium farms	-0.026	0.488	-0.204	-	-0.136
Large farms	-0.050	-0.225	-0.041	-	+0.071
All farms (wt.avg)	-0.044	-0.345	-0.180	-	-0.143

1. For explanation of code, see Table 3
2. DEP = dependent variable
3. - indicates variables not included
4. t-value in round brackets

Significance levels: *** Significant at 0.1% probability level.
** Significant at 1% probability level
* Significant at 10% probability level.

Table 5. Simultaneous equation model and estimated parameters of gross productivity and input use in Indian farms as a function of resources given and of distance to the nearest market by farm-size group — Nagpur district.

Variable[1]	Equations 1	2	3	4	5
TP	[DEP][2]	-[3]	-	-	-
HYV	1.77 (2.2)*[4]	[DEP]	1.23 (8.5)***	-	0.666 (0.8)
FERT	1.53 (3.8)***	-	[DEP]	-	-
FYM	2.43 (4.5)***	-	0.03 (0.4)	[DEP]	-
PEST	-0.68 (-1.0)	-	-	-	[DEP]
CR	-42.8 (-0.8)	-	-	-2.27 (-0.4)	-
IRR	1.47 (2.4)*	0.004 (0.1)	0.68 (8.6)***	-	-
HLAB	1.55 (6.2)***	-	-	0.238 (13.0)***	-
FS	-	2.3 (2.6)**	-	-4.09 (-3.3)***	-
CT	-9.3 (-1.0)	-	-	6.16 (6.4)***	-
SMK	-4.4 (-1.4)	0.018 (0.1)	-1.21 (-2.0)*	-	-0.58 (-1.7)*
MMK	-3.97 (-1.3)	-0.23 (-1.0)	-1.13 (-1.9)*	-	-0.81 (-2.4)*
LMK	-0.6 (-0.2)	-0.48 (-0.2)	0.008 (0.01)	-	-0.04 (-0.1)
Derived elasticities of distance to market based on 11-km distance					
Small farms	-0.10	+0.012	-0.231	-	-0.37
Medium farms	-0.12	-0.258	-0.277	-	-0.62
Large farms	-0.013	-0.459	+0.001	-	-0.017
All farms (wt. avg.)	-0.073	-0.204	-0.147	-	-0.272

1 For explanation of code, see Table 3.
2 DEP = dependent variable.
3 - indicates variables not included
4 t-values in round brackets

Significance levels: *** Significant at 0.1% probability level.
** Significant at 1% probability level.
* Significant at 10% probability level.

higher productivity; small farmers remain unaffected.

The overall elasticities derived from the analysis of two regions are approximately -0.1 for allocation effects and -0.3 for input effects. This implies that a decrease in market distance by 30% (which amounts to roughly the same as doubling the market density) causes agricultural productivity to increase by 3% through allocation effects, and input use to increase by 9%, which, in turn, would cause productivity to go up by 2%.

Policy Implications

The implications of these findings are summarized in Table 6.

1. A food policy that supports free movement of interstate trade of food grains measurably increases productivity. Trade restrictions decrease productivity, especially if available improved technologies widen regional differences in comparative advantages.

2. The effects of interfering with interstate trade have a lag of about 2 years. The liberalization of interstate trade in India in 1978 probably began to bear fruit in 1981, with 1979/80 a drought year. Because of the liberal food-grain trade policy, we can expect a 5% increase in annual production from 1981; should the policy be reversed, production will then be reduced.

3a. The density of surfaced roads has a positive effect on productivity in all except the 'far below average' production districts.

3b. The density of regulated markets affects productivity in all districts regardless of whether

Table 6. Market policies and their impact on agricultural productivity in India (summary of results of four analytical approaches and different sets of data).

Approach number	Market policy measure (assumed or observed)	Quantified impact on productivity	Analytical method, applied data used, and sources of data
1	Restriction of trade flows between regions to 10% of free flows at two different levels of technology.	Decrease in productivity (in t/ha) by a) 2% with traditional technologies; b) 4% with improved technologies.	Normative activity analysis with quadratic programming for an inter-regional trade model with secondary data on coefficients and elasticities.
2	Lifting of trade restrictions imposed by food zoning (keeping all other input variables constant).	Increase in productivity of foodgrains (in t/ha) by 5% after 2 years.	Empirical analysis with the generalized least squares technique on 10 years' data for 13 states in India; official statistics.
3		Productivity (in Rs/ha) is affected with a lag of 2 years as follows:	
	a) Increasing road densities by 10%.	a) in all but far below average regions increase in productivity of 0.7%; in far below average regeions no effect on productivity;	Empirical analysis with the ordinary least squares technique and 15 years' data for 94 districts in 4 states of India; official statistics.
	b) Doubling of market densities wherever densities are less than half the optimum.	b) in all regions increase in productivity of about 5%;	
	c) Lifting food zoning (keeping all other variables constant).	c) in all but far below average regions increase in productivity of 9%; in far below average regions no effect on productivity.	
4	Reduction of the average distance to the nearest market from 21 km to 14 km.	Increase in productivity (Rs/ha) by 3% 3% at given constant inputs; increase input use by 9% for small farmers.	Empirical analysis, using the multivariate regression technique with simultaneous equations and data from 300 farmers; our survey.

they are above or below average in per capita production. The effect of markets on productivity increases at a decreasing rate; a saturation point is reached with 132 to 161 markets per 100000 km², beyond which regulated markets have no productivity effects at the aggregate level. While actual average densities of regulated markets in 1976-77 are about 25% below this value, there are districts, especially in Karnataka, where market density has surpassed optimum levels (Appendix Table 1). However, where market density is far below the saturation level, additional markets must be expected to have a very strong positive effect on productivity. For instance, in Madhya Pradesh there still are many districts with market densities of 50 to 60 regulated markets per 100000 km². In such districts, a doubling of the density of regulated markets is called for.

Establishing a regulated market costs about Rs 4 million. If an area of 10000 km² now serviced by five market yards (or 50 markets per 100000 km²) were to double the number to ten, it would imply an additional cost of Rs 20 million. The additional return on 60% of cultivable land in such an area, i.e. 600000 ha, at Rs 20/ha would then be Rs 12 million annually, beginning two years after implementation.[8] Assuming a life of 15 years and annual operating costs of 7% of the capital investment, the internal rate of return on this investment would amount to 43%. Returns of this magnitude would justify rather substantial inputs into market infrastructure wherever the nearest market is at a distance of 17 km or more from farmers.[9]

3c. The impact of food zoning is detrimental to productivity in all districts, except for districts of 'far below average' per capita production where it has no effect.

4. There is a positive equity effect of market access, once a minimum level of market density is reached. In Nagpur, the density of markets ensures that the average farmer is located about 11 km from the nearest market; small and medium farmers are likely to gain from further improvements. Increasing market density in Mahbubnagar would benefit large farmers.

As with most inputs or new technologies, large farmers are the first to take advantage also of greater market access. However, as availability increases and small farmers gain access to the market, they too take advantage of the new input. Thus, apart from its efficiency effect, better market access above a minimum level also has a desirable equity effect.

8 The marginal increase in aggregate productivity of a shift from 50 to 100 markets per 100000 km² is Rs 2.0 in 1/10 ha, or Rs 20/ha

9 A density of 50 markets per 100000 km² implies an average radius of 25 km per market area and an average distance of 17 km for all farmers; for 100 markets the radius is 18 km and the average distance for all farmers is 12 km, if we assume homogenous distribution

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Appendix Table 1 Distribution of districts based on market density in four SAT states of India 1978-79.

State	Market density (No./100 000 km²)				Districts (No.)
	< 40	40-120	120-200	> 200	
Madhya Pradesh	9 (21)[1]	31 (72)	3 (7)	-	43 (100)
Andhra Pradesh	-	3 (15)	8 (40)	9 (45)	20 (100)
Karnataka	-	5 (26)	9 (48)	5 (26)	19 (100)
Tamil Nadu	1 (8)	3 (25)	6 (50)	2 (17)	12 (100)
TOTAL	10 (11)	42 (45)	26 (27)	16 (17)	94 (100)

1 Figures in parentheses indicate % to total districts in each state.

Interlocking of Credit and Product Markets and its Impact on Agricultural Productivity

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Summary

The agricultural sector may be taken to consist of different markets, of which the most important are land, labor, money, and product markets. Under conditions of imperfect competition, with a possible aggravation of imperfections by interlocking, the benefits of government programs are likely to be watered down by the time they reach the beneficiaries, particularly in the lower income groups. A study was organized in 1980 in selected locations of Andhra Pradesh, Bihar, and Punjab, to study the nature of transactions under different types of contracts and the performance of agriculture in different situations. Based on the data collected during the study, this paper analyzes the different types of contracts reported; the terms and conditions of the contracts; the decisionmaking regarding input application and crop management in these different conditions; and finally the productivity levels achieved therein. This would throw light on the hypothesis that interlocked transactions hamper profit maximization and development of the poor. For the purpose of this analysis, the product and money markets are selected and the credit and output sale transactions are analyzed separately and together. The paper specifically deals with cultivation of sugarcane, groundnut, and cotton in the districts of Kurnool and Chittoor in Andhra Pradesh, India.

Résumé

Entrecroisement des marchés du crédit et du produit et son impact sur la productivité agricole : *Le secteur agricole peut être considéré comme une collection d'unités consistant en divers marchés, dont les plus importants sont les marchés du terrain, de la main d'oeuvre, de l'argent et du produit. Dans les conditions de concours défectueux, dont les défauts sont éventuellement aggravés par l'entrecroisement, il est probable que les avantages des programmes du gouvernement sont atténués, le temps qu'ils filtrent aux bénéficiaires, surtout dans les groupes à revenu bas. Une enquête a été initiée en 1980 dans certains emplacements de l'Andhra Pradesh, du Bihar et du Punjab en vue d'étudier la nature des transactions sous différents types de contrat et le comportement de l'agriculture dans des conditions variées. D'après les données réunies au cours de l'étude, cette communication analyse les différents types de contrat signalés, les modalités des contrats, la prise de décision sur l'application des intrants et la gestion des cultures dans ces conditions variées, et enfin, les niveaux de productivité y atteints. Ces analyses permettraient d'éclaircir l'hypothèse que des transactions entrecroisées entravent la maximalisation du profit et le développement des pauvres. Aux fins analytiques, les marchés du produit et de l'argent sont sélectionnés et les opérations du crédit et de la vente de produit sont analysées séparément ainsi qu'ensemble. L'article traite en particulier les cultures de canne à sucre, d'arachide et de coton dans les districts de Kurnool et Chittoor dans l'Andhra Pradesh en Inde.*

Introduction

The agricultural sector has four important components which may be called 'markets', covering the inputs of land, labor, credit, and output. It is common knowledge that these markets consisting of givers and takers do not operate under conditions of perfect competition. There are several causes for imperfection, some of them relating to infra-

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structure, such as lack of market access, inadequate information, or shortages of input supplies; others are caused by short supply leading to rationing of factors, which in turn lead to exploitation of the weaker party. In a planned economy, public intervention often tries to correct such defects. But there are always means to circumvent these measures and undermine their efficacy. One of the vehicles of exploitation is interlocking of two or more markets where either of them can be manipulated to nullify the advantage in the others. The effects of such imperfections may have far-reaching implications even on farm technology and productivity. In this paper an attempt is made to study the interlocking of credit and product markets and its implications.

Linking of product sale with loans is not a novel feature. In fact, it was considered an easy way to recover loans advanced by cooperatives and other public institutions. This is a harmless mechanism so long as the terms of sale are not modified in the case of such tied transactions.

This paper gives an overview of the credit and product markets in the selected areas, describes the nature of credit transactions and sales, discusses the impact of interlocking on farming, and goes on to summarize the discussion.

Data for this presentation are borrowed from a collaborative study sponsored by the World Bank in three states in India: Andhra Pradesh, Bihar, and Punjab. In Andhra Pradesh, five districts were selected for the study to represent heterogeneity in irrigation, cropping pattern, penetration of public program for agricultural development, etc. Detailed surveys were conducted during rainy season 1980/81 and the period April 1981 through September 1982, covering all operations including marketing of late-season crops of the 1981/82 agricultural year. Two villages close to Adoni in Kurnool district were selected to represent the hinterland of this important market for cotton and groundnut. And two villages close to Chittoor were selected for studying small farmer agriculture producing groundnut and sugarcane. In each village about 40 households were selected for a detailed survey representing all activities, and the present analysis is based on the responses obtained.

Structure of the Markets

Adoni is a regulated market managed by a statutory market committee. There is a well-organized market yard where more than 60 commission agents operate, and more than 150 traders from far and near bid for the produce offered for sale. The produce is properly graded and the buyer has comprehensive knowledge of the quantity and quality compositions of the produce on sale on a given day. Agent's commission, weighment charges, and other market payments are standardized. Adoni is reputed to be a fair market, and there is very little exploitation of the seller even under conditions of tied sale. Moreover, the commission agent often provides storage facilities if the seller opts to postpone the sale in expectation of a better price. These commission agents also operate as moneylenders. They lend at 24% interest p.a. Private moneylenders charge interest at 18 to 36% p.a. Villagers borrow from commission agents generally for crop-production expenses, though use of such money for nonagricultural purposes is not uncommon. In addition to the commission agents, the villagers also borrow from commercial banks, the regional rural banks, and the farmers' service society. However, the proportion of institutional loans in the tied borrowings is smaller. Agriculture in the region is not very productive; the cultivators are in general backward and poor, and have to depend to a large extent on borrowings. For this reason, the rate of interest is high. Another reason for high interest rates is that commission agents cannot manipulate the sale transactions to their advantage.

Chittoor too has a statutory regulated market, but does not have a market yard. Over 200 commission agents engaged in the trade of groundnut, jaggery, and other notified commodities have their establishments here. The buyers, accompanied by officials of the market committee, go in a group from one commission agent to another to inspect the commodity on sale and bid in an open auction. Unlike in Adoni, auctioning is done with an imperfect knowledge of the full range of quality and total quantity offered for sale. Therefore, it is likely that some sellers may incur a loss if the buyers become cautious and offer low prices. The sellers are also often unable to judge the price offered for commodities of different grades and their own comparative position in the auction. In order to have this knowledge, the seller has to have a comprehensive view of the range and quality of products on sale, which is not possible because the product is dispersed in the godowns of a large number of commission agents. Another difference one finds in Chittoor is that the commission charged for marketing varies

from less than 2% to 4.5% of the value of the output, depending on the bargaining capacity of the seller, while the commission is strictly kept at 2% in Adoni. The merchants are also suspected of indulging in malpractices, such as pilferage of small quantities of jaggery deposited in their premises by the sellers. There is a widespread impression among the sellers, particularly the weaker farmers, that the commission agents in Chittoor tend to exploit them.

The money market in Chittoor consists of commercial banks, the regional rural bank, and cooperatives in the institutional sector; commission agents and other moneylenders operate in the private sector. The sugar factory located at Chittoor also arranges credit in the form of cash and farm inputs through the Indian Bank, which operates on the premises of the factory. Whenever money is borrowed from commission agents dealing in jaggery, it is tied to the conditional sale of jaggery worth about three times the amount borrowed. Commission agents charge between 12 to 18% interest p.a., and the rate goes up to 36% for loans from private moneylenders. In the case of borrowings through the sugar factory, cultivators are required to sell their output to the extent committed to the factory in their contracts signed before the commencement of the growing season; the extent is related to the number of shares they hold in the equity of the cooperative factory. Any default by the cultivators is treated as breach of agreement by the sugar factory. Thus both institutional loans and private loans advanced for sugarcane cultivation tend to be interlocked with marketing.

However, the fact that the rate of interest is lower in Chittoor than in Adoni may be owing to the competition that commission agents and private moneylenders face from financing institutions. The commission agent has to depend on the marketing of the produce for his income. He has to have a stable and sizeable turnover. As both the sugar factory and the commercial banks—which have adopted one of the two selected villages—advance loans at reasonably low rates of interest, the private moneylenders cannot afford to raise the rate of interest. In addition, this region is very fertile, has stable irrigation sources and considerable area under irrigated and commercial crops. Therefore, obtaining a loan is not difficult in this district, and this could be another reason for the low rate of interest prevailing there. Another interesting factor is that interlocked loans are cheaper than open loans.

Borrowing and Sale Transactions

The total amount of loans outstanding on earlier borrowings as of 1 April 1981, as well as borrowings during 1981-82, for the selected cultivator households were analyzed. The total borrowings in all the four villages put together average Rs 9346 for the small farmer and Rs 17820 for the large farmer. Nearly one-third of the borrowings came from institutional sources—averaging Rs 3693.77 (32.82%) and Rs 6262.50 (35.14%), respectively, for the large and small farmer. The extent of loan from private sources averaged Rs 5652 for the small farmer and Rs 11557 for the large farmer.

Of the institutional loans advanced to small farmers, 13.78% was in the form of tied loans and the rest was untied. The tied institutional loans represent the borrowings from the sugar factory in Chittoor district. For the large farmers there is no tied institutional borrowing; there are no large farmers in Chittoor and there is no institutional tied lending for this category of cultivators in Adoni. Of all the private loans advanced to small farmers, one-fourth are tied and the rest are untied. For the large farmers, tied loans form only 4.16% of the total borrowings. The proportion of tied loans in gross

Table 1. Use of institutional and private loans (percentages).

Category	Short-term agricultural expenses	Agricultural investments	Houses and trade	Unproductive spending
Institutional				
Small farmers	33.79	40.97	11.77	13.47
Large farmers	64.47	35.53	-	-
Private				
Small farmers	12.68	32.11	10.20	45.01
Large farmers	8.79	60.69	-	30.52

borrowings for the small and large farmers is 21.33% and 2.70%, respectively.

Farmers spend institutional finances predominantly for agricultural purposes (Table 1). All borrowings by large farmers from institutions were spent on agriculture, while small farmers spent 74% of institutional loans on agriculture. This includes medium and long-term investments such as purchase of animals, irrigation works, etc. Small farmers reported spending about one-fourth of the institutional borrowings for nonagricultural purposes such as business, houses, and unproductive spending including food and clothing, ceremonies, etc. However, not all the unproductive spending can be called a diversion; for instance, the small farmers of Chittoor district reported having borrowed gold loans from commercial banks in Chittoor, as well as in far off places like Madras and Bangalore, which did not carry any stipulation as to their use. Private loans are spent largely for nonagricultural purposes by the small farmers. The large farmers, however, spent nearly 70% of borrowings from private sources for agricultural purposes and the rest on unproductive nonagricultural purposes

When the cultivator borrows from a commission agent with a tying condition, it is usually with an understanding that he would spend the amount to cultivate a specified crop. Nevertheless, only 53% of the tied loan amount on the small farms was spent on agriculture (Table 2), while as much as 41% was spent on unproductive purposes. Large farmers, on the other hand, reported spending the entire amount of the field loan on short-term agricultural operations.

An important question that emerges from these observations is: why does a farmer go to a commission agent and enter into a tied transaction? One reason is that this involves fewer formalities, less documentation and waste of time and anxiety associated with obtaining institutional finance. Secondly, tied transactions are cheaper than untied or institutional finances. Thirdly, he can borrow in instalments whenever required by him and in small amounts, and these loans often cover expense on consumption or nonagricultural investments if the borrower is well acquainted with the commission agent. Fourthly, he can utilize the commission agent's storage space when needed. The commission agents too gain from tied transactions; besides interest they are assured of commission on the marketed produce. Secondly, through a tied transaction his loan is secured. This leads us to another question: how does the farmer fare in a tied sale, when compared to straight sales?

That question in turn leads us into marketing transactions. The four important agricultural products on sale in the two districts are groundnut, cotton, jaggery, and sugarcane. Groundnut is cultivated in both Chittoor and Kurnool districts. Cotton is grown only in Kurnool, and sugarcane only in Chittoor. Jaggery is processed out of sugarcane. Table 3 gives the total quantity of sales in the two district markets, including tied sales in the market, sales in the village, and untied sales in the market.

In Kurnool, groundnut occupies an important

Table 2. Use of tied and untied loans (percentages).

	Small farmers				Large farmers			
	Tied loans		Untied loans		Tied loans		Untied loans	
Item of expenditure	Institutional	Private	Institutional	Private	Institutional	Private	Institutional	Private
Short-term agricultural expenses	100	25.77	26.19	8.31	-	100	64.47	8.79
Agricultural investments	-	27.90	45.68	33.51	-	-	35.53	60.69
Total agriculture	100	53.67	71.87	41.82	-	100	100.00	69.48
Business	-	-	1.51	1.40	-	-	-	-
Non-agricultural investments	-	4.95	11.62	10.82	-	-	-	-
Total non-agricultural (Productive)	-	4.95	13.13	12.22	-	-	-	-
Food and clothing	-	21.93	9.45	18.91	-	-	-	21.77
Ceremonies	-	7.07	1.51	17.85	-	-	-	5.92
Medical and education	-	2.83	1.09	0.90	-	-	-	2.83
Litigation	-	-	-	1.18	-	-	-	-
Debt redemption	-	9.55	2.20	7.08	-	-	-	-
Total unproductive		41.38	14.25	45.87	-	-	-	30.52

Table 3. Marketing channels in Kurnool and Chittoor districts.

Crop	Distribution of sale: Straight in market (t)	Village (t)	Tied in market (t)	Total sales (t)	Value of total sales (Rs)
Groundnut					
Kurnool	80.4	-	43.3	123.7	501 128
	(65)[1]		(35)	(100)	
Chittoor	21.3	6.3	-	27.6	89 577
	(77)	(23)		(100)	
Cotton					
Kurnool	5.6	7.1	0.55	13.2	55 956
	(42)	(54)	(4)	(100)	-
Jaggery					
Chittoor	11.3	-	23.1	34.4	43 475
	(33)		(67)	(100)	

1 Figures in parentheses indicate percentages of total sales

place in the marketing transactions of the cultivators. As much as 123 tonnes of groundnut valued at more than Rs 500000 was reported to have been sold by the sampled cultivators in one year. Most of the sales were in straight transactions, while only 35% was in the form of interlocked sales.

There was only one tied transaction for cotton, while 42% (nearly 13.2 tonnes) of the quantity marketed by the sampled farmers was in the form of straight transactions. As much as 53% of the produce was sold in the village itself. The persons who buy the crop in the village are local residents with commission agency establishments in the regulated market in Adoni. There are two such traders to whom the produce was sold in the Kurnool villages. The cultivators are known to have borrowed money from these two merchants. But since borrowers and lenders belonged to the same village, the traders did not insist on formal commitment for delivery of produce to the advancing of a loan. Legally, these are untied loans, but the borrowers sold their produce to the traders as a matter of moral commitment.

In Chittoor the interlocking of money and product markets was heavier, particularly with reference to the jaggery trade: two-thirds of the produce was sold in tied sales, whereas less than one-third was sold directly in the market.

Data from the survey on marketing costs and on prices received by cultivators have been analyzed and presented in Tables 4 to 7. The following observations are based on these data.

1. For groundnut in Kurnool the average price offered in straight sales was less than the price offered in tied sales by about Rs 273 per tonne (see Table 4). There is no clear-cut explanation for this seemingly paradoxical situation, where a higher price is obtained in a tied situation. The fact that the Kurnool market is highly competitive suggests little possibility for price manipulation by commission agents. The fact that commission agents help their clients to store the commodity in expectation of better prices suggests the possibility of a higher price in tied transactions. The commission paid to the agent, the weighment charges, and other expenses are more or less similar in the straight and tied transactions.

2. There were no tied transactions for groundnut in Chittoor district (see Table 5). However, in one of the villages far from Chittoor, the produce was sold in the village and also in the Chittoor market. The village sales, unlike in Kurnool district, are not linked to borrowings. They are free sales. Nevertheless, the prices in village sales are 25% lower than the market prices in Chittoor. Even allowing for transport and other marketing costs, the difference will likely be considerable. Imperfect knowledge of markets, and an inclination to save time and energy involved in taking the produce to the distant market may have led the producers toward local

Table 4. Sales of groundnut in Kurnool district through different channels.

	In the market straight	In the market tied	In the village
Quantity sold (t)	80.4	43.8	-[1]
Value of output (Rs)	317 862	183 266	-
Less:			
Transport costs	2 997	1 956	-
Weightment costs	281	144	-
Commission	6 231	3 666	-
Other costs	1 129	350	-
Net value received (Rs)	3821/t	4094/t	-
Price paid (Rs)	3954/t	4235/t	-

1 - indicates no sale

Table 5. Sales of groundnut in Chittoor district through different channels.

	In the market straight	In the market tied	In the village
Quantity sold (t)	21.3	-[1]	6.3
Value of output (Rs)	73601	-	15976
Less:			
Transport costs	928	-	-
Weightment costs	87	-	-
Commission	1471	-	-
Other costs	57	-	-
Net value received (Rs)	3329/t	-	2535/t
Price paid (Rs)	3448/t	-	2535/t

1 - indicates no sale

sales. This case of imperfection is not attributable to exploitation by buyers-cum-money-lenders, but to poor market access.

3. There was only one cultivator in the sample who sold his cotton crop in a tied transaction (see Table 6). However, cotton too was sold in the village as well as in the open market. With cotton, the tied transaction fetched a lower price than the straight transaction in the regulated market. As against Rs 4231 per tonne (net) received in straight transactions, the tied transactions fetched only Rs 3942/t, a reduction of about 7%. The difference between the price received in the straight transaction and the sales at the village level, is only about Rs 36/t. Thus there is some indication of exploitation in tied transactions, though it is not enough to support a generalization.

4. There are no village sales of jaggery (see Table 7). However, there is widespread interlocking of credit and marketing. Tied transactions fetched a lower price than straight transactions. The net value received was Rs 1356/t in straight transactions, as against Rs 1147/t obtained in tied transactions. One reason for the low price may be sale of comparatively low grade jaggery to the commission agents. But the possibility of exploitation also exists, particularly where a higher rate of commission is charged from borrowers. Unable to charge a high rate of interest because of heavy institutional supply, the commission agents resort to a hike in market commission. With an 18% p.a. interest rate and a commission of 2.37%, the commission agent earns a return of 25.11%, compared to a 24% p.a. interest rate and 0.80% commission on straight purchases, which give him a return of 26.4% on untied loans.

   Though the rate of return on Rs 100 disbursed as loan is marginally less, this is compensated by the vastly increased turnover the commission agent can get by marking down the interest rate. He also gains goodwill with the cultivator.

Impact on Farm Productivity

Has the interlocking of credit and product markets resulted in higher productivity through adoption of a better technology? With their commitment to

Table 6. Sales of cotton in Kurnool district through different channels.

	In the market straight	In the market tied	In the village
Quantity sold (t)	5.6	0.55	7.1
Value of output (Rs)	23986	2221	29749
Less:			
Transport costs	110	15	20
Weightment costs	8	1	2
Commission	359	34	23
Other costs	26	3	3
Net value received (Rs)	4231/t	3942/t	4195/t[1]
Price paid (Rs)	4321/t	4038/t	4202/t

1 Two households sold their produce directly in the market

Table 7. Sales of jaggery in Chittoor district through different channels.

	In the market straight	In the market tied	In the village
Quantity sold (t)	11.31	23.08	-[1]
Value of output (Rs)	15697	27778	
Less:			
Transport costs	223	620	-
Weightment costs	4	16	-
Commission	125	658	-
Other costs	7	16	-
Net value received (Rs)	1356/t	1147/t	-
Price paid (Rs)	1388/t	1204/t	-

1 indicates no sale

Table 8. Varietal preferences, input levels, and per hectare yields.

Category	Area (ha) under			Fertilizer level (kg/ha)			Cost of plant production (Rs/ha)	Yields (kg/ha)
	Traditional varieties	Improved varieties	HYVs	N	P	K		
Groundnut (rainy season)								
Small farmers—Int	26.51 (9)[1]	-	-	43	32	41	139	680
Small farmers—Str.	19.37 (34)	-	-	59	39	58	16	1 010
Large farmers—Int.	-	-	-	-	-	-	-	-
Large farmers—Str.	21.82 (5)	-	-	36	27	48	141	570
Groundnut (postrainy season)								
Small farmers—Str.	8.93 (14)	-	-	40	34	31	84	1 380
Large farmers—Str.	22.85 (8)	-	-	77	44	38	179	1 560
Cotton								
Small farmers—Int.	4.06 (1)	-	-	2	2	2	-	80
Small farmers—Str	28.80 (10)	-	-	7	4	7	-	90
Large farmers—Int.	-	-	-	-	-	-	-	-
Large farmers—Str.	72.07 (9)	-	-	17	13	16	1	110
Sugarcane								
Small farmers—Int.	2.53 (7)	-	0.16 (1)	143	58	137	-	61 690
Small farmers—Str	4.41 (10)	-	2.64 (6)	134	63	79	-	79 260

1. Figures in parentheses are number of reporting households
Int — with interlocked sales
Str — without interlocked sales, straight
nil

deliver a large part of output to the commission agents, it is rational to expect the cultivators to produce more so that they can gain through better prices for the surplus produced, which can be sold in straight transactions after the commitment to the agent is met. This condition would prevail particularly where the cultivators fear that the terms of sale would be adverse in tied as against straight transactions. Against this background, data presented in Table 8 give the varietal preferences, per hectare input levels, and yields for the small and large farmers with interlocking and straight transactions.

All the cultivators of groundnut, whether they were involved in interlocked borrowings or not, reported cultivation of traditional varieties only. Therefore, the interlocking of markets does not seem to affect choice of varieties. Level of input use is lower on the holdings with straight transactions than in interlocked transactions. Even though the combined data for Chittoor and Adoni presented in Table 8 reveal that the average N, P, K levels are higher on the straight holdings, this includes the cultivators in Chittoor who are more progressive and have applied higher doses of fertilizers and farmyard manure. Because of higher input levels, the small farmers with interlocking have achieved a higher yield than those dealing in straight transactions, including large farmers.

With respect to groundnut cultivators in the postrainy season, there were no improved or high-

yielding varieties (HYVs) under cultivation on the sampled farms, but the input levels and per hectare yields of the small farmers were lower than those of large farmers. And neither small nor large farmers had commitment of sales to the commission agents for postrainy season groundnut.

For cotton, varietal difference does not exist, but among the small farmers, the lone farmer with interlocking reported a lower input level and yield rate than farmers with no interlocking. There is no interlocking among the large farmers, who recorded higher input levels and yields than the small farmers.

There is interlocking in sugarcane. Cultivators resorted to the cultivation of HYV sugarcane, and farmers with interlocking had a smaller area and a smaller number of holdings under HYV than those without interlocking. Input levels are somewhat higher on holdings with interlocking, but output is lower.

Our analysis showed that cultivators with interlocking did try to achieve higher productivity. They succeeded with groundnut but failed with sugarcane, in spite of higher fertilizer doses, because they did not adopt HYVs to the same extent as farmers without tied sales. Interlocking is not the only factor influencing farm productivity. A more detailed analysis is called for to identify all the factors that influence yields, the types of technology adopted, and the effect of market imperfections on farm technology.

Conclusions

- The empirical study supports the hypothesis of market imperfections. Three variants were observed: sales in regulated market *with* credit tying, sales in regulated market *without* credit tying, and sales in villages. In the credit market we find institutional agencies, private moneylenders, and commission agents offering loans. The last agency sometimes stipulates sale of produce through it.
- The trader-cum-moneylender does manipulate terms of the transactions to his net gain in perfect and imperfect product markets. This suggests that the farmer stands to lose in both cases.
- Interlocked transactions do induce cultivators to adopt a better technology. However, the results are not always encouraging. Other factors may influence farm productivity. A much wider analysis of all contributory and inhibiting factors is called for.

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Contract Farming in Thailand

Vatchareeya Thosanguan*

Abstract

This paper explores the premise that contracts between middlemen and farmers cultivating commercial crops—sugarcane, pineapple, and tobacco—as well as poultry farmers, for sale of produce and purchase of inputs are biased in favor of the middlemen and that the contract system locks farmers into continual and inescapable poverty. In the process, the paper lists some reasons behind the evolution of contract farming in Thailand; describes some of the existing contractual arrangements, including price and credit agreements; and urges a cautious and gradual approach to governmental intervention in the delicate balance of relationships between farmers and middlemen.

It proposes and discusses four groups of indirect interventions that the government could make for the benefit of the farmer: measures to relieve shortcomings of the present contract system, credit measures, price controls, and measures to control production levels.

Résumé

Agriculture contractuelle en Thaïlande : *L'auteur examine dans cet article la prémisse que les contrats de vente de la production et d'achat des intrants, entre les intermédiaires et les paysans produisant les cultures commerciales—canne à sucre, ananas et tabac—ainsi que les aviculteurs, sont prédisposés en faveur des intermédiaires, et que le système du contrat emprisonne les paysans dans une pauvreté permanente, voire inéluctable. L'article dresse une liste des raisons du développement de l'exploitation sous contrat en Thaïlande tout en décrivant certains accords contractuels courants, y compris les accords du prix et du crédit. Il souligne l'importance d'une solution prudente et progressive pour ce qui concerne l'intervention gouvernementale afin de ne pas trop déranger l'équilibre délicat existant entre les paysans et les intermédiaires.*

A cet effet, il propose et discute quatre types d'interventions indirectes que le gouvernement peut faire au profit des paysans : mesures visant à pallier les défauts du système actuel de contrat, mesures de crédit, contrôles des prix et mesures pour contrôler les niveaux de production.

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Nutrients Distribution and Consumer Preferences in India: Some Policy Implications

K.N. Murty and M. von Oppen*

Summary

This paper attempts to build upon the results of an earlier study that analyzed consumption patterns of ICRISAT mandate crops vis-a-vis their substitutes/complements using systems of demand equations separately for rural and urban areas of India. It analyzes nutritional status, another important aspect of consumer behavior. The study aims at translating quantity-based demand parameters into nutritional dimension and analyzes the patterns therein. In particular, the consumption levels of nutritional energy, protein, iron, and other minerals, and their sources of origin and distribution across population groups are looked into more closely. The results can be corroborated with the earlier findings of the existence of relationships between consumer preferences (as expressed in market prices) and evident and cryptic quality characteristics (e.g., seed size, protein content, etc.).

This study helps update available evidence about nutritional gaps in India, which would facilitate generating of agricultural technology to bridge such nutritional gaps.

Résumé

Distribution des éléments nutritifs et préférences des consommateurs en Inde—certaines implications politiques : *L'article se base sur les résultats d'une étude antérieure qui a analysé les structures de consommation des cultures du mandat de l'ICRISAT par rapport à leurs substituts/compléments, à l'aide des systèmes d'équations de demande établis séparément pour les régions rurales et urbaines en Inde. L'état nutritionnel, un autre aspect important du comportement du consommateur est analysé. L'étude vise également à traduire les paramètres de demande à base de quantités en dimension nutritionnelle et y analyse les structures. Sont examinés plus particulièrement les niveaux de consommation de l'énergie nutritionnelle, de la protéine, du fer et d'autres minéraux, leurs sources d'origine ainsi que leur distribution à travers les groupes de population. Les résultats actuels peuvent être confirmés avec ceux obtenus précédemment sur l'existence des relations entre les préférences des consommateurs (comme exprimées en cours du marché) et les caractéristiques de qualité tant évidente qu'occulte (ex. taille de la graine, teneur protéique, etc.).*

La mise à jour des données disponibles sur les carences nutritionnelles en Inde réalisée par l'étude permettrait l'élaboration de la technologie agricole appropriée pour combler ces carences.

Introduction

In a market economy prices have the primary role of directing productive allocation of resources. A secondary function of market prices—upon ex-post analysis of data on prices and other factors—is to provide information on various aspects of consumer and producer behavior. Such information derived from market price is perhaps not highly important to the market participants, but it is of immense value to planners and policymakers at the institutional level. Observed patterns of consumer and producer behavior permit planners to predict the effects of changes that will occur in future: changes in technologies affecting quality and quantity of supplies, changes in income or its

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ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 1985. Agricultural markets in the semi-arid tropics. Proceedings of the International Workshop, 24-28 October 1983, ICRISAT Center, India. Patancheru, A.P.502 324, India: ICRISAT.

distribution, and changes in price policies affecting supply and demand.

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has been actively involved in the development of crop- and farming systems-based agricultural technologies to raise agricultural productivity and thereby increase aggregate production of its five mandate crops—sorghum, pearl millet, chickpea, pigeonpea, and groundnut—in the semi-arid tropical regions of the world. To succeed in such an effort calls for a thorough understanding of the socioeconomic environment of the region in general, and the production and consumption decisions of the population in particular. Measuring nutritional status and its distribution is an important step leading to such an understanding.

Among nutrients, study of energy and protein consumption merits priority over other areas because the human nutritional problem has been redefined as a general food problem involving an energy-protein gap. Recognizing the existence of calorie-protein gap of varying magnitude around the globe, several researchers (e.g. Pinstrup-Andersen 1981, Poleman 1981, Radhakrishna 1981, and Ryan et al. 1984) have emphasized the need for strengthening the available knowledge on the extent and severity of such deficiencies, particularly in developing countries. Further, the usefulness of disaggregated demand elasticities by population/income/social groups, by households with and without malnutrition, etc., in assessing the nutritional effects of agricultural and rural development projects has been amply underscored. The present exercise is a small step in this direction.

This paper presents two complementary uses of market prices: (1) to study the patterns of energy and protein consumption in India as a translation from commodity to nutrient (quality) domain; and (2) to analyze as a special case consumer preferences for quality characteristics in coarse grains. This work is an attempt to combine earlier work done separately in these two areas, in order to better understand the demand patterns and consumer preferences of crops, such as sorghum and pearl millet, grown particularly in the semi-arid tropics. Presentation of these research results in one paper may call for undue summary presentations of the two parts. However, it permits expansion into a discussion of consumer demand for food in terms of quality, an issue of interest not only for decision-makers and planners at the administrative level, associated with food distribution, but also at the level of technology design (e.g., in plant breeding for selection of new cultivars with good consumer acceptance).

The paper is divided into five sections. The first three sections present the methodology for analyzing nutrient distribution and results obtained. The fourth section presents a summary of the methodology for assessing consumer preferences of quality characteristics and the results obtained. It also attempts to integrate the above two approaches conceptually, thus providing a deeper understanding of the demand for coarse grains by low-income consumers. Some policy implications are listed in the final section.

Methodology of Nutritional Analysis

Introduction

There are two utility-based approaches for human nutritional status measurements of consumers. The first utilizes the characteristic demand theory pioneered by Ironmonger and later popularized by Lancaster (1971). This approach assumes that commodities are consumed because of the utility derived from their characteristics or properties. For food, these characteristics include nutrient content, texture, color, taste, etc. Since the relationship between commodities and characteristics is essentially a technical one, the usual approach of consumer utility maximization gives us characteristic demand functions in terms of consumer income and characteristic prices. These relations can be utilized to evaluate the nutritional status of consumers, and also to analyze the nutritional impact of income redistribution and price policies.

The second approach, which we follow estimates commodity demand functions and translates them into nutritional dimensions, using nutrient content coefficients.[1] In particular, we are

1 This approach is apparently preferable to the procedure of estimating nutrient functions directly (e.g., Alderman and Timmer 1980; Scandizzo and Knudsen 1979) for the following reasons: it has an intuitive appeal in the sense that consumer's choices in reality are based on physical characteristics (such as size, color, cooking quality, etc.), individual's taste preferences, and economic factors (such as market prices and level of income). In addition, all the nutrient-price relationships are completely identified by the parameters of the demand system. The direct approach lacks these attractive features.

interested in scaling income and price elasticities estimated in commodity space into characteristic space. Such a translation would not have any implications if we were dealing with only one commodity, because the estimated elasticity is independent of translation (scaling). However, since we generally deal with multicommodity, multinutrient situations involving commodity and nutrient interactions, the implications are far from trivial.

An earlier exercise (Murty 1983) made a quantity-based analysis of consumption patterns in India. In addition, we have attempted a preliminary analysis of calorie consumption. This analysis indicated widespread energy deficiency in both rural and urban areas of India. The present study is aimed at refining the earlier analysis and extending it to protein consumption, thus covering the two nutrients which are important from crop-breeding, nutritional, and price-policy perspectives.[2]

The Model

The regular collection of consumer expenditure data in India has a history of over three decades. A number of studies on the analysis of consumer behavior have been undertaken using this wealth of information (for a comprehensive review of these studies see Bhattacharya 1978). These studies were mostly confined to the estimation of Engel functions for one or more commodities. Such an approach ignores the importance of relative prices and interdependence among the consumption of various items in the decisionmaking process of the consumer, and also leads to results which are inconsistent with budget allocation. Systems of demand equations can rectify these limitations and serve several useful purposes.

Several studies (such as Radhakrishna et al. 1979, Radhakrishna and Murty 1980) have revealed that the Linear Expenditure System (LES) provides a reasonable fit when the range of income variation is small. Further, in analyses involving a large number of consumer items with varying budget shares, relatively more-structured models like the LES or its variants are preferable to more-flexible alternatives. In view of the paucity of reliable consumer expenditure data and the problems of estimating large-scale models, one is often tempted to adopt hierarchic estimation procedures which demand simple model specifications for reasons of theoretical consistency (e.g., Deaton 1975, de Haen et al. 1982, and Murty 1983). All these considerations tend to support the choice of LES, despite its twin limitations: linear Engel curves and additive utility specification.

The LES model has the form:

$$p_{it}\, q_{it} = p_{it}\, c_i + b_i[m_t - \sum_{j=1}^{n} p_{jt}\, c_j] \qquad (1)$$

$$i = 1,2, \ldots, n; \; t = 1,2, \ldots, T$$

In relations (1), p_{it} and q_{it} represent the price and quantity consumed of ith item in period t; m_t is the total consumption expenditure in period t; and b_i and c_i are the parameters called marginal budget shares and committed quantities respectively; n is the number of commodities in the consumer budget, and T is the number of time periods or observations. Under certain regularity conditions, relations (1) constitute a complete demand system that is amenable to empirical estimation. By simple calculus, the expenditure and price elasticities in the LES model can be calculated:

$$\eta_{io} = \frac{b_i}{w_{it}} \text{ where } w_{it} = \frac{p_{it}\, q_{it}}{m_t} \qquad (2)$$

$$\eta_{ij} = \begin{cases} -\dfrac{b_i\, p_{jt}\, c_j}{m_t\, w_{it}} & \text{for } j \neq i \\[2ex] -1 + \dfrac{(1-b_i)\, p_{it}\, c_i}{m_t\, w_{it}} & \text{for } j = i \end{cases} \qquad (3)$$

$$i,j = 1,2, \ldots, n$$

After estimating the parameters in (1), these elasticities can be calculated either at each point in time or at the sample mean. Let k_{ij} be the amount of the jth nutrient (e.g. calories, protein, amino acids, etc.) contained in one unit of the ith commodity consumed. Rewriting equation (1) in terms of the nutrient consumed, and rearranging the terms, we get:

$$k_{ij}\, q_{it} = k_{ij}\, c_i - \frac{k_{ij}\, b_i}{p_{it}} \cdot \sum_{j=1}^{n} p_{jt}\, c_j + \frac{k_{ij}\, b_i}{p_{it}}\, m_t \qquad (4)$$

$$i = 1.2, \ldots, n; \; j = 1,2, \ldots, l$$

2. The same analysis has been carried out for consumption of iron and other minerals. The results are not reported here, as the consumption of iron and other minerals is only of secondary importance from the nutritional standpoint.

where 1 is the number of nutrients being considered. Omitting the time suffix and summing over all commodities, containing the jth nutrient,

$$\sum_{i=1}^{n} k_{ij}q_i = \sum_{i=1}^{n} k_{ij}\, c_i - \left(\sum_{j=1}^{n} p_j c_j\right) \sum_{i=1}^{n} \frac{k_{ij}\, b_i}{p_i} + \sum_{i=1}^{n} \frac{k_{ij}\, b_i}{p_i}.m \qquad (5)$$

Equation (5) can be rewritten as

$$k_j = \alpha_j + \beta_j m \quad j = 1,2, \ldots, 1 \qquad (6)$$

where

$$k_j = \sum_{i=1}^{n} k_{ij}q_i$$

$$\alpha_j = \sum_{i=1}^{n} k_{ij}\, c_i - \left(\sum_{i=1}^{n} p_i c_i\right) \sum_{i=1}^{n} \frac{k_{ij}\, b_i}{p_i}$$

$$\beta_j = \sum_{i=1}^{n} \frac{k_{ij} b_i}{p_i}$$

Equation (6) relates to the linear nutrient consumption functions underlying the LES. The parameter β_j is the marginal propensity to consume the jth nutrient. From (6), the income and price elasticities of the jth nutrient intake are given by,

$$\epsilon_j = \sum_{i=1}^{n} \pi_{ij}\, \eta_{io} \qquad (7)$$

$$\epsilon_{jk} = \sum_{i=1}^{n} \pi_{ij}\, \eta_{ik} \qquad (8)$$

$$k = 1,2, \ldots, n$$
$$j = 1,2, \ldots, 1$$

where $\pi_{ij} = K_{ij}\, \hat{q}_i / \sum_{i=1}^{n} K_{ij}\hat{q}_i$

with q_i as estimated quantity of ith commodity consumed, η_{io} and η_{ik} (i,k = 1,2, ..., n) are the income and price elasticities of demand as defined in equations (2) and (3). Thus, equations (7) and (8) are the counterparts of equations (2) and (3) expressed in nutrient dimensions.[3]

The above procedure of arriving at nutritional elasticities from commodity elasticities appears deceptively simple. In fact, it involves a fairly complicated procedure with precise data requirements. This procedure is outlined in the following section.

Consumption Data and Estimation

Consumption

Data used for estimating the demand model are the time series of cross sections on consumer expenditure published in the reports of the National Sample Survey Organisation (NSSO) for the rounds 2 through 25, covering the period 1950-51 to 1970-71 (see Radhakrishna and Murty 1980 for details). Each of the NSSO reports on consumer expenditure provide the per capita monthly expenditure on cereals; milk and milk products; edible oils; meat, eggs and fish; sugar and jaggery; other food; clothing; fuel and light and other nonfood items for 12/13 expenditure classes in each round. In certain rounds, a further breakdown of commodity aggregates, i.e., cereals and other food, into rice; wheat; sorghum; pearl millet; other coarse cereals; gram (chickpea); and other pulses is also provided.

In order to utilize this published information fully, Murty (1983) resorted to a hierarchical estimation (for similar exercises, see Deaton 1975, Radhakrishna and Murty 1980, de Haen et al. 1982) wherein the LES demand system was first estimated for aggregate commodities and then some of these aggregate commodities were decomposed into individual items through estimation of submodels. A 9-commodity aggregate model was first estimated and two submodels involving the cereals and other food aggregates were estimated in the second stage (Murty 1983). Linking of these models hierarchically, using a two-stage budgeting procedure, gave a 16-commodity demand model

3 In Pitt (1983), a linear tobit model has been used to estimate quantity-based demand parameters initially and to convert them later into nutritional dimension. In Podkaminer (1981) an expenditure system quite similar to ours has been used to analyze the direct substitutability of foodstuffs implied by their nutrient content, but the parameters of the final form have been estimated in nutritional dimensions

which included the five ICRISAT-mandate crops. To focus attention on these crops and to facilitate comprehensive study of their substitutability/complementarity to other crops and products consumed, the study aggregated the detailed 16-commodity model into a 9-commodity model with the following commodity classification: (1) superior cereals; (2) sorghum; (3) pearl millet; (4) chickpea; (5) other cereals; (6) edible oil; (7) pulses (other than chickpea), (8) other food, and (9) nonfood items.

In order to overcome the unattractive property of linear income effects implied by the LES model, the NSSO expenditure classes were stratified into five expenditure groups each for rural and urban areas,[4] on the basis of 17th round (1961-62) expenditure classes: Rs. 0-8 forming the first group; 8-11, 11-13 the second group, 13-15, 15-18, 18-21, the third group; 21-24, 24-28, 28-34, the fourth group, and 34-43, 43-55, 55-75, 75 and above, the fifth. The class boundaries of the above groups were expressed at the prices of other rounds by using class-specific price deflators.

Commodity-group price indices with 1961-62 as base year were compiled from the Economic Advisor's monthly wholesale price relatives. For rural and urban areas, separate weights based on the 13th round NSSO expenditure data were used. A separate model was estimated for each expenditure group using the time series of cross-sectional data, and the results of that study were reported (Murty 1983). In addition to those results, we utilize here the 28th round NSSO expenditure and quantity data for the present nutritional analysis. In Table 1, we present the per capita daily consumer expenditure on the nine commodity groups described above for the reference year 1973-74. The table indicates the level and relative importance of various items in consumers' budget at different real income levels.

Food constitutes more than 75% of the total consumer expenditure in the budget of lower and middle income households in rural and urban areas of India. Its share declines to about 60% in the budget of richer households. Within food, cereals account for a major share (60%) for low and middle income households; this share declines to about 33% for rich households. To compensate this decline, the expenditure shares on nonfood items and noncereal foods increase with real income. Superior cereals by far are the largest item of expenditure in lower and middle income households in both rural and urban areas. ICRISAT-mandate cereal crops (sorghum and pearl millet) contribute substantially (8-12%) to the food needs of the poorest households. The shares of pulses and edible oils, which include the two noncereal mandate crops, pigeonpea and chickpea, are relatively constant and range 2-5%. The intrasectoral differences (i.e., within rural and urban sectors) in budget structure are more pronounced than the intersectoral differences (i.e., between rural and urban sectors).

Nutrition

Since the biochemical measurements of the nutrient content of common foodstuffs are quantity based, precise data on the quantity of each food item consumed are required in the consumer budget. Such information is particularly difficult to gather in the case of composite commodity groups for which only value information is usually available. Fortunately for India, the NSSO publishes both quantity and value of consumption of certain items in a few of the rounds. From this data, it is possible to calculate the nutrients consumed, as well as the amount of nutrient obtained from different sources for one rupee of expenditure. Using this information one can calculate the weighted averages of commodity-based income and price elasticities to give us nutrient elasticities with respect to consumer income and commodity prices.

In order to quantify the nutrient consumed by each of the 10 rural/urban expenditure groups, we used the quantity and value of consumption of various food items published in the 17th and 28th round reports of NSSO. The published data are on a per capita monthly basis for 14 expenditure classes. Based on the consumption details given in the 28th NSS round for cereals and in the 17th NSS round for items like edible oil, pulses, and other food, per capita daily nutrient intake is calculated by source for energy and protein. The nutrient conversion estimates given in two earlier studies (Gopalan et al. 1976 and the 26th NSSO round for various items) were used, after adjusting for percentage edible portion wherever possible. The estimated number of persons in each expenditure class is used as a weight to compute averages.

4 The definition of rural/urban areas in NSSO 28th round is the same as that of the 1971 population census. The urban areas encompass all towns with a population of 50 000 and above as well as all other places with a municipality, corporation, cantonment board, etc. which are notified as town areas.

Table 1. Per capita daily expenditure (Rs) on various items in 1973-74.

Expenditure group[1]	Superior cereals	Sorghum	Pearl millet	Chickpea	Other cereals	All cereals	Edible oil	Pulses	Other food	Total food	Nonfood	Total expenditure
						Rural India						
1	0.24	0.06	0.02	0.002	0.09	0.412	0.02	0.02	0.11	0.562	0.11	0.672
	(35.7)[2]	(8.9)	(3.0)	(0.3)	(13.4)	(61.3)	(3.0)	(3.0)	(16.4)	(83.7)	(16.3)	(100.0)
2	0.37	0.08	0.03	0.005	0.09	0.575	0.04	0.04	[illegible]	0.855	0.16	1.015
	(36.5)	(7.9)	(3.0)	(0.5)	(8.9)	(56.8)	(3.9)	(3.9)	(13.7)	(84.3)	(15.7)	(100.0)
3	0.55	0.07	0.05	0.007	0.09	0.767	0.06	0.06	0.37	1.257	0.27	1.527
	(36.0)	(4.6)	(3.3)	(0.5)	(5.9)	(50.3)	(3.9)	(3.9)	(24.2)	(82.3)	(17.7)	(100.0)
4	0.77	0.06	0.06	0.012	0.09	0.992	0.09	0.09	0.68	1.852	0.60	2.452
	(31.4)	(2.4)	(2.4)	(0.5)	(3.7)	(40.4)	(3.7)	(3.7)	(27.7)	(75.5)	(24.5)	(100.0)
5	0.95	0.06	0.06	0.022	0.10	1.192	0.15	0.14	1.39	2.872	2.00	4.872
	(19.5)	(1.2)	(1.2)	(0.5)	(2.1)	(24.5)	(3.1)	(2.9)	(28.5)	(59.0)	(41.0)	(100.0)
						Urban India						
1	0.24	0.05	0.01	0.001	0.03	0.331	0.03	0.02	0.19	0.571	0.14	0.711
	(33.8)	(7.0)	(1.4)	(0.1)	(4.2)	(46.5)	(4.2)	(2.8)	(26.7)	(80.2)	(19.8)	(100.0)
2	0.35	0.06	0.03	0.002	0.03	0.472	0.05	0.04	0.28	0.842	0.19	1.032
	(33.9)	(5.8)	(2.9)	(0.2)	(2.9)	(45.7)	(4.8)	(3.9)	(27.1)	(81.5)	(18.5)	(100.0)
3	0.50	0.05	0.02	0.002	0.02	0.592	0.08	0.06	0.47	1.202	0.34	1.542
	(32.4)	(3.2)	(1.3)	(0.1)	(1.3)	(38.3)	(5.2)	(3.9)	(30.5)	(77.9)	(22.1)	(100.0)
4	0.64	0.04	0.02	0.005	0.02	0.725	0.14	0.09	0.87	1.825	0.69	2.515
	(25.4)	(1.6)	(0.8)	(0.2)	(0.8)	(28.8)	(5.6)	(3.6)	(34.6)	(72.6)	(27.4)	(100.0)
5	0.68	0.02	0.01	0.008	0.01	0.728	0.23	0.12	1.99	3.068	2.31	5.378
	(12.6)	(0.4)	(0.2)	(0.1)	(0.2)	(13.5)	(4.3)	(2.2)	(37.0)	(57.0)	(43.0)	(100.0)

1. The expenditure groups 1,2,3,4, and 5 correspond to the per capita monthly total expenditure classes 0-8, 8-13, 13-21, 21-34, 34 and above in 1961-62 rupees, respectively.
2. Figures in parentheses are percentage shares.

Source: 28th Round of National Sample Survey Organisation, Report No. 240 — Tables on Consumer Expenditure.

Empirical Results on Nutrients Distribution

Nutrient Intake and Rupee Worth

The per capita daily nutrient intake by source and the estimated rupee worth of each nutrient are presented in Tables 2-5, separately for energy and protein.

Energy. The per capita daily energy intake varied from 1205 to 3620 kcal in rural areas and 1120 to 3073 kcal in urban areas of India (Table 2). Cereals contribute the largest share of total energy consumed in both rural and urban areas: 69-88% in rural areas, and 44-77% in urban areas, the percentage declining with rising real income.

Within cereals, superior cereals account for the largest share—45-55% in rural and 41-58% in urban areas. Sorghum's contribution to energy consumption ranged between 4-15% in rural areas and 1-12% in urban areas; while pearl millet accounted for 5-6% of energy consumption in rural and urban areas. Thus, ICRISAT-mandate cereal crops (sorghum and millet) contribute substantially—18-20% in rural areas and 14-17% in urban areas—to the poor household's total energy requirement in India. The other cereals category (maize, barley, finger millet, etc.) also occupies an important position as a caloric source. Its share ranged from 7-24% in rural areas and 1-8% in urban areas.

Chickpea (Bengal gram) is classified as a cereal in NSS data, but treated as a substitute for pulses in households' consumption. Its energy share is the least among all food categories. Chickpea contributes more to the caloric intake of richer households in both rural and urban India. The behavior for other categories of food items—edible oils, pulses, and other food—is similar to that for chickpea. These latter four food categories are relatively expensive

Table 2. Per capita daily energy intake by source in 1973-74.

Expenditure group[1]	Energy intake (kcal)									
	Superior cereals	Sorghum	Pearl millet	Chickpea	Other cereals	All cereals	Edible oil	Pulses	Other food	All food
	Rural India									
1	540.94	174.93	59.68	3.01	285.78	1064.34	18.52	24.99	96.78	1204.63
	(44.90)[2]	(14.52)	(4.95)	(0.25)	(23.72)	(88.35)	(1.54)	(2.07)	(8.03)	(100.00)
2	836.91	215.98	93.33	10.01	273.71	1429.94	36.05	52.18	165.79	1683.97
	(49.70)	(12.83)	(5.54)	(0.59)	(16.25)	(84.92)	(2.14)	(3.10)	(9.85)	(100.00)
3	1144.14	202.16	119.41	12.54	246.27	1724.62	55.21	81.41	277.00	2138.24
	(53.51)	(9.45)	(5.58)	(0.59)	(11.52)	(80.66)	(2.58)	(3.81)	(12.95)	(100.00)
4	1515.61	161.79	142.45	21.90	234.66	2076.41	88.69	122.25	459.28	2746.63
	(55.18)	(5.89)	(5.19)	(0.80)	(8.54)	(75.60)	(3.23)	(4.45)	(16.72)	(100.00)
5	1861.26	159.01	170.72	39.70	255.62	2486.31	134.47	176.92	822.74	3620.44
	(51.41)	(4.39)	(4.72)	(1.10)	(7.06)	(68.67)	(3.71)	(4.89)	(22.72)	(100.00)
	Urban India									
1	590.12	134.[illegible]0	26.23	1.20	88.99	840.99	33.83	38.09	207.03	1119.94
	(52.69)	(12.00)	(2.35)	(0.11)	(7.95)	(75.09)	(3.02)	(3.40)	(18.49)	(100.00)
2	773.87	176.94	67.20	3.24	87.43	1108.66	56.36	53.46	225.39	1443.89
	(53.60)	(12.25)	(4.65)	(0.22)	(6.06)	(76.78)	(3.90)	(3.70)	(15.61)	(100.00)
3	1061.16	117.55	50.89	3.08	53.67	1286.35	98.67	90.46	344.98	1820.46
	(58.29)	(6.46)	(2.80)	(0.17)	(2.95)	(70.66)	(5.42)	(4.97)	(18.95)	(100.00)
4	1235.99	87.02	45.75	4.59	49.82	1423.17	169.54	131.12	575.87	2299.70
	(53.75)	(3.78)	(1.99)	(0.20)	(2.17)	(61.89)	(7.37)	(5.70)	(25.04)	([illegible] 0.00)
5	1247.43	39.96	17.31	11.74	25.22	1341.66	232.84	156.02	1342.55	[illegible]073.07
	(40.59)	(1.30)	(0.56)	(0.38)	(0.82)	(43.66)	(7.58)	(5.08)	(43.69)	(100.00)

1. See Table 1, footnote 1
2. Figures in parentheses show percentage shares of the total

Source: NSS Reports 184 and 240 on consumer expenditure, corresponding to the 17th and 28th rounds.

Table 3. Energy (kcal) contained in one rupee of expenditure by source in 1973-74.

Expenditure group[1]	Monthly per capita expenditure class (Rs)	Superior cereals	Sorghum	Pearl millet	Chickpea	Other cereals	Edible oil	Pulses	Other food
				Rural India					
1	0- 24	2275	3121	2874	1929	3230	913	1470	876
2	24- 34	2265	2825	2754	2143	3098	1030	1467	811
3	34- 55	2099	2759	2620	1939	2876	958	1400	754
4	55-100	1965	2605	2585	1852	2732	981	1310	680
5	100 +	1961	2495	2722	1807	2657	887	1266	590
				Urban India					
1	0- 21	2442	2710	2776	1331	3116	1027	1760	1117
2	21- 34	2225	2865	2562	1313	3051	1175	1370	805
3	34- 55	2103	2533	2476	1354	2888	1177	1530	738
4	55-100	1927	2429	2284	1016	2767	1184	1427	665
5	100 +	1824	2260	2297	1410	2376	1032	1266	674

1 See Table 1, footnote 1

Source NSS reports 184 and 240 on consumer expenditure, corresponding to the 17th and 28th rounds, and nutritional coefficients from Gopalan et al 1976

sources of energy, and are usually consumed by richer sections of the population. Edible oils and pulses include the two other ICRISAT-mandate crops, groundnut and pigeonpea, whose individual share cannot be worked out from available NSS data.

Table 3 shows the relative cost of energy (calories) by source and across income categories. For most of the food items, the unit cost of caloric consumption increases with income, implying perhaps better quality and/or higher processing margins. In both rural and urban areas, other cereals, pearl millet, and sorghum are the cheapest sources of energy, the order varying somewhat across income classes.

Protein. The per capita daily protein consumption varied from 32 to 103 g in rural areas and 32 to 81 g in urban areas of India (Table 4). Cereals contributed the major share of protein intake, 67-83% in rural areas and 45-70% in urban areas. This indicates a marginally higher contribution of protein from noncereal food commodities, compared to energy. As with energy, superior cereals constitute a major source of protein within the cereals group. Chickpea continues to be the least contributing protein source, other than edible oils which do not contain protein.

Sorghum commands a protein share of 10-22%, and pearl millet 2-15%, in the budget composition of rural and urban consumers. Other cereals occupy a share almost equal to that of sorghum and pearl millet in rural areas, but are only one third as important in urban areas. In urban areas, the protein share of other food, which includes dairy and meat products, rises to 41% for consumers in the topmost income class. This is identical to that of superior cereals' (rice and wheat) protein contribution for the same income class. Pulses contribute at most 13% to the rural consumer's budget, and 15% to the urban consumer's budget.

In terms of the rupee worth of protein, pulses seem to be the cheapest source in both rural and urban areas (Table 5). They are closely followed by chickpea, pearl millet, and sorghum in rural areas, and by pearl millet and sorghum in urban areas. Animal protein is the costliest in both areas. The cost of unit protein consumed increases with consumer status; the rich consume more expensive forms. Pulses, chickpea, pearl millet, and sorghum provide the poor man's protein and energy. The rupee worth of protein (in g) from different sources—pulses (102), chickpea (92), pearl millet (84), sorghum (82), other cereals (74), superior cereals (53), and other food (mostly animal protein 20)—in rural areas illustrates their relative cost Animal protein is five times as expensive as vegetable protein from pulses.

Table 4. Per capita daily protein intake by source in 1973-74.

Expenditure group[1]	Protein intake (g)									
	Superior cereals	Sorghum	Pearl millet	Chickpea	Other cereals	All cereals	Edible oil	Pulses	Other food	All food
	Rural India									
1	12.72	5.21	1.92	0.14	6.86	26.65	0.00	1.83	3.53	32.21
	(39.49)[2]	(16.18)	(5.96)	(0.43)	(21.30)	(83.36)	(0.00)	(5.68)	(10.96)	(100.00)
2	20.44	6.44	3.00	0.48	6.99	37.35	0.00	3.82	4.89	46.06
	(44.38)	(13.98)	(6.51)	(1.04)	(15.18)	(81.09)	(0.00)	(8.29)	(10.62)	(100.00)
3	28.73	6.02	3.84	0.60	6.34	45.53	0.00	5.95	7.48	58.96
	(48.73)	(10.21)	(6.51)	(1.02)	(10.75)	(77.22)	(0.00)	(10.09)	(12.69)	(100.00)
4	38.90	4.82	4.58	1.04	6.04	55.38	0.00	8.94	11.40	75.72
	(51.38)	(6.37)	(6.05)	(1.37)	(7.98)	(73.14)	(0.00)	(11.81)	(15.06)	(100.00)
5	50.16	4.74	5.48	1.89	6.32	68.59	0.00	12.94	21.61	103.14
	(48.63)	(4.60)	(5.31)	(1.83)	(6.13)	(66.50)	(0.00)	(12.55)	(20.95)	(100.00)
	Urban India									
1	15.99	4.01	0.84	0.06	1.44	22.34	0.00	2.78	6.64	31.77
	(50.35)	(12.63)	(2.64)	(0.19)	(4.53)	(70.34)	(0.00)	(8.75)	(20.91)	(100.00)
2	20.23	5.27	2.16	0.15	1.91	29.72	0.00	3.91	7.27	40.90
	(49.46)	(12.89)	(5.28)	(0.37)	(4.67)	(72.67)	(0.00)	(9.56)	(17.78)	(100.00)
3	28.06	3.50	1.63	0.15	1.17	34.51	0.00	6.61	9.80	50.92
	(55.10)	(6.87)	(3.20)	(0.29)	(2.30)	(67.77)	(0.00)	(12.98)	(19.25)	(100.00)
4	33.21	2.50	1.47	0.22	1.16	38.65	0.00	9.59	15.97	64.21
	(51.72)	(4.03)	(2.29)	(0.34)	(1.81)	(60.19)	(0.00)	(14.94)	(24.87)	(100.00)
5	33.90	1.19	0.56	0.56	0.49	36.70	0.00	11.41	33.15	81.26
	(41.72)	(1.46)	(0.69)	(0.69)	(0.60)	(45.16)	(0.00)	(14.04)	(40.79)	(100.00)

1 See Table 1, footnote 1

2 Figures in parentheses show percentage shares of the total

Source NSS reports 184 and 240 on consumer expenditure, corresponding to the 17th and 28th rounds

Table 5. Protein (g) contained in one rupee of expenditure by source in 1973-74.

Expenditure group[1]	Monthly per capita expenditure class (Rs)	Superior cereals	Sorghum	Pearl millet	Chickpea	Other cereals	Edible oil	Pulses	Other food
	Rural India								
1	0- 24	53.5	93.0	92.3	91.6	77.5	0.0	107.5	32.0
2	24- 34	55.3	84.2	88.5	101.8	79.1	0.0	107.3	23.9
3	34- 55	52.7	82.2	84.2	92.1	74.0	0.0	102.3	20.3
4	55-100	50.4	77.6	83.1	88.0	70.3	0.0	95.8	16.9
5	100 +	52.9	74.3	87.4	85.8	65.6	0.0	92.6	15.5
	Urban India								
1	0- 21	66.2	80.7	89.2	63.2	50.4	0.0	128.7	35.9
2	21- 34	58.2	85.4	82.3	62.4	66.6	0.0	100.2	26.0
3	34- 55	55.6	75.5	79.5	64.3	63.1	0.0	111.9	21.0
4	55-100	51.8	72.4	73.4	48.3	64.3	0.0	104.3	18.4
5	100 +	49.6	67.3	73.8	67.0	46.1	0.0	92.5	16.6

1 See Table 1, footnote 1

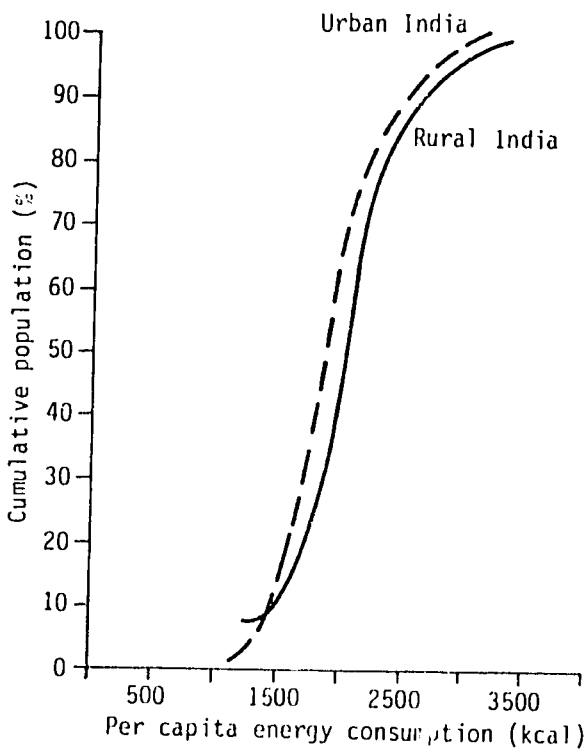
Source NSS reports 184 and 240 on consumer expenditure, corresponding to the 17th and 28th rounds, and nutritional coefficients from Gopalan et al 1976

Nutrient Deficit/Surplus vis-a-vis RDAs

Table 6 presents the average per capita daily nutrient intake and its percentage deficit/surplus with reference to the respective Recommended Daily Allowance (RDA). The cumulative percentage population over the expenditure groups is also provided. The RDA levels of 1600 kcal and 43 g, recommended for an average Indian (FAO revised norms), are taken as the critical levels for the two nutrients, energy and protein. For energy 2240 kcal (Sukhatme's earlier norm) is also considered as RDA. Using the average intakes and estimated cumulative percentage population, the nutrient distributions are plotted (Fig. 1). From this plotting, it is possible to interpolate the approximate cumulative percentage population consuming any nutrient below a certain given critical level.

Corresponding to the lower critical energy level of 1600 kcal per capita per day, the undernourished poor constitute approximately 13% of rural and 20% of urban population in India. These percentages compare favorably with the FAO estimate of 20% for developing countries including India. At the critical level of 1600 kcal per capita per day, the extent of energy deficiency is up to 25-30% RDA in both rural and urban areas. If the critical minimum energy requirement is taken as 2240 kcal per capita per day, then the percentage of poor would increase to approximately 73% in rural areas and 82% in urban areas. The extent of energy deficiency in this case increases to 46-50% RDA. These percentages are alarmingly high and indicate severe undernutrition in both rural and urban areas. From the cumulative distributions of nutrient intake, it follows that severe undernutrition or near starvation is more prevalent in rural than in urban areas. But the extent of energy-protein deficiency is more in urban poorer than rural households (see also Ryan 1977, and Rao and Vivekananda 1979).

When we compared the average protein intake levels with the RDA of 43 g per capita per day, some segments of population were found to suffer from protein deficiency of upto 26% RDA. The approximate percentages of population suffering from protein deficiency were found to be the same as those



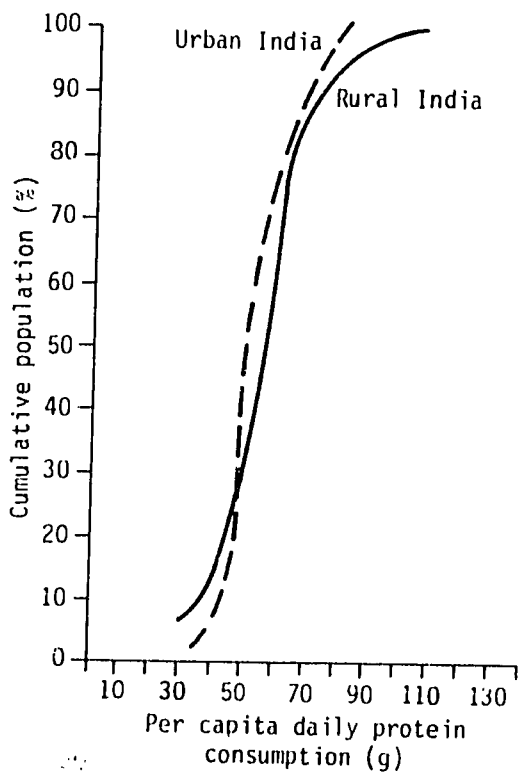


Figure 1. Cumulative distribution of nutrient intake.

Table 6. Per capita daily nutrients consumption and their deficit/surplus (%) with reference to recommended daily allowances.[1]

Expenditure group[2]	Percentage population	Cumulative percentage population	Per capita daily nutrient consumption: Energy (kcal)	Per capita daily nutrient consumption: Protein (g)	Deficit surplus (%): Energy	Deficit surplus (%): Protein
			Rural India			
1	6.72	6.72	1204.63	32.21	-46.22	-25.09
2	16.89	23.61	1683.97	46.04	-24.82	7.07
3	39.53	63.14	2138.24	58.96	-4.54	37.12
4	29.80	92.94	2746.63	75.71	22.62	76.07
5	7.06	100.00	3620.44	103.13	61.63	139.84
			Urban India			
1	0.91	0.91	1119.93	31.77	-50.00	-26.12
2	11.30	12.21	1443.88	40.90	-35.54	4.88
3	34.47	46.68	1820.45	50.93	-18.73	18.44
4	37.13	83.81	2299.70	64.21	2.67	49.33
5	16.19	100.00	3073.09	81.24	37.19	88.93

1 The Recommended Daily Allowances (RDA) for the two nutrients are: energy 2240 kcal and protein 43 g

2 See Table 1, footnote 1

suffering from energy deficiency—13% in rural and 20% in urban areas, corresponding to the 1600 kcal RDA norm. This finding seems to support the argument that energy deficiency is the main nutritional gap and if that is taken care of, the protein gap would automatically be bridged.[5] Obviously, this logic is based on the assumption that those suffering from protein deficiency also often suffer from energy deficiency and any excessive protein would be converted into energy.

Table 6 also shows how the per capita nutrient gap or surplus varies across expenditure groups. At the per capita level, the energy-protein gap in the lowest income groups appears to be relatively small. One might argue that this could be bridged with the available supplies through redistribution of food and incomes. However, when income transfers take place, there will be additional demand over and above the recommended levels (owing to either ignorance or sheer taste-based preference for certain items) from the beneficiary populations requiring additional supplies. There would also be expansion in demand for other non-cereal products and services as purchasing power increases. If such supplies are not forthcoming redistribution of income might only lead to providing benefits to some at the cost of others.[6]

Nutrient Intake—Income Relationships

In order to quantify the relationship between nutrient intake and consumer total expenditure (a proxy for consumer income), the average values

5 Some clinical experts, nutritionists, and economists (e.g., Sukhatme 1973, Beaton and Swiss 1974, Ryan et al. 1974, Payne 1975, and Ryan 1977) argue that the available cereal diets, which are cheap sources of energy, contain protein scores higher than the 'safe' levels of protein-calorie ratios to ward off any protein deficiency *per se* if only they are consumed in adequate quantity. However, others (e.g., Scrimshaw 1977) feel that the revised FAO/WHO protein norms are rather low, more so because infections cause heavy protein losses and thereby a need to replenish them. While emphasizing the need to look into the distribution of food and nutrient intake by malnourished and vulnerable populations, they caution planners and policymakers who tend to prescribe tailor-made solutions based on average per capita estimates of protein adequacy or deficiency. According to them, malnourishment is more a social than a technical problem.

6 In an earlier exercise, Murty and Radhakrishna (1982) have shown that a moderate transfer of purchasing power in favor of the urban poor will generate demand for all food items and fuel and lighting, while it depresses markets for clothing and other nonfood commodities. But a more drastic redistribution, aimed at total eradication of poverty, increases manyfold the demand for food grains at the cost of even some food items like milk products and all nonfood commodities, indicating the extreme importance of food grains in the budget of poorer households.

on the two variables obtained for the five rural/urban expenditure groups are used as observations. In view of the very low degrees of freedom, the estimated parameters may not be precise. For each nutrient a quadratic equation, with nutrient intake as dependent variable and total consumer expenditure (both on per capita per day basis) as independent variable, has been estimated separately for rural and urban areas. Quadratic equations are chosen to allow for the diminishing rate of marginal nutrient intake. The parameter estimates of these relationships along with some summary measures of goodness of fit are presented in Table 7. The parameter estimates have all expected signs and are statistically significant at either 1% or 5% level. The adjusted coefficient of determination (R-square) values are high, indicating a very good fit. The estimated relationships are shown graphically in Figure 2. The graphs indicate a saturation tendency. On a per capita basis, the average consumption of both the nutrients is lower in urban areas than in rural areas.

In Figures 3 and 4, we plotted the behavior of percentage energy and protein intakes against changes in real income by commodity source. This tells us which of the nutrient sources are substitutable/complementary as income rises. Broadly, with affluence, sorghum and other cereals (pearl millet to a lesser extent) seem to lose importance as sources of energy and protein. The energy-protein share of superior cereals rises initially and then declines. Nutrient share of other food mainly, and pulses to a lesser extent, increase uniformly with rise in income. Thus, structural changes in consumption patterns (i.e. shifts in preferences) from cereal to noncereal-based items are most likely to take place with real income growth.

To look more closely at intersectoral (rural/urban) and intrasectoral patterns in nutrient consumption, we have estimated the average and marginal propensities to consume nutrients across expenditure groups for rural/urban areas. The average propensity to consume a nutrient (this should not be mistaken for average nutrient intake) is obtained by dividing total daily consumption of that nutrient with the total amount spent in obtaining it. The marginal propensity to consume a nutrient is estimated by multiplying the average propensity with its intake elasticity with reference to income. These estimates are presented in Table 8.

Both average and marginal propensities to consume nutrients decline with income, suggesting diminishing utility for nutrient consumption. In other words, the nutrient worth of a rupee declines with affluence. It is also clear that the average and marginal propensities to consume any nutrient are higher in rural areas than in urban areas for each expenditure group. This might be owing to a uniformly lower expenditure, in absolute as well as relative terms, on all cereal items in urban than in rural areas. For noncereal items, however, the opposite is true. For the lowest expenditure groups in both urban and rural areas, the marginal propensity to consume any nutrient is higher than the

Table 7. Relationships between nutrient consumption and expenditure.

Nutrient variable	Intercept	Coefficient of the variable: Expenditure	Coefficient of the variable: Expenditure²	Adjusted R-square	F-ratio
		Rural India			
Energy	564.28	1235.74**	-122.65*	0.993	300.77
		(10.43)[1]	(-5.99)		
Protein	13.10	34.12**	-3.22*	0.992	256.23
		(8.74)	(-4.78)		
		Urban India			
Energy	550.59	924.76**	-84.87*	0.994	357.34
		(11.16)	(-6.53)		
Protein	15.61	26.31**	-2.63**	0.994	356.60
		(12.46)	(-7.92)		

1. t-values are in parentheses.
** Significant at 1% level.
* Significant at 5% level.

average propensity, implying an increase in nutrient intake more than proportionate to any given increase in income.

Table 8. Estimated average and marginal propensities to consume nutrients.

Expenditure group[1]	Average propensity Energy (kcal)	Average propensity Protein (g)	Marginal propensity Energy (kcal)	Marginal propensity Protein (g)
	Rural India			
1	1825	48.80	1857	51.44
2	1667	45.58	1554	43.11
3	1416	39.05	1121	31.04
4	1121	30.90	677	17.98
5	742	21.13	322	8.75
	Urban India			
1	1577	44.75	1603	47.15
2	1402	39.71	1195	34.19
3	1182	33.07	808	22.41
4	916	25.58	516	3.50
5	571	15.10	239	5.79

1 See Table 1, footnote 1

The percentage decline in the average propensities to consume nutrients over the income range varied between 57-61% in rural areas and 63-73% in urban areas. However, the decline is much more rapid for marginal propensities—83% in rural areas and 87% in urban areas.

Nutrient Intake Elasticities

Tables 9 and 10 present the estimated uncompensated nutrient elasticities with reference to commodity prices and consumer income. For computing π_{ij}s, observed rather than estimated $\hat{q}_i$s are used. Looking across the tables, one finds that the nutrient elasticity estimates with reference to consumer income are similar for energy and protein.

The estimated nutrient elasticities with reference to consumer income close to unity for expenditure groups 1 and 2 in rural areas and expenditure group 1 in urban areas indicate that the consumers belonging to these groups will tend to spend their additional income equiproportionally on calories and protein, derived mainly from cereal consump-

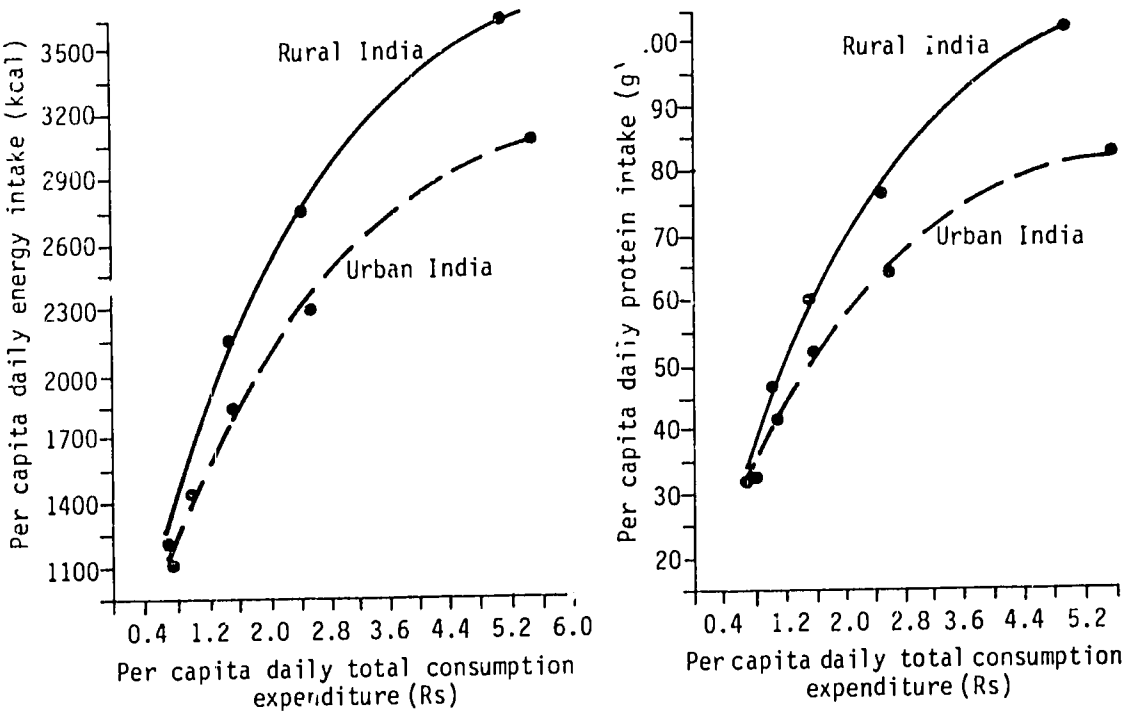


Figure 2. Relationships between nutrient intake and expenditure.

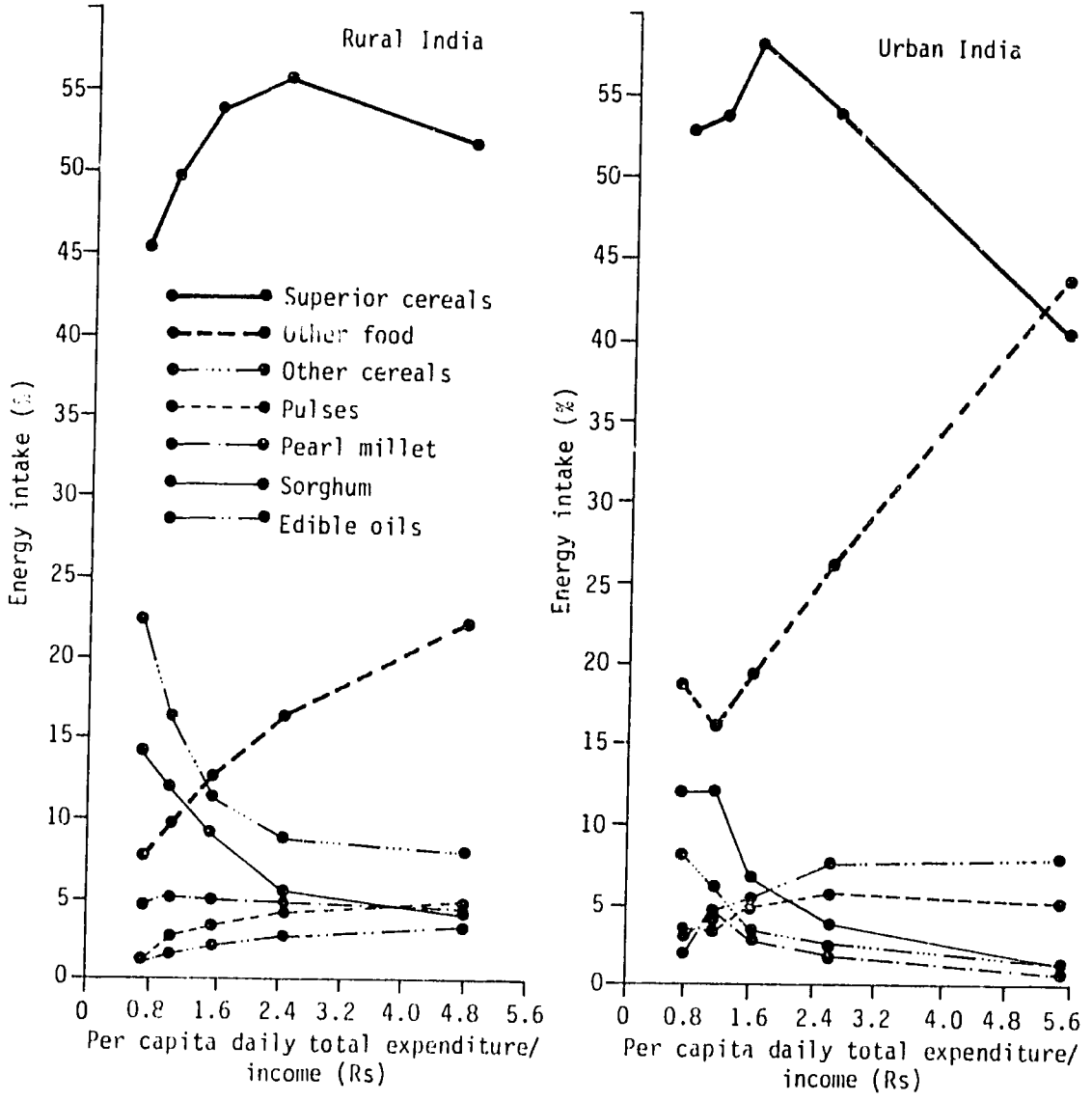


Figure 3. Energy intake by source and income level.

tion. This implies that any redistribution of income in favor of the poor would generate demand for cereals, particularly coarse cereals like sorghum, pearl millet, and other cereals, which are relatively inexpensive. Such income redistribution should be accompanied by increases in supplies to prevent abnormal price rises. The income effects on nutrient consumption decline by about 58% with rises in income. In the highest income brackets, about 60% of the additional income is spent on goods and services other than food. The intersectoral (rural/urban) differences in nutrient elasticities are small compared to intrasectoral differences.[7]

The uncompensated nutrient elasticities with reference to commodity prices are quite interesting.

7 Radhakrishna (1981) reported a similar pattern for energy consumption in India. The empirical results of Pitt (1983) for rural Bangladesh are of similar magnitude as those for lower expenditure groups here. However, Pitt's estimates show, rather surprisingly, a marginal increase in nutrient elasticities between nutritionally 'not so better off' and 'better off' households for staple food items.

The cereal price effect is the largest among all price effects for low income consumers, while non-cereal price effects are larger for richer sections. For example, a 10% decrease in cereal price would induce the low income consumers to increase their energy and protein consumption by 7-8%, of which about 5% comes from coarse cereals. Thus, cereal price movements are critical for the nutritional well-being of the rural and urban poor. Any increase in cereals supply, particularly coarse cereals, would have two positive effects—(1) a direct price effect and (2) an indirect income effect through employment—on the welfare of rural and urban poor.

Some variation in nutrient elasticities with reference to commodity prices can be observed across nutrients. For example, prices of sorghum and pulses affect protein consumption more strongly than energy consumption for all classes of consumers, but more so the poor than the rich. However, these uncompensated price elasticities tell us only part of the story. The total effect of a price subsidy (for example, on nutrient consumption) can be derived only after compensating the consumer for his income gain.

Tables 11 and 12 present income-compensated nutrient elasticities. A majority of these estimates are numerically small and negative, implying a rela-

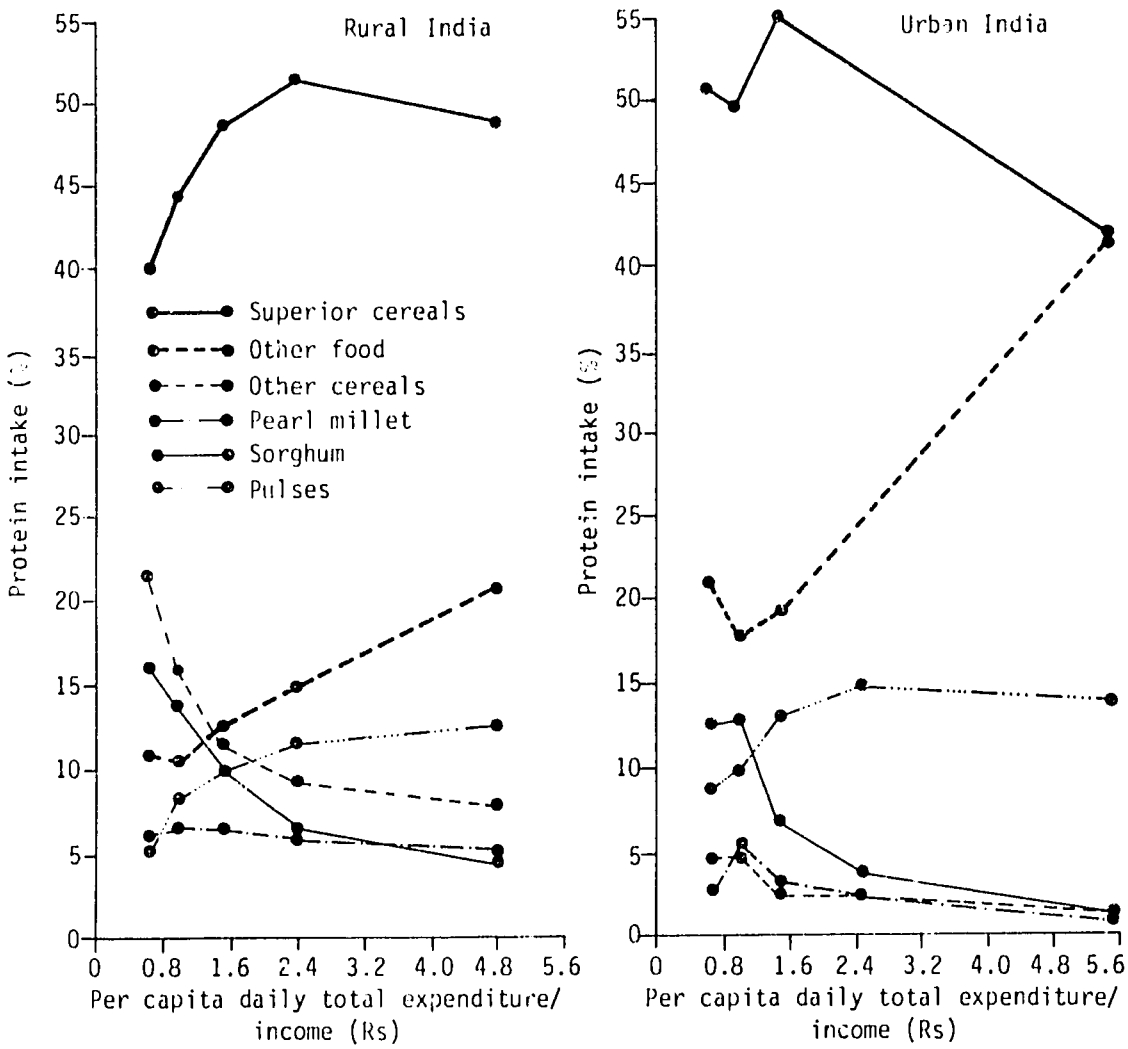


Figure 4. Protein intake by source and income level.

Table 9. Uncompensated energy intake elasticity with reference to commodity prices and consumer income.

Expenditure group[1]	With reference to the price of										w.r.t.[2] consumer income
	Superior cereals	Sorghum	Pearl millet	Chickpea	Other cereals	All cereals	Edible oil	Pulses	Other food	Nonfood	
	Rural India										
1	-0.348	-0.174	-0.068	0.003	-0.189	-0.776	-0.017	-0.023	-0.103	-0.100	1.017
2	-0.425	-0.127	-0.087	0.011	-0.129	-0.757	-0.024	-0.033	-0.106	-0.012	0.932
3	-0.354	-0.057	-0.035	0.000	-0.062	-0.508	-0.025	-0.037	-0.137	-0.087	0.792
4	-0.250	0.022	-0.029	0.007	-0.030	-0.324	-0.023	-0.030	-0.154	-0.072	0.604
5	-0.160	-0.021	-0.024	-0.002	-0.018	-0.225	-0.027	-0.027	-0.155	0.000	0.434
	Urban India										
1	-0.500	-0.106	-0.014	0.040	-0.072	-0.652	-0.031	-0.035	-0.191	-0.112	1.020
2	-0.437	-0.091	-0.059	0.040	-0.036	-0.583	-0.039	-0.036	-0.163	-0.032	0.852
3	-0.319	-0.028	-0.015	0.005	-0.012	-0.369	-0.044	-0.040	-0.184	-0.046	0.684
4	-0.175	-0.016	-0.006	0.004	-0.006	-0.199	-0.049	-0.032	-0.227	-0.057	0.563
5	-0.102	-0.003	0.000	-0.001	-0.002	-0.108	-0.036	-0.018	-0.349	0.091	0.419

1 See Table 1, footnote 1
2 w.r.t. - with reference to

tively low proportionate increase in nutrient intake in the event of a price subsidy. The estimates in general are negative with reference to the price of cereals and pulses. Chickpea is an exception in some cases. The magnitude of these estimates vary across nutrients, expenditure levels, and rural/urban sectors. Broadly, cereal price subsidies would increase energy and protein consumption in rural as well as urban areas, though the effect is similar for the two nutrients. Further, the effect is much stronger on lower income consumers than on the richer sections.

Within cereals, a subsidy on superior cereals seems to predominantly increase energy and protein intake in both the areas. Subsidy on sorghum, pearl millet, and other cereals also encourages energy consumption by all sections of consumers, proportionately more by the poor. Among non-

Table 10. Uncompensated protein intake elasticity with reference to commodity prices and consumer income.

Expenditure group[1]	With reference to the price of										w.r.t.[2] consumer income
	Superior cereals	Sorghum	Pearl millet	Chickpea	Other cereals	All cereals	Edible oil	Pulses	Other food	Nonfood	
	Rural India										
1	-0.270	-0.229	-0.093	0.000	-0.170	-0.762	-0.003	-0.072	-0.113	-0.103	1.054
2	-0.347	-0.158	-0.114	0.003	0.121	-0.737	-0.010	-0.080	-0.107	-0.012	0.946
3	-0.322	-0.064	-0.044	-0.004	-0.061	-0.495	-0.014	-0.075	-0.125	-0.087	0.795
4	-0.218	-0.025	-0.042	0.000	-0.028	-0.313	-0.011	-0.055	-0.132	-0.070	0.582
5	-0.144	-0.024	-0.031	-0.004	-0.014	-0.217	-0.005	-0.063	-0.130	0.000	0.414
	Urban India										
1	-0.492	-0.124	-0.023	0.035	-0.031	-0.635	-0.007	-0.091	-0.205	-0.115	1.054
2	-0.389	-0.110	-0.075	0.032	-0.022	-0.564	-0.009	-0.075	-0.181	-0.032	0.861
3	-0.294	-0.042	-0.021	0.004	-0.007	-0.360	-0.014	-0.085	-0.171	-0.045	0.678
4	-0.156	-0.021	-0.009	0.003	-0.004	-0.187	-0.012	-0.066	-0.210	-0.053	0.528
5	-0.098	-0.004	0.000	-0.001	0.000	-0.103	-0.008	-0.044	-0.311	0.083	0.384

1 See Table 1, footnote 1
2 w.r.t. - with reference to

Table 11. Income-compensated energy intake elasticity with reference to commodity prices.

Expenditure group[1]	With reference to the price of									
	Superior cereals	Sorghum	Pearl millet	Chickpea	Other cereals	All cereals	Edible oil	Pulses	Other food	Nonfood
	Rural India									
1	0.017	-0.088	-0.036	0.006	-0.053	-0.154	0.014	0.003	0.067	0.070
2	-0.085	-0.057	-0.056	0.016	-0.047	-0.229	0.008	0.000	0.083	0.138
3	-0.068	0.018	-0.012	0.004	-0.017	-0.111	0.005	-0.006	0.056	0.056
4	-0.059	-0.007	0.016	0.010	-0.009	-0.081	-0.001	-0.007	0.013	0.076
5	-0.076	-0.015	-0.018	0.000	-0.009	-0.118	-0.014	-0.015	-0.030	0.177
	Urban India									
1	-0.151	-0.034	0.000	0.041	-0.030	-0.174	0.016	-0.003	0.077	0.084
2	-0.148	-0.040	-0.037	0.042	-0.012	-0.195	0.001	-0.004	0.069	0.129
3	-0.095	-0.007	-0.006	0.006	-0.004	-0.106	-0.006	-0.104	0.024	0.102
4	-0.031	-0.008	-0.001	0.006	-0.002	-0.036	-0.017	-0.012	-0.033	0.098
5	-0.048	-0.001	0.001	0.000	-0.002	-0.050	-0.018	-0.009	-0.194	0.271

1 See Table 1, footnote 1

cereal items, pulses qualify for price subsidy aimed at raising protein intake by the poor; rich households would benefit from a subsidy for other food items. However, pulses rank second to sorghum (and in some cases, to pearl millet as well) in rural areas, and to superior cereals in urban areas, in increasing protein intake of poorer households. Thus, price subsidy as an instrument to affect changes in nutrient intake needs judicious handling.

Consumer Preferences for Quality Characteristics

Analysis of Consumer Preferences for Sorghum and Pearl Millet

One of ICRISAT's objectives is to develop improved varieties of sorghum and pearl millet with high and stable yield, to increase production.

Table 12. Income-compensated protein intake elasticity with reference to commodity prices.

Expenditure group[1]	With reference to the price of									
	Superior cereals	Sorghum	Pearl millet	Chickpea	Other cereals	All cereals	Edible oil	Pulses	Other food	Nonfood
	Rural India									
1	0.108	-0.139	-0.060	0.002	-0.030	-0.118	0.029	-0.045	0.062	0.072
2	-0.001	-0.087	0.082	0.007	-0.038	-0.201	0.023	-0.047	0.084	0.141
3	-0.035	0.026	0.020	-0.001	-0.016	-0.098	0.017	-0.044	0.069	0.056
4	-0.035	-0.011	0.029	0.003	0.008	-0.080	0.011	-0.033	0.028	0.074
5	-0.063	-0.018	0.025	-0.002	-0.006	-0.114	0.008	-0.051	-0.012	0.169
	Urban India									
1	-0.132	-0.050	-0.009	0.036	0.012	-0.143	0.042	0.059	0.071	0.089
2	-0.098	-0.058	-0.053	0.034	0.002	-0.173	0.031	-0.042	0.053	0.131
3	-0.072	-0.021	-0.012	0.004	0.001	-0.100	0.023	-0.059	0.034	0.102
4	-0.021	-0.013	-0.005	0.004	-0.001	-0.036	0.018	-0.046	-0.028	0.092
5	-0.049	-0.003	0.000	0.000	0.000	-0.052	0.007	-0.035	-0.168	0.248

1 See Table 1, footnote 1

Experience with the adoption of such new varieties has shown that consumers are often reluctant to accept these as full substitutes for existing local varieties, for both food and fodder purposes (Parthasarathy Rao 1983). This resulted in low selling prices and adoption rates, thus reducing the effect such high-yielding varieties could have had on production. The earlier sections in the study have shown the importance of sorghum and pearl millet in the poor man's budget and the roles that their prices play in the purchasing decisions. This justifies the use of market prices for drawing inferences on consumer preferences for certain quality characteristics. Selection for traits that ensure good consumer acceptance of the grain is thus an important requirement for the success of any improved variety.

The use of consumer panels to assess grain quality is a time-consuming procedure, requiring large amounts of valuable seed material for testing purposes. Its application is thus rather limited. A more effective method is based on a market-derived selection index. In this section, we summarize the methodology employed for deriving a selection index for grain quality of sorghum and pearl millet (von Oppen 1976, von Oppen et al. 1979, von Oppen and Pathasarathy Rao 1982); a summary of the results is also given.

The analytical method involves essentially three steps: (1) collection of small grain samples (50 g) from individual transactions on one or several consecutive market days and of data on the prices at which they are sold in the market, (2) laboratory analysis of the samples, giving measurements on a set of relevant grain qualities, and (3) explaining the variation in market prices in terms of variation in qualities with the help of regression analysis. The estimated coefficients and the functional form of the relationship constitute the basis for the selection index. The results indicate that any new variety, of which 50 g of material is available, can be analyzed for the same qualities, and its consumer preference can be predicted with an accuracy of about 70%. The explanatory variables included are glumes, mold, and seed size as visible or evident characteristics and dry volume, swelling capacity, and protein content as cryptic characteristics.

Figure 5 depicts the effects of a 25% increase in any one of the characteristics on consumer price for sorghum. For instance, a variety which has a dry volume of 25% above the average value fetches a price 15% above the average; similarly, a variety with a protein content of 10.1% (which is 25% above average) would be honored with a 4% higher price. The same variables are found to be relevant for pearl millet as well with similar explanatory power (von Oppen and Jambunathan 1978).

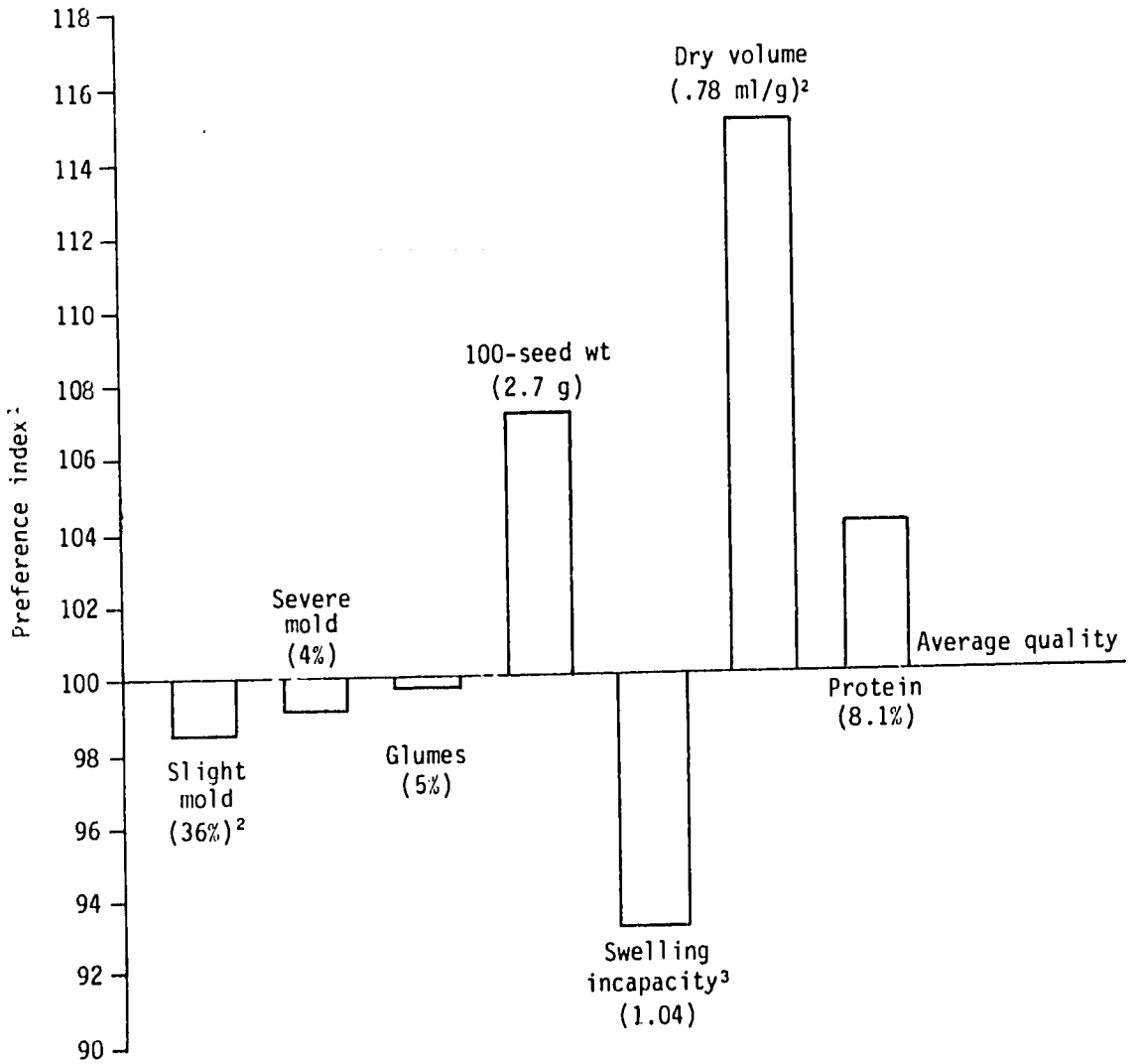
This methodology has been validated by predicting the consumer preferences for two sets of samples and comparing them with the actual consumer acceptance in two villages (Bapna and von Oppen 1980, Parthasarathy Rao and von Oppen 1983). The results were similar, even though the tests were carried out in two different villages in different years, one located in Maharashtra and the other in Andhra Pradesh. Comparison of the predicted and actual preferences for both the villages showed a high degree of correlation, especially for consumers in the lower farm-size and landless groups.

Considering the dependance of the rural and urban poor on nutrients from sorghum and pearl millet, it is not surprising that the consumers have developed a strong ability to differentiate between varieties on the basis of evident qualities and the origin of production. The color of the grain and its origin give an indication of the cryptic qualities of a particular sample. For example, the yellow sorghum from Khammam district of Andhra Pradesh is generally high in protein content, and the consumers know that through long experience. This information is reflected in the market by a price differential.

Relationship between Nutrient Consumption and Consumer Preferences

Calories and protein are two important characteristics that determine the quality of food for nutrient conscious consumers. The consumption patterns explored above describe consumer preferences and needs for these two quality characteristics. As these nutrients are measurable across nearly all food items it is possible, as demonstrated above, to estimate elasticities of demand for these two nutrients. However, other characteristics, too, influence critically the quality of certain food items. Some of these are dry volume (calories) and protein content, cleanness of the grain (absence of glumes and of moldy grains), and milling and cooking qualities (like seed size and swelling capacity). However, since qualities such as cleanness and ease of milling/cooking are item-specific and cannot be measured for comparison with other items, a general consumer demand analysis for these qualities would be impossible.

Instead, a detailed analysis of consumer preferences for sorghum, based on data collected over a very short period of one or few consecutive market days, can be attempted, and this was done. In a short time span, the quantities of supply and demand could be assumed fairly constant, and observed price variation can be attributed solely to quality changes. It is interesting to compare the results of the two approaches in the case of protein content in sorghum. The consumer demand study shows that consumers in the lowest income group would respond to a decrease in sorghum price by 10% with an increase in demand of 2.3%. In comparison, the consumer preference study shows



1. Increase or decrease in preference index owing to a 25% increase in sorghum qualities from average.
2. Average values in parentheses.
3. Ratio of weight increase over volume increase after soaking in water for six hours.

Figure 5. Sorghum quality characteristics affecting preference index.

that, ceteris paribus, an increase of sorghum protein content by 25% would find consumers ready to pay a 4% higher price. Although these results are not exactly the same, their order of magnitude is similar: prices which consumers pay thus measurably reflect the quality of food they are buying. Careful analysis of market prices can thus lead to an understanding of the determinants of consumer demand.

Policy Implications

- The above analysis has shown that degrees of malnutrition ranging from severe to moderate exist in both rural and urban areas of India. The observed energy-protein gaps can possibly be bridged by a more efficient food distribution system. By looking into the profiles of nutritionally vulnerable sections, it should be possible to identify the poorest of the poor. These groups most likely do not participate in the market functioning, and hence a direct target-group oriented approach might be appropriate.
- Those people who are only marginally malnourished can perhaps be induced to improve their nutrient intake through appropriate price subsidies; a subsidy on cereals is the most effective in both rural and urban areas. Within cereals, price subsidy on superior cereals in urban areas (currently catered to by the public distribution system) and on superior and coarse cereals (including sorghum and pearl millet) in rural areas is likely to increase calorie-protein intake. A subsidy on pulses ranks second to that on cereals in increasing protein intake.
- The poorest consumers, particularly in rural areas, have the highest price and income elasticities of demand for calories and protein; any increase in income or its redistribution in favor of the lowest income groups will lead to nearly proportional increases in the demand for calories and protein. Sorghum and pearl millet are major contributors to the nutrient intake of very poor people, notably of calories but even more so of protein. Improved varieties of these cereals should be of a quality that suits this class of consumers, as their preference patterns are very pronounced.
- Measured against certain standards of recommended allowances, calorie deficiencies are more severe than protein deficiency, and prevalent across a wider range of low income groups. Emphasis on cereals and oilseed crops should probably continue; pulse improvement will gain in importance as soon as calorie needs are met.
- Nutrient content, cooking quality, and cleanness (absence of glumes and molds) of the grain are important determinants of consumer preferences for sorghum and pearl millet. The adoption of new varieties of sorghum that do not suit these consumer preferences appears to be slower. Therefore, in the development of improved varieties, selection for good consumer acceptance is very important.
- Together with information on qualities and quantities demanded, market prices are valuable sources of information for studies on consumer behavior and preference patterns. Therefore, proper maintenance of market reporting services, markets, and efficient marketing systems *per se*, are an important precondition to effectively assess consumer behavior and development trends.
- This analysis was at the aggregate (country) level and focused attention on the income dimension only. The problem of undernutrition and malnutrition is, however, specific to region, population, and socioeconomic group. Further research in other dimensions is needed to arrive at operational level recommendations.

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Efficiency in Pricing and Operation of Markets for Semi-Arid Tropical Crops in India —A Case of Groundnut in Gujarat

V.T. Raju and B.D. Bhatt*

Abstract

This paper examines the efficiency in pricing and operation of regulated markets for groundnut, an important crop in Gujarat, one of the major semi-arid tropical states of India. For the study, regulated markets (with groundnut arrivals around 15% of total arrivals), 110 farmers, 39 wholesale traders, 11 oil millers, and 22 retailers were selected and the data collected by survey through tested questionnaires. Efficiency in pricing is measured in terms of correlation of price movements of groundnut in separate markets, and the weekly wholesale prices of groundnut in selected markets for 1981/82 are used for this purpose. The results indicate that most of the price correlations between selected markets for groundnut were high, positive, and statistically significant. Hence, it is concluded that most of the selected markets are efficient in pricing for groundnut. Efficiency in operation is measured in terms of marketing costs, marketing margins, and price spreads of groundnut in selected markets. The concurrent method is used to estimate marketing costs, margins, and price spreads, and the results indicate that these varied from market to market.

In all the selected markets, the farmer's share of the consumer's rupee was the highest (73 to 79%), followed by the miller's (5 to 8%), wholesale trader's (1 to 4%), and retailer's (1 to 4%) shares. Hence, it is concluded that most of the selected markets are efficient in operation.

An attempt is also made in this paper to quantify the marketing efficiency by fitting regressions with correlation coefficients as dependent variables and some of the factors affecting pricing efficiency as independent variables. Pricing efficiency can be affected by several factors, and in this study 14 such factors are identified for which hypotheses are postulated. As the dependent variable (correlation coefficient) was always between a pair of markets, independent variables (except distance) were derived accordingly, and the average values of pairs of markets and ratios were worked out and regressions fitted separately. The results indicate that out of 14 variables, 10 attained the expected signs when the average values were considered in the regressions, whereas only 6 variables attained the expected signs when the ratios were considered. The regression results suggest that more traders and telephones, proper size and use of the market yard, and more production and market arrivals of groundnut would be conducive to improving pricing efficiency of groundnut in selected markets of Gujarat.

Résumé

Efficacité de la fixation des prix et de l'opération des marchés pour les cultures tropicales semi-arides en Inde—un cas de l'arachide au Gujarat : *Ce rapport examine l'efficacité de la fixation des prix et de l'opération des marchés réglés pour l'arachide, une culture importante au Gujarat, l'un des Etats majeurs des zones tropicales semi-arides en Inde. A cette fin, les marchés réglés (avec l'arachide représentant 15% des apports totaux), 110 paysans, 39 grossistes, 11 fabricants d'huile et 22 détaillants ont été choisis et les données ont été obtenues par une enquête conduite au moyen*

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des questionnaires éprouvés. L'efficacité de la fixation des prix est mesurée en fonction de la corrélation des fluctuations des prix sur les différents marchés, et les prix hebdomadaires de gros de l'arachide sur les marchés sélectionnés pour 1981/1982 sont pris en compte à ce propos. Les résultats de l'enquête indiquent que la plupart des corrélations de prix entre les marchés sélectionnés pour l'arachide ont été élevées, positives et significatives au point de vue statistique. On peut donc tirer la conclusion que la majorité des marchés sélectionnés sont efficaces dans la fixation des prix pour l'arachide. L'efficacité de l'opération, par contre, est mesurée en fonction des frais de commercialisation, des marges de commercialisation et de la différence des prix de l'arachide sur les marchés sélectionnés. L'étude fait appel à la méthode de l'observation des prix en même temps, en vue d'évaluer les frais de commercialisation, les marges, et les différences des prix. D'après les résultats, ces éléments ont varié d'un marché à l'autre.

Dans tous les marchés échantillonnés, la part du paysan de la rupie du consommateur a été la plus élevée (73 à 79%), suivie de celles du fabricant d'huile (5 à 8%), du grossiste (1 à 4%) et du détaillant (1 à 4%). Ceci laisse donc à croire que la plupart des marchés échantillonnés sont efficaces dans le domaine de l'opération.

Le rapport vise également à quantifier l'efficacité de la commercialisation en calant d'une part les régressions avec les coefficients de corrélation (variables dépendantes) et d'autre part avec certains facteurs affectant l'efficacité de la fixation des prix (variables indépendantes). L'efficacité de la fixation des prix peut être affectée par plusieurs facteurs dont 14 sont identifiés dans l'étude pour lesquels des hypothèses sont postulées. Étant donné que la variable dépendante (coefficient de corrélation) a toujours été entre une paire de marchés, les variables indépendantes (sauf la distance) ont été déduites à l'avenant. Les valeurs moyennes des paires de marchés et les rapports ont été dérivés et les régressions ont été calées séparément. Les résultats indiquent que 10 sur 14 variables ont atteint les signes escomptés lorsque les valeurs moyennes ont été prises en compte dans les régressions, tandis que seulement 6 variables ont atteint les signes escomptés lorsque les rapports ont été pris en compte. Les résultats des régressions donnent à croire que davantage de commerçants et de téléphones, une étendue adéquate et un usage approprié de la place du marché ainsi qu'une production et un apport accrus de l'arachide sur les marchés favoriseraient l'amélioration de l'efficacité de la fixation des prix de l'arachide dans les marchés sélectionnés du Gujarat.

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Equity Aspects of Agricultural Markets

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The Fear of Trade: Equity Considerations in the Analysis of Marketing

Michael Lipton*

Summary

The main schools of economic thought--Smith-Ricardo, neoclassical, and Marxist—argue that more marketing is good. Given outputs in each place, the option of exchange among places generally contributes to welfare. The option also permits division of labor, local specialization, and hence more output in all localities combined of each commodity, given factor inputs in each locality. Factor supply responses can further raise outputs. Emergent merchants and "differentiation of peasantry" allegedly not only increase output but also assist development.

This paper raises some doubts about these arguments--and not only from an equity viewpoint. More and better marketing is not the main factor inducing larger markets and is not the only route to greater division of labor. It is sometimes a contributory cause of growth; even the growth it does cause can be associated with increases in risk, or in Gini coefficients, so that the poor lose out.

The impact of "marketing" on income distribution is as yet unexplored. Classical theory of distribution of gains from trade allows only one case (Bickerdike's) where a trading party might get worse off; but distribution within trading villages or regions is largely neglected. So is distributional impact (a) as trade alters the labor intensity of production; (b) via resource transfers, as profits from production are switched to trading enterprises and trading profits are then reinvested; and (c) as trade "urbanizes" activity.

All these issues are affected by the assumption about the alternative. Isolated families, diversified and locally dense villages, conventional market links, and export-import nexuses offer distinct alternatives to the expansion of distant trade through outside stimuli.

Presently state or state-subsidized investments in transport and other market infrastructure are taken for granted, even by people who dislike producer parastatals. Free road use goes unreviewed by agencies that question the consequences of all other subsidies. The implicit diversion of resources from production to trading, especially where factor supply responses are weak, is dubious. Such diversion may especially harm the poor through its impact on efficiency, equity, and safety. Demographic considerations further increase such dangers.

Résumé

La crainte du commerce—des considérations sur la répartition équitable dans l'analyse de la commercialisation : *D'après les principales écoles de pensée économique—Smith-Ricardo, néo-classique et Marxiste—l'accroissement de la commercialisation est bon. Étant donné les productions dans chaque localité, l'option d'échange parmi les localités contribue généralement au bien-être. L'option permet, en outre, la division du travail, la spécialisation locale, et en conséquence, plus de production de chaque marchandise dans l'ensemble des localités, étant donné les intrants de production dans chaque localité. Les réponses aux approvisionnements en facteurs de production peuvent accroître davantage la production. Les paysans qui sont en train de se transformer en marchands et la "différentiation du paysannat" améliorent vraisemblablement non seulement la production mais aussi le développement.*

Cette communication a émis des doutes à propos de ces arguments—mais non seulement du point de vue de la répartition équitable. Davantage de commercialisation de meilleure qualité n'est pas le principal facteur qui suscite des plus grands marchés et n'est pas la seule voie à une plus

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grande division du travail. Parfois elle est une cause contribuante de la croissance; en fait, même la croissance qu'elle engendre pourrait être accompagnée de l'augmentation de risques ou de coefficients Gini, de sorte que les pauvres ne gagnent rien.

L'effet de la "commercialisation" sur la répartition du revenu est encore inconnu. La théorie classique de répartition des profits du commerce ne donne qu'un cas (celui de Bickerdike) où la situation d'une partie contractante avait empiré; cependant, la répartition à l'intérieur des villages ou des régions commerciaux est généralement négligée. Il en va de même pour l'effet de la répartition: (a) car le commerce modifie l'intensité de la main d'oeuvre de la production; (b) à travers des transferts de ressources puisque les profits de la production sont réorientés vers des entreprises commerciales et les profits du commerce sont ensuite réinvestis; et (c) car le commerce "urbanise" l'activité.

Toutes ces questions sont affectées par la supposition de l'alternative. Des familles isolées, des villages très peuplés tant diversifiés que locaux, des réseaux conventionnels de marchés et des liens exportation-importation offrent d'autres alternatives distinctes à l'expansion du commerce étoffé grâce aux stimulis externes.

Les investissements d'État ou subventionnés par l'État dans les domaines du transport ainsi que d'autres infrastructures du marché sont actuellement considérés comme admis, même par les personnes qui n'aiment pas l'intervention gouvernementale dans les activités reliées à la production aux entreprises publiques. L'utilisation gratuite des rues n'est pas prise en compte par les agences qui mettent en doute les conséquences de toutes autres subventions. Le détournement implicite des ressources au commerce à partir de la production, en particulier dans le cas où les réponses aux approvisionnements en facteurs de production sont faibles, est contestable. Tel détournement peut affecter surtout les pauvres, à travers son impact sur l'efficacité, la répartition équitable et la sécurité. Les facteurs démographiques aggravent encore plus ces dangers.

Introduction

Most development economists seem to believe that for small farmers, and more generally the poor in low-income countries, more marketing is desirable. This paper examines the equity implications of this proposition. First, however, it must be clarified.

What is 'more marketing'? Numerous interlocked indicators affect marketing. Normally they move together, under clear and uniform pressures. Sometimes, even for the same place, the indicators move in opposite directions, as when a village markets a larger part of its output, but its markets become more localized and less diverse. Sometimes supply pushes the indicators in one direction, but demand in another, as when villagers want to market an increasing part of output, but outsiders demand declining quantity at given prices. In such cases, the meaning of 'more marketing' is obscure. Yet its precise coverage can determine its desirability in different sorts of places (remote or integrated, diversified or specialized). Many pro-marketeers, moreover, seek more competition, trader specialization, cash orientation, or market separation—items usually associated with more marketing, but seldom maximized by the same policy set.

This paper assumes that the interlocked indicators of more marketing are pushed in the same (upward) direction by supply and demand factors acting in concert. It questions the arguments, static or dynamic, that have persuaded most economists that such movements are desirable.

It goes on to enquire what policies follow from these arguments. Even the desirable alternatives have costs. In the short run, more marketing means less production, as resources are shifted from producing commodities to exchanging them. Why should not the staunch advocates of markets, who usually propose state activity to improve and articulate them, leave it to market forces to allocate resources between producing commodities and exchanging them?

We next consider what modifications are required in the 'case for more marketing' by a concern for self-sustained poverty reduction. There need be no trade-off with efficiency; the same modifications may be required, not only for reasons of horizontal (especially rural-urban) and vertical (especially intrarural) equity, but also for reasons of efficiency and growth. Extreme emphasis on, and resource allocation to, "more marketing" may waste resources that could otherwise generate faster growth. Transport, postharvest, and artisan processes may be *inefficiently* overprovided, overcentralized, urbanized, capital-intensified, monopolized, or bureaucratized. Opportunities to improve production of largely self-consumed prod-

ucts with high weight/value ratios may be lost. Remote but largely self-sufficient areas may be unduly neglected, because they are too nearly decomposable from national input-output (and multiplier) matrices. Above all, relatively immobile human resources, if engaged mainly in feeding themselves or in very limited local exchanges, may find their "health, education and welfare" inefficiently (not "merely" unjustly) neglected by national authorities that overstress integrated markets in the development process.

I have two aims in this paper. The subsidiary one is to act as the devil's advocate in respect of the proposed canonization of marketing as an unquestionably major and positive element in development and poverty reduction. The main aim is at least to scratch the surface of deciding what marketing means.

What is "More Marketing"?

A set of indicators

Consider a village V, comprising several producing farm families. Let us make three simplifying assumptions.

(1) Each family provides its own inputs of land, labor, and nonfarm artisan services.

(2) Every price stays the same always, and is the same for (and known by) everybody.

(3) While producing families may differ in the values and compositions of their total outputs or inputs—or even input-to-output transformation efficiencies—any given producing family produces the same total value of outputs each year, from the same total value of nonlabor and nonland inputs, and consumes the same amount.

For V, more marketing or integration in markets usually refers to an increase in the market-related proportion of one or more of three totals:

- total value of farm output in V;
- total value of farm raw-material inputs in V;[1]
- total value of consumption in V.

The market-related proportion of total value of output (or of inputs or of consumption) in V can mean the proportion of it[2] that a person resident in V does not self-consume (or self-supply), but

- exchanges,[3] with any person from a different household,[4]
- exchanges with any person from a household not in V,
- exchanges with any person from a 'remote' or nonlocal household (this proportion may be weighted by some index of the distance of the exchange).

This appears to suggest nine indicators of the market-orientation of V, even on our extremely simplifying assumptions. Only on these assumptions are some indicators linked definitionally. For example, if a family raises the proportion of gross farm output marketed, it must also raise the proportion of purchased farm inputs and consumption purchased from the market. That happens only because we assume that the family is self-reliant in each nonfarm product, and that there is no change in gross saving or investment levels, which equal depreciation because farm output is not changing. If the farm can shift family workers between the production of corn and of, say, nonmonetized investment in bunding, then it can vary the proportions of output value sold and of inputs purchased, without determining the proportion of consumer goods purchased.

1 When assumption (1) is relaxed, the proportion of all farm inputs purchased is allowed to rise. This requires a labor-hiring (or land-renting) family to reduce the self-consumed proportion of its output, except to the extent that hired-in land or labor replaces purchased inputs.

2 All the three following indicators are measured as proportions of totals, not in a 'nested' fashion. For example, output exchanged with non-V is expressed as a proportion of V's total output, not of exchanges by V's families with all other transactors whether in V or not.

3 For cash, kind, labor, or any of these plus a transaction in credit or insurance. Most economists regard a move to commodities-for-cash transactions, and away from commodities-for-kind, labor, as in itself developmental, efficient, or desirable. Such a move is positively correlated, as a rule, with increased marketing, but the case for the two changes is not exactly the same.

4 Exchanges within households—common, and indeed cash-based, between husband and wife in northern Nigeria (Longhurst 1980)—are generally ignored by economists, or regarded as 'precapitalist' and/or undesirable. Why? These exchanges obviously increase the prospects for specialization. Perhaps intrafamily exchange is seen as a rival to interfamily exchange.

Fortunately, the first three indicators do oblige by being highly correlated empirically. In India, villages with high ratios of marketed surplus to output do tend strongly to feature high levels of technology (and hence high ratios of purchased inputs to total inputs),[5] and high proportions of bought-in to total consumer goods (Dasgupta 1977). However, it is neither obvious nor universally observed that the second set of three indicators is either intercorrelated or correlated with the first set. A high level of specialization by family firms within a remote, diverse village—and of exchanges among them—could well tend to make them less keen to market their outputs, or to buy their inputs or consumer goods, from distant national' market centers. Conversely, the long-distance trans-Saharan (Anthony et al. 1979) or central Asian caravan treks not merely preceded, but were substitutes for specialization and exchange within rural communities or localities. The linear pattern of trade and market integration, in which all our nine potential indicators move together, may be a 'majority' experience to an extent sufficient for a 'theory of economic history' (Hicks 1969), but there are enough exceptions and inverse relationships to require great care. When we claim that (agricultural) marketing induces static gains—from trade, specialization or steady growth—we need to recall that it is in fact several different things, not always moving together.

Measuring the progress of 'marketing' becomes even more problematic when we relax assumptions (1) to (3) in the foregoing discussion. Consider (2) first. If V markets only one product, and purchases only one input or consumer good, the index-number problem can be avoided when relative prices change. If there are several outputs, however, since normal supply responses would induce producers in V to market more of a product whose prices have risen, and less of a product whose prices have fallen, the proportion of total output of all V-products marketed might well rise on a Paasche measure, but fall on a Laspeyres measure. The conflict between these measures could as readily arise from normal demand (or derived demand) response, by consumers in V, in respect of consumer goods (or inputs into production).

Relaxing (3), even on its own, creates further problems. If there is no trend (in outputs, inputs, or consumption), anticipated seasonal fluctuations in V, unless so similar in all villages that trade does not justify transport and other costs, will increase the proportion of output that V markets. Unexpected fluctuations can suddenly and sharply raise or reduce this proportion. Fluctuations in supply of any product in many villages at the same time, with normally sloped demand curves, will cause movements in the value of that product in the same direction only if it is in price-elastic demand; sale of output usually fluctuates in the same direction as output, but more sharply. Thus marketing/output ratios for a particular crop—measured in tonnes—are higher when its output fluctuates upwards, but the relative price of that crop is lower. So is the absolute value of its output, if demand for the crop is price-elastic; the impact of that crop upon V's marketing/output ratio for all crops, necessarily measured in money values, may well fluctuate downwards. The elementary, but complicated, algebra of even simple cases is too boring to set out.

The complications are even more 'intrinsic' to our problem of defining 'more marketing', if there is a clear uptrend in V's output of a particular crop (while others stagnate), and that crop initially represents a large part of V's market sales by value, say 75%. Especially if it is a cereal, the proportion of its quantum marketed can easily rise—from a quite high base—while price falls; if other villages are also boosting output, it can (with price-inelastic demand) lead to falls in the proportion of total value of all products marketed by V. This is tough on V, and looks statistically like a decline in marketing. A careless diagnosis might even lead us to suspect urban bias. But is the process necessarily undesirable?

Relaxing (1) creates, not index-number paradoxes, but more problems. Unequal villages, in which major buyers of labor confront landless sellers of labor, of necessity feature higher ratios of marketing to totals—of outputs, and of consumer-goods plus inputs—than villages that satisfy assumption (1). There is no logical need for ratios of outside-village to intravillage sales to be higher, though poverty among intravillage buyers makes it likely. Indeed, across northern Indian villages, extra-village marketing/output ratios are correlated with proportions of households reliant mostly on labor income (Dasgupta 1977). If a village has specialized artisans, its farmers almost certainly exchange a larger part of their output within the village; this may be at the cost of self-consumption (if the artisans are 'instead of' farmers who do their

5 Dasgupta (1977) also shows that hired labor in these villages looms relatively large in the composition of total labor, and that land inequality and hire also show high values

own carpentry, etc.) or of purchases from urban sources. The former would be classified by the marketing lobby as development, the latter as regression. Yet nobody who has seen how African villages suffer from forced reliance on urban sources—for lack of local artisan specialists—could readily assent to the latter classification.

A set of desiderata

Apart from the existence of different indicators of 'how much marketing', and apart from the problems of even defining these indicators in the (likely) case that assumptions (1), (2) and (3) fail, there is a further problem. Advocates of 'more marketing' usually associate it with four related, but distinct, desiderata: market competition, market separation, cash orientation, and trader specialization. If more market competition is desirable, then—given the levels of all nine indicators—more transactors are better than fewer; more commodities to choose from (given the number of transactors and the value traded at each place) are better than fewer; and more locations of exchange, given the value of transactions (and the number of traders) at each distance from V, are better than fewer. Market competition may increase as a larger proportion of V's output, inputs or consumption is exchanged, or as it is exchanged at a greater distance from the family farm; but there is no guarantee. We could all run the argument either way, and find empirical cases of each sequence.

Another issue is market separation. If transactions in grain markets, credit markets, or land and labor markets are "linked", this is often taken to be undesirable, regressive, even semi-feudal (Bhaduri 1973), or bad for the poor. It is not often made clear whether the *requirement* that all transactions in X be linked to a transaction in Y (at least for some "disadvantaged" groups) is the object of complaint, or, less plausibly, the *option* to transact in linked markets at all. Some southern Indian experience (Epstein 1973) suggests that the loss of this option is bitterly regretted by poor losers. Yet market development is often assessed by the emergence of formally separated markets in different commodities, whether the transactors are freed by this emergence from a traditional compulsion to operate in linked markets, or whether the emergence replaces the option of linked market transactions by the new compulsion to operate in separated markets.

A third issue is cash orientation. Wages and rents in kind, *jajmani* relationships (in which craftsmen provide nearby farmers with services on demand, in return for a share of the harvest), and other forms of barter are assumed to be less desirable, or at an earlier stage of development, than cash transactions. These, in turn, are sometimes assumed to be inferior to bank or credit-card arrangements. The clear advantages of cash or credit-card *options* are often confused with a much more dubious case to campaign for, subsidize, or invest in efforts to render nonkind transactions *dominant* or even compulsory. The Truck Acts in nineteenth-century England, and the opposition to the US 'company store', were fully justified by the wish to avoid undue pressure on workers to buy from their employers; but general guilt by association for transactions in kind is not justified. Such transactions have been revived in the informal sector of many rich countries—for reasons of profit and convenience, not just to evade taxes. Such revival also proves that no positive monotonic, let alone linear, relationship between 'more marketing' and 'more cash transactions' can be assumed.

The fourth distinct issue is trader specialization. Usually more marketing, in any of the nine senses, probably correlates positively with this. However, a closed community can develop a large class of different sorts of specialized merchants wholly in the sphere of exchange. Conversely, if trade among places is highly seasonal, even very open and trade-dependent economies may not provide sets of incentives that create specialized traders; instead, producers of particular crops may devote the slack season to trading.

I do not want to overstate the problem. However, suppose each of the above four items has a single indicator, so that there are thirteen indicators altogether, nine of 'marketing desiderata' and four of the 'usually associated desiderata'. Let us accept that, in nine cases out of ten, if any of these indicators is rising, then any other, selected at random, is rising too. Even then, to use a change in one indicator as a guide even to the direction of change of others will be wrong for at least one out of four other indicators over one-third of the time, and for at least one out of seven indicators at least half the time.

Theoretical Implications

Gains from "More Marketing"

Let us now assume that all the indicators move up together. Must this lead to rises in each communi-

ty's real income? Need the poorest deciles (in each community or nationality) gain, absolutely or relatively? One can separate five types of real-income gain from trade; three are neoclassical and two classical. We describe each gain as if the move were (a) by each of two producers (the arguments generally become less clear-cut if the trade-openers are two places), (b) without risk, and (c) from no trade to open trade (usually similar arguments apply to moves from less trade to more trade).

Ultrastatic (gain from trade) arises when trade is opened, but no producer can vary any factor inputs, or otherwise change the production possibility surface (PPS). Before trade, a producer reaches the highest consumer-indifference surface (CIS) by selecting the point on the fixed PPS tangential to a CIS. After trade, he produces at the point on the PPS tangential to the highest price surface (PS), trades where that PS is tangential to a CIS, and reaches a higher CIS than before. Ultrastatic gain does not depend on perfect competition—implying linear PSs unchanged when any one producer enters into trade, strictly concave CISs and strictly convex PPSs—but on much weaker conditions, and indeed is negative only in an exceptional, implausible case (Bickerdike 1906).

Static factor adjustment gain arises because, after trade becomes feasible, a producer—given the level of real factor cost[6]—can alter the factor mix, and hence the PPS and the point of tangency of PPS to PS that optimizes the PS-CIS tangency. The new PPS intersects the old, but the potential welfare from the optimization of production-and-exchange is normally higher. Usually a change from the no-trade mix of the types of variable (e.g. labor) cost would permit a higher PS-CIS tangency after the PS exchange became possible.

Semistatic factor response gain is a consequence of the higher price-incentives brought by greater opportunities for exchange. Real factor input is increased, and the whole PPS envelope moves outwards, to an extent defined by price-elasticity of total supply, and hence by price-elasticity of supply for, and of substitution among, factor inputs.

Quasi-dynamic gain arises as physical and human capital are adjusted to exploit the posttrade chances for greater specialization in larger markets. Nothing in the neoclassical responses alone (unless the PPSs comprise mainly linear facets) tends towards specialization or division of labor. This is a classical process, as producers exploit the new prospects after trade for dynamic comparative advantage (Robinson Crusoe cannot specialize), and—in some cases—for economies of scale. The process is reflected in extremely nonhomothetic outward movements of the PPS. However, strong complementarities in production (e.g., from crop mixing), or trading costs, can easily override the process.[7]

Long-run dynamic gain arises from socioeconomic transformations induced by exchange. For Marxists, this means the development of capitalism out of precapitalist formations, and its spread to new parts of the globe, enabling production potential to "burst the integuments" of precapitalist and nonfree exchange systems, especially in labor markets. The differentiation of the peasantry into an assetless proletariat and a counterposed kulak class is seen as part of the process, and as 'progressive', not deplorable. On the other hand, for those who see long-run dynamics as mainly within, rather than between, socioeconomic forms, the gains trade brings in this sense are from the development of entrepreneurship, and of specialized trade, transport, and banking institutions.

Losses from "More Marketing"

Suppose, however, that more trade is taking place—on all thirteen indicators—between two places, not two individuals. The above arguments follow through to the extent that community indifference curves can be constructed, but the welfare gains are for whole communities. Unless there is actual compensation (Little 1957), the poorest within them could lose.

Consider labor's share, first of ultrastatic gains. A community shifting along the PPS could well lower

6 If there are several factors of production, and their relative prices change when trade is opened, or if market-purchased and family-supplied factors change relative values even with only one factor (presumably labor), then an arbitrary index (e.g., Laspeyres) must be used to determine the level of real factor cost.

7 Such effects create important, indeed pervasive, exceptions to the rule that "specialization in farm products...made possible by exchange...permits fuller exploitation of natural advantages in production...Production that is specialized in location can purchase [inputs] more cheaply and sell its output at higher prices...Areas of specialized production will inevitably be more prosperous than those of widely varied outputs". (Anthony et al. 1979, p. 79).

the marginal product of labor. Static factor adjustment could easily reduce unskilled labor input. If laborers are a separate, largely assetless class, they may lose more by the resulting falls in hours worked and/or in wage rates than they gain by the shift to a higher CIS.[8] Conversely, laborers might gain in the places moving in opposite directions along ultrastatic PPSs and/or subsequently factor-adjusting to increase labor input. But, taking the two sorts of places together, there is no guarantee that the poorest will not lose absolutely from the ultrastatic effects of trade expansion nationwide. Nor can we assume that poor assetless laborers avoid loss by leaving the areas where trade is labor-displacing. Such a shift alters the PPSs in both emigrant and immigrant places, so the whole optimization process iterates again; moreover, migration involves social outlays that can outweigh the static gains from the trade that induced it. Empirically, the incidence of long-term migration is low among the poorest (Connell et al. 1976), who can seldom afford the risks and costs.

The poor within a trade-increasing community may also be harmed by changes in consumption. Consider two isolated communities, A and B, with comparable income per head, distributed much more unequally in A. Relative demand will cause 'poor people's consumer-goods' to be more expensive, compared to 'rich people's consumer-goods', in B. The opening of trade will induce prices to settle somewhere between A-relativities and B-relativities. Thus the poor in A lose out, compared to the rich in A; and the poor in B gain, relative to the rich in B. Since the poor in A started poorer than the poor in B—because we assumed income-per-person the same in A and B, but inequality greater in A—these consumption effects of more trade are, unambiguously, relatively antipoor. Of course other scenarios can be built, but this one is quite plausible.

The long-run dynamics of growth with expanded trade can also easily harm the poor. "Marketing services become a larger part of *the* consumer food bill and the composition of *the* market basket shifts from low-cost, starchy foods towards higher-cost livestock products, fruits and vegetables" (Riley and Weber, 1979, p. 32, my italics): which consumer, which basket? The description is true of the community's total consumption, but the poorest 10-15% in low-income countries not only spend far above-average proportions of food outlay (and *a fortiori* of income) on low-cost starchy foods, but tend to reduce these proportions negligibly, if at all, as income rises (Lipton 1983). Demand for labor, too, can suffer during long-run dynamic gains from trade, as capitalist farmers, specializing increasingly in products appropriate for labor-replacing equipment, acquire the investible profits (or the credit-worthiness) to afford it. A self-sufficient Indian Punjab—necessarily much more diversified—would have lower real income per person, as would the rest of India; but it would also have far less labor-displacing farm machinery. In this case, the dependence of rapid growth on technical progress, and of that progress on wheat specialization, is nevertheless enough for us to be fairly confident that more trade and specialization have helped the poor. In less favorable circumstances, as in Maharashtra or Botswana, one could not be so confident that, within each trade-expanding area, overall growth for the poor would outweigh labor-replacing innovation plus changes in the output-mix and the consumption-mix.

Further obstacles to confidence that more trade (via more real income) must help the poor within each place are risk and demography. Irrespective of how it is measured, higher risk normally hurts the poorest most, both because of diminishing marginal utility of income, and because they usually have least access to credit, savings, or grain stocks. Kautsky (1899) took it for granted that the peasant's risk increases with his dependence on the market, "which he finds even more moody and incalculable than the weather" (pp. 10-11). It is market-dependent rural buyers—households of laborers, followed by small commercial herders, rather than subsistence crop farmers, however small—that are normally the main victims of famine; thus it appears to be the collapse of market demand, not of self-consumed supply, that most often induces failures of 'exchange entitlements' so extreme as to threaten starvation (Sen 1981).

Risk is not obviously linked, however, positively or negatively, with more markets. Credit and insurance markets normally reduce risk, but tend to be less usable by poorer groups. However, to the extent that trade leads to specialization and reduces likely diversity of outputs, which in turn leads to more trade, the portfolio of farmers becomes more vulnerable both to supply-side factors reducing

8 To claim that no community CIS can be constructed if income distribution changes is to deny, rather anarchically, *any* prospect of evaluating the ultrastatic gains from trade when it is opened between two communities (unless full actual compensation of all losers takes place).

yield for a particular crop, and to demand-side factors (made more important by increased market dependence) reducing price.

Trade should cut supply-induced variability of output values for most communities because, in a big and not fully open market, supply declines will be compensated for most communities by price rises. However, such stabilization is much greater for the rich man, who markets most of his crop, than for the poor man who eats it all (and indeed is negative for a deficit-foodgrain farmer or a landless laborer, who finds his grain purchases dearer in just those years when his output levels and/or employment prospects are bad (Lipton 1970))

A more reliably favorable impact of 'more marketing' on income stability for the poor is seasonal. If market access is improved (i.e. if unit trading costs are lowered among rural areas with different harvest seasons for food crops), fluctuations in availability and prices will be lower, and this should help the poorest most.[9] However, as trade and specialization in nonfood crops increase, there is little scope for offsetting seasonal food exchanges. It seems likely on balance that an integrated, large food system will in times of crisis make available a wider range of access to more food sources (including stocks) than a small, remote system.

The special demographic, and linked labor-market, characteristics of poor people affect the impact 'more marketing' has on them in important ways, largely neglected in the literature. In low-income countries, poor households can be divided into ultrapoor—the 10-15% whose outlay per person is so low as to cause significant caloric risk—and a further 20-30% of other households, quite often hungry but very seldom to the danger level. The nutritional behavior of these two groups is discontinuously distinct.[10] Even more important for our analysis, so are their population and labor choices and characteristics. The mean household size and child/adult ratios of the ultrapoor are somewhat, though not much, higher than those of the poor; but both statistics are much higher than for the rich. Urban male/female ratios are near unity for the poorest two deciles, but for less-poor people rise very sharply with outlay per person. As for the labor force, while overall participation rates fall with outlay per person due to demographic factors, age-specific rates rise steadily as poverty presses harder, and reach a ceiling around the point of ultrapoverty. Unemployment (however measured) and its fluctuations, as well as those in participation and wage rates, increase with poverty, as does their covariance.[11]

There appears, then, to be a distinct group of ultrapoor with characteristics that tend to impede benefits from market enlargement. These may well be physical, and due partly to hunger induced by poverty (and, for example, preventing—especially in lean seasons—extensive job search to raise participation rates or cut unemployment, as would normally happen when poverty presses harder). Generally, it is the nonpoor who earn the largest part of income by selling marketed output, but the ultrapoor who depend most heavily on selling labor and buying marketed food. The characteristics of this last group suggest that some barriers must be overcome before they can reap benefits from some forms of improved marketing. That is by no means a universal rule. In particular, more competitive and seasonally stable village-level food marketing helps the poorest, with their scant access to (and high opportunity cost for working women of) travel to market centers.

More clear-cut is the effect, on the distribution of benefits and costs from market involvement, of child/woman ratios, typically almost twice as high in the poorest deciles as in the richest (Lipton 1983b). Chances to market output, or labor, will be usable by these very poor groups to the extent that production of the extra output is compatible with child care.

Up to this point we have merely sketched some reasons for doubting the a priori belief that, even if growth in general often trickles down, the five types of GNP gain from trade necessarily enrich the poor. The most important consequences of 'more marketing' for the poor have still to be considered. Does it tend to create channels for extraction, for transfer on 'fair' terms, or for mobilization of rural surpluses? Do capital flows tend to be more from marketing into small-scale rural activity, or vice versa? What are the effects of the centralization of transport and postharvest services which is induced by greater trade/output ratios? Would we expect different effects of 'more marketing' upon diversified and

9 This is so, because the poor are usually most hurt by (and exposed to) risk, and because they have the highest ratios of food consumption to income, and in rural places of food purchases to food consumption.

10. The ultrapoor, but not the poor, appear to maintain certain critical ratios—food/outlay, cereals and roots/food, coarse/fine grains—as poverty recedes. (See Lipton, 1983).

11 For a fuller account, see Lipton (1983 a, b).

exchanging local economies, as against subsistence and unspecialized ones?

Equity, Growth, and Nutrition

Suppose that clear GNP gains from 'more marketing' exist. For the moment, let us assume that no poor group emerges as a net loser. Is there a policy implication that the state should invest to provide more marketing—as a monopolist or as a competitor—or that it should stimulate private suppliers to switch resources towards marketing? One of the two conclusions would certainly follow if more marketing were a necessary condition for GNP growth and if existing marketing facilities were fully utilized at critical times. More marketing can be necessary for growth only if, for farm production to increase, farmers must be assured of markets for their harvests (Anthony et al. 1979, p. 97). Usually, however, growth can also be achieved by increasing family or local consumption of products, especially food that is now marketed, or by devoting extra inputs (or switching existing ones) towards such uses. Similar alternatives to more marketing usually exist for inputs—e.g., retention of seeds (including synthetic or composite HYV mixes) instead of annual purchase of conventional hybrids—and for consumer goods.

In an important sense, 'more marketing' is an alternative to a more equal distribution, either of the gains from growth or of assets. The self-consumed proportion of farm output increases when village income is more equally distributed—partly because of standard Engel-type relationships, but mainly because the use of output, either in kind or as a source of cash, to pay landlords and workers, tends to decrease with equalization. Despite some counter-observations,[12] it may be hypothesized that the proportion of a village's nonself-consumed demand that is met by local production for consumption and investment is normally likely to be higher, ceteris paribus, with greater equality. In such cases, 'more marketing' is necessary for growth only because such growth is extremely unequal.

If more marketing were indeed necessary for higher output, one would expect this to be signalled by much higher private returns to invest in agricultural marketing than in farm production. Where this is suggested by some data sets (e.g., for North Arcot in Southern India: Harriss 1981, pp.77-78), a large, responsive net flow of private capital from farming to trading firms appears to be under way (*ibid.* pp. 66, 91-92; and her paper for this Conference). It is not plausible that markets should work much less well in regard to the supply of resources for trading than for farming, especially since most rural marketing is done by small firms with small, divisible capital requirements.

There are two major cases for exceptional State emphasis on more marketing as a necessary condition for growth. First, marketing might be much more prone than production to important indivisibilities, especially in the sense that marketing may depend on infrastructure requiring (and owing its social profitability to) very costly central grids like roads and railways. Second, the State, or private market power, might bias profitability heavily towards production and against marketing, so that price signals lead private investors into choosing too little marketing. The former case—largely inaccurate—is responsible for the marriage, in much African public policy, of transport explosion and output stagnation. The latter case is unlikely to hold: political attacks on middlemen are seldom accompanied by state ability to make their activities significantly less profitable relative to production; anyway, repression of farm output prices[13] is usually common and substantial (though not systematically increasing) and it is unlikely that repression of the return to trading is comparable.

State activity in marketing can be justified even if 'more marketing' is not necessary for growth. It need only be shown that, if we incorporate appropriate income-distributional weights, the marginal social rate of return to state investment is higher in marketing than in production—or that state action to shift private investment towards marketing would cost less through production loss than would be

12. The work of Hazell and Roell (1983) appears to show a higher ratio of local to overall consumer demand among upper income deciles in two rural areas, one in Malaysia and other in northern Nigeria. However, there are some oddities about the data sets (e.g., stratification by household total, not per-person incomes; apparent breakdown of Engel's Law over the whole income range). That key self-consumption/demand ratios—manure/fertilizer and retained seed/purchased seed in production; roots/cereals, starches/foods, and foods/totals in consumption—should not, in general, be higher for more equal places is indeed hard to believe.

13. Measured, for example, by the ratio of purchasing power of a farm output bundle (over a farmer's nonfarm consumption bundle) at world prices to the purchasing power of the same farm-output bundle at national prices.

gained from extra marketing.

It is entirely feasible in some areas, as the Punjab's history since 1963 shows, for investments in publicly owned, or publicly stimulated, production infrastructure to increase the cultivation income of dependent peasants "lacking even... a pair of bullocks and a plough", such as "Malla" (Epstein 1985) and even of landless laborers. Extra income to such people must weigh very highly in any distribution-weighted estimate of benefits. Can investments in 'more marketing' offer comparable returns? The Amul experience with very poor dairy farmers suggests that the answer is sometimes "yes".[14]

But the question must at least be asked. It is not enough to prove that: (a) effective product marketing systems encourage production, and (more doubtfully) cut risks (Abbott 1967); (b) there exist in marketing "appropriate facilitating services best provided by government" (Jones 1970); and (c) marketing features "new technologies and new institutional arrangements...unprofitable or unavailable to individual [is that,] if adopted by all [market participants], could yield substantial system improvements" (Riley and Weber 1979, p.13). It is essential also to explore whether higher or more equitable GNP gains might be achieved by governments that leave marketing to the market, and instead use their scarce resources to undertake or encourage, respectively, (a) direct investment in production (including risk-reducing irrigation or pest control), (b) provision of appropriate facilitating services for production (e.g., by research and extension) of locally profitable smallholder input combinations; or (c) measures to overcome indivisibility, prisoners' dilemma or isolation-paradox issues in farm production.

Similarly, in an "exploration of the relationship between nutrition and marketing", it may well be that "if rural food distribution services are ineffective and high cost, nutrition suffers" (*ibid.*, p.22). However, if the state is allocating scarce investments, subsidies, or administrative energy to improve nutrition among at-risk groups, a given nutritional gain could well be more cost-effectively obtained by increasing the production of calories per acre, and/or the proportion of persons who own acres that produce calories, than by more or better marketing of outputs, inputs, or consumer goods, including food. The notion that the difficulty in reducing poverty by state action along the two familiar paths—production and redistribution—can be avoided by a cost-effective approach to marketing may well be a generalized form of what has been correctly described in a special case ('improved' storage) as the "the myth of the soft third option" (Greeley 1982).

A good example is the justified concern of Epstein (1985) with distress sales—postharvest disposals by poor, often deficit, farmers to meet obligations and to secure essential relationships with patrons. Such disposals may be a small part of marketing, but often take place at seasonally low prices, depressed at village level (especially in remote places) by collusive purchasing—despite the correct observation (Lele 1976) that formal grain markets are highly competitive. But distress sales need not mean that more and better marketing, even if directed at the very poor, is a cost-effective remedy for poverty and inadequate options. Distress sales suggest such evils in the family making them; but it could—I believe, normally would—gain much more if enabled (by government outlays to raise its production) to keep and eat a larger part of its food crop, than if the same government outlay were used to increase the household's choices among times, places, and outlets for marketings, and/or to reduce its marketing costs.

So it is mistaken, although natural, to think that more marketing is the solution to the marketing problems of poor farmers. The mistake has deep roots:

- Economists are often biased against self-consumption. They frequently infer, incorrectly, from the existence of gains from trade and from the role of trade as an engine of growth, to the justification of subsidies to trade (free roads, etc.) that are, in effect, disincentives to self-consumption, and thus usually regressive.

- The emerging new orthodoxy about dirigisme, planning, and the role of the state in economic development (Lal 1983) is not the same as laissez-faire. It assigns certain tasks to the state (e.g. parts of education, health, agricultural extension) and is not dogmatically opposed to income redistribution by state action. But it is in general *against* state action designed to alter the structure of production or to reduce foreign trade, and *for* state action to improve and

14. The absence of reliable data on costs, returns, and distribution of benefits precludes any confidence, however

enlarge markets. This balance of state action, whether via public ownership or via incentives or controls, supports a shift of national resources against production for self-consumption, and militates against benefit-cost comparison of resource use for more production as compared with more marketing.

- It is widely believed that traditional marketing systems are in some sense grossly inadequate. This belief does not stand up to careful examination, either in Africa (Anthony et al. 1979, p.112) or in India (Lele 1976). Marketing systems respond rationally to frequently backward technologies, low and unequal incomes, and available profit incentives. The results are bad for the poor, but not because of marketing failures.

- Finally, it is widely believed that each major locality or region is, or must be, rather undiversified. If so, potential gains from more marketing are large (though it is not clear why traders are allegedly not catering for them). However, local diversity is often much more than it seems to be. This is not only the case for India, with its widespread artisan caste specialization and apprenticesnip, it applies also to most parts of Africa (Anthony et al. 1979, pp.87-96). Microstudies in Third World villages typically show 25% of worktime and 33% of income coming from nonfarm occupations (Chuta and Liedholm 1979).

Local specialization also takes place among crops, as is revealed by the large share of farmers' calorie consumption that is purchased (Anthony et al. 1979, pp. 97-101). Thus, even in not-too-unequal smallholder villages, export-crop specialists exchange income for food from grain farmers. In more unequal places, poor farmers often produce high-value, labor-intensive vegetables or milk, to exchange for cheap calorie sources like cassava. The emphasis on remote markets and free roads, at the cost of resources to upgrade artisanship (and farming) for local exchange, can be misplaced in such circumstances, and based on a gross underestimation of local diversity, actual and feasible. Indeed, subsidization of distant markets and remote exchanges can produce disincentives that inefficiently and unjustly penalize such local trade—and diversity—as does exist. This danger appears in the drain from rural to urban Africa of trainee artisans.

Policy Implications

This paper closes with a few words on the consequences for the poor of the policy tilt towards more marketing, not merely as a natural outcome of the growth of exchangeable surpluses, nor as a potential cause of gains from trade, but as a candidate for selective subsidy at the expense of production. Three areas are briefly reviewed: postharvest technology, transport, and centralization-urbanization-surplus. We close with a few positive thoughts on how marketing policy and research might be better orientated towards cost-effective poverty reduction.

Postharvest Technology

Postharvest technology (PT) is a major area in which more marketing has been associated with large new inputs. These have been justified by their protagonists on the grounds of efficiency and equity. As for efficiency, losses in traditional postharvest systems are small (typically 5-7% of output) for grains; many modern systems of threshing, storage, and milling show higher food losses; and profitability on such systems is almost entirely because of saved labor costs in the case of intermediate technologies (e.g., Engelberg rice hullers), or because of government subsidy in the case of 'modern' ones (e.g. large-scale rice mills) (Greeley 1982; Harriss 1977). As for equity, almost all major recent PT innovations have involved technical changes which have reduced the income of the poor relative to the nonpoor, mainly by reducing labor intensity.

Such changes might nevertheless be desirable if the *absolute* incomes of the poor rose. Despite falling labor inputs, this could take place with a profitable innovation because: (a) alternative work was available; and/or (b) the value of GNP was raised by the technical change; and/or (c) absolute losers from the innovation were compensated out of gainers' income by transfer payments. Another possibility is that, while changes in PT are undesirable in isolation, they are a necessary concomitant to desirable changes, notably increases in incomes associated with regional specialization, urbanization, and/or changes in the nation's agricultural output-mix. In such circumstances, the net effect on the well-being of poor people is positive: gains from desirable changes may outweigh inevitably concomitant losses from changes in PT

Unfortunately, one must state bluntly that many changes in PT have needlessly harmed the poor and have absorbed large public-sector subsidies—open or concealed. This has happened only because lobbying by PT supplier interests has found fertile soil in the uncritical ideology of 'more marketing' that pervades parts of some LDC governments, and of some aid agencies. The spread of modern rice mills—despite (readily predictable) throughput variations, resultant huge pre-subsidy losses, negative employment effects, and no food savings—is a telling example. Less obviously, so is the spread of soybeans—in practice, usually for livestock consumption—upon spurious nutritional grounds. Meanwhile, locally adapted legumes, much more generally affordable to (and eaten by) the poor, are neglected or displaced in favor of soybeans, which are much more profitable to producers of capital-intensive PT equipment.

Most new PT has, in fact, failed to meet the conditions that might reverse its apparent negative effects on the poor. New PT has not increased food availability or timeliness for consumers, or (by reducing losses) effectively raised producer prices, because old PT showed low food-loss rates (at least in all careful studies for cereals), while silo storage and centralized large-scale milling involve cross-haulage, risks of unmanageable surges, and delay. Labor-displacing PT has been supported by extension, foreign-exchange and interest-rate concessions, and subsidies in areas like rural Bangladesh, where alternative work is scarce, especially for very poor and homebound women formerly reliant on mortar-and-pestle custom-hulling for cash incomes. Since food savings from new PT—or output-mix changes involving new PT—have been small or negative, and since released labor has so often found no alternative work, GNP gains have been absent, or at best smaller than were available on alternative investments, notably in production. Except in a few cases such as Sri Lanka, no public social-security systems exist to safeguard even the poorest losers from innovation. Traditional systems, often in decay, are further undermined as the innovation drives out traditional artisanship.

What inferences can we draw from these reflections? We should distinguish three sorts of PT innovations. Some, like almost all modern rice mills and most large grain silos in Asia and Africa, would never be feasible except as public investments or with big public subsidies. Being absolutely harmful to most poor people, such PT innovations are wasteful of tax and aid funds and should be minimized. In particular, aid agencies envisaging support for silo systems should publish clear evidence that the project will show grain savings sufficient to justify costs.

A second group of PT innovations are profitable largely because they displace labor. This group has two subsets. Some innovations (such as Engelberg hullers) would be profitable at almost any defensible shadow-price of labor—not just at the (higher) market wage—so that immobile and damaged poor workers should be helped by specific retraining or asset-distribution, not by Luddite opposition to economical innovations. As for other, more marginal innovations (in mechanical or pedal threshing), the older and more labor-intensive PT would still be used if the wage were not above the shadow-price of labor; in such cases, there is a role for tax-and-subsidy policy affecting employment (or seasonal migration) or capital acquisition.

A third group of PT innovations offers a reasonably attractive rate of return mainly because they reduce the volume or value of crop losses. Such innovations are rare in cereals, generally depend on local artisans and materials, and seldom displace labor (for examples see Boxall et al. 1978).

A further lesson of PT is to extend the analysis, beyond the above choice of techniques and inputs for specific product groups, to look at the effect on poor groups of production-and-marketing decisions affecting the location and commodity-mixes of output and consumption. The shift from cereals and roots to vegetables, fruit, meat and dairy products, being due largely to the unequal distribution of most Third World growth, often responds more to the enrichment of the better-off than to the nutritional needs of the poor. Normally, this shift of the "food basket" towards semiluxury perishables substantially raises PT costs per unit of output. Arguments that this increase should be accommodated, or even subsidized, by public policy, especially if they are given a "nutritionist" coloration, almost always disguise the special pleading of wealthy interest groups.

Rather, hidden PT costs—and benefits, if any—should always be considered in evaluating projects that change the agricultural output mix. The move towards national self-sufficiency in cereals usually involves major changes in marketing patterns, most notably from one where ports or railheads mainly supply the towns, to one where they are increasingly supplied by rural surplus areas. This switch involves big shifts and major options in the provi-

sion, maintenance, and use of private and public marketing systems, transport infrastructures, and associated PT. The shifts and options are closely connected to choices about domestic output-mixes (extra wheat in N.W. Bangladesh or extra rice in Comilla, as ways to replace grain imports, imply quite different ways to supply Dhaka). Whether publicly funded or privately responsive, PT changes are seldom considered during the transition to self-sufficiency, though the impact of marketing options on employment and poverty may be large.

Transport

Urbanization, movements towards national (or away from local) self-sufficiency, and many other policy changes affect not only marketing directly, but also the requirements for major infrastructure such as roads. Roads are constructed much less labor-intensively than most investments, and their use for marketing is more intensive by rich farmers.

However, what is most alarming, is the high cost of the investments Africa is making on roads. In the early 1970s, transport investment there was already leaving inadequate resources for production. For 1980-83, the first phase of the Trans-African Highways Plan—four under construction, five being planned—was costed at $2.2 billion annually (of which 77% was secured); the second phase, 1984-88, is to cost $6.5 billion annually. For comparison, total aid to the affected (i.e., traversed) sub-Saharan and N. African countries in 1981 was $7.3 billion; in 1979 aid to low-income sub-Saharan countries comprised about 54% of total public and private investment.[15]

Even these huge outlays cover only multicountry investments in the trans-African highway system. Substantial sums are also going into single-country roads. Not all these outlays are designed to improve or increase marketing. Extra mileage (and alleged vehicle operating cost savings on existing mileage) for freight, rather than for passengers, overwhelmingly forms the main source of projected benefits. 'More marketing' is presumably the main intellectual force behind these truly horrendous outlays.

For what will there be to market? Africa, for the most part, features sparse populations and wide 'spreads' of location of product. This increases marketing costs (of providing access to an average 'bit' of rural output for an average resident in a nation). Yet also prevalent are bad, fragile, extensively farmed soil-water regimes, with very low total factor productivity—many persons per efficiency-unit of land. Such conditions reduce the capacity to finance marketing costs. The only way out of this dilemma is investment in research, technology, and institutions that help produce more, so as to increase the attractiveness for farmers of raising their total factor productivity; this increases both their capacity to pay for costs of marketing and the actual and potential rural surpluses, thus rendering profitable rural-rural or rural-urban exchanges. Yet both aid and investible domestic resources (and the even scarcer administrative skills, and maintenance capacity to support them) are diverted away from necessary productive activity, towards premature roads and other huge outlays on telecommunications, airports, rail links, etc. Contractors, mainly European, may get rich at the expense of African exchequers and European taxpayers; but will the process help the poor of Africa, or retard their development by denying them the necessary inputs for agricultural growth?

Urbanization

Diversion of resources to PT and transport, as infrastructures for 'more marketing', is often seen as a necessary requirement of (a) urbanization, and (b) associated, desirable measures affecting the rural surplus. Harriss (1981, 1983) illustrates how marketing in southern India is used to extract surplus, so does the history of many West African marketing boards. However, there is much confusion about the role of rural surpluses in economic development.

One has to separate three policies towards sur-

15 A. Ellis, 'African highway master plan', *Financial Times* 12.9.1983, p.12. Ellis describes as "problems posing opportunities for the world civil engineering community" (sic) the facts that "Africa does not generally make or assemble its own road building equipment [and] has not developed indigenous construction enterprises." For African agriculture at least, his piece should have been headlined 'Roads to Disaster'. Aid data from OECD (DAC), Development Cooperation 1982, Paris 1982, pp. 69-224. [All African countries are 'affected' (traversed) by the highways actual or planned by end-1988 except Burundi, Equatorial Guinea, Gabon, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Somalia, S. Africa and Swaziland; all SSA is 'low-income' except Cameroon, Congo, Ivory Coast, Mauritius, Nigeria, Seychelles, Swaziland, and Zimbabwe].

plus steps to increase it (mobilization), to transfer it, and to urbanize it. One has also to separate voluntary, price-repressive, and quantity-extractive methods in each case. Other things being equal, it is desirable to increase the proportion of income that rural people are willing and able to save; and to provide information and incentives to help channel such savings into rural or urban activities with high expected social rates of return. It is much less clear that urbanization of rural surpluses (rural savings exceeding rural investment in all regions) is efficient or equitable, especially if brought about extractively or by price repression. Just as distant trade is not obviously better than local trade (though *options* cannot be bad), transfer or extraction of investible surpluses is not obviously better over long distances than within small areas. Yet such superiority is implicit in much of the philosophy and practice of economic integration, 'more marketing', PT, and roads—whether seen as responsive to urbanization and centralization, or as inducing them.

Long-distance roads, marketing and integration may well be the enemies of short-distance integrative measures, especially in large countries (or regions) obsessed with enforcing national identity through central state power. The complex, finely balanced, local interdependence of village artisans and efficient small farmers, while genuine, may often, admittedly, correspond to an outdated technology set. Harriss' description (1983) of how small traders lend cheaply to technologically backward small farmers, so that the two groups preserve each other in aspic, has a quasi-Geertzian ring of truth. Yet the greater labor-intensity (and hence productivity of nonlabor factors) of small farmers given new or old technology is logically and empirically well established, not least by empirical data in alleged counter-demonstrations (e.g., Roy 1981). Therefore, cannot such rural involution often be best dynamized by upgrading local systems, and not by extractive and centralizing processes of marketing and its costly transport infrastructures?

It would take too long to spell out the options here; a few examples may suffice. Low-cost packed-earth, or cheaply surfaced, roads to link farms, villages, and nearby small towns (10-50000 population) would be preferred to interurban roads to open the hinterland. Improved on-farm or (competitive) trader storage would be preferred to silos. In sparsely populated areas, 'one-stop service stations'—rather than center-to-periphery delivery systems—would be the preferred approach to farm input supply. Farm production systems, including the output-mix, would be chosen (and encouraged by pricing and extension) in part for their capacity to economize on input and output marketing costs: i.e., in part, for their amenability to short-distance exchanges. In such a package, the emphasis is on making local investment attractive, and on upgrading local amenities (including retailing, schools, primary health care), rather than on laying roads to distant output and input markets.

Conclusion

It is no more than a tentative hypothesis that the poor would gain if marketing emphasis shifts toward nearby markets. It is much more certain that the poor lose from policies biased against self-consumption. This is plainly true in most African economies, where the great bulk of the poorest 10-30% are farmers, largely for subsistence (though with a significant exporting minority in a few countries). It might seem more doubtful in parts of South Asia, where an increasing majority of the poorest 10-15% are landless or near-landless laborers. However, they compete as labor suppliers against deficit farmers. If the latter found self-employment for self-consumption to cut their farm deficits more rewarding, then pure laborers would face less competition for jobs on larger farms and rural nonfarm enterprises.

There is one final, strong indication that all parties, (including the poor within trade-expanding communities) may not gain from larger trading sectors. Evidence is growing, if only by bits, that nutrition suffers from marketing, if income is held roughly constant. In African villages, the incidence of caloric insufficiency is more in cash-crop than in subsistence-crop villages (Schofield 1979). In rural Kenya, families that consume maize *and* millet in significant amounts suffer less child undernutrition than families that concentrate heavily on one staple food (UNICEF 1983). In India, extra rural female employment income reduces child undernutrition if—but only if—it comes from the family's own enterprise (Kumar 1977). Urban female employment income has very small, and sometimes negative, effects on child nutrition (A. Berg 1968).[16] At a higher level of nutrition, the switch to cash-crop

16 Cited in Reutlinger and Selowsky, 1976

agriculture in an area of Mexico has been associated with damaging reductions in dietary diversity (Dewey 1981).

More options for trade are good for the poor. Systems biased in favor of integrative marketing, and against local exchanges and especially self-consumption, are not. That is especially true where systems, integration processes, and marketing all tend to extract rural resources for urban use. There is no reason to expect such systemic biases to be efficient enough to compensate for their inequity. Indeed, drains of state effort and funding, away from support of agricultural and artisan production and towards more marketing as reflected in developing costly road infrastructure, may well damage efficiency and equity alike.

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Differential Access to Markets and its Impact on Agricultural Development

T. Scarlett Epstein

Summary

The present thrust to increase the marketable surplus of agricultural crops relies almost exclusively on improved production techniques, almost completely ignoring the marketing side, particularly in the context of the majority of underprivileged farm households.

This paper explores the role of socioeconomic continuity and its interaction with change variables in the field of rural development. One important aspect of this continuity is the persisting heterogeneity of social systems, which is reflected in the different life strategies pursued. These life strategies usually represent a careful balancing not only of different consumption requirements but also production needs, including inputs and marketing. In line with this argument, this paper suggests categorization of farm households into (1) sell-to-subsist, (2) target, and (3) profit-making farmers.

Sell-to-subsist farmers usually have marginal or small landholdings and sell (or often barter) their labor and/or a proportion of their crops just to help meet some of their basic needs apart from the food they themselves produce. These farmers are therefore not wholly subsistence farmers, nor are they cash croppers. Many of them are perpetually indebted to the local big landowners to whom they pledge part of the crop before it even matures or to whom they deliver the produce after the harvest. These sell-to-subsist farmers find themselves as clients of local patrons who offer them not only consumption credit but also a minimum of social security, while at the same time providing the channel through which they can market their produce or buy whatever they need. Big farmers usually bulk the produce thus acquired and market it through middlemen. Sell-to-subsist farmers pursue a precariously balanced survival strategy which necessitates their continuing indebtedness as clients and prevents them from responding positively to price incentives and/or attractive new technologies.

Target farmers usually have medium-sized holdings on which they can produce a limited surplus for sale, over and above their own consumption needs. Many of them are descendants of magnate farmers having had to share—possibly over generations—with numerous siblings the large ancestral estate. They tend to vie for prestige in terms of conspicuous consumption and spend lavishly on life-cycle rituals, particularly on weddings. These target farmers are thus keen to adopt new technology only at a time when they have a specific expenditure target. They pursue a strategy whereby they try to meet their varying target expenditures with periodic bursts in agricultural production. They are, therefore, mainly concerned with access to markets and the rural/urban terms of trade.

Profit-making farmers represent the biggest landowners, who have sufficient land to produce large and continuing quantities of surplus crops for the market. The scale of their operations puts them in a reasonably strong bargaining position vis-a-vis not only middlemen traders but also local small and marginal farmers as well as landless laborers. Their dominant role at the local level gives these profit-making farmers greater access to resources as well as extension services than poorer farmers can get. They also have the necessary funds and/or access to credit, enabling them to experiment with technological innovations. These farmers in fact pursue strategies aiming to optimize their returns, though not even they can escape the urban bias in development and the accompanying unfavorable rural/urban terms of trade.

This study has policy implications: for example, an improvement in the rural/urban terms of trade is likely to induce profit-making and target farmers to try and produce more for the market,

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particularly if this is accompanied by better price and market information as well as access to a growing variety of consumer luxuries.

Résumé

Accès différentiel aux marchés et son effet sur le développement agricole : *Les efforts actuels pour accroître l'excédent commerciable des cultures agricoles sont axés presque totalement sur les techniques de production améliorées, en négligeant complètement l'aspect commercial, surtout à propos de la plupart des ménages paysans défavorisés.*

Cet article examine le rôle de la continuité socio-économique et son interaction avec les variables de changement dans le cadre du développement rural. Un important aspect de cette continuité est l'hétérogénéité constante des systèmes sociaux, qui se traduit dans les diverses stratégies de vie poursuivies. Ces stratégies de vie représentent, en général, un équilibre délicat, non seulement de différents besoins alimentaires mais aussi des besoins de production, dont les intrants et la commercialisation. Conformément à cet argument, l'article suggère la division des ménages paysans en trois catégories : (1) les paysans qui vendent pour subsister, (2) les paysans cibles et (3) les paysans intéressés.

Les paysans qui vendent pour subsister n'ont généralement que des propriétés marginales ou petites et vendent (ou souvent troquent) leur travail et/ou une proportion de leurs récoltes afin de satisfaire leurs besoins vitaux à part la nourriture qu'ils produisent eux-mêmes. Ils ne sont pas donc ni tout à fait des paysans de subsistance, ni des cultivateurs commerciaux. La plupart d'entre eux sont toujours redevables aux grands propriétaires locaux auxquels ils mettent en gage une part de leur culture avant même qu'elle ne mûrisse ou donnent le produit après la récolte. Ces paysans qui vendent pour subsister deviennent des clients des protecteurs locaux qui leur offrent non seulement du crédit de consommation mais aussi un minimum de la sécurité sociale tout en fournissant le débouché pour écouler leur produit ou acheter ce dont ils ont besoin. Les grands paysans entassent en vrac la production ainsi acquise et la vendent par les intermédiaires. Les paysans qui vendent pour subsister ont une stratégie de vie équilibrée d'une façon très précaire, qui leur emprisonne forcément et sans cesse dans leur état d'endettement en tant que clients et leur empêche de répondre positivement aux incitations des prix et/ou aux nouvelles technologies attrayantes.

Les paysans cibles ont généralement des propriétés de grandeur moyenne où ils peuvent produire un peu plus d'excédent que leurs besoins alimentaires. La majorité d'entre eux sont des descendants de grands paysans. Au fil des générations peut-être, ils ont dû partager la vaste propriété ancestrale avec plusieurs parents. Ils ont tendance à dépenser sans compter dans les principaux rituels de vie, en particulier les mariages, pour gagner du prestige et faire parade de leur argent. Ces paysans cibles n'adoptent pas de nouvelle technologie qu'au moment où ils ont un but spécifique de dépense. Leur stratégie tente de satisfaire leurs divers besoins monétaires avec des poussées périodiques de production agricole. Donc, ils s'intéressent plutôt à l'accès aux marchés et les termes de l'échange rural urbain.

Les paysans intéressés représentent les plus grands propriétaires qui ont suffisamment de terrain pour produire sans cesse de grandes quantités de récoltes excédentaires aux fins commerciales. L'échelle de leurs opérations leur donne une assez forte position de force dans les négociations par rapport non seulement aux commerçants intermédiaires mais aussi aux paysans locaux, tant petits que marginaux ainsi qu'aux paysans sans terre. Au niveau local, ils jouent un rôle prédominant qui leur donne un plus grand accès aux ressources ainsi qu'aux services de vulgarisation que les petits paysans. Ils ont également les fonds nécessaires et/ou l'accès au crédit qui leur permettent d'expérimenter avec des innovations technologiques. En fait, ces paysans poursuivent des stratégies ayant pour objet l'optimisation de leurs rendements, bien que même eux, ils ne puissent échapper à la tendance urbaine dans le développement et les termes de l'échange rural urbain défavorables concomitants.

Cette étude a des implications politiques : par exemple, une amélioration dans les termes de l'échange rural urbain encouragerait les paysans intéressés et les paysans cibles à produire davantage pour le marché, surtout si ceci est accompagné des prix plus élevés et d'une meilleure information du marché ainsi que de l'accès à un éventail croissant des biens de consommation de luxe.

Introduction

> The market can determine a price between two parties one of whom has a continent to exchange, the other, glass beads. Differences in the scale of operation and in wealth between the two parties—as when one is operating close to the subsistence margin while the other has huge reserves of capital—will affect the actual price and options given by the market. The terms of trade will always favour the one who can wait or find other exchange parties (Smith 1977, p. 118).

The present thrust in trying to increase the marketable surplus of agricultural crops relies almost exclusively on improved production techniques, while almost completely ignoring its marketing aspect, particularly in the context of the majority of underprivileged farm households. This is exemplified in India's Sixth Five Year Plan which states that "systematic identification of the most needy among the target group and preparation of appropriate investment projects for them and reorientation from security-based lending to project-based lending are some of the important aspects of the improved delivery system ... full support will need to be given by the extension agency in building up the awareness and motivation of the rural poor in respect of their production and investment needs" (Planning Commission 1981, p.172). This statement glibly assumes that all that is needed to improve the productivity of small and marginal holdings is to alert these farmers to investment needs—for which access to credit is supposedly available—while completely ignoring that most of them are already heavily indebted to one or other kind of money-lender just to meet their basic requirements.

Thus the existing market and credit structures in India and many other Third World countries have so far been effective in increasing agricultural productivity only on large holdings belonging to profit-making farm households, and even in their case the urban bias and the unfavorable rural-urban terms of trade (see Lipton 1977) have often discouraged maximum crop production and sales.

This paper sets out to enquire why existing market structures have on the whole encouraged only the 4% of large farmers to improve agricultural productivity while the small and marginal farm units, which compose 85% of the total number of operational holdings in India, "cannot often afford the market and the market cannot afford them either" (Yotopoulus 1974, p.5). To explore this phenomenon, I develop here a categorization of farm households based on the different types of life strategy they pursue. This indicates that different market and credit structures are necessary for each of these categories to help improve their agricultural productivity.

The Theoretical Setting

Some of the greatest social scientists of our times have been apt to analyze the changing socioeconomic systems that have existed throughout known history in terms of phases or stages of development. Marx, for instance, related the sequence of these phases to the changing mode of production and consequent productive relationships, while Weber (1930) connected it more with different ideologies and beliefs. Durkheim (1964, rpt.) elaborated this view of the economy and proposed that economic activities cannot be understood apart from the moral, religious, legal, and political institutions that provide the context of economic behavior. Rostow argued in terms of five stages of growth, each of which, according to him, also is the result of "strategic choices made by various societies concerning the disposition of their resources, which include but transcend the income- and price-elasticities of demand" (1960, p.16). Polanyi (1957) continued this trend of "evolutionary phase" analysis, and by concentrating on trade, money, and markets, he delineated three patterns of "modes of economic integration": reciprocity, redistribution, and market exchange, which, according to his historic analysis, occur in successive stages.

The Marxist concept of the dialectical connection of quantity and quality, which focuses not only on "the 'final' changing of one quality into another, but the content of the break (what quality is replaced by what) and *the concrete stages* (emphasis added) of the struggle in the transition to the new quality" (Shirokov, undated, p.292), has obviously influenced the thinking also of many non-Marxist development economists in their analysis of rural changes, when they examine the "transitions from subsistence to cash economies," for instance, in terms of stages of growth (e.g., Fisk 1964).

This theoretical assumption of "breaks" and quantitative changes turning into qualitatively different stages of socioeconomic development has

obviously oversimplified the great complexities of development processes in which there is a mixture of continuity and change. However powerful new elements on the socioeconomic scene may be as change agents, and even if they do introduce a qualitative change, they never appear to be able to eradicate completely all aspects of the customary social system. In this paper, I discuss such social continuity in the context of access to markets and its impact on agricultural productivity.

Rather than the widely accepted assumption of discontinuity in change processes, the argument presented here, which is based on a number of anthropological and other village studies, explores the role of continuity and its interaction with change in rural development. One important aspect of continuity is the persisting heterogeneity of social systems, not only in terms of different socioeconomic strata, but, more important, in terms of their life strategies pursued. These life strategies involve decisions and choices not only in the productive area, but also in the consumption as well as socio-political areas. Life strategies are importantly influenced by the resource base of individual households, but not exclusively so

Categorization of Farm Households

In every existing rural society but particularly in Third World countries, one can easily distinguish between different categories of farm households. This categorization is usually based on the size of landholding. Thus, for instance, in India total operational farm holdings are divided into 50.6% marginal farmers with less than 1.0 ha of land, 34.2% small farmers with between 1.0 and 4.0 ha, 11.2% medium farmers with landholdings ranging from 4.0 to 10.0 ha. The remaining 4% are large farmers with more than 10 ha, who own altogether 31% of the land, more than three times the percentage owned by the 50.6% of marginal farmers (see Table 1).

This type of categorization is obviously also indicative of the actual as well as potential marketed surplus, but has its drawbacks simply because it has a univariable focus on size of landholding. By contrast, the categories I suggest here are based on a holistic approach, which examines production as well as consumption decisions and other activities as an integral part of the variant life strategies pursued by different households.

The usual compartmentalization of economic, political, social, and other variables in the context of these strategies is only a theoretical abstraction from reality by social scientists working within the narrow confines of their separate academic disciplines. Real-life strategies usually represent a careful balancing not only of different consumption requirements but also of productive needs, including inputs and marketing. Therefore, a package-type categorization into (1) sell-to-subsist, (2) target, and (3) profit-making farm households represents reality much more closely and also indicates the continuity element in change processes, with its focus on persisting social relationships. Moreover, such categorization should also have important policy implications for the chances of future agricultural development in the semi-arid tropics (SAT), as well as elsewhere in the Third World.

Sell-to-Subsist Farm Households

These households "constitute over 70 percent of (India's) farming population (who) have little input mobilising power and risk taking capacity" (Planning Commission 1981, p.172). By careful resource management they succeed in surviving often below formally accepted poverty levels. "Of the 350 million people below the poverty line (in India), around 300 million are in the rural areas. These consist

Table 1. Proportion of different-sized landholdings and their cultivable land, India 1970-71 and 1978-79.

	1970-71[1]		1978-79[2]	
Category	No (%)	Area (%)	No (%)	Area (%)
Marginal farmers (Less than 1.0 ha)	50.6	8.9	50.6	9.1
Small farmers (1.0-4.0 ha)	34.2	30.5	34.2	30.3
Medium farmers (4.0-10.0 ha)	11.3	29.8	11.2	29.6
Large farmers (10.0 ha and above)	3.9	30.8	4.0	31.0
	100.0	100.0	100.0	100.0

1 These figures are derived from data in Naidu 1975, p.40.
2 These figures are derived from data in Times of India 1982, p.113

largely of the landless labourers, small and marginal farmers, rural artisans and other workers" (Planning Commission 1981, p.170). To understand their survival strategies is thus crucial in any attempt at increasing agricultural productivity in the SAT region. This is particularly so because of ICRISAT's professed objective to help improve the lot of the poorest farmers by increasing the productivity of their small plots.

Farmers with marginal and small holdings are usually labeled as "subsistence cultivators." This assumes that they do not participate in market transactions as part of their agricultural activities, but grow crops only for their own consumption. However, in the majority of cases this is not so. Almost every household these days is in need of some cash to meet its minimum requirements. These sell-to-subsist farmers are thus involved in market transactions not because of a crop surplus, but because their meager resoures force them to sell (or sometimes barter) their labor and/or a proportion of their crops just to provide for their basic needs. For sell-to-subsist households the sale of crops and/or labor often amounts to the equivalent of barter. Many of them sell their crops at the expense of lowering their own nutritional levels below minimum food requirements. Barbara Harriss argues that among these underprivileged farmers demand for cash has increased because of a 'compulsive involvement in markets,' not stemming from the need to sell a distress surplus to meet obligatory cash taxes except for obligatory bribes, but from a congeries of forces, including

a an increase in the need for cash to purchase the inputs of modern technology including (those that ensure an adequate supply of) water;

b simultaneously an increase in insecurity because of the higher level of environmental vulnerability, and

c a high incidence of demand for consumption credit, which puts farmers in debt to provision merchants (Harriss 1981, p.168)

I suspect that consumption needs represent the most important reason for distress sales. Many of these farmers are perpetually indebted to the local big landowners to whom they pledge some of their produce before it matures, or deliver it immediately after harvest. They thus find themselves as clients of local patrons who offer them not only consumption credit but also a minimum of social security, while at the same time providing the channel through which they can market their produce.

Big farmers usually bulk the produce and sell it altogether to middlemen. These intravillage produce transactions are largely ignored by planners and economists, who feel on safe ground only as long as they can base their argument on quantitative information, however unreliable they themselves realize their data are. For instance, Lele frankly states that:

> data on village-level prices in India are relatively scanty and generally of poor quality.... The major source of village-level prices is, therefore, the farm (harvest) prices collected by the departments of agriculture or statistics at the state level....(These) prices also rely heavily on the cultivator's memory, and since units of measurement are fairly arbitrary in rural areas, provide only a rough indication of the general price levels prevailing in villages during harvest times. Despite all these limitations, farm prices are the only available source of information on village-level prices which applies to several regions and several years (1971, p.84)

Accordingly, farm prices provide the basis of much of Lele's argument in which she claims that "the number of intermediaries seems much too large to permit monopolistic practices in trade.... High profits earned by a few traders are not monopolistic returns but can be attributed to the large volume of operations resulting from their command of capital, a scarce resource in Indian trade" (1971, p.215). Lele obviously was unaware of the many sell-to-subsist farmers who cultivate their small acreages and sell some of their produce to their local profit-making farmers with whom they have a personalized relationship, who in turn are linked through middlemen to national and international markets. The omission in Lele's argument of these sell-to-subsist farm households was serious enough, particularly since she herself stresses that "statistical information is often not adequate to arrive at specific conclusions unless it is coupled with direct observation; it may even tend to be misleading. Traders and market officials were, therefore, interviewed extensively through informal discussions of trading practices" (1971, p.214). But she obviously did not consider it necessary to question farmers themselves about their marketing

practices. However, in her defense it can be said that she was interested only in "food grain marketing" without trying to link this with increasing agricultural productivity. It seems more surprising that Barbara Harriss (1981) pays so little attention to what she calls distress sales and the patron-clientship that they involve, since she claims to base her discussion on intensive village studies.

Since the ultimate object of the present workshop is to explore the links between agricultural productivity and market facilities to "assure a fair distribution of the gains from an efficient market economy" (Jackson, personal communication)[1] sell-to-subsist farmers, I suggest, should be the central focus of our discussions. They include marginal farmers, who in India have average holdings of about 0.4 ha, and small farmers with an average land area of about 2 ha (see Table 2).

Nutritional deficiencies among these quasi-subsistence farmers are already of concern, not only nationally but also internationally. Yet it seems well-nigh impossible to discover a satisfactory biological definition for "subsistence requirements" per capita or per household. This makes it difficult to measure the food surplus of an agricultural unit. In this context, Marvin Harris suggested that "we have been blinded to the fact that food quanta judged superfluous from one viewpoint may be absolutely vital from another viewpoint and that excessive quantities for short periods may be accompanied by drastic shortages over a longer period" (1959, p.191). I have similarly argued elsewhere (1967) that even stagnant economies produce periodic food surpluses as a result of environmental conditions over which agriculturalists have little or no control. The extra effort annually expended to produce at least a marginal quantity of produce for sale may be just enough to ward off starvation in drought years. For sell-to-subsist farmers their marginal crop sales may represent a minimum risk insurance against the vagaries of climatic changes. Moreover, by supplying their marketable surplus to local patrons, these quasi-subsistence farmers insure themselves also against irregular contingencies such as, for instance, sickness, and life-cycle rituals. To protect himself, each client seeks to have more than one patron. On the other hand, each patron tries to have a number of clients to optimize supplies of crops as well as access to labor (see Figure 1). These cross-cutting ties help to reemphasize village unity against the many social cleavages which occur in faction-ridden Indian rural societies (see, e.g., Miller 1965 and Nicholas 1965).

1 Curtis R. Jackson, letter dated 7 Apr 1983 ICRISAT, Patancheru, A.P., India

Table 2. Average size holding per farm unit category, India 1970-71[1] and 1978-79.[2]

Category	1970-71 (ha)	1978-79 (ha)
Marginal farmers	0.40	0.40
Small farmers	1.99	2.04
Medium farmers	5.92	6.08
Large farmers	17.55	18.10

1 These figures are derived from data in Naidu 1975, p.40
2 These figures are derived from data in Times of India 1982, p.113

The personalized relationships that sell-to-subsist farmers have with local big farmers, who often are also shopkeepers, have important implications not only for their crop marketing but also for their cultivation practices. To illustrate the linkages between production, credit, and expenditure, which these relationships facilitate, I discuss here the pattern of cash transactions in the case of sell-to-subsist farmer Malla, who resides in Wangala, a south Indian village I studied first in 1955 and again in 1970. Though Malla lives in a village where some of the land is irrigated and himself owns a small plot of wetland, his survival strategy is indicative of many underprivileged farmers like him.

> Malla is an alert and lively young man in his early thirties. In 1955 he was still unmarried and lived together with his widowed mother and two younger siblings. In the meantime both Malla and his brother got married and they partitioned their one dry acre so that Malla has now only half a dry acre. Malla now lives with his mother, wife and two young children.
>
> Malla's father had acquired a quarter acre of wetland before he died. This his mother continued to cultivate and she insisted that it remain undivided in Malla's care. In addition, Malla managed to get another quarter acre of wetland in 1963 when he agreed to act as intermediary on behalf of Timmegowda, his Peasant master, in a land transaction. Timmegowda encouraged Malla to exercise his

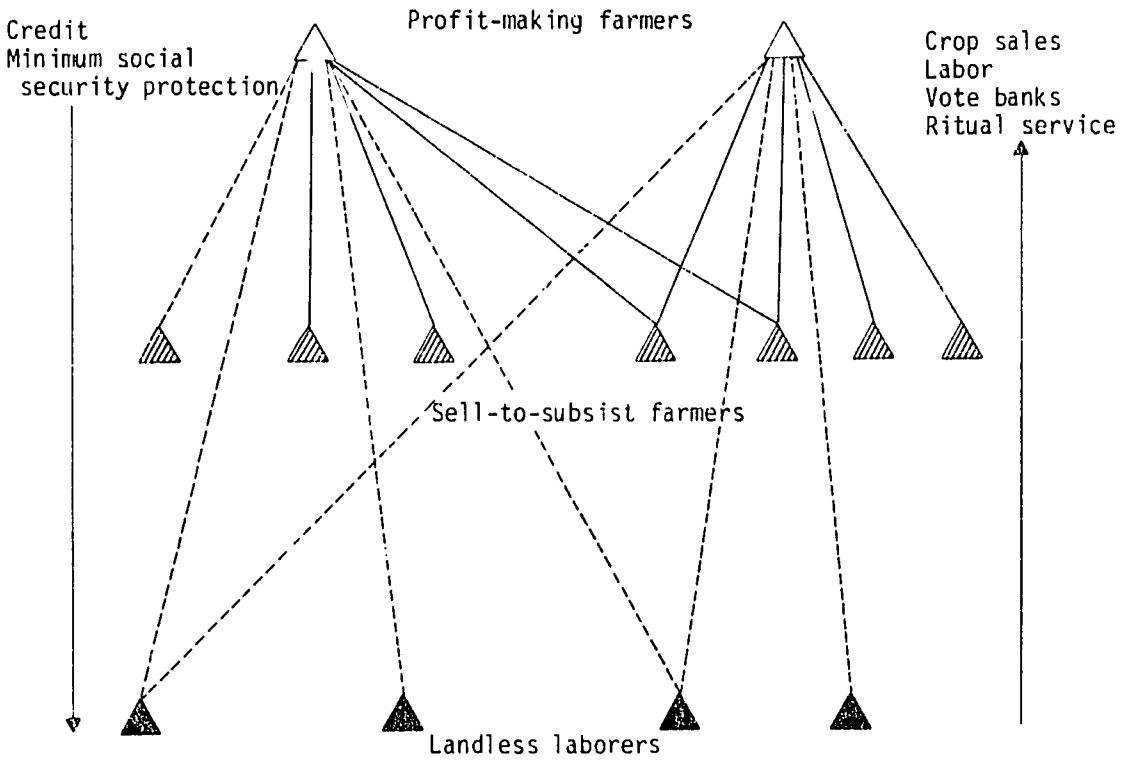

Figure 1. Intravillage patron-client relationships.

right to purchase newly irrigated land from the Government at well below market prices. Timmegowda advanced Rs. 1000 with which Malla bought one and a quarter acres wetland. Subsequently, Malla sold one acre of this land to Timmegowda and was allowed to keep the rest for his own needs. Both partners to the transaction were pleased for both gained by it: Timmegowda got one acre for Rs. 1000 in 1963, when the market price of one wet acre in Wangala was about Rs. 3500; Malla was happy because without any effort or money spent on his part he managed to acquire an additional quarter wet acre. Malla told me that his own example was but one of a number of similar cases where Wangala Peasants manipulated land transactions with the aid of their dependent A.K.s[2] and either allowed the latter to keep a small part of the acreage they thus acquired, or they agreed to write off part or even all the debt their A.K.s owed them. Very few Wangala A.K.s are able to meet their basic household expenditure and they are therefore becoming cumulatively more indebted to their Peasant masters. In their eyes these land deals enable them to raise their heads once more, though they do not know for how long.

I mentioned to Malla that, had he been able to keep all of the one and a quarter wet acres for himself and cultivated cane on one acre, he might have been able to get sufficient money after one or two years to pay off the purchasing price of the land. Malla appeared fully aware of this possibility, but to him it was a purely theoretical one only. He explained that he could never have borrowed sufficient money to pay for the land in the first instance. He was aware of the favourable loan arrangements for members of Scheduled Castes but pointed out that to qualify for one

2. A.K. is the abbreviation used for Adikarnataka, the village for scheduled castes in the Mandya region.

an A.K. needs the signature of an official who he knows will not sign without a bribe of Rs. 150. Malla went on jokingly: 'If I had Rs. 150 ready to give in bribes I would not need a loan at all!' Moreover, Malla stressed that without strong bullocks and at least a minimum of working capital it would have been impossible for him to even attempt cultivating cane. Malla has no cattle at all and agricultural implements worth only about Rs. 60. He often gets a loan of his peasant master's bullocks or has to hire a pair to plough his wetland. Malla's lack of funds to purchase wetland and to finance cash cropping coupled with his indebtedness to his Peasant master prevented him from benefiting from the special privileges, in regard to the purchase of newly irrigated Government land, which the authorities try to vest in village A.K.s... Sixty-nine per cent of Wangala A.K. households have insufficient land to produce their household needs (Schoenherr 1972, p. 36). Malla is one of these poor villagers.

The additional quarter acre of wet land Malla has acquired enabled him to produce more of his household consumption: in 1955 his subsistence output at current prices amounted to Rs. 7 per consumption unit; by 1970 it had increased in real terms by about 15 per cent. Agricultural wages contributed 39 per cent of Malla's household expenditure in May 1955. During that month Malla and his brother together worked 23 days and earned a daily cash wage of Rs. 1.25; his mother and sister each worked 15 days for which they received daily in cash Rs. 0.50. Wage labour formed an important part in Malla's family's activities and constituted the biggest single item in his income. By contrast in June 1970 wages made up no more than 18 per cent of Malla's total household expenses at 1955 prices (see Table 3). In that month his wife worked six days as casual labourer and earned Rs. 1.00 in cash per day and Malla himself worked 15 days at a rate of Rs. 2.00 per day. The number of days Malla's household members managed to get casual employment per month has thus been drastically reduced. Moreover, the purchasing power of daily wages has also declined considerably...

This drastic decline in Malla's real wage income is reflected in his considerably lower standard of living. He still lives in the same small thatched hut which now looks even more dilapidated than it did previously; he and his family walk around in clothes which are almost in shreds. Malla told me that he has arranged with his hereditary peasant masters to give him ragi for his annual reward in kind instead of paddy (Epstein, 1973, p. 160).

Table 3. Malla's monthly budget per consumption[1] unit at 1955 prices.

	Income					Expenditure			
	May 1955		June 1970			May 1955		June 1970	
	Rs	%	Rs	%		Rs	%	Rs	%
Subsistence	7	23	8.0	42	Food	13	42	10.0	53
Barter	4	13	4.0	21	Clothes	7	22	2.5	12
Wages:					Sundries	3	10	1.0	5
Agriculture	12	39	3.3[2]	18	Ritual expenditure	1	3	0.5	3
Miscellaneous:					Household				
Cash	2	6	1.3[2]	7	overheads	3	10	1.0	5
Gifts	2	6	1.0	5	Gifts	3	10	0	0
Net borrowing	4	13	1.4	7	Interest	1	3	2.0	11
					Miscellaneous	0	0	2.0	11
Total	31	100	19.0	100	Total	31	100	19.0	100

1. 1955 and 1970 3.66 C.U.
2. Deflation Index: 2.85.

Whenever he has a chance, he trades the more expensive paddy he produces for the cheaper ragi he can buy.

> Malla had had to reduce his expenditure per consumption unit on clothes, sundries, such as country cigarettes, betel leaves and areca nuts, and so on, and household overheads, such as pots and pans, by about two-thirds, just to try to make ends meet. The greater emphasis placed on food in his household expenditure illustrates the well known fact that people living at the lowest levels of income have to give first priority to food to ensure their survival. In spite of Malla's attempt to cut down his overall household expenses he still cannot pay everything out of his income and is cumulatively getting more and more indebted to his hereditary Peasant masters... He complains that in spite of his efforts to find work he has not succeeded in securing anything like regular employment. Yet he appreciates his Peasant masters' generosity in advancing him money to keep his family going. Timmegowda, one of Malla's Peasant masters, explained to me that as long as he himself has at least a small surplus over and above his own family needs, he will always try and help Malla: he still remembers Malla's father who had worked for his own father and that there existed a give and take relationship between these two men. Timmegowda stressed that he feels morally obliged to continue this relationship. Moreover, through Malla's intervention he had managed to buy one acre of wet land at a bargain price. There may be similar attractive opportunities in future, so that Timmegowda is careful not to alienate Malla and risk missing such chances (Epstein 1973, p. 165).

Moreover, Timmegowda finds the conversion of paddy into ragi, which he often effects for Malla, a profitable proposition.

Malla's profile illustrates several facets of sell-to-subsist farm households. His falling real wage income means that he has to reduce his already meager consumption expenditure. Since his current income fails to meet his basic needs he continues to be greatly indebted. Lacking even the minimum cultivation assets, such as a pair of bullocks and a plow, he is in no position to experiment with any of the technological innovations which require additional funds, even if they hold the promise of higher productivity. As far as Malla is concerned, his household's consumption needs have to be met first before he can even consider borrowing to invest in improved inputs. His only link with crop markets is through Timmegowda, his local patron, with whom he trades paddy for *ragi* (finger millet), from whose shop he buys much of his needs, for whom he and his family members work as casual laborers, and who persistently continues to offer him credit.

Malla's basic consumption requirements have a fairly regular pattern; other contingent expenses he incurs are expenditure on sickness and life-cycle rituals. By contrast his income is peaked in certain months of the year—namely, during the busy periods in the agricultural cycle, when his household can earn most by wage labor, and after the harvest when he can trade paddy for ragi. Credit thus helps Malla to harmonize the peaked production phases with regular as well as contingent consumption expenditure. The cost of this credit is not only the interest he has to pay Timmegowda, but also the other subservient aspects which are normally part of any dependency relationship. Malla is not even aware of the market prices for paddy and ragi. However, even if he knew that Timmegowda was unfairly exploiting him by paying him too little for his paddy and charging him too much for ragi, he would be in no position to voice his dissatisfaction; he is too much in Timmegowda's debt.

Malla's survival strategy, which is symbolic of most sell-to-subsist farmers, involves the continuous search for additional sources of income while accepting his client status, because it assures him a basic subsistence as well as a minimum social security.

Even credit arrangements specifically designed to offer financial assistance to some of the underprivileged farmers rarely reach their target. As is illustrated in Malla's case, bribery and corruption among petty officials administering these various credit schemes are frequently responsible for the failure of well-intentioned aid programs.

Unable to repay the small loan he got from the village cooperative society, the farmer is disqualified from further credit. "The rate of growth of agricultural credit advanced by the cooperatives has lately slowed down... The most important reason for this stagnation in credit flow is the mounting overdues which are clogging the process of credit recycling" (Planning Commission 1981, p. 177).

The poorest farmers are thus at a disadvantage in securing the credit they need to improve the productivity of the land they cultivate. In fact, they find themselves in a "Catch-22" situation: they cannot acquire the necessary inputs that will increase their marketable surplus unless they have access to credit, and they cannot get sufficient credit to do this without already having a considerable market surplus. This vicious circle of low productivity, low incomes, and high consumption credit need—reflected again in low productivity—is likely to be broken only by a radical restructuring of credit facilities together with novel production patterns for sell-to-subsist farm households.

Sell-to-subsist farmers presently pursue a precariously balanced survival strategy that necessitates their continuing indebtedness as clients unable to respond to price incentives and/or attractive new technologies.

Target Farm Households

Along with the many sell-to-subsist farmers, most villages also have target-oriented households. These usually have medium-sized farms, on which they can produce a limited surplus for sale over and above what they need for their current expenditure.

A large proportion of these households are descendants of magnates, who had to share the ancestral holding with numerous siblings. They usually grow and sell crops to reach a specific target. If the individual farmer within this category regards the local profit-making farm households as his reference group, he will set his targets in terms of providing sufficient funds to purchase the inputs necessary for increasing agricultural productivity. In practice, however, more often than not these farmers realize the serious economic constraints within which they have to operate, which make it unlikely that a medium-sized farm unit will ever achieve the economic viability of a profit-making household.

Accordingly, many of them vie for prestige ranking in terms of conspicuous consumption. They spend lavishly on the *rites de passage*, particularly on weddings. Village weddings used to last for 1 day only. Nowadays, most weddings take 3 days and involve elaborate rituals and feasts. "Middle-farmers compete among themselves for novel ways of displaying their wealth...(One) hired an old car to come 30 miles to the village to drive the bridal pair in procession through the three bumpy village streets... The difference between the wedding expenses of the middle-farmer and the magnate is much smaller than that between the wedding expenses of the poorest and the middle-farmer. This is in line with the general socio-economic differentiation in Wangala" (Epstein 1962, p. 104). Every wedding involves the wedding household in expenditure excessive in relation to its normal current income. Target farmers, therefore, have to plan carefully their cultivation pattern at least two seasons before the date of the wedding, so as to ensure that they will be able to meet at least a large proportion of the additional expenditure the wedding involves.

These farmers are usually keen to adopt new technologies at the same time that they are trying to meet a specific expenditure target in the hope and expectation that this will help them achieve their objective. Many an agricultural extension agent has been surprised by the sudden receptiveness to his advice by previously reticent farmers, while sometime later he has been disappointed because these same farmers fall back into their customary cultivation practices. The concept of target farm households can readily explain what otherwise would seem completely irrational behavior: once these farmers have reached their target many of them are prepared to relax and fall back into their old habits.

The easier the access to the market of consumer luxuries, the greater is likely to be the emphasis on conspicuous consumption. Target farmers will flourish if there are also ready and favorable markets for the sale of crops and the purchase of inputs. These farmers usually survey the market and explore the most advantageous market link. They rarely have personalized relations with suppliers and buyers and are often prepared to transport their crop surplus over long distances to the nearest town just to secure a better price and eliminate the local middleman and his profits.

The existence of such target farmers indicates the utility of money and the ready access it gives to a range of desired goods and services. Unlike profit-making farmers, who regard cultivation as a business venture, target farmers aim at satisfying specific consumption objectives. Therefore, a worsening in the rural/urban terms of trade and/or a deterioration in the supply of desired consumer goods will be reflected in a decline of cash crop production by target farmers. To illustrate their predicament "it may be useful to offer a free translation of a song, collected during field work", sung by the chief economist of an isolated tribe in the foothills of

southern Papua:

Song of the Tribal Economist

The primitive farmer says cash
Is unsatisfactory trash;
    It wont keep off rain
    And it gives me a pain
If I use it to flavour my hash.

So why should I work out my guts
At the whim of these government mutts,
    My liquor comes free
    From the coconut tree
And my Mary makes cups from the nuts.

Should I walk for three days into town,
Sell a sack of my spuds for a crown,
    Buy a bottle of beer
    And fall flat on my ear?
No, I'd rather stay here and lie down.

If I act in a rational way
I'll just sit on my backside today.
    When I want a good feed
    I've got all I need
Piping hot, and there's nothing to pay.

Cash cropping is all very well
If you've got something to sell;
    But tell me, sir, why
    If there's nothing to buy
Should I bother? You can all go to hell.

(Fisk 1964, p.166)

This song clearly indicates the dilemma cash cropping presents to the target cultivators whose traditional level of living is satisfactorily provided for from their own nonmonetary resources. For them, money has little utility unless it gives them command over additional luxuries, in the form of goods and services that they want, at the time and place they want them. Target farmers are always keen to ensure ready access to markets. For instance, a resettlement scheme in the Middle East ran into trouble because of lack of suitable marketing arrangements. The new settlers became indifferent to assistance in improving cultivation practices and raising productivity, and reluctant to invest even in small sums or to obtain credit for this purpose (Louwes 1962). It is only the ability to sell crops and buy goods and services that encourages target farmers to produce a market surplus.

Target farmers pursue a strategy whereby they try to meet their varying target expenditures with periodic bursts in their agricultural production. They are, therefore, mainly concerned with access to markets and the rural/urban terms of trade and are prepared to invest in new technologies only if these help them achieve their targets.

Profit-Making Farm Households

These represent the biggest landowners who have sufficient land to produce crops for the markets. My own studies of two Karnataka villages clearly indicate a neat correlation between the marketable surplus of a household and its political position (1973). These "magnate" households live in extended families, which enables them to pursue intrahousehold economic diversification: they not only cultivate crops mainly for sale but also operate flour mills and cane crushers as well as retail stores and coffee shops. They are thereby able to spread the risk and protect themselves against the hazards of market fluctuations relating to any one of their several economic ventures.

The scale of their operations puts them into a reasonably strong bargaining position, not only with their middleman buyers but also with the local small and marginal farmers as well as landless laborers. Each magnate household is in fact at the apex of a patron-client hierarchy within its village (see Fig 1). As already mentioned, sell-to-subsist households frequently sell their labor and/or a small volume of their marketable crops to their local patrons, for whom they also often provide vote banks. In return, the patron provides them with a minimum social security, including consumption credit and protection. Not only does one patron have several clients but individual clients often also have more than one patron. This arrangement gives the poorest households at least a minimum of bargaining power *vis-à-vis* their patrons, whom they can play off one against the other. However, collusion among local patrons is equally effective in getting their clients to continue toeing the traditional line, as I discussed with relation to a drama incident as part of my south Indian village studies (Epstein 1962, p.183).

The strategic role which these magnate households thus occupy at local levels gives them greater access to resources and distribution networks in comparison with poorer farmers. They are usually the first villagers to learn of a new technology or input that is likely to improve agricultural

productivity. Moreover, they have the necessary financial resources and/or access to credit, which enables them to experiment with different innovations. There are many reports available that show that even cooperative credit societies favor the richer farmers. In 1970 I established that

> wealthy Wangala Peasants who have comparatively large landholdings manage to borrow big amounts ranging up to Rs. 3,000 while a large number of poorer farmers could only secure small loans of Rs. 100 or Rs. 200. The richer Peasants are, therefore, in a much better position to buy large quantities of fertilizer on credit and thereby ensure a good harvest than are the poorer farmers. The richer a man, the more creditworthy he becomes. The richest, therefore, can easily get loans from the co-operative society at the official rate of interest....Poorer farmers are still often driven to take loans from money-lenders, particularly if they need money for other than cultivation purposes (Epstein 1973, p.109)

Profit-making farm households are well equipped to respond positively to price incentives; they have better access to information and credit as well as cushion of their own financial resources. Thus they are not compelled to sell their crops immediately after the harvest, when prices are at their lowest, but can wait until they can get a better price. Recent studies have shown that storage losses even in traditional village stores amount to only a small proportion of the volume of crops stored (Boxall 1978, p. 123); therefore delaying crop sales seems an attractive proposition. Wealthier farmers are also in a position to choose from among a number of alternative suppliers of inputs to ensure the best buy. Thus, only profit-making farmers can fully participate in the available market structures.

Profit-making farm households are the nearest we can get in the rural context to the kind of behavior that is discussed in most economics textbooks and depicted in the "Rational Economic Man Model," which in turn still forms the basis for most economic reasoning.

These profit-making farmers in fact pursue strategies which largely aim at optimizing their profits; though not even they can escape the urban bias in development and the accompanying unfavorable rural/urban terms of trade (Harriss 1981; Lipton 1977).

Some Policy Implications

The different life strategies pursued by the various categories of farm households, which this paper discusses, clearly indicate that different measures are required for different types of farm units to ensure the adoption of improved cultivation technologies.

Profit-making farmers, like wholesale traders, "go to considerable lengths to bind themselves with a system of credit and information relationships with other traders in order to provide working capital, and to stabilise and reduce risk in commercial relations. Information, got by whatever means, is circulated quickly and indiscriminately through the market towns. The rural trader is noticeably less able to command information than his urban counterparts" (Harriss 1981, pp. 202-203).

Altogether, there appears to be a great dearth of personnel trained in marketing. "At present the crucial need for marketing education is met in only a few countries, and marketing extension as a consistent public service is still confined largely to North America" (Abbott 1958, p. 168). The marketing content of most national development plans is at present very low. As already mentioned, this is exemplified in the various Indian Five Year Plans. Although agriculture provides the livelihood for the majority of the population in most developing countries, Abbott found that none of the 13 current plans he examined assigned a major role to the marketing of agricultural products in their development strategies. "In only three did the financial allocation of marketing exceed six percent of total expected investment in agriculture" (1968, p. 87). Therefore, besides manipulating the terms of trade in favor of the agricultural sector, a freer flow of market information right to village level would facilitate an increased market surplus. Moreover, there may be a role for public intervention via a policy of open market trading and the building up of bigger stocks (Lele 1971, p. 221). Even Lele suggests this, though she is otherwise totally convinced of the efficiency of private middlemen in providing for competitive markets.

Target farmers, like profiteers, will benefit from an improvement in the rural/urban terms of trade. However, for them this will be reflected in spasmodic bursts of improved productivity unless their demand horizon can be broadened to even out their sporadic target-oriented productive activities. To encourage target farmers to invest persistently

in improved inputs necessitates not only more emphasis on market and price information, but also ready access to a growing variety of consumer luxuries.

Sell-to-subsist farmers present the most difficult problem in terms of ensuring improved productivity of their lands. In India they represent almost 85% of the total number of operational farm units and occupy altogether about 40% of the total cultivated area (see Table 1). Most of them are dependent on local patrons to help them meet their basic cash requirements, which puts them into a highly unequal trade relationship with the buyers of their produce as well as labor and the suppliers of their basic cash goods. This is aptly described by Smith, as quoted at the beginning of this paper, and indicates the need for structural changes. Since without a political revolution it seems impossible to redistribute the means of production, we have to develop at least some palliative measures to improve the lot of the large number of underprivileged rural households. In the long run we shall all be dead in any case.

In order to break the dependency relationships existing between sell-to-subsist clients and their local patrons, which provide a vertical social linkage, more emphasis will have to be placed on developing horizontal ties among the clients themselves. For instance, it should be possible to establish cooperative societies, in which membership is restricted to small and marginal farmers and which link the poorest strata of rural society directly with the market. Such cooperatives could supply credit. However, in the beginning they would have to provide loans not only for productive inputs, but also for consumption purposes. Thus a considerable initial financial support from commercial banks and/or government sources will be required to get such a scheme off the ground. Cooperative societies for sell-to-subsist farm units could also provide links with the market, even for the smallest grower, in terms both of crop sales and of purchases of consumption goods and production inputs. Moreover, such societies could also intervene in the labor market and thereby enable their members to benefit from the economies of large-scale transactions.

Rural cooperatives have so far been rather ineffective in helping the poorest villagers, largely because in most cases they have been dominated by the local wealthy and powerful elite who utilized for their own benefit the advantages coooperatives are meant to provide. The establishment of cooperatives with a membership limited to sell-to-subsist villagers will obviously also face serious problems of survival. It will need the concerted support from different appropriate government agencies as well as voluntary associations to ensure potential members that cooperative membership can provide them with at least the same security on which they rely as clients. Another danger, of course, is that profit-making farmers and middlemen traders will come to regard such a venture as a threat to their own operations and will therefore gang up to squash it.

SEWA (Self-employed Women's Association) of Gujarat represents one successful example of such a horizontal organization among the poorest producers. SEWA is a voluntary organization which covers only a limited population. However, its experience should provide interesting guidelines for the establishment of similar organizational structures under public auspices.

As I have stressed before

> The restructuring of marketing is only one aspect of economic development. Its strategic importance, however, has so far been widely neglected. It represents a serious challenge to planners of developing countries, which unless met is likely to threaten the process of development in particular and the world's food supplies in general (Epstein 1982, p. 232).

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Impact of Agricultural Markets on Income Distribution

Hans-Georg Bohle*

Summary

The paper examines the role of agricultural markets in generating inequities in income distribution across different size groups of farmers. Based on 150 interviews with a stratified sample in three agricultural regions of Tamil Nadu, India, we arrive at the following findings.

- *Contrary to current allegations, small and marginal farmers have a considerable marketable surplus and their main source of income is from marketing their produce. Consequently, the efficiency of the agricultural marketing system has a major impact on the living conditions of small and marginal farmers.*
- *Small and marginal farmers rely relatively more on the income they derive from the marketing of nonfood crops than do medium and large farmers.*
- *The level of marketing costs is found to be much higher in nonfood-crop marketing than in food-crop marketing.*
- *Marginal and small farmers have to incur disproportionately higher marketing costs than other size groups in disposing their marketable surplus.*
- *These double disadvantages get further aggravated for those small and marginal farmers who live in villages remote from agricultural market centers.*

We conclude that in the process of agricultural marketing, market access as well as marketing costs are biased against small and marginal farmers.

Résumé

Impact des marchés agricoles sur la répartition du revenu : *L'article examine le rôle des marchés agricoles dans la production de répartition inéquitable du revenu à travers des groupes de paysans de différentes grandeurs. D'après 150 entrevues à l'aide d'un échantillon stratifié dans trois régions agricoles au Tamil Nadu, en Inde, on a tiré les conclusions suivantes :*

- *A l'encontre des allégations courantes, des paysans marginaux et petits ont un assez grand excédent commercialisable et leur principale source de revenu vient de la vente de leur produit. Par conséquent, l'éfficacité du système du marché agricole a une très grande incidence sur leurs conditions de vie.*
- *Les paysans marginaux et petits dépendent du revenu de la vente des cultures non vivrières relativement plus que des moyens et grands paysans.*
- *Le niveau des frais de commercialisation semble plus élevé dans la commercialisation des cultures non vivrières que dans celle des cultures vivrières.*
- *Les paysans marginaux et petits doivent encourir des frais de commercialisation élevés et disproportionnés à leur niveau que d'autres groupes de paysans dans la commercialisation de leur excédent commercialisable.*

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- *Ces deux inconvénients sont aggravés encore plus pour les paysans marginaux et petits qui vivent dans les villages éloignés des centres commerciaux agricoles.*

L'article aboutit à la conclusion que dans le processus de la commercialisation agricole, l'accès au marché ainsi que les frais de commercialisation sont prédisposés contre les paysans marginaux et petits.

Objectives and Scope of the Study

Poverty-oriented development policies have only recently started to view rural market imperfections as a major bottleneck for small farmer development (Mittendorf and Lee 1979). This delay may be attributed to the widespread belief that small farmers do not produce much for the market. With the better understanding now emerging of peasant economies in Third World countries this paper will demonstrate that such a view is no longer tenable.

Four major problem areas have been identified that not only adversely affect small farmers' income but also have counterproductive consequences (von Oppen 1978).

- High price differentials between small-scale producers and consumers.
- High price risks for small producers.
- Unfavorable terms of trade for small farm produce.
- Incidence of high marketing costs for small producers (a point specially made by Fischer et al. 1978).

These adverse conditions are generally attributed to inefficiencies of the rural market system in four respects: pricing, operation, communication/innovation, and management (Mittendorf 1980). This empirical study will concentrate on the operational side of agricultural marketing. On the basis of 150 interviews that were taken from a stratified sample in three selected regions of Tamil Nadu (southern India),[1] this paper will discuss production and marketing patterns of the sample farmers and their income and equity effects. Special emphasis has been placed on the incidence of marketing costs for farmers of different size-classes, marketing different agricultural commodities, and living in villages with varying access to the nearest market center. Such analyses—by size-class, by commodity, and by access—of marketing costs are intended to serve as an indicator to measure and assess the impact of the operational efficiency of rural markets on small and marginal farmers' (SMF) income vis-a-vis that of large and medium farmers (LMF).[2]

Production Patterns

The study areas of western Salem (WS),[3] eastern Salem (ES) and central South Arcot (CSA) are situated in the dry inland part of Tamil Nadu with annual rainfall of around 600-800 mm. Consequently, rainfed agriculture dominates. Cultivation is diversified, with considerable cash crop production besides irrigated paddy and nonirrigated coarse grains. In WS study area, groundnut and cotton are the predominant cash crops; in ES, tapioca and sugarcane are grown; in CSA, groundnut is again the main commercial crop.

The production pattern of the farmers[4] (Table 1) reflects different interregional rainfall regimes and hydrological resources. In WS, where rainfall is lowest and where water resources are scarcest, 90% of the land is under rainfed cultivation. Thus, around 75% of the value of output of the sample farmers is constituted by (dry) nonfood crops. Even SMF, who constitute 83% of all farmers, are evidently commercially oriented. In ES, where water

1. I am greatly indebted to Mr. S Ramamurthy, Department of Econometrics, University of Madras, for his valuable help in conducting the interviews

2. The size-classes are defined by the size of the operational holdings: marginal farmers: below 1 ha, small farmer: 1-2 ha; medium farmer: 2-4 ha; large farmer: above 4 ha of dry land

3. For details, see Aiyasami and Bohle (1981).

4. In western Salem, two villages with a difference in accessibility to the market center were selected in Konganapuram block. 40 randomly selected farmers were interviewed, 5 in each size class. In eastern Salem, the sample consisted of 64 farmers in three villages of varying accessibility in Talaivasal block. In central South Arcot, 46 farmers in one highly accessible village of Tindivanam block were interviewed.

Table 1. Production patterns in the study areas.

Type of commodity	Small and marginal farmers: Value of output (Rs × 1000)	Small and marginal farmers: Proportion of total output (%)	Large and medium farmers: Value of output (Rs × 1000)	Large and medium farmers: Proportion of total output (%)
Western Salem				
Coarse grains and other food crops	16.4	29.6	50.3	26.6
Nonfood crops	39.0	70.4	139.1	73.4
Total	55.4	100.0	189.4	100.0
Eastern Salem				
Paddy and other food crops	57.9	48.0	161.4	36.6
Nonfood crops	62.6	52.0	279.2	63.4
Total	120.5	100.0	440.6	100.0
Central South Arcot				
Paddy and other food crops	93.2	58.5	124.4	64.1
Nonfood crops	66.2	41.5	69.6	35.9
Total	159.4	100.0	194.0	100.0

Source: Field Survey 1980/81

resources are not so scarce, about 50% of the SMF's and 33% of the LMF's produce food crops, mainly paddy. In CSA, with its ample groundwater resources, paddy production dominates. This is the only case where LMF produce more foodcrops than do SMF, besides the profitability of growing paddy, the commodity is also used by LMF to pay agricultural laborers in kind.

From Table 1 we infer that SMF always produce a larger percentage of their total output for the market; in most cases, this percentage is lower for the LMF.

Market Participation

In the food-crops sector, as a rule, farmers who produce relatively more food grains also market greater parts of their output (Table 2). WS is the only case where both SMF and LMF market only negligible quantities of their modest food-grain harvest. In ES, SMF take 25% and LMF nearly 50% of their food grain output to the market; in CSA, the figures are 50% and 67% respectively.

Considerable market participation of the SMF in the food-grain sector is still exceeded by their high participation (70-100% of output) in marketing nonfood crops. Taking food crops and nonfood crops together, the proportion of value marketed to value produced by SMF is 50% in WS (LMF: 68%), 64% in ES (LMF: 74%) and 65% in CSA (LMF: 75%). These findings strongly confirm that rural marketing has to be regarded as an essential element of small farmers' income formation.

Marketing Process

The income losses experienced by SMF in the process of marketing their produce have been traced back to four problem areas, which work against SMF in the marketing process (Hanumantha Rao and Subbarao 1976).

1. Bulk of the sales are effected in the village itself, rather than in the bigger primary markets where the prices could be higher if there is better competition between the buyers.

2. Heavy harvest-season sales by SMF, while LMF takes the advantage of higher off-seasonal prices.

3. Higher price offers to LMF owing to bulk sales and thus economies of scale.
4. Oligopsonistic practices by moneylender-traders who enter into prior arrangements with the SMF

These four factors, namely, place and time of sale, quantity sold, and the agency to whom the sale is made are briefly discussed for the three study areas separately.

Western Salem: Groundnut is marketed by all size-classes of farmers in the harvest season (Oct/Nov). Large farmers, however, reportedly hold back their produce about one month longer than do SF, resulting in slightly higher prices. Such a trend is not observable with cotton, which is also marketed in the harvest season range (irrigated Mar/Apr; nonirrigated Jul/Aug). Cooperative marketing society and itinerant traders are the main market channels for both commodities. Farmers of the accessible village market their produce through the cooperative society, whereas farmers of the inaccessible village use itinerant traders as the market outlet. SMF in the inaccessible village suffer most as they have no access to the facilities and favorable prices of the marketing society.

Eastern Salem: SMF sell about 50% of their paddy surplus in the harvest season (Jan/Feb), whereas LMF hold back 80% of their produce for off-season sales. The main channels of paddy marketing are wholesale market (*mandi*) and itinerant traders. Contrary to the WS case, it was found that itinerant traders do not visit less accessible villages, so that all categories of farmers have to take their produce for sale to one of 20 wholesale markets located about 25 km away, however small the quantity be.

As tapioca is a perishable crop, marketing is naturally confined to the two harvesting seasons. The only marketing agencies are sago mills. Although plenty of them are available (150 in Attur taluk alone), only large farmers reported selling according to favorable price offers. SMF are either bound by advance payments to a particular sago mill, or they use the help of brokers to market their produce. Such a situation has a definite impact on the prices received by the producers; prices ranged from Rs 16-34 per bag for the SMF and from Rs 20-43 per bag for the LMF.

Central South Arcot: Harvest sales (Oct-Feb) constitute the bulk of paddy transactions with SMF (86%), whereas LMF retain 43% of their paddy surplus for off-season sales. Village merchants and

Table 2. Marketing patterns in the study areas

Type of commodity	Small and marginal farmers		Large and medium farmers	
	Value marketed (Rs × 1000)	Proportion of total output (%)	Value marketed (Rs × 1000)	Proportion of total output (%)
Western Salem				
Coarse grains and other food crops	0.5	3.1	7.8	15.5
Nonfood crops	27.1	69.6	121.7	87.5
Total	27.6	49.8	129.5	68.3
Eastern Salem				
Paddy and other food crops	15.0	25.9	73.8	45.7
Nonfood crops	62.3	99.5	253.5	90.8
Total	77.3	64.1	327.3	74.3
Central South Arcot				
Paddy and other food crops	43.1	46.2	80.7	64.9
Nonfood crops	60.8	91.8	65.3	93.8
Total	103.9	65.2	146.0	75.3

Source: Field Survey, 1980/81.

itinerant traders are the main market outlets (SMF: 85%; LMF: 80%). Owing to the high accessibility of the sample village, there seems to be high competition among the buyers, which makes the village quite attractive as a marketplace for farmers of all size-groups.

Groundnut, however, is mainly marketed to the old (1939), well-established, and easily accessible regulated market at Tindivanam. Only 5 of the 27 SMF in the sample who market groundnut resort to itinerant traders; all LMF of the sample use the regulated market. Farmers of all size-groups prefer harvest season sales (Mar/Apr).

We infer that, owing to financial constraints and contractual obligations, SMF depend more heavily on unfavorable harvest season sales than do LMF (Sarkar 1981). As a rule, their marketing range is not as wide as that of LMF (Satya and Gill 1977), who can reach wider markets and more competitive buyers (Sarkar 1981). The latter disadvantage is further aggravated for those SMF who live in more inaccessible locations.

Table 3. Marketing costs and market access in the study areas

Accessibility to market center	Marketing costs in sale proceeds (%)			
	SMF	LMF	SMF	LMF
Western Salem	--Groundnut--		-----Cotton-----	
Accessible village	5.7	4.2	3.7	3.5
Less accessible village	7.3	5.2	8.0	5.0
Eastern Salem	--Paddy--		--Tapioca (Range only)--	
Accessible village	1.5	2.6	18.4	8.9-15.1
Less accessible village	6.3	4.5	8.0-26.4	11.2-19.9
Inaccessible village	7.6	6.7	26.4-32.8	10.2-19.7
Central South Arcot	--Paddy--		---Groundnut---	
Highly accessible village	2.4	1.7	2.5	1.8

SMF = Small and Marginal Farmers
LMF = Large and Medium Farmers (as defined in footnote 2 of this paper).
Source: Field Survey, 1980/81

Marketing Costs and Market Access

The operational efficiency of a market system can most conveniently be measured by the occurrence of operational marketing costs (Mittendorf 1980). Bansil (1981, p.254) found that major marketing cost components were commission, brokerage, trade allowance, transport and weighing charges, and market fees. Our study reveals that while computing marketing costs, processing, personal expenses of the farmer, as well as hidden (informal) costs, have also to be taken into account.

As we report in Table 3, marketing costs drain off between 2 and 30% of the farmers' sale proceeds. Tapioca marketing in eastern Salem proved to be extremely costly and may serve as an illustration of how marketing costs sum up for SMF. When the crop is ready for harvest, the small farmer takes a sample to the sago mill to which he is committed to sell his produce because of the credit the mill advanced to him in the preharvest period. The farmer hands the sample over to a broker who awaits him at the mill. The factory owner, through the broker, examines the sample and fixes a price in the absence of the farmer. Then by bargaining between the farmer and the broker, the price per bag is arrived at, with a hidden price margin for the broker. When the harvested tapioca is taken to the factory by hired lorry, which has been arranged by the broker, the broker examines the quality of the tubers and invariably reduces the prearranged price per bag. The small farmer has to agree because the crop is perishable. The product is then weighed by a weighman who demands kickbacks for correct weighment. Finally, the product is unloaded by coolies, who have to be paid by the small farmer. The tubers are weighed in units of 72 kg; it is common for last lots that weigh less than 72 kg not to be reckoned; they are taken gratis by the factory owner. When the transaction is over, the broker is compensated for his "services" by the small farmer.

Transport, brokerage, and personal expenses are the major tapioca marketing cost components. The data show that poor accessibility to the market center raises the proportion of marketing costs considerably, and that the income SMF derive from marketing their produce is disproportionately low.

These are the major findings of our marketing cost survey (Table 3):

- The proportion of marketing costs to sale proceeds is invariably higher for SMF than for LMF,

which means a relatively higher loss of income for SMF.

- The occurrence of marketing costs is higher for nonfood crops than for food crops. This also implies a relatively higher loss of income for SMF vis-a-vis LMF, because the income of the former depends to a relatively greater extent on the marketing of nonfood crops (Table 2).

- Market inaccessibility increases the proportion of marketing costs for all size-groups of farmers (Bansil 1981). However, inaccessibility has a relatively higher negative impact on SMF income than on that of LMF.

- Limited market access has a more pronounced impact on the marketing costs of nonfood crops than on foodcrops. This again has a discriminating effect on SMF income.

From this analysis we infer that the operational efficiency of the rural market systems under study here is biased against SMF. This bias is more pronounced under conditions of limited market access. Besides pricing, operational, communication and management efficiency, market access efficiency[5] may thus be regarded as another major element that determines the income and equity effect of a rural market system.

Recommendations

Lowering of marketing costs through more efficient market operations and improving market access—especially for SMF—can significantly contribute to small farmer development. For rural market development policies, this implies more than regulation of markets and improvement of road and transport facilities. Various projects have shown that these measures may also have negative economic, social, and cultural impacts on SMF. Instead, we need to think of informal market institutions that could be promoted (Fischer et al. 1978).

In our study area, for example, a dense network of weekly rural markets is in existence (Bohle 1981). They are informally organized focal points especially for the weaker sections of the rural society (Harriss 1976). For them, these market places serve as basic service centres and as primary market outlets. They are generally easily accessible for SMF and therefore widely used by them (Bohle 1979).

Instead of market development "from above" which focuses on the large terminal markets in India's cities (Steppe 1980), and instead of establishing secondary regulated markets in the rural towns as currently practiced in the country,[6] the promotion of the existing primary village markets[7] or the establishment of new ones should have higher priority. From this, village markets will, we expect, improve horizontal integration, reduce external dependency, and increase their capability to react to changes in the market. This should be followed up by a labor-intensive expansion of the concerned tertiary sector. What seems to be even more important is the expectation that such decentralized market development "from below" can actually secure the participation of the rural poor, who are the intended beneficiaries of India's rural market development policy.

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5. See FAO (1980), p. 23.

6. For example, under the FAO/DSE Asian Rural Market Centre Development Programme.

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The Role of Agricultural Markets and Market Policy—Not Conducive to Rural Welfare?

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Summary

Based on a survey of 15 villages in the low-rainfall tracts of southern India, it is found that facts do not support the view that the role of agrimarkets or commercialization of agriculture contributes to rural underdevelopment. This paper argues that such a view is misleading, as it diverts attention from the real market problems facing agriculture and from other factors that account for rural poverty.

Résumé

Rôle des marchés agricoles et de la politique commerciale—non favorable au bien-être rural? : *Fondée sur une enquête de 15 villages dans les régions à pluviométrie basse du sud de l'Inde, cette communication démontre que la conception du rôle des marchés agricoles ou de la commercialisation de l'agriculture comme des causes contribuantes du sous-développement rural, n'est pas appuyée par des faits. L'auteur ajoute qu'une telle conception est, en fait, trompeuse car elle détourne l'attention des problèmes réels du marché auxquels l'agriculture doit faire face ainsi que d'autres facteurs responsables de la pauvreté rurale.*

The role of agricultural markets and the implications of commercialization of agriculture for rural welfare have been widely discussed, particularly in India. Till the 1950s, agricultural markets were characterized as imperfect, exploitative, and rather unhelpful to the development of agriculture. Giving expression to such a view soon became outdated, one could of course safely attribute imperfections or inefficiency that existed in the rural markets to inadequate infrastructure. Agricultural markets were regarded as competitive, sensitive to the laws of supply and demand, and giving the correct stimuli to farmers and consumers. By implication, they were regarded as securing optimal welfare for all, but for aberrations which could be corrected through improvement in infrastructure.

The official policy, however, was based on the assumption that the market had imperfections both because of unfair practices or the exploitative role of traders, and because of inadequate infrastructure. The market policy, as reflected mainly in setting up regulated markets, storage facilities, etc., was intended to correct such imperfections and make the markets more competitive. Such a policy could not, of course, influence the way prices were determined and the fluctuations therein. A policy of merely ensuring a greater degree of competitiveness does not solve such an issue; it may not even succeed in preventing concentration in trade turnover and manipulation of market prices by a few.[1] In fairness, the official policy also included encouragement to cooperative marketing, which was not widely practiced.

Current thinking tends to ignore the role of merchant capital and the nature of agricultural market functionaries and their functioning, but concentrates on the nature of exchange between the urban and the rural sector as if it takes place directly. Even if the existence of these functionaries

1. For a critique of the functioning of regulated markets in India, see Harriss 1980a and 1980b.

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ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 1985. Agricultural markets in the semi-arid tropics. Proceedings of the International Workshop, 24-28 October 1983, ICRISAT Center, India. Patancheru, A.P.502324, India: ICRISAT.

is recognized, they have presumably no special role to play, except to act as instruments of the exploitative urban sector. The theory of unequal exchange between the Center and the Periphery in the world capitalist system has been applied by Dandekar (1980) to trade within the country between the capitalist urban sector and the pre-capitalist agricultural sector. Lipton (1977) goes to the extent of attributing poverty in developing countries to urban bias on several fronts, including in the main the alleged policy of ensuring adequate urban supply of food at low prices. It is made to appear that the role of agricultural markets—or of commercialization of agriculture in general—is essentially depressive, with a built-in tendency towards rural underdevelopment rather than development. If this is the basic problem of the agricultural sector, any reform of the market structure to make it competitive or to impart stability to prices there, would not promote rural welfare; it would only strengthen the mechanism of rural exploitation through trade.

This paper argues that the 'urban-bias' view of the role of agricultural markets and market policy is misleading, because it diverts attention from the real problems facing the agricultural sector. This paper contends that field-level experience covering a sufficiently wide cross section, does not support the view that commercialization of agriculture is inherently depressive. The contention is based on a survey the author conducted in 1978-79, covering both farm and nonfarm households in 15 villages of southern India, five each in Anantapur district of Andhra Pradesh, Bijapur district of Karnataka, and Coimbatore district of Tamil Nadu (Nadkarni, in press). Climatically, it was a normal year. The author personally visited all the villages to gain first-hand field impressions. Villages were selected to give adequate representation to those with and without irrigation facilities, those with rural industries and without, and those with and without animal husbandry. Household data were collected through a sample survey, and included output and marketed quantity. Based on this data and the weights derived from complete listing of households, population estimates were made for each strata or type of household, as well as for the village as a whole. Estimates were made not only of agricultural output and its marketed proportion, but also of income and the proportion of poor households. No claim is made here that these estimates apply to the state or even the district as a whole.

The region covered is drought prone, with low and uncertain rainfall, though some parts particularly in Coimbatore district had the advantage of irrigation. The selected villages provided a good deal of variation in the level of commercialization of agriculture, measured in terms of gross marketed quantity as a proportion of output in value terms (Appendix 1). Actual prices realized by respective farm households in respect of output sold were used for valuation, rather than some notional average uniform for all. Where realized prices were not available for a household, prices realized by a household in the same strata, and nearest to it in the size of holding, were used.

Commercialization of agriculture was not just marginal. In 12 of the 15 villages, over half of the farm produce was sold; in 8, the proportion was above 60 per cent. The average value (not weighted) for all the 15 villages was as high as 62%, though the range extended from 28.4 to 88.5%. Though irrigated villages were more commercialized than dry villages, rural industry was more strongly associated with commercialization of agriculture than irrigation. Where rural industry existed, it was mostly handlooms. Of the eight villages having significant rural industry, four had cotton handlooms as the major industrial activity, two had weaving units for woolen blankets, one had basket making besides some handloom units, and another had mining and quarrying as the major nonfarm activity. Traditional rural industries, such as blacksmithery and carpentry, were notable only in one village in Coimbatore district, which also had a significant handloom industry. Two villages in Coimbatore district also had mechanized oil expellers to process groundnut seed, apart from a few semimechanized traditional oil extraction plants (*ghanis*).

There was also a regional factor behind the commercialization of agriculture in the sense that all the villages in Coimbatore district—dry and wet—were more commercialized and developed than the rest of the sample. The average proportion of sales to agricultural output in Coimbatore villages was 81.3%, in contrast with 54.4% in Anantapur and 50.4% in Bijapur. The agriculture of Coimbatore villages was more prosperous, and their economy was more diversified and better integrated with the urban sector. Even the small and marginal farmers were deeply involved in the product market both as sellers and buyers. The market of the region was more developed, and not only had industries for processing agricultural raw material, but also other small industries. Apart from the movement of agricultural produce, improved transport facilitated

workers commuting to outlying villages and towns. Commercialization of agriculture and proximity to urban areas hardly appeared to have depressed the economy of the Coimbatore villages.

Regional development apart, the strongest factor affecting the commercialization of agriculture across villages, is the value of farm produce per cultivating household; the coefficient of correlation across villages was 0.67. This is not surprising because higher marketable surplus results under such conditions. Though concentration in land tends to increase both farm produce per cultivating household and marketable surplus, the share of large holdings did not by itself emerge as an important positive factor behind differences in the levels of commercialization; concentration in land existed generally both in more and less commercialized villages. What made the crucial difference is that commercialization of agriculture stimulated higher production, both in agricultural and nonagricultural activities, particularly as seen across villages. This is a point of significance with implications for welfare. If commercialization of agriculture takes place under force or bondage, it cannot stimulate agricultural development or production. But more genuine commercialization can do so and thus contribute to welfare. If, for example, milk production is commercialized under bondage, much of it may be simply sold depriving the producing household of its own intake of milk and milk products, and even a fair return from sale. But if commercialization increases production, the household's own intake of milk need not fall, and its income would increase. Our survey reveals that commercialization is more of the latter kind. Such commercialization cannot take place unless the household can gain higher income through market involvement.

There is a qualification to the correlation between commercialization and farm output per household. If commercialization is measured in terms of gross sales as a proportion of output (without accounting for repurchases), even small farmers were almost as commercialized as large farmers. But this is not because the small farmers were compulsively involved in the market under conditions of bondage. Their market involvement was more to maximize their purchasing power, with which they could purchase what they liked—mainly food grains. In rice-growing villages, small growers sold rice and purchased jowar, an activity which maximized their purchasing power to meet their needs. Such calculations often get submerged in intervillage comparisons, except when the village consists mostly of small and medium holders who are also highly commercialized, as it happened in Vadakalur. Barring such exceptions, the role of per household production as an important factor in commercialization—influencing it and also being influenced by it—clearly emerges. If commercialization were to be measured in terms of *net* sales instead of gross sales, such a correlation would emerge even in the intravillage situation across households.

It was interesting to find that more than irrigation, commercialization of agriculture seemed to have a stronger positive impact on the incomes (Appendix 2) of not only all rural households across villages, but also on the incomes of marginal farmers and agricultural labor.[2] The coefficient of correlation across villages between the proportion of sale to agricultural output and average income of all rural households was high (0.84). The correlation was less significant (0.62) with respect to the income of agricultural labor. It was weak, though positive, with respect to the income of marginal farmers cultivating a hectare or less (0.48) and statistically significant at the 10% level. Commercialization of agriculture did not apparently help small growers much, but there was also no evidence of a negative impact. On the other hand, it tended to raise both wage levels and magnitude of employment in more commercialized villages.

It was, therefore, not surprising that the more commercialized villages were found to have a smaller proportion of the poor households. It is the isolated and less commercialized villages which provided a dismal contrast with urban areas rather than the more commercialized villages.

The poverty line was defined for the villages at the income level of Rs 4360 in a year for a household, which was the average of all households' income taking all the villages together. In the selected villages, the average size of household was five persons. Incidentally, this poverty line came very close to the one at the national level calculated for 1978-79, the reference year for our survey. The poverty line was fixed at Rs 20 per capita per month at 1960-61 prices, considered sufficient at least to provide the minimum calories needed for an average person. Adjusting it upwards for the increase in the cost of living of agricultural laborers, and calculating it on annual

2. Incomes have been computed here after deducting paid out costs from the value of output, but not imputed costs on account of family labor or rent on own land.

per household basis the figure turned out to be Rs 4380.

The magnitude of poverty on this criterion in the selected villages was a staggering 77.8%. Irrigation did not seem to make much difference, since this proportion was 79.8% in relatively dry villages, and 75.5% in relatively wet dry villages, the latter demarcated in terms of having 30% or more of net sown area under irrigation. Interestingly, there was a very strong negative correlation (-0.81) between the proportion of poor households and the level of commercialization. In contrast, the correlation of the latter with the proportion of area irrigated was only -0.26, and not statistically significant. The proportion of the poor households in Coimbatore villages, which as we noted were more commercialized was 60.9%, compared with 86.2% in other sample villages together.

This reduction in poverty was made possible because commercialization of agriculture—with attendant higher value of output per cultivating household—increased the incomes of agricultural labor and marginal farmers as noted above and also of rural artisans (cultivating and noncultivating), the categories to which most of the rural poor belong. But it increased the income of rich cultivators even more than the income of the poor, and consequently increased the inequality in the distribution of income within villages. It was not only through increase in income from cultivation, but also in income from other sources.

The larger cultivators were able to diversify their household economy more than others, entering into such activities as animal husbandry, processing of agricultural produce, and trade. Their economic activities also extended to urban areas. In Kalangal, a large cultivator family ran a transport service, covering Coimbatore. In Kokkampalayam large farmers cultivating tobacco were also involved in tobacco trade extending beyond their village. In villages like Sholamadevi and Vadakalur, which did not have large cultivators but were nevertheless quite commercialized, the medium holders were involved in urban trade (in the former) and in oil industry (in the latter). The scope and profitability of such diversification increased with commercialization, the major beneficiaries of which were larger cultivators. Interestingly, the higher inequality was not due to small and marginal farmers getting relatively unfavorable prices compared to large farmers in more commercialized villages. In less commercialized villages, the former tended to get lower prices, a difference which was not observed in more commercialized villages, except when large farmers traded in the goods they produced. Measuring inequality in a village in terms of coefficient of variation in the incomes of 15 categories of households,[3] there was a positive and significant correlation (0.52, significant at 5% level) between inequality and the level of commercialization across villages.

The study thus inferred that commercialization of agriculture is concomitant—if not identical—with rural development. There was no evidence to suggest that it had a depressive impact on the economy; it certainly tended to increase inequality but not absolute poverty. Commercialization of agriculture can be expected to raise the income and productivity of all, though to a differing degree for different categories, depending on the control they have over the means of production and their capacity to market their produce. It is the producers who are not able to do so who derive *relatively* fewer benefits from commercialization. Overall, cultivators gain rather than lose from the process. Even in more commercialized villages, the extent of poverty that remained was quite significant, and commercialization by itself is no solution to the problem of poverty.

There could also be situations where even absolute poverty may increase with commercialization. But usually the process involved may be more complex than mere commercialization. Thus, if landlords were to resume land from tenants and cultivate paddy or other commercial crops such as sugarcane on a large scale, employment would decrease and absolute poverty would increase. But the more basic cause of poverty here is expropriation of tenants resulting from landlord capitalism replacing precapitalist production conditions and not any 'unequal exchange' between sugarcane cultivators and the urban sector. In such a situation, an increase in sugarcane prices would hardly contribute to the well-being of landless villagers.

At the macro or national level, there has been an impressive increase in agricultural production in India, which would not have been possible in the face of a consistently adverse price situation for farmers. Though subject to periodic fluctuations, the increase in food-grain production has been approximately 3% per annum during the last three decades. It is true, as Dantwala (1967) maintains,

3 Seven cultivating households as per size of holding, and eight noncultivating households as per their main occupation

that technological breakthrough more than price incentives provided a spur to the Green Revolution and the consequent increases in production. But as he has also said, there was no deliberate attempt to turn the terms of trade against agriculture and provide food grains to the urban sector at unprofitable and low prices (Dantwala 1976). Except when bumper crops were harvested, the situation has been inflationary, with both agricultural and nonagricultural prices rising and keeping pace with each other, and the anxiety of the policy-makers was to keep inflation in check. There have been a few years—particularly in the 1970s—when terms of trade adversely affected agriculture; however, there is not enough evidence to support characterization of the problem of marketing agricultural produce as one of adverse terms of trade or of long-term deterioration in the same, as against the urban sector within the country. Even Tyagi, otherwise of the 'urban-bias' view, concedes that, on the whole, prices of agricultural and industrial products have moved upward at the same pace (Tyagi 1979).

As to the procurement of part of the marketable surplus at less than market prices for supply through the public distribution system, more than one study found that since the system coexisted with access to the free market, it has exerted an upward pressure on free market prices (Dantwala 1967; Krishnaji 1973; Mitra 1977). As Dantwala observes, ".... the weighted average price of levy and nonlevy sales is likely to be higher and certainly not less than the price the farmer would have received in the absence of levy" (Dantwala 1976, p.37). This could be because, "when part of the demand is satisfied at less than equilibrium prices, demand in the free market itself increases. This increases the free market prices to a higher level than the equilibrium prices, which would have prevailed in the absence of fair-price shops" (Nadkarni 1973, p. 66). It could also be because procurement reduces the quantity available for purchase by millers in the case of rice (Subbarao 1979). Whatever the reason, Subbarao has further shown that even if the statutory levies are realized (ignoring a significant degree of evasion), farmers would still not suffer any income loss on their total marketable surplus since free market prices may be expected to go up steeply. Besides, the producer levy may have some favorable income redistribution effect in so far as small farmers are free to sell their entire marketable surplus at higher free market prices.

We may better understand the problem of marketing agricultural produce, if we set aside grand theories of 'urban-bias' or 'unequal exchange' and look instead at the types of commodities involved, conditions of their demand and production, and their market structures. It may be useful in the first instance to distinguish between production of food grains and nonfood grains. Unlike in advanced countries, income elasticity and demand for food grains in India is high. Coupled with a relatively inelastic supply situation, there is consequently a constant upward pressure on prices, interrupted occasionally by bumper harvests. But the procurement prices have offered an effective floor, which are not known to fall even when free market prices decline but which rise with the latter. The number of markets, traders, and buyers in the case of food grains are significantly higher than in the case of nonfood-grain commercial crops, thus creating a better market situation for food grains.

Even in the case of food grains, where the demand conditions facing growers are relatively more favorable, the actual gain to growers would depend on how organized and how small or big they are vis-a-vis traders. If they are mostly small growers facing powerful miller-traders, as in the case of paddy, they would be exploited in the market and the major part of the gain from favorable demand conditions may be appropriated by the latter, both growers and urban consumers losing in the bargain. 'Urban-bias' and 'unequal exchange' theories miss this crucial point.

The situation can be worse still and more complex in the case of nonfood-grain, commercial crops. Crops like cotton and groundnut, significant commercial crops in the semi-arid areas, are also subject to weather uncertainty. Demand for these crops is less stable than for food grains, and there is no constant pressure for demand to rise. In fact, if food-grain prices rise, demand for the less essential goods produced from commercial crops is often offset by the supporting demand from middle and higher income classes who are better compensated for inflation than the poor. Conditions in the world market also affect crops, particularly if they are exported. Consequently, prices may move independently of the output of these crops. Even if prices fall with a significant increase in production, the fall is often more than proportionate, and cannot be attributed only to inelastic demand. It is the existence of monopsonist elements dominating the market which is more to be blamed. This is particularly true in the case of commercial crops. Even if

several traders operate in the market, they are quick to develop an understanding among themselves. There are occasions when farmers have rebelled and sought alternatives. For example, in 1979, cotton growers in Saundatti in Dharwad district of Karnataka found that traders in the regulated market there quoted Rs 3500 per tonne, while a co-operative spinning mill at Gadag in an adjacent taluk offered Rs 5000 per tonne. They not only sold that year's cotton to the Gadag mill, but also decided to set up their own cooperative mill.[4]

By and large, however, once a cultivator grows such crops, he has little or no option regarding who he can sell them to. If the crop concerned is perennial, such helplessness can also be equally perennial. Often large cultivators overcome this disadvantage by trading in the crop themselves. The survey found that large farmers who grew tobacco and also traded in it, were much richer than other tobacco growers. It is mostly the small and unorganized growers who are easily amenable to exploitation, particularly when faced with monopoly industries and multinationals who procure and process the crop. This has been the case with cocoa growing and processing, as revealed in a recent study. The study proposed the setting up of a cooperative organization on the Anand Model in Gujarat for cultivation and processing of cocoa (Kurian 1983). 'Unequal exchange' may be an apt phrase to characterize such situations, rather than as a general theory of urban-rural relations. The effort should be to increase the farmers' share in consumer prices rather than to merely increase raw material prices.

More difficult to handle is the uncertainty on the price front, as wide price fluctuations affect most commercial crops, with domestic and world market forces operating here almost independently of weather conditions. Even if support prices are assured, fluctuations above the support level are not stopped, thus making rational planning or decisionmaking difficult for farmers. If a region's economy is not only highly commercialized but also dependent on one crop, it becomes highly vulnerable to instability. More than any long-term question of terms of trade, it is the sudden crash in product prices which agitates the minds of farmers and makes them feel almost totally helpless. Though it could marginally help matters, improvement in infrastructure would not change the monopsonistic nature of the market for commercial crops nor would it stabilize crop prices. A general increase in the price of commercial crops would not help either, as the benefits may again go to trading and processing interests. The basic problem is that the market structure as a whole is unfavorable to farmers even in the regulated markets.

The problem of rural poverty is even deeper, and has to be understood not only in terms of production conditions or agrarian structure within the rural sector, but in terms of the entire economy as well. An ideology of anti-industrialization may do more harm than good. This is because one of the basic causes behind persistence of rural poverty is the failure of the industrial sector to expand sufficiently rapidly and generate employment so as to absorb a significant proportion of the underemployed labor from the agricultural sector. Success here would have increased per capita productivity in agriculture, raised wage levels, and contributed to the development of the home market for both the agricultural and nonagricultural sectors. Such a process is threatened when the size of operational holdings tends to continuously decline, and cannot be corrected by turning the terms of trade in favor of agriculture. The feasibility of a model of rural-led economic development—with self-sufficient villages or minimized urban-rural integration—is yet to be demonstrated in India and elsewhere.

This does not mean there is no market problem as such. But we cannot perceive the market problem as is currently done by the 'urban-bias' theories, nor can we go to the other extreme of positivism and hold that nothing is wrong with the market structure and regard it as competitive and efficient. It would help us if we recognize that there is such a thing as merchant capital, the role of which—though often combined with industrial capital, as in the case of commercial crops and their processing—is also independent. As Harriss has shown, trade is more profitable than several other socially more productive economic activities, which could result in resources flowing more into trade than in the latter activities (Harriss 1981). While commercialization of agriculture is necessary for rural development, the role of trade would depend on the nature and type of functionaries involved. Monopsonistic and speculative elements, which provide marketing and related services, can act as common exploiters of both farmers and the noncultivating working class, and prejudice both agricultural and industrial development. Instead of voicing populist theories, social scientists, farmers,

4. Report in *Deccan Herald*, Bangalore, 8 August 1980

and political leaders need to seek better alternatives to the present marketing system and also ways of achieving them. By demanding periodic upward revision of agricultural prices, farmers would only be playing into the hands of trading interests.

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Appendix 1. Commercialization of agriculture in the study villages.

Villages[1]		Percent of agricultural output sold	Has significant industry (+) or not (-)	Number of households	Value of agricultural output per cultivating household (Rs)	Area irrigated (%)
Kokkampalayam	(C)	88.5	+	646	13352	67.8
Kalangal	(C)	86.5	+	722	9405	44.8
Vadakalur	(C)	82.8	+	924	3791	14.1
Sirukinar	(C)	76.4	+	698	5815	28.3
Sholamadevi	(C)	72.5	+	763	14870	88.0
Rayalcheruvu	(A)	69.2	+	697	5463	56.6
Mugnalkhod	(B)	64.4	-	368	5579	61.5
Mulsavalgi	(B)	62.5	-	523	4112	17.9
Beluguppa	(A)	58.1	+	846	5866	2.6
Korapadu	(A)	53.5	-	366	8448	48.8
Gorindla	(A)	52.2	-	707	3018	9.9
Nandyal	(B)	50.9	-	111	4265	32.6
Sulibhavi	(B)	46.0	+	1020	1773	2.5
Chinnamushturu	(A)	38.9	-	190	2237	7.8
Kambagi	(B)	28.4	-	378	2328	6.9

1. Ranked in order of the level of commercialization of agriculture. (A) refers to villages in Anantapur district of Andhra Pradesh, (B) to those in Bijapur of Karnataka, and (C) to those in Coimbatore of Tamil Nadu.

Appendix 2. Impact of commercialization of agriculture on household income.

Villages[1]		Average income per household[2] (Rs)				Proportion of poor households (%)	CV in income per household (%)
		All	Cultivating	Marginal farmers	Noncultivating agricultural labor		
Kokkampalayam	(C)	7184	10917	5396	2782	71.3	298.9
Kalangal	(C)	7670	12707	2396	2780	53.3	185.0
Vadakalur	(C)	7205	7964	5045	3053	57.3	301.4
Sirukinar	(C)	4178	4921	1990	3393	44.3	64.7
Sholamadevi	(C)	5305	13094	10045	2760	78.5	113.3
Rayalcheruvu	(A)	3978	6410	1897	1759	82.2	282.4
Mughalkhod	(B)	4032	5075	2301	1808	79.5	125.4
Mulsavalgi	(B)	2980	3341	2704	1472	87.0	75.1
Beluguppa	(A)	3967	5590	2306	2094	79.4	80.2
Korapadu	(A)	5254	6514	2384	1833	80.0	159.6
Gorindla	(A)	2876	3187	3672[3]	1702	91.4	107.7
Nandyal	(B)	2726	2920	1586	1701	83.8	63.9
Sulibhavi	(B)	3171	3042	1332	2461	89.9	267.5
Chinnamushturu	(A)	2304	1645	777	2322[4]	92.6	47.9
Kambagi	(B)	2561	2661	2410	1616	96.8	69.1

1 Ranked in order of the level of commercialization of agriculture. (A) refers to villages in Anantapur district of Andhra Pradesh, (B) to those in Bijapur of Karnataka, and (C) to those in Coimbatore of Tamil Nadu.

2 From all sources.

3 Income of marginal farmers here was higher than that of average cultivating household, because of the involvement of the former in sheep husbandry, weaving, and trading.

4 Higher income than average cultivating household and marginal farmers in the village, because of involvement in quarry work and petty trading.

Food-Grain Market Integration in Northern Nigeria: Implications for Subregional Equity Concerns

Christopher L. Delgado*

Summary

Difficulties of the environment and an increasingly severe production problem in the West African semi-arid tropics are likely to lead to policies emphasizing production increases in the relatively high-potential microregions, to the possible detriment of nearby low-potential areas. It is argued herein that differential rates of technological progress will tend to produce greater income inequalities among microregions, in the medium run at least, the greater the degree of market integration among them. Furthermore, the type of equity-oriented production policy that might usefully be proposed for the lower potential areas also depends on the functioning of regional markets.

Analysts frequently do not have the detailed survey data at hand to directly evaluate market integration through examination of marketing margins. Where such data exist in the West African SAT, they cover only a few markets. This has led to widespread use of correlation coefficient analysis of price series to measure market integration, a practice that has been shown in previous literature to have severe drawbacks. This paper proposes an alternative method to correlation coefficient analysis, which nevertheless uses only price series data and some elementary knowledge of the seasonality of production. Weekly primary price series for millet and sorghum in 22 villages, and monthly secondary series for 15 major market centers in northern Nigeria, are emphasized in a case-study context. The conclusions show additional reasons for rejecting correlation coefficient analysis, support the position that useful (albeit second best) results can be had from the analysis of price series alone, and present evidence of millet and sorghum market integration in northern Nigeria. At best the evidence is mixed, and may be indicative of a number of useful policy directions for equity concerns.

Résumé

Intégration du marché des grains alimentaires au nord du Nigeria—conséquences pour la répartition equitable sous-régionale : *Les stress du milieu ajoutés au problème grave et sans cesse croissant de production dans les régions tropicales semi-arides ouest-africaines amèneraient vraisemblablement des politiques mettant l'accent sur l'augmentation de la production dans les microrégions à potentiel relativement elevé, au detriment éventuel des régions avoisinantes à potentiel bas. L'argument présenté dans cet article est que les taux différentiels de progrès technologique auront tendance à produire des inégalités de revenu plus grandes parmi les microrégions, au moins à moyen terme, au fur et à mesure que les marchés s'intégréront dans les microrégions. En outre, le type de politique de production visant à une répartition équitable qui pourrait utilement être propose pour les régions à potentiel bas dépend aussi du fonctionnement des marches régionaux.*

Souvent, des analystes n'ont pas à leur portee des données d'une enquête de détail afin d'évaluer directement l'intégration du marché par l'examen des marges de commercialisation. Lorsque telles données sont disponibles dans les régions tropicales semi-arides ouest-africaines, elles ne concernent qu'un nombre limité des marchés. Ceci a mené à un usage largement repandu de l'analyse de coefficient des corrélations de la série de prix pour évaluer l'intégration du marché, une pratique qui a été critiquee par les documentations précédentes pour ces graves inconvéniens. Cette communication presente une alternative à l'analyse de coefficient des corrélations, qui ne prend en compte,

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ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 1985. Agricultural markets in the semi-arid tropics. Proceedings of the International Workshop, 24-28 October 1983, ICRISAT Center, India. Patancheru, A.P.502324, India: ICRISAT.

néanmoins, que les données sur la série de prix et des connaissances élémentaires de la nature saisonnière de la production. Sont soulignées dans le cadre d'une étude de cas, la série de prix hebdomadaire primaire pour le mil et le sorgho dans 22 villages, et la série de prix mensuel secondaire pour 15 principaux centres commerciaux au nord du Nigeria. Les conclusions montrent des raisons supplémentaires pour rejeter l'analyse de coefficient des corrélations, soutiennent la position que des résultats utiles (bien que deuxièmes) peuvent être obtenus de l'analyse de la série de prix seule et présentent l'évidence de l'intégration des marchés du mil et du sorgho au nord du Nigeria. L'évidence, au mieux, est mélangée et pourrait indiquer plusieurs directives de politiques utiles à l'intention de la répartition équitable.

Introduction

Food-grain market integration is a well-worn topic in agricultural economics; studies in the West African Semi-Arid Tropics (WASAT) typically involve analysis of bivariate correlations among price series. The objective is usually to determine market efficiency in the tradition of "structure-conduct-performance" analysis of industrial organization theory (Harriss 1982).

This paper will argue that the degree of market integration, as represented by the interdependence of prices in several markets of a small subregion, also has important implications for equity concerns among microregions of the subregion, particularly under conditions of technological progress in environments of the type characteristic of the WASAT. For present purposes, "region" is taken as an ecological whole such as the WASAT, or some sizable part thereof. Subregion is an administratively or historically defined area, such as the central part of northern Nigeria. Microregion is understood as a smaller administrative unit presenting some homogeneous characteristics, such as an agricultural development project area.

First, the argument supporting the implications of market integration will be outlined. Second, existing literature on assessing market integration with less than ideal amounts of data will be briefly alluded to, with particular attention to northern Nigeria. Third, a case study for two microregions of the area will be presented. Evidence of market integration will be assessed using price series, but without the use of correlation coefficients. Some implications will be drawn for policy-oriented research on marketing and production in the region.

Food-Grain Market Integration and Subregional Equity in the WASAT

An emerging issue of great importance to food policy in the WASAT is the fundamental difficulty of the natural resource base. Soil may have half the clay content of the red soils of the Indian SAT, and half the water-holding capacity (Matlon 1983). The low cation exchange capacity is typical of highly fertile soils; potassium and trace element deficiencies and acidification are easily induced by intensified cropping (ibid.). Furthermore, the variability of soil, rainfall, and water resources is typically high even within microregions (Delgado 1979a). This is perhaps even more true in the WASAT than in the Indian SAT, owing to differences in topography (Matlon 1983).

The likely result of this fragile and variable environment for food production, in the context of a major and increasing food production deficit, is that policy will increasingly follow biology in efforts to increase regional food output. Policy interventions to promote technological change in grain production will be increasingly focused on higher potential areas. This will tend to occur not only across ecological zones, as in greater attention to the middle belt of Nigeria, but also within subregions. Villages with greater access to higher quality alluvial soils and with irrigation potential are likely to receive more government and donor attention than lower potential villages only 40 km away. If this scenario is correct, significantly different rates of technological progress are likely to apply to different villages even within relatively small geographical areas of the WASAT.

The implication of this for subregional equity depends principally upon four factors. First, the proportion of net food producers to net food purchasers determines the immediate relative impact on real incomes of a decline in food prices, other things being equal. Second, the functioning of the marketing system between the subregion in question and other subregions of the country will determine how local production increases have an impact on local food prices. If the demand curve faced by producers is relatively elastic in the short run, there may be relatively little impact. Third, the functioning of the marketing system within the sub-

region will determine whether declines in price in one village or microregion are transmitted to others. Fourth, the degree of mobility of factors of production in the lower potential areas will determine their capacity to adjust to a decline in food prices, and thus the ultimate impact of the latter on incomes.

In many areas of the WASAT, and in northern Nigeria in particular, it is reasonable to believe that the vast majority of inhabitants are net producers of the grain they eat, although they may both buy and sell grain and although crop patterns differ from year to year. There is little permanent landless labor and the vast majority of production occurs on peasant small holdings that grow their own food in addition to a small, and variable, surplus (Norman et al. 198[illegible]). Food grains may account for more than three-quarters of agricultural production in value terms on these small holdings. While the phenomenon of urban poor may exist in large cities, such as Kano and the capitals of the Sahelian countries, the poorer inhabitants of smaller towns in the WASAT tend to be closely linked to food-grain producers through strong redistributive kinship ties. Furthermore land is sufficiently abundant in most WASAT areas to allow an urban dweller the option to return to agriculture.

Even the functionally and ethnically distinct pastoralists of rural northern Nigeria—principally the Fulani—may not be net beneficiaries of lower food-grain prices, despite the fact that they are usually net food buyers. This is because of the very important forward linkages of food grain producer incomes with respect to demand for milk and meat products sold by the Fulani (Hazell and Roell 1983). Furthermore, the Fulani in guinea savanna areas are increasingly producing their own grain (Delgado 1979b, Van Raay 1975).

Thus there is considerable support for the view that higher food-grain prices in northern Nigeria tend to be relatively beneficial to the vast majority of the population in the area. The position that lower food-grain prices are on the whole detrimental to regional equity is reinforced by the conventional wisdom that coastal areas outside the WASAT are considerably better off than the northern areas and that poverty in West Africa is primarily a rural phenomenon (Gbetibouo and Delgado, in press).

There is considerable evidence that serious bottlenecks exist in the functioning of cereal marketing systems between northern Nigeria and the rest of the country, particularly when traditional systems are faced with new elements such as rapid technological change. Jones (1968) and Ejiga (1977) both found evidence of smoothly functioning marketing outlets for cowpeas, a cash crop in this instance, from the North to the South. But Jones found only weak correlation between northern and southern prices for millet and sorghum.

Weak marketing channels, perhaps aggravated by parastatal interference, are a particular problem when rapid technological change occurs. Seed-fertilizer technology, in conjunction with good weather and heavy provision of support services, was associated with increased maize production in the Funtua agricultural development project from 300 tons (short ton = 2000 lb) in 1975/76 to 57 300 tons in 1979/80 (Olayide and Idachaba 1983). Outlets for the increased production were not forthcoming, and local prices collapsed, a similar problem affected cotton prices in the same area (ibid.).

Cereals marketing systems within northern Nigeria have been studied by several authors, most notably in the present context by Hays (1977), and Hays and McCoy (1977). They find that intermarket and seasonal price spreads exceed distribution and storage costs. Bivariate correlation coefficient analysis of secondary monthly wholesale price data for 15 cities in northern Nigeria showed generally weak correlations, even when unadjusted for long-term seasonal trends (Hays 1977). However examination of price spreads on an average basis over years and of trader storage and sales patterns suggested that:

> Price differentials exceeding positive price spreads among markets did not result from planned manipulation under monopolistic or monopsonistic conditions but rather from imperfections inherent in the system, which made effective arbitrage in response to spatial price differentials difficult. Intermarket price spreads (both greater than, and less than, transfer costs) exist because erratic supply increases risks in intermarket arbitrage, dissemination of information on prices and supply in the various markets is inadequate and traders taking part in arbitrage within these markets are non-specialized. Consequently, traders develop contacts in certain areas to keep informed on market conditions and engage in trading in those areas. This results in competition in local areas or subsystems but lack of integration in the total network of markets (Hays and McCoy 1977, p. 191).

Thus we arrive at a fundamental *curiosum* of marketing work in the WASAT: surveys of trader activity show relatively modest margins and indicate generally competitive trader behavior within the natural and policy constraints imposed upon them, but low price correlations appear to suggest a low degree of market integration. Before exploring this further, we turn to the fourth element determining the impact of differential rates of technological progress on subregional equity: the mobility of factors of production.

Two sorts of mobility are relevant: that between areas experiencing technological change and those not experiencing it, and that within the lower potential areas themselves. To the extent that labor can migrate from low to high potential areas in response to technological change, as is the case with Rajasthan and Punjab in India, the negative impact of differential rates of technological progress on regional equity will be less. However, the beneficial effects within the low potential area of labor emigration may be considerably less in the relatively land-abundant WASAT as opposed to Asia, since the marginal productivity of labor in the former may still be close to average productivity. Of greater importance to subregional equity in the WASAT context is the mobility of factors within the lower potential areas. As technological progress increases, the regional comparative advantage of higher potential areas for a given commodity and regional inequities vis-a-vis lower potential areas will tend to be less; more resources in the lower potential areas can then be shifted to commodities other than the one in which their regional comparative disadvantage is growing.

In northern Nigeria, as elsewhere in the WASAT, farmers appear to be quick to take advantage of new opportunities by shifting land, labor, capital, and management resources among crops and increasing total resource input to farming (Norman et al. 1981). However, it is usually assumed that farmers wish to be self-sufficient in food grains, an assumption borne out by the high proportion of total holdings under these crops, often to levels beyond that suggested by profit maximization (e.g., Delgado 1979a). Research shows this to be the case in northern Nigeria; on average 70% of holdings in the zones north of Zaria are devoted to food crops (Balcet and Candler 1981). Furthermore, farmers in the region are reluctant to abandon food self-sufficiency even where they are clearly able to rely on the market to assure food supply, as in the case of the wealthier Hausa farmers (ibid.). In one case at least, an additional survey showed that this reluctance stems not just from risk considerations, but also from obligations within the extended family to supply grain (ibid.). It is plausible that a microregion—that is saddled with a growing regional comparative disadvantage in grain production owing to rapid technological progress elsewhere—will show considerable resistance to switching resources out of grain production beyond a certain point into cash crops (groundnut and cotton) or nonagricultural pursuits, although the reverse process might work quite smoothly.

The implications of differential rates of technological progress in food-grain production within WASAT subregions, and specifically within rural northern Nigeria, may now be assessed in the light of the above hypotheses concerning the relative importance of food-grain production in total economic activity, the functioning of market systems within and between subregions, and the willingness of farmers to abandon food-grain production in areas with lower potential. Other things being equal under these conditions, the greater the degree of market integration *within* subregions, the greater will be the divergence in mean real incomes between farmers in the areas of the subregion undergoing rapid technological change relative to those who live in lower potential rural areas of the subregion. Since food-grain producers with small land holdings constitute the vast majority of the subregional population, the same proposition holds true for subregional equity among locations.

The argument hinges upon the effects of technological change upon local prices and how these changes are transmitted to other areas within the subregion. Given poor marketing links with areas consuming food-grains outside the subregion, rapid growth in food-grain output in high potential areas is likely to be associated with falling local food-grain prices, as it happened in areas of northern Nigeria during 1979/80. However, producers in the high potential zones are most likely still better off than before in absolute terms. This is because higher production in the short run, and the ability to switch some resources into nonfood activities in the medium run, still allows them to expand food output. But producers in the low potential zones are likely to be worse off. Even if output has not increased, food prices will fall if the market in low potential areas is integrated with that in high potential areas. In the medium run, the decline in income in low potential areas could be offset by switching to nonfood crops by developing their evolving com-

parative advantage in that area. However, if food security considerations and traditional obligations seriously slow down this transition, producer incomes in the area may fall absolutely.

If markets within the subregion are not integrated—in the sense that price declines in high-potential zones are not transmitted to lower-potential zones within the subregion—then a two-sided effect will tend to reduce income disparities between the two areas of the subregion. First, incomes in the higher-potential area will be relatively lower, since poor marketing outlets for expanded production outside the subregion will be compounded by poor marketing outlets within the subregion, leading to lower food prices than would be the case otherwise. Second, producer incomes in the lower-potential regions will be relatively higher, since presumably local food prices will be higher than they would be if subregional markets were integrated.

Clearly in both scenarios, the solution to improve aggregate subregional income is to improve marketing outlets with areas outside the region. However, equity-oriented policies towards the lower potential areas should be substantially different depending upon the degree of market integration within the subregion. If subregional markets function smoothly, market policies should seek to promote those additional factors that will help producers in the lower-potential areas to increase their incomes. They can do this by purchasing lower-priced food and securing the wherewithal to do so by cultivating noncereal crops. This could mean emphasizing grain legume production, livestock, groundnut, or cotton. Better access roads and market information would permit the marketing system within low-potential areas to better serve farmers there, thus reducing the constraint on food production.

If subregional markets are not integrated, then the equity-oriented policies outlined above are not likely to work. Farmers in the lower potential areas will want to continue to maintain the status quo with respect to food production. Direct policy intervention may be needed to promote market integration with the higher-potential areas at the same time as promoting other activities. Furthermore, research in the Indian SAT suggests that government may not be able to rely upon the private sector to provide rural services (input supply, transportation, marketing, etc.) in the lower-potential areas to the extent to which they would be if economic activity in the subregion was well integrated (Wanmali 1983). The overall implication is that governments with equity concerns will have to play a relatively stronger interventionist role in the lower-potential areas if markets are not well integrated with the higher-potential areas. More generally, the regional equity problem under differential rates of technological change is less noticeable in the short run and becomes more intractable in the long term.

The preceding analysis hinged upon the absence or presence of market integration within the subregion, and was characterized by all the qualifications of multihanded speculative economics in the absence of primary data.

Case Study of Food-Grain Market Integration in Northern Nigeria

A case study of subregional food-grain market integration was conducted in an area of northern Nigeria undergoing technological change, based upon new field data. The settings for the study are the contiguous agricultural development projects of Funtua and Gusau, some 80 to 240 km northwest of Zaria in northern Nigeria.[1] The projects were implemented with World Bank assistance over the period 1976-80, and were designed to promote agricultural development through provision of infrastructure, inputs, rural services, and improved seed-fertilizer technologies. The average growth rate in food-grain production was 5% during the project period in the Funtua project, with a lower rate of growth in the drier Gusau.

The Funtua and Gusau projects comprise 7500 and 3800 square km respectively, with average population densities of approximately 70 to 90 inhabitants per square km. Roughly half of the land is under crop production. Rainfall is unimodal, ranging from 1200 mm in 160 days in the southern part of Funtua to 800 mm in 130 days in the northern part of Gusau. Typical farms are 2 to 4 ha, and there is very little irrigation. One-fifth of farm labor input is hired labor, and 60% of all labor goes to farming activities. Hired labor is typically provided by members of smaller farm households from farms within the project area. The main crops grown are sorghum in Funtua, and millet in Gusau. The two crops are grown in both areas and are

1 The description of the projects and the project areas draws heavily upon Balcet and Candler (1981), and Slade (1975)

staple foods. Major food crops account for roughly 70% of cropped area, a relatively low proportion by WASAT standards. Even large farmers prefer to be self-sufficient in sorghum and/or millet, and farm-level food security considerations are important.

An intensive monitoring and evaluation effort was put in place by the Nigerian Agricultural Projects Monitoring, Evaluation, and Planning Unit. Producer price surveys were begun on a weekly basis in mid-1976. Household heads were asked what the price was that they either received for a sale made the day of the interview or expected to receive. For the purposes of this study, a subsample of villages was designed to cover the period August 1976 to March 1978, on the basis of availability and continuity of data over the sample period.[2] This led to a subsample of 17 villages in Funtua and 5 villages in Gusau.[3]

It soon became apparent that seasonality was a major factor in considering both mean prices and their variance. Therefore the data set was subdivided into two harvest seasons (August to January) and one postharvest season (January to August).[4]

The result was a clean, comparable data set of farm-level prices for sorghum and millet over an 18-month period covering one postharvest and two harvest seasons for 22 villages, containing observations for each village and week. A total of 118 heads of household were sampled in the 22 villages, 33 of those sampled were from Gusau.

Assessing of Food-Grain Market Integration in Northern Nigeria

The present study proposes a simple methodology using well-known elements, which to the author's knowledge have not been put together before in this context (Delgado 1983). The approach is to decompose the variance of food-grain price into components.

The essence of the experiment is to isolate the random elements in food prices, having gotten rid of the seasonal time effects by deseasonalizing and eliminating the village effects on the hypothesis that the systematic interactions among village price series can be adequately represented as a constant mean price spread between each pair of points, with deviations *from the mean spread being random*. The hypothesis may be tested statistically. Should the test fail, markets in a given season in this case can be construed to exhibit systematic changes in prices that are different for each market. The existence of such divergent trends within a small space and time context is a clear indication of lack of market integration, even if the reverse is not necessarily true.

The first step is to remove from the data long-term trends and constant mean seasonal price spreads. Next, polynomial regressions were run separately by ordinary least squares (OLS) for each crop, village, and season to deseasonalize the data. It became apparent that prices had different distributions in different villages and that simple pooling of data across villages could lead to statistical bias. The pooled data for each crop, season, and project were run using generalized least squares (GLS) separately by project. Plots of the estimated prices with seasonal means removed are shown in Figures 1 and 2. The results were then used to test the hypothesis that residual variation around the mean seasonal price spread between villages is nonrandom (Delgado 1983).

Results of the tests show a striking dichotomy between the 1976/77 postharvest season and the two harvest seasons. Despite high variation in the raw data in the postharvest season, a common seasonal trend with constant average price spreads among villages cannot be ruled out. However, the reverse is true of the harvest season data. In seven out of eight cases, the hypothesis of equality of trends can be clearly rejected. The eighth case, concerning the 1977 harvest season for sorghum in Funtua is similar, even though the statistical results are not as strong.

Weekly Data Experiments in a Broader Time Frame

One interpretation of the weekly data experiments listed above is that they represent some particular

2 Some of the villages in each project were infrequently sampled, making their data unusable for present purposes. Only a few villages in Gusau were continuously sampled over the sample period.

3 The raw price data contained outliers due to errors. Observations that differed from the mean annual observation for the village in question by more than three standard deviations were, therefore, rejected on the basis that the probability of rejecting a valid observation under this procedure was less than one-ninth. Recalling Chebyshev's inequality, to wit that $P[(X-M) \geq K\sigma] \leq K^{-2}$, regardless of the distribution of x where x has mean M and variance σ^2. In practice, this led to less than 2% of the data being rejected as unreliable.

4 The remaining 10 weeks of data were not analyzed as they provided insufficient information on price behavior in the 1977/78 postharvest season.

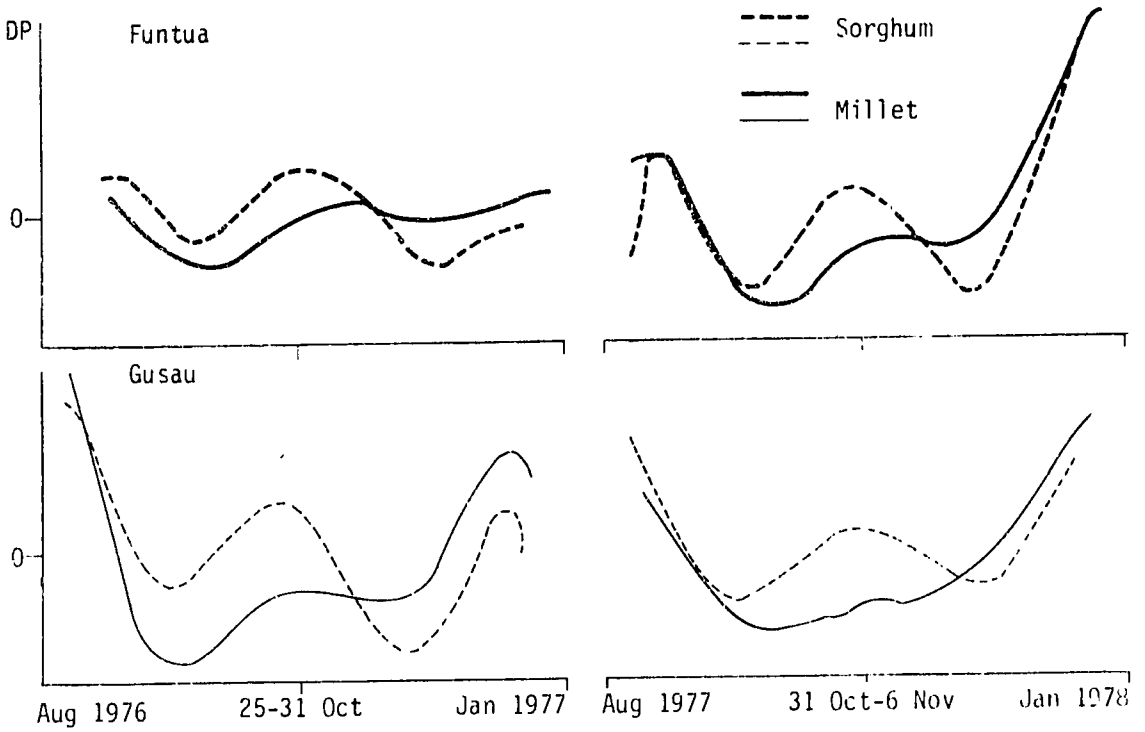

Figure 1. Estimated prices during harvest periods by village, with seasonal means removed

$(DP_{it} = \sum_{k=0}^{6} ph_{GLS} t^k)$

quirk of the August 1976 to March 1978 period. Therefore a similar experiment was run using monthly secondary wholesale price data for 15 cities in northern Nigeria (Hays 1977). A process whereby postharvest food price spreads are more typically variable than harvest season food prices would be consistent with the previous findings. Hays' monthly data covers the periods 1958 to 1965 and 1969 to 1971 and comes from Nigerian crop and weather reports. The country's history and a lack of data for the civil war years leads to a natural division of the data into three periods: 1958 to 1961, 1962 to 1965, and 1969 to 1971.

The essence of the monthly data experiments was to compute acceptable estimates of the variance of detrended food-grain prices in both the harvest and postharvest seasons of each year in the sample. The estimation procedure had to take account of the possibility that such variances differ.

The procedure used was to run OLS regressions for each period, using dummy variables for each month and a polynomial time trend (Delgado 1983). The residuals were used to estimate the seasonal variances. The latter were used to construct GLS weights in the usual manner and the regressions re-estimated for each market, period, and crop using GLS. The GLS residuals were retrieved and their variance estimated by season. Bartlett's tests—by crop and market at 0.05 significance level—were used to test for the equality of seasonal variances according to several possible combinations presented in Table 1. The experiments were conducted separately for each crop and market to avoid problems of pooling across markets.

The results strongly confirm the view that there are significant seasonal differences among the variances of the deseasonalized price series. For both crops in all markets, the null hypothesis of equality of variance across all seasons could be rejected at the 0.05 significance level. Virtually similar results were obtained when considering harvest and postharvest season variances separately over the 1958 to 1971 period, although the null hypothesis could not be rejected for 17% of the harvest season cases. When major time periods were considered separately however, a much greater degree of indeterminacy was obtained. For

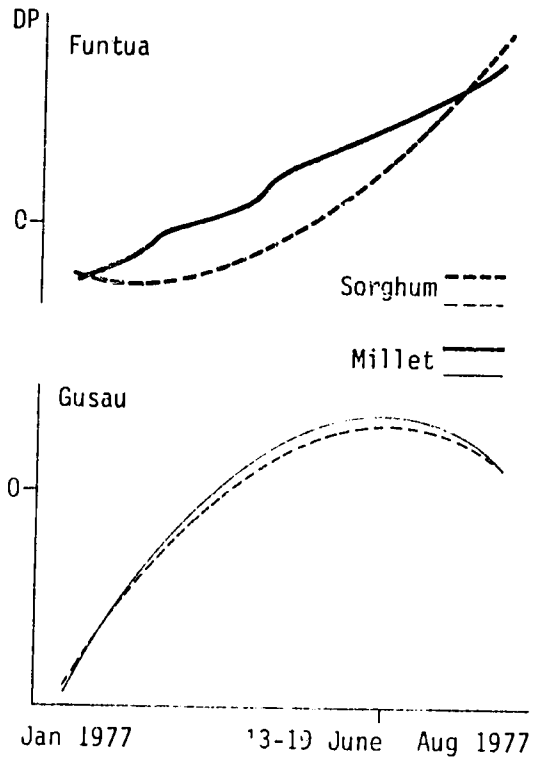

Figure 2. Estimated prices during the postharvest period by village, with seasonal means removed $(DP_{it} = \sum_{k=0}^{4} \hat{\gamma}_{k_{GLS}} t^k)$

example, the null hypothesis of equality among harvest season variances in the 1969 to 1971 period could be rejected in only 40% of the cases.

Finally, the hypothesis was incorporated that the occurrence of the Islamic festival season, defined for present purposes as beginning with the end of Ramadan (Id-al-Fitr) and ending with Id-al-Kabir (similar to Easter or Passover), was important for describing the *variation* in food-grain prices. This was done for two reasons. First, the weekly data for the harvest season exhibited an unexplained and substantial "bump" at the time of Id-al-Kabir (24 Oct 1976 and 13 Oct 1977). Second, this is a time of year when households may have nonpostponable needs for cash or food grains, leading to an increase in "sell-or-buy-it-at-any-price" type market activity.

The results in Table 1 show that seasons covering the festival season do not do better on the equal variance test, so also seasons that do not cover the festival period. However, the limitation of the experiment to harvest seasons that do not include the festival period led to the null hypothesis of equality being rejected in only 47% of the cases. Nevertheless, the seasons considered were concentrated in the third period of the sample time frame, and tests on equality of harvest season variances in third period alone did even better, as only 40% of the cases were rejected. The conclusion is that the harvest-postharvest season distinction is far more important for looking at the determinants of food-grain price variability than the festival-nonfestival period distinction.

Summary and Interpretation of Results

The weekly farm-level price data for August 1976 to March 1978 from Funtua and Gusau suggest three conclusions with respect to the price integration of local food-grain market systems in northern Nigeria. First, the differences in price behavior between Funtua and Gusau were sufficient to preclude pooling them jointly for consideration as a unified market system. Second, within each project, there are strong seasonal differences in food-grain market integration between the harvest and postharvest periods. Market integration is defined here as the existence of stable price spreads among markets in a given season, despite considerable variation in prices. Third, markets are clearly not well-integrated in Funtua or Gusau in the harvest periods. The reverse conclusion is not necessarily valid for the postharvest period, but at least the evidence is consistent with the hypothesis of market integration thus defined.

The monthly secondary wholesale data for 15 urban areas in northern Nigeria over the 1958-1971 period also suggest three conclusions. First, differences in variances among deseasonalized prices as between harvest and postharvest seasons tend to support the second point above on a market-by-market basis. Second, the monthly data suggest that there may be less stability among postharvest-season price variances over time than is the case for harvest-season price variances. This is not surprising, since over a time period, differences in production outcomes are likely to affect postharvest prices to a greater degree than harvest prices. Third, the monthly data do not support the view that relatively higher variability among villages in the 1976 and 1977 harvest seasons (as opposed to the 1976/77 postharvest season) can

Table 1. Incidence of rejection of null hypothesis of equal variances out of 30 possibilities.[1]

Null hypothesis about equality of variances	1958-1961 (%)	1962-1965 (%)	1969-1971 (%)	Pooled 1958-65, 1969-71 (%)
All variances	-	-	-	100
Harvest season variances	57	50	40	83
Postharvest season variances	53	70	67	100
Variances for all seasons that cover the Islamic festival period[2]	-	-	-	87
Variances for all seasons that do not cover the Islamic festival period[2]	-	-	-	100
All harvest season variances that cover Islamic festival period[2]	-	-	-	63
Harvest season variances that do not cover Islamic festival period[2]	-	-	-	47

1 15 markets for both millet and sorghum. Figures in the table refer to the percentage of cases where the null hypotheses of equality is rejected

$$\sqrt{\hat{\sigma}_i^2} \quad \left(\frac{1}{n-16} \right) \sum_{t} \left(P_{it} - \sum_{m=1}^{12} d_{im} - \sum_{k=1}^{4} b_k \, t^{k} \right)^2$$

where d_m are monthly dummy variables, t is a time trend, and the other symbols have their conventional interpretations

2 For present purposes, the Islamic festival period is defined as the period from Id-al-Fitr to Id-al-Kabir. This fell primarily in the postharvest season from 1958 to 1963, and in the harvest season from 1964 to 1971

be explained by the occurrence of the Islamic festival season during the 1976 and 1977 harvests.

The implication of the combined results for research on food-grains market integration in northern Nigeria, and perhaps in the WASAT as a whole, is that analysts should focus on factors that vary between the harvest and postharvest seasons. The variables that spring to mind in this regard concern differences in: (a) volume of sales and purchases; (b) the frequency, size, and variability of market presentations; (c) market agents and the destination of grain traded; and (d) characteristics of food grains sold.

Possible seasonal differences in the "thinness" of village markets immediately spring to mind in the current context. Hays (1977) reports that roughly half of the sales of grain by smallholders in his 1970-71 marketing survey occurred in the period corresponding to the postharvest season. The corresponding figure for sales by larger farmers was 70%. Data presented by Sherman, Koré, and Coulibaly at this conference for three separate areas of the WASAT are roughly consistent with these findings. Although far from conclusive, the data in no way suggest that sales are concentrated in one season or the other. Further research should investigate the possible concentration of farm-level purchases of grain.

One of the most plausible explanations of seasonal differences is the one suggested by Hays (1977) and still largely unstudied. This is the hypothesis that grain transactions in rural areas in the harvest period are to a greater extent among farmers than is the case in the postharvest season. If true, the implication is that traders in the postharvest season play a relatively greater role in transmitting price signals among villages.

Finally, the factors underlying the "bumps" in the harvest season price trends of Figure 1 are complex and interesting. Under standard assumptions

of economic behavior, such bumps should not occur. One explanation is the occurrence of religious festivals at the peak (1976 and 1977). Another explanation might be distress sales in the first trough after the early millet harvest, followed by withdrawal once immediate cash needs are met. The most likely explanation is that two kinds of grain—old and new—are being sold during the harvest period, without being differentiated by price but differentiated by the consumer. When the harvest is good, farmers rush to sell off the old grain in store, which may lose considerable value when the new crop is in. Thus the first trough possibly measures the price-depressing effects of the early millet harvest compounded by the selling of old sorghum; the "bump" occurs as more valuable new grain replaces old grain in the market, and the second trough occurs as the full new harvest takes effect. The mix of new and old grain in each village is probably quite different, leading to apparent variation in geographic price spreads, when in fact different commodity bundles are involved.

The resolution of the relative importance of distress sales and the changeable characteristics of market commodities at harvest time awaits rigorous field work, and is a neglected area of research in the WASAT. It is intriguing to note that approximately one-third of the yearly wholesale urban price series for millet and sorghum reported by Hays (1977) for 15 markets in northern Nigeria (a total of 330 series), exhibit the October-centered "bump" of Figure 1. Clearly a better understanding of the mechanics of seasonal price processes in the harvest season is crucial in understanding the scope for improving market integration by policy intervention.

Conclusions for Subregional Equity Considerations

Seasonal differences in food-grain market integration in the price sense are consistent with the finding by Hays and McCoy (1977) that traders' margins are not, on the whole, excessive in the spatial or temporal sense, yet monthly price correlations over years are low. The implication for locational equity concerns is that markets will not necessarily transmit supply-induced price increases between high and low potential microregions in the six months following the first harvest, the period in which prices are relatively low. In other words, farmers in the low-potential areas may not be able to rely upon technological change in high potential areas to improve their food supply, at least not to the same extent that they could if markets in the two microregions moved in tandem.

The policy implications of this for subregional equity concerns is that efforts to move farmers in lower-potential areas out of food-grain production into noncereal production pursuits will not—and possibly should not—be successful. Farmers in the lower-potential microregions will probably stick with an occupation in which they have an increasing comparative disadvantage relative to the higher-potential food-grain producing areas of the subregion.

The best means to get around this appears to be intervention to improve direct market integration. This would presumably permit farmers in the lower-potential area to take advantage of cheaper grain as consumers, while producing other commodities. However, such tempting intervention should not be undertaken without a better understanding of the processes underlying the apparent lack of market integration, i.e., the high local variability in harvest-season food-grain prices.

If this higher variability is because of distress sales following the harvest period, policies relating to alternative credit sources for target groups, and financial interventions generally, may be the appropriate means to promote both improved equity and efficiency. This is different from the interventions usually proposed: market infrastructure, information, and provision of road links. On the other hand, if the higher variability is owing to erroneously classifying several commodities as one (e.g., various combinations over time of last year's late millet, this year's early millet, this year's late millet, humid and dry grain, etc...) then the poor price correlations observed may be owing to inappropriate and misleading price data. It is likely that this variation in the characteristics of what is being sold—and not adjusted for in the price series—is much greater in the harvest than the postharvest period. This would explain research results showing both competitive market behavior and poor price correlations.

In any event, resolution of the question awaits rigorous field research that concentrates on the August-January period. Such research needs to pay particular disaggregated attention to the characteristics of buyers and sellers on the one hand, and the grains bought and sold on the other. In particular, it should pay attention to seasonal differences in these variables.

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Market Forces and Erosion of Common Property Resources

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Summary

Common property resources constitute a significant component of the agricultural resource base in rural areas of developing countries. Broadly speaking, the common property resources (CPRs) are those that are utilized jointly or individually by the members of the community (with or without usage charges), without any exclusive individual property right on them. In the context of Indian village communities, CPRs include: village forests; community pastures; wasteland; community threshing grounds; river/rivulet banks and beds; watershed drainages, ponds, tanks, and groundwater; etc. The CPRs directly or indirectly play an important role in enhancing and stabilizing the income, employment, and sustenance of village communities. However, under the pressure of circumstances, the CPRs have been declining and deteriorating rapidly during recent decades. Institutional changes, increased pressure on land, and free play of market forces seem to be the primary factors behind the decline of CPRs. This paper, after highlighting the contribution of CPRs to village income, presents evidence on their erosion. Factors contributing to this erosion are discussed with the help of village-level data from selected areas of Rajasthan and Madhya Pradesh in India. The role of market forces in the process is described.

Résumé

Forces du marché et disparition des ressources des propriétés communes : *Les ressources des propriétés communes constituent une importante composante de la base des ressources agricoles dans les régions rurales des pays en voie de développement. En gros, les ressources des propriétés communes sont celles qui sont exploitées conjointement ou individuellement par les membres de la communauté (sans ou avec frais d'utilisation), sans aucun droit exclusif de propriété individuelle sur elles. Dans le cadre des communautés villageoises indiennes, les ressources des propriétés communes comprennent : forêts du village, pâturages de la communauté, jachères, terrains de vannage de la communauté, rives et lits des rivières/ruisseaux, bassins-versants, étangs, réservoirs et nappe phréatique, etc. Les ressources des propriétés communes jouent un rôle significatif soit direct soit indirect en augmentant et stabilisant le revenu, l'emploi et les moyens de subsistance des communautés villageoises. Cependant, sous la pression de la conjoncture des circonstances pendant les dernières décennies, les ressources des propriétés communes diminuent en ampleur et se dégradent rapidement. Des changements au niveau d'institut, la pression accrue sur les terres disponibles et le libre jeu des forces du marché semblent être les principaux facteurs de leur diminution. Après avoir souligné la contribution des ressources des propriétés communes au revenu du village, l'auteur met en évidence leur affaiblissement. Les causes contribuantes de cet affaiblissement sont examinées à l'appui des données à l'échelle villageoise des régions sélectionnées du Rajasthan et du Madhya Pradesh en Inde. Le rôle des forces du marché mises en jeu dans cet affaiblissement est décrit.*

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Introduction and Summary

Common property resources (CPRs) constitute a significant component of the agricultural resource base in the rural areas of developing countries. Broadly speaking, common property resources are those that are utilized jointly or individually by the members of the whole village community (with or without usage charges), without any exclusive individual property right on them. In the context of Indian village communities, the CPRs include: village forest; community pasture; wasteland; community threshing grounds; river/rivulet banks and beds, watershed drainages, ponds, tanks, and groundwater; etc. CPRs directly or indirectly play an important role in enhancing and stabilizing income, employment, and sustenance of village communities.

Both the quantity and quality of CPRs has deteriorated rapidly in the recent past. Institutional changes, particularly changes following land reforms in the early 1950s, and the free play of market forces seem to be the primary factors behind the decline of CPRs. This paper describes the contributions of CPRs and highlights the role of different factors responsible for their erosion. The role of market forces and the effects of improved market infrastructure, which increased prices and profitability of CPR-products and helped to accentuate the degradation of CPRs, are discussed. The analysis is based on village-level data from selecteo districts in Rajasthan and Madhya Pradesh (MP) states of India.

The Approach and Data

Rajasthan and MP, with 75 and 94 persons per square km respectively (compared with 173 for India), are not only among the regions with the lowest population density in India but also have considerable area in CPRs. According to 1979-80 statistics, the CPRs—including grazing lands, wasteland, permanent fallows, and forests—account for 45 and 50% of the total geographical area of Rajasthan and MP, respectively. The corresponding figure for other states, excluding Orissa and the northern and northeastern hill states, hardly exceeds 35%. Because of high rainfall and better soils, CPRs are more productive in the study areas of central MP than in the sandy and arid study areas of western Rajasthan. The relative importance of specific CPRs also changes accordingly. The change in the status of CPRs and forces underlying their decline are indicated by comparing data for 1953-54 and 1982-83. The cropping year 1953-54 is chosen mainly because it marks a watershed in the agrarian history of the two states. During 1951-54, an ambitious land reform program was conceived and initiated, following the 1949 report of the Rajasthan and Madhya Bharat Jagir Enquiry Committee. The impact of land reform activities started being visible after 1953-54 (Singh 1964). Since the CPRs first suffered from the backlash of progress of the land reforms program, 1953-54 is treated as a starting point for comparative analysis. Initiation of land reforms being a major event in the history of the villages, it offered a useful reference point to elicit information from knowledgeable and elderly villagers through recall. Furthermore, the slow and gradual development of rural areas, particularly in transport and communication, related infrastructure, and links with town-based market structure, started only after 1953-54, when the early land reforms phase was carried out.

The data for selected villages from districts of Nagaur, Jodhpur, and Jaisalmer in Rajasthan were collected in several stages from 1963-64 to 1982-83 (Jodha 1985). The data from villages of Raisen and Vidisha districts of MP were collected during 1982-83 under ICRISAT's ongoing village-level studies (Singh et al. 1983) and by ad hoc data-gathering under the research project on "Role of Common Property Resources in Traditional Farming Systems" (Jodha 1982a). The data presented in the paper are from three sources: (i) data relating to whole villages were collected largely from village records and revenue documents with the help of village panchayat (elected village council) and patwari (village-level revenue official); (ii) data relating to village-level marketing and prices were collected from records of traders and through recall from knowledgeable village elders; (iii) data relating to individual families were collected from sample households. Besides these quantified details, qualitative information from the study villages is also presented in the paper.

Contribution of CPRs to Rural Community

Before discussing the decline of CPRs and causes thereof, it will be useful to comment on the direct and indirect contributions CPRs make towards income, employment, and sustenance of rural

communities. In the following discussion we list and describe the possible benefits from CPRs. As far as possible, the benefits have been quantified.

Benefits from CPRs

CPRs generate income directly through the provision of physical products, by supplementing income and employment, and in the form of social gains; CPRs also contribute to the productivity and stability of farming systems. The ways in which these benefits and contributions emanate from different CPRs are described below (see also Table 1).

Fodder supply, grazing space, and land saving for crops. To the extent CPRs (through supply of fodder and grazing space) partly sustain the farmer's draft and milch stock and other animals, they help in retaining land for crops which, in the absence of CPRs, would have to be used for fodder production. Alternatively, in the absence of CPRs, the farmer would be forced to reduce his livestock to a level permitted by his own feeding resources. In either case, resource availability for private property resource-based (PPR-based) farming would have declined. Such a resource-saving contribution of CPRs is very important, especially for small and medium farmers, who already have too little land to be spared for animals. For instance, in the study areas of Rajasthan mentioned above, the households having land up to 5 ha had 4 to 12 animal units per ha; those with 10 to 15 ha of land had 1 to 3 animal units per ha (Jodha 1985).

Off-season land availability from river/tank beds and availability of irrigation water. The CPRs' resource-augmenting role in PPR-based farming systems is obvious when we look at the beds of dry tanks, or river/rivulet beds, which are used for off-season cropping. Crop irrigation is car-

Table 1. Benefits from common property resources in villages.

Benefits	Contributions to farming systems[1]	CPRs[2]						
		A	B	C	D	E	F	G
Physical products								
Food	e,c	+[3]		+				
Fodder	a,c,d,e	+	+			+		
Fuel/timber, etc	a,e	+	+	+		+	+	
Water	b,c,d				+	+		+
Manure/silt/space	b,c	+	+	+			+	
Supplementary income/employment								
Off-season activities	e,d	+				+	+	
Drought period sustenance	d	+	+				+	
Addl. crop activities	b,d			+	+		+	+
Addl. cattle	b,d	+	+					
Petty trading, handicrafts	d,c	+					+	
Social gains								
Resource conservation	f	+	+					
Drainage/recharge of groundwater	f,d,b			+	+	+		
Sustenance of poor	e							
Stability of farming systems	-	+	+	+				
Renewable resource supply	a,b	+	+	+				+
Better microclimate/environment	d	+	+		+			

1 The benefits can be looked at as contributions to PPR-based farming systems and can be classified under categories (a) resource saving for CPR-based farming systems, (b) resource augmentation for farming systems, (c) fuller use of environment, (d) seasonal buffer and stability of farming systems, (e) rural equities and nutrition, and (f) importance in resource-centered technology

2 CPRs: A = Community forest, B = Pasture/wasteland, C = Pond/tank, D = River/rivulet, E = Watershed drainage/riverbank, F = River/tank bed, G = Groundwater

3 + indicates applicability or incidence

ried out by lifting water from rivers/rivulets or ponds and by the use of groundwater (recharged through percolation tanks).This augments both the area under crops and the cropping intensity of the cultivated area.

Support to integrated activities for fuller use of the environment. In dry-farming areas, traditional farming systems partly derive their stability and viability by making fuller use of a highly variable agroclimatic environment.In doing so the farmer uses crops, livestock, and trees/bushes (the latter being less sensitive to temporal variability of rains) as integral components of his production strategy.The CPRs, particularly village forests, grazing lands, rivulets, and watershed drainages play a significant role in this strategy.

Seasonal buffer and stabilization effects during droughts. Due to the seasonality of crop production and periodic droughts, CPRs cushion dryland farmers' welfare during crisis periods.They are sources both of physical supplies (of food, fuel, fodder, etc.) and of income and employment, especially for relatively poorer households (see Table 2).

Contribution to rural equity and nutrition of poor. Rural inequalities generated by PPR-based farming systems are partly reduced by CPRs as the labor-intensive activities to harness most of the CPRs (except irrigation water) are usually performed by the poor. Petty trading and handicrafts based on CPR-products (e.g., basket-making, *beedi*-making) are additional sources of income

Table 2. Dependence on common property resources (CPRs) by indicated categories of rural households in selected villages in Rajasthan and Madhya Pradesh.[1]

	Categories of households			
	Rajasthan villages		Madhya Pradesh villages	
Indicators	Labor, small farmer	Large farmer	Labor, small farmer	Large farmer
Households (no.)	58	33	40	20
Households (%)				
— meeting > 70% grazing requirements from CPRs	97	24	82	25
— collecting food material from CPRs	41	3	77	0
— collecting fuel from CPRs	86	0	98	0
— collecting fodder from CPRs	36	3	55	5
— collecting timber, silt, etc., from CPRs	12	36	10	45
— obtaining supplies and wage employment from CPRs during drought	69	0		-
- using CPR water for irrigation (%)	0	9	0	15
— consuming only CPR-food items that were collected and not purchased[2]	39	0	50	0
CPR based income as proportion of gross income per household (%)[3]	42	15	-	-

1 Source: See note 1, Table 3. Information for villages of Nagaur, Jodhpur, and Jaisalmer districts of Rajasthan is pooled here.
2 Include a variety of food items indicated by Table 8.
3 The gross CPR-based income includes value of CPR products collected and 50% of the gross income from livestock raising. Comparable details for Raisen district (MP) are yet to be analyzed

Table 3. Some indicators of extent of benefits derived from selected CPRs by sample households in selected villages of Rajasthan and Madhya Pradesh.[1]

	District			
	Nagaur	Jodhpur	Jaisalmer	Raisen
Sample households (no.)	56	52	48	80
Animal units grazing days contributed by CPRs (%)	88	97	95	67
Direct employment days per household (no.)[2]	71	58	42	60
Direct employment days per active worker (no.)[2]	32	21	19	28
Gross value of CPR products collected per household (Rs)[3]	285 (10.6)	301 (12.8)	219 (9.9)	426 (10.8)
Free irrigation from CPRs (rivulets) as proportion of gross irrigated area (%)	Nil	2	Nil	92[4]

1 Source: For Rajasthan villages (in Nagaur, Jodhpur, Jaisalmer) Jodha 1982b; Madhya Pradesh (Raisen) villages Jodha 1982a (Rajasthan data are for 1963-65, MP data are for 1982-83)

2 Includes only days spent on fodder and fuel collection and animal grazing in the case of Rajasthan villages. In Raisen villages, grazers' employment days are not included. Only days spent collecting a large variety of CPR products are considered. All employment is expressed in man days

3 In 1982-83 prices. Figures in parentheses indicate CPR income as percentage of gross income per household. The figures for the first three areas would exceed 30, 36, and 48%, if half of the livestock income in these villages is added to CPR income. For Raisen villages the proportion of CPR income to gross household income is tentative, based on preliminary analysis.

4 This information for Raisen relates to 10 villages based on village records. Irrigation is by lifting water from rivulets. Total irrigated area is about 250 ha

and employment for the poor. The CPRs' contribution to the poor man's nutrition is well-recognized; through their food-gathering activities in forests, ponds, etc.,the poor consume a number of items rich in food value (Jodha 1982b) (see Table 2). Data collected through detailed diet surveys in selected villages of semi-arid tropical areas in peninsular India (Ryan et al. 1984), have revealed that CPR-products constitute 8 to 9% of the total diet of labor and small-farmer households.The corresponding extent was around 4% in the case of large farmers.

Importance in resource-based prospective technologies. In the prospective technologies involving soil-moisture conservation, supplemental irrigation through runoff collection, use of seasonal rivulets and integrated use of runoff collection and percolated water in the watershed context, the management of CPRs may prove a crucial factor for PPR-based farming systems.One example is integrated management of watersheds involving social forestry, agroforestry, grassed waterways, and other provisions for water harvesting and drainage to facilitate optimum use of the environment for crop and livestock production, as revealed by the dry-farming operational research project at Indore (Anon 1980).

Extent of Benefits: Quantified Evidence

Indicators of the actual extent of benefits from selected CPRs derived by sample households in the selected areas are presented in Table 3. Most of the grazing (expressed in terms of animal unit grazing days) in selected villages was done in CPRs.The contribution of CPRs ranged from 67% in the Raisen (MP) villages to 88 to 97% in the arid villages of Rajasthan.CPR product collection (including animal grazing in the Rajasthan villages) generated direct employment of 42 to 71 man days per household in different areas.This excludes the indirect or second-stage employment in terms of processing and/or marketing of the products.Nor does it consider the extent of employment when

CPR-product collection was done incidentally, when the workers' main employment was on other farm activities.CPR-product collection generated direct employment for 19 to 32 man days (of 8 hr or more).Most of the labor engagement in CPR-product collection is during the summer period, when alternative employment opportunities are limited, or when other wage employment is not available, or when the soil is too wet for work in the field.The average per household gross value of CPR products collected was Rs 426 in the Raisen villages.The corresponding figures (after adjustment for price rises between 1963-65 to 1982-83) ranged from Rs 219 to 301 in the Rajasthan villages.The inclusion of more variety and some high-value CPR-products (such as gum, honey, fruits, spices, fish, and game) led to higher gross income from CPR products in the Raisen villages.The only input in collection of CPR products was family labor, but the income from such collection constituted about 10 to 12% of per household gross income from all sources.In the Rajasthan villages, even if 50% of income from livestock is attributed to CPRs (because of excessive dependence on CPR grazing), the share of CPR-based income in gross income per household would become 30 to 48% in the different areas.

Furthermore, as indicated by Table 2, the CPR-based income constituted 42% of per household gross income of labor and small farmers in the villages of the three Rajasthan districts pooled together.The corresponding figure for large farmers was 15%. Table 2 gives further details about relative dependence of poor (labor and small-farmer) and rich (large-farmer) households on CPRs.The low extraction cost, labor-intensive CPR-use activities, such as gathering of food, fuel, and fodder were largely undertaken by the poor. Because of their higher usage cost, some CPR-based activities, such as irrigation from groundwater or surface flows of rivers/rivulets, were confined to large farmers who had higher capital resources.The income from CPR use in such cases was much higher than any other CPR-based activities.

Erosion of CPRs

Three Forms of Erosion

The valuable role played by CPRs in the economy of rural areas, has been seriously threatened in recent decades, for a variety of reasons. Decline or erosion of CPRs in the study areas has taken three forms: (a) Shrinkage of physical area of CPRs; (b) Legal restriction preventing use of CPRs; and (c) Degradation or deterioration of the production potential of CPRs.

Of the three forms, the first two are easy to illustrate and quantify with the help of land-use statistics in different areas. The decline of CPRs owing to factors (a) and (b) is illustrated using village-level evidence from selected areas of Rajasthan and MP.The extent of degradation can be and has been illustrated with the help of some indirect indicators.

Shrinkage of CPR area. The area of CPRs has declined mainly because more and more land has been given to private ownership. Under land reform programs and other welfare schemes, considerable area of CPRs has been converted into private property and has been distributed to individuals. Besides, the unchecked illegal grabbing of CPR lands for private use has reduced the area of CPRs. Such grabbing of CPR areas is encouraged by the fact that the state does not have firm measures against it. At the tehsil or taluka level (subdivision of district), those illegally possessing CPR areas are punished by an amount of fine which is much smaller than returns from private use of CPRs. After 3 to 5 years of such punishment, the officials take a lenient view of the situation and illegal possession is formally legalized.

Two side issues relating to privatization of CPRs may be mentioned at this stage. The first issue relates to productivity gains through privatization of CPRs. To the extent that better management and higher productivity are achieved after transfer of CPR lands to private individuals, the change may prove beneficial to society. However, such productivity gains are quite doubtful in view of the fact that CPR lands are often submarginal lands and are suited for natural vegetation rather than crop raising. The privatization of CPRs encourages cropping on these lands, which reduces their productivity. At least in the arid zone of western Rajasthan (comprising 11 districts) the increased area under crops, following transfer of CPR lands to individuals, led to corresponding decline in the yield of all major crops during two decades following the land reforms (Jodha 1982c).

The second issue relates to the equity and welfare consequences of privatization of CPRs. This could be a real possibility if CPR lands are distributed to the landless and poor. However, one is not

sure about how much poor people—the major users of CPRs—collectively lose or gain through individual acquisition of low-productivity parcels of land. Furthermore, as Jodha (1985) reported, all those legally or illegally acquiring CPRs as private lands are not the poor. In the study villages of Nagaur and Jodhpur districts in Rajasthan, 59 to 62% of privatized CPR lands went to those who already possessed 10 to 15 ha or more of land. The share of the landless in such land distribution ranged from 11 to 13% only. Furthermore, over 90% of the good quality CPR lands went to this category of large farmers, while the landless did not get any share of these good lands.

However, these and other consequences of privatization of CPRs need further study.

Legal restrictions on use. Under yet another set of arrangements, CPRs are classified as CPRs in land records, but their usage by people is legally prevented. Rather than allowing people to use CPRs, the government or village panchayats have resorted to the system of auctioning the use of CPRs to contractors and thereby generating revenue for the exchequer. The auction is often done for a specific period. Collection of CPR products—fuel, fodder, wood, leaves, fish—usage of dry riverbeds, etc., are restricted by such an arrangement in various villages. The villagers often work as laborers for the contractors in exploiting the CPRs.

Auctioning is often resorted to in the case of CPRs that are still highly productive, and government finds them rich sources of additional revenue. Once CPRs are degraded by overuse and fail to attract contractors, they are returned for free public use.

Degradation. The consequence of physical and legal shrinkage of CPRs is the reduced availability of CPRs per user, leading to overcrowding of the remaining CPRs. Overuse of CPRs is also because of complete disappearance of provisions like taxes, penalties, and various regulatory measures against misuse of CPRs following land reforms (Jodha 1985, Singh 1979). Similarly, CPRs auctioned to contractors are also overexploited, since the contracts are for fixed periods and there is no check on overuse.

These institutional factors have accentuated the overexploitation of CPRs, which has resulted from the secular growth of human and livestock population depending on the CPRs in these areas, as elsewhere in the developing world (Pant 1983, Mann and Kalla 1977, Sandford 1976). The third factor, namely market forces, accentuating the degradation of CPRs is discussed later in this paper.

Quantified Evidence on Decline of CPRs

The village-level data indicating shrinkage of physical area of a few CPRs, along with their increased overcrowding by livestock, are summarized in Table 4. Data taken from relevant village records

Table 4. Decline of CPR[1] area in selected areas of Rajasthan and Madhya Pradesh between 1953-54 and 1982-83.[2]

Area (district, state, and no. of villages)	1953-54		1982-83	
	CPR (%)[3]	Animal units/100 ha	CPR (%)[3]	Animal units/100 ha
Nagaur (Rajasthan, 2)	43	38	14	68
Jodhpur (Rajasthan, 2)	38	42	16	73
Jaisalmer (Rajasthan 2)	67	12	48[4]	19[4]
Raisen (Madhya Pradesh, 10)	27	43	6[5]	58
Vidisha (Madhya Pradesh, 8)	32	46	8[5]	62

1. Includes village pasture, wasteland (including riverbanks and catchments of tanks) and village forest land. It excludes forest lands under government control, particularly in Madhya Pradesh.
2. Source: Data collected from village records and other revenue papers.
3. Expressed as % of total land area of the selected villages.
4. Relates to 1963-64 and 1964-65.
5. This excludes the areas of CPRs the public use of which is legally restricted by government or panchayats in Madhya Pradesh. Their extent varies from 2 to 5% of total area in different villages.

and revenue records at two points of time are presented. As explained earlier, the first period (1953-54) corresponds to the years before comprehensive land reforms programs were able to make their impact on land usage. Hence this reflects the position of CPRs (i.e. proportion of their area to total geographical area of villages) before large-scale conversion of CPRs into private ownership took place. The second point in time (1982-83) represents present conditions. Though the rate of legal conversion of CPRs into private property resources (PPR) slowed down with the passage of time, the illegal grabbing of CPRs by influential villagers continues (Jodha 1985). Similarly, legal restriction on public use of CPRs through their auction to contractors for revenue became more important over time as public authorities started exploiting every conceivable source of revenue.

According to Table 4 the CPRs—village pasture, wasteland including riverbanks, catchments of tanks, and village forest—constituted 27 to 67% of total geographic area of selected villages during 1953-54. This had declined to 6 to 16% by 1982-83; this excludes the Jaisalmer villages, for which data only for 1963-64 to 1964-65 are reported. As indicated by district-level data, the decline in area of CPRs during the decade following land reforms has been faster than the rate of growth of rural population in these areas. If Jaisalmer villages are again excluded, the pressure of livestock on the above CPRs has increased from 38 to 46 animal units per 100 ha in 1953-54 to 58 to 68 during 1982-83. Not only has pressure on CPRs increased, but the taxes, penalties, and other provisions regulating the use of grazing space during the feudal order prior to land reforms have also disappeared. As reported by Singh (1979) the *jagirdars* (feudal landlords) were legally entitled to 64 *lags* (taxes, levies, etc.) besides the right to impose penalties to be paid by the farmers and grazers. The important ones relating to use of CPRs (Jodha 1985) were: grazing tax (called *ghas mari*), cost of grazing some parts of CPRs on priority basis, livestock-related levies (*laag baag*) payable during ceremonies, compulsory labor for digging/desilting watering ponds, and penalties for unauthorized use of CPRs.

Following the disappearance of these provisions, there is no restriction on overexploitation of CPRs. Village panchayats are authorized to regulate the use of CPRs, but they seldom do it.

In the MP villages, CPRs covered by legal restriction on their use by villagers constituted 2 to 5% of the total geographical area of the villages during 1982-83. Such restriction was negligible in the Rajasthan villages.

Degradation of Physical Production Potential

Recording the extent of degradation of the production potential of CPRs is a difficult task. Benchmark information is not available. Indirect evidence was used, recording the experiences of older people who have witnessed the changes. In some cases a recorded description of an earlier period can be compared to the existing situation. Efforts to assemble evidence and quantify the extent of degradation of CPRs is still in progress under ICRISAT's research project on CPRs (Jodha 1982a). The physical degradation of CPRs is suggested by deterioration in the botanical composition of vegetation in village forests and pastures; reduced carrying capacity of grazing lands; accentuated soil erosion in the forest, grazing areas, and river banks; and deterioration in both quantity and quality of groundwater (Jodha 1980). Some of the indicators of physical deterioration of CPRs are presented in Table 5. These indicators are not confined to only the CPRs covered by Table 4, but include several other CPRs as well.

Role of Market Forces

While discussing the role of market forces in the erosion of CPRs, a few points should be noted at the outset.

Some Basic Issues

First, erosion of CPRs through decline in their area and overexploitation is largely because of institutional measures (e.g., land reforms) and secular growth in pressure on CPRs. Market forces have only accentuated the erosion of CPRs that was caused by these factors. Hence, market forces have played mostly a complementary role in the process. However, market forces have also played an independent role, as they are largely responsible for the degradation of CPRs. This is because market forces have tended to be more strongly felt with advances in communication and transport facilities over the period of time, and thereby have become more conducive to exploitation of CPRs.

Table 5. Manifestations of degradation of common property resources in villages.

Manifestation[1]	Village forest	Community: Pasture	Community: Pond/tank	Watershed drainage	Riverbank	Riverbed (dry)	Ground-water
Deterioration in botanical composition of vegetation	x[2]						
Emerging vegetationless patches	x	x		x	x		
Reduced carrying capacity	x	x			x		
Fall in physical supplies (fuel, timber, food, etc.)	x	x	x		x		
Increased instability of supplies	x	x	x				x
Reduced period of assured supplies	x	x	x				x
Erosion/deep gully formation	x	x		x	x		
Fall in water table						x	x
Low recharge in wells						x	x
Underutilized pumpsets							x
Out-of-use wells						x	x
Extent of wells requiring redigging						x	x
Increased salinity of groundwater							x
Increased silting			x	x		x	
Shrinkage of command/service area			x		x	x	x

1. Work is in progress to quantify the extent of manifestation.
2. X denotes that manifestation is applicable.

Secondly, a highlighting of the negative impact of market forces should not mean their complete negation. The positive role of market forces in promoting growth cannot be denied. The negative impact felt at this stage could be a necessary evil, characterizing a transitional phase before market forces develop mechanisms that induce protection and restoration of CPRs.

Thirdly, because of the very nature of the variables involved, isolation and quantification of the role of market forces in the erosion of CPRs is difficult. It calls for evolving an approach or procedure to meaningfully describe the process through which market forces play their role in the exploitation of CPRs.

Finally, in keeping with the preceding statement, we can discuss the role of market forces vis-a-vis three forms of erosion of CPRs, and provide quantitative evidence wherever it is possible. It is useful to provide a sketch of the market situation as it obtained at two points of time, particularly with reference to infrastructure, marketing, and prices of CPR products.

Transformation of the Market Situation

Change in the market situation in the study areas is a continuous process and hence it is difficult to fix precisely the time when change started. However, absence or presence of some relevant factors on the scene may help in broadly fixing the period from which visible transformation of the market situation started. According to this reasoning, 1953-54 or the period around the early phase of land reforms can be roughly treated as a reference point. Details presented in Table 6 broadly support this.

Market Situation Before 1954

The situation of study villages around 1953-54 or before could be described as follows.

Physical isolation. The villages studied are even today backward, compared with several advanced areas in the two states. However, the situation was worse only three decades ago. Because even min-

imum infrastructure was lacking, most of the villages were isolated from trading centers. This restricted the market and marketability of CPR products along with many other products of the villages.

Subsistence orientation. Partly owing to physical isolation and partly for lack of exposure to market and cash nexus, subsistence production dominated economic activities. Production and use of CPRs was largely for self-consumption, notwithstanding very limited need-based exchange or barter trade.

Petty trading. The trading activity in most villages was characterized by the presence of small shopkeepers, who had only loose links with major traders in towns, and by the periodic appearance of itinerant traders, who occasionally bought village products and sold consumables during their visits. They collected supplies of CPR products, but rarely induced sellers to supply more. This was largely owing to high transportation cost, perishability of certain products, lack of processing facilities, and absence of information on outside demand.

Change in Market Infrastructure

During the last three decades or so, this situation has completely changed. The study villages are by no means very well placed in terms of infrastructure even today, but their integration with the rest of the economy—particularly distant marketing centers—has definitely improved, compared with 1953-54. More villages in 1982-83 have all-weather roads, regular bus services, frequent visits of trucks for transport of goods, post offices, and more shopkeepers/traders, including those having links with distant trading centers (Table 7). Improved transport and communication, as witnessed elsewhere (Devres 1980), have helped increase people's exposure to a cash economy and to market forces. Traders (or their agents) having knowledge and links with wider markets have penetrated into the interior areas. Transport and communication facilities have also improved. Collection and marketing of CPR products (and other products) is no longer governed by forces of local supply and demand.

Market forces operating in a much wider context influence the whole pattern of CPR use. High profit-

Table 6. Complementary and independent role of market forces in erosion of CPRs.[1]

Details	Changes in the market situation in the selected areas						
	Improved integration/ widening of market	Increased frequency of trading	Higher prices/ profitability of CPR products	Commercialization of CPR products	Transformation of CPR product collector	New incentive system-advance payment, agents, etc.	Improved economic viability of sub-marginal land's use
A. Factors complemented by market forces							
State policies/measures							
Privatization of CPRs							A
Indifference to confiscation of CPRs			A				A
Abolition of taxes, regulations on CPR use			CB				
Relief policies	C						
Contractor system of CPR use	CB		ACB				
Secular changes							
Increase in human/ animal population			CB				
B. Market forces' independent role		CB		CB	CB	CB	

1. Erosion of CPRs in terms of A = decline in area of CPRs, B = degradation of CPRs (i.e., decline in production potential), and C = intermediate stage (before B) indicating increased pressure on or over-exploitation of CPRs

Table 7. Indicators of changes in the market situation in selected villages of Rajasthan and Madhya Pradesh (1953-54 to 1982-83)[1].

Details	Market-related infrastructure[2]							
	Rajasthan				Madhya Pradesh			
	Nagaur		Jodhpur		Raisen		Vidisha	
	A	B	A	B	A	B	A	B
Villages studied (no.)	2	2	2	2	10	10	8	8
Villages with all-weather road (no.)	-	1	1	2	1	4	2	5
Villages with regular bus services (no.)	-	1	-	2	-	3	-	5
Villages with bus service in fair weather (no.)	-	-	-	-	-	6	-	3
Villages with post office (no.)	-	2	-	2	-	5	-	6
Villages with shopkeepers/traders (no.)	-	2	1	2	2	9	3	8
Village-level traders/agents dealing in CPR product (no.)[3]	-	3	-	4	-	6	1	7
Traders/agents giving advances for CPR-product collection (no.)	-	2	-	1	-	4	-	6
Outside traders visiting villages (no.)	4	6	3	7	6	11	5	12
CPR products covered by village level barter (no.)	5	-	6	-	10	3	12	4
CPR products purchased by traders (no.)	2	8	2	10	4	17	4	20
CPR products covered by contractor system (no.)	-	2	-	1	-	4	-	5
CPR products for which district level processing facility exists (no.)	-	3	-	4	-	6	-	8

1 Source See Table 5, footnote 1
2 A refers to 1953-54, and B to 1982-83
3 CPR products also include products of CPR based enterprises, such as livestock raising

ability of collection and trading (and processing) of CPR products has transformed the behavior of CPR product gatherers as well as that of traders. For instance, the villager who collected CPR products to supplement his own sustenance is now induced to do it for profit. The trader who collected only the offered supplies now induces people by advance payment and by the appointment of village- or cluster-level agents to collect and supply more of the CPR products. In place of occasional visits of traders with bullock carts or caravans of camels to collect supplies, now trucks and tractors frequent villages to collect supplies during all seasons. CPR products, which had very low prices in the past, now fetch much higher prices. This has attracted several external agencies, including speculators and contractors, to the CPR product business. Some of the rich villagers, instead of gathering CPR products, have joined the traders as their agents. They induce overexploitation of CPRs by obstructing whatever limited regulatory measures villagers attempt to impose on use of CPRs. Indicators of the extent of these changes in the study areas are summarized in Table 7.

Price changes. The final impact of these changes on the market situation, particularly with reference to CPRs, is reflected through a very significant increase in the prices of different CPR products over the last three decades. Table 8 presents the prices of selected CPR products at two points of time. Collection of 1953-54 price data during 1982-83 is in itself an incredibly difficult task. Furthermore, their comparability with 1982-83 prices poses other problems because of inflation. In view of this, a small digression on procedure used for collection and comparison of price data presented in Table 8 is useful.

Price data of CPR-products (and a few other items) in MP villages were collected during field work in 1982-83. The author visited the villages with workers of the rural health department of Madhya Pradesh. The health workers were not only frequent visitors to these villages, but had very good and long-standing rapport with the villagers. In fact the villages were purposively selected according to the advice of the health workers and the readiness of villagers to respond in interviews.

Price data were collected partly from records of shopkeepers/traders and partly through interview. The number of respondents for the 1982-83 data was 46 from 14 of the 18 villages studied from Raisen and Vidisha districts. This included shopkeepers/traders, farmers, and a few public functionaries like the *patwari* and the schoolteacher. For 1953-54, the number of respondents was only 18. Despite 1953-54 being an important landmark in the villages (owing to land reforms), not many could clearly recall prices of that period. We had to rely more on nonsystematic records of shopkeepers and others for the 1953-54 data.

The 1953-54 price data were recorded/reported in terms of *annas* (16 annas = 1 rupee). For several items, the unit of measurement was number (e.g. 100 beedi leaves) rather than weight. Even the weights were in terms of *maunds* and *seers*. For purposes of analysis they have been converted into the metric units of measurement now used in India.

To compare 1953-54 prices with 1982-83 prices,

Table 8. Average price of CPR products in selected villages of Raisen and Vidisha districts of Madhya Pradesh during 1953-54 and 1982-83.[1]

CPR products	Unit of measurement	Price (Rs)[2] 1953-54 Actual[3]	Adjusted to A[4]	Adjusted to B[5]	1982-83	% increase in col. (6) over col. (4)	(5)
Fruits/seeds, etc.							
Achar	Kilogram	3.50	29.75	18.20	47.00	58.0	158.2
Mahua	Kilogram	0.06	0.51	0.31	0.80	56.9	158.1
Tendu	100 pieces	0.13	1.10	0.68	2.00	81.8	194.1
Amla	100 pieces	0.13	1.10	0.68	1.80	63.4	164.7
Gum	Kilogram	2.06	17.51	10.71	33.00	88.5	208.1
Ber	Kilogram	-[6]	-	-	0.75		
Singada	Kilogram	0.25	2.21	1.3	3.00	35.7	130.8
Leaves/roots, etc							
Bidi leaves	Kilogram	0.04	0.34	0.21	0.55	61.8	161.9
Pattal leaves	Kilogram	0.04	0.34	0.21	0.45	32.4	114.3
Tesu root	Kilogram	0.13	1.10	0.68	2.20	100.0	223.5
Fodder	100 kg	0.50	4.25	2.60	10.50	147.1	303.9
Fuelwood	100 kg	0.50	4.25	2.60	11.50	170.6	342.3
Fencing material	Cartload	0.50	3.82	2.60	9.0	135.6	246.2
Other							
Honey	Kilogram	1.50	12.75	7.80	28.00	119.6	259.0
Fish	Kilogram	-	-	-	7.00		
Rabbit	1 piece	-	-	-	11.75		
Fox skin	1 piece	-	-	-	4.50		
Deer skin	1 piece	-	-	-	16.50		
Silt/soil	Cartload	0.37	3.25	1.92	6.50	100.0	238.5

1. Price data collected during field work in 1982-83.
2. Per unit of applicable measure.
3. Original price data collected in terms of traditional units of money and measurement. See text for details.
4. 1982-83 price level, using change in gold price as a measure of inflation. See text for explanation.
5. 1982-83 price level, using consumer price index for agricultural labor as a measure of inflation. See text.
6. - indicates products not marketed earlier, thus no basis for comparison exists.

the impact of the inflation rate has to be removed For this, two indicators were adopted: (i) increase in gold price as a measure of inflation, and (ii) increase in consumer price index for agricultural workers in the concerned districts of MP. The use of the latter is a standard procedure adopted by economists. However, the use of the gold price as a measure of inflation may seem strange, and therefore requires some explanation.

The choice is justified by the fact that, at the village level, a given quantity (a *tola*) of gold is generally equated with a certain amount of food it can buy. In 1953-54 one *tola* (10 g) of gold bought 850 kg of wheat. It bought practically the same quantity of wheat in 1982-83. The price of a *tola* of gold was Rs 200 to 205 in 1953-54, and Rs 1700 in 1983-84. This is an increase of eight and a half times, and thus a measure of inflation as villagers perceive it. On the basis of this simple and crude method, the 1953-54 CPR prices should be inflated by 8.5 times to be comparable to 1982-83 prices. On the other hand, if one uses the consumer price index for agricultural workers in MP, the corresponding figure is 5.2. The adjusted prices on the basis of the two methods are presented in Table 8. If change in gold prices is used as the measure of inflation, the CPR-product prices (net of inflation) have increased by 32 to 170% in the study areas. If the consumer price index-based measure of inflation is used, the increase in real CPR prices is even greater. This increase can be attributed to improvement in the market and the marketability of CPR products.

The increased prices give an accurate picture of the increased profitability of CPR-product collection. Because family labor (often used when no other jobs are available) is the only cost involved.

Complementary Role of Market Forces

As mentioned earlier, the erosion of CPRs has been accentuated by state policies executed through land reforms and by the secular increase in the pressure on CPRs. The state policies played their role through:

a. distribution of CPR areas for private use;

b. implicitly relaxing restrictions on illegal confiscation of CPRs by influential people in villages;

c. periodical auctioning of CPRs to contractors for public revenue;

d. abolishing the taxes, penalties, and regulatory measures that prevailed during the feudal days before land reforms to prevent misuse of CPRs.

The first three actions led to reduced physical area of CPRs. This in turn led to increased pressure on CPRs, which, when accompanied by no restriction on use of CPRs, led to their overexploitation and degradation. The role of factors (a) and (b) was further strengthened by demand forces, as the latter increased the profitability or economic viability of using even submarginal lands (i.e., CPRs converted into cropland) (Jodha 1980).

The government's ever-increasing tendency to auction CPRs (factor c) is also encouraged by market forces, because the market price and profitability of CPR products has improved. More and more traders and speculators were thus induced to enter CPR-based business (Tables 7 and 8).

On the other hand, the profitability of CPR use has also been increased through reduction in the private cost of exploiting CPRs due to factor (d). Before the land reforms in Rajasthan villages, one had to pay (at 1976-77 price levels) Rs 1.25 grazing tax per animal, and Rs 23 per household as other costs of using CPRs. With the abolition of the *jagirdari* system in 1952, these private costs of CPR use were also abolished. This has been complemented by increased prices of products from CPRs and CPR-based enterprises like animal husbandry. For instance, at constant price level, the prices of wool and milk products during 1964-65 had increased by 3.5 to 5.5 times over 1950-51 prices (Jodha 1980). The higher profitability of CPR exploitation, resulting from reduction of cost and increase in product prices, has led to increased extraction from CPRs.

There is yet another mechanism through which the combined operation of state policies and market forces has led to overcrowding and overexploitation of CPRs (e.g. grazing lands). This relates to the reduced severity of the impact of droughts and famines in dry areas. Historically, famines played a leveling role as far as the pressure on CPRs is concerned. It was not a welcome phenomenon; yet periodic droughts eliminated a number of animals. As a net result, pressure on CPRs was regulated by nature. In the changed situation, state policies of drought relief and improved integration

of these areas with wider markets have facilitated survival of animals that otherwise would have perished during the droughts. This helped raise pressure on CPRs, without simultaneously upgrading the carrying capacity of CPRs (Jodha 1978).

The secular growth in the pressure on CPRs—resulting from the individual's concern for self and neglect of his collective responsibility to CPRs—is another factor responsible for degradation of CPRs. This has been the basis of the tragedy of commons in various communities (Hardin 1968; Sandford 1976). In the study areas, the factors underlying the tragedy of commons have been further accentuated by state policies and market forces. To the extent that market forces did not initiate but only helped the other factors (state policies and secular growth of pressure on CPRs), their role has been complementary in exploiting CPRs. Table 6 illustrates this role. However, besides this complementary role, the market forces on their own have initiated the process that led to degradation of CPRs.

Independent Role of Market Forces

To the extent that increased marketability and prices of products of CPRs or products of enterprises based on CPRs (e.g., animal husbandry) have induced villagers to overexploit CPRs and disregard traditional regulatory/conservation practices, market forces can be treated as playing an independent role in erosion of CPRs. The system of advance payments to gatherers of CPR products; provision of agents in villages to help collection of CPR products; increased frequency of trading transactions, improved links of local traders with wider markets; transformation of traditional CPR-product gatherers into profit-seeking persons; better transport, marketing, and processing facilities for CPR products are a few concrete factors that have completely transformed the market situation in the villages. All of them in their respective ways contribute to overexploitation and degradation of CPRs.

Protecting CPRs

If the trends shown in this paper are any indication, the CPRs in rural areas have a bleak future. Considering their social, economic, and environmental effects, their loss may imply a national loss, although to the extent that private property leads to efficient use of land resources, there are also gains involved. Nevertheless, there is need for measures to protect, conserve, and improve productive contribution of CPRs to the rural communities.

At this stage it is not possible to present a concrete scheme to help CPRs. However, learning from the process of erosion of CPRs and the factors underlying it, one can suggest a few broad directions in future steps to protect CPRs.

- Some element of private cost of using CPRs should be introduced. This may be in terms of taxes and penalties on violation of some regulations, to be introduced on use of CPRs.

- The traders, their agents, and contractors should be charged some levy on the basis of their turnover in CPR-product trade, and this should be invested back into the improvement of CPRs.

- Some CPRs could be given to CPR users as a collective body to protect, manage, and use on a long-term basis. Fish ponds given to tribals in parts of MP are a case in point.

- Village institutions (i.e. *panchayats*) already have the responsibility to manage and regulate use of CPRs. However, for various reasons (particularly their dependence on votes), they are unable to adopt strict measures to regulate use of CPRs. One of the ways to activate *panchayats* in this direction could be the provision of grants linked to the productivity and status of CPRs.

To sum up, in a world where free goods are being increasingly used as population increases and as rising incomes accelerate demand, market forces—generally accelerating economic development—will automatically lead to more and more intensive use of CPRs. This calls for better management of CPRs to direct activities away from "mining" of CPRs and toward production-oriented utilization of these resources. Within the framework of appropriate management, rules, and property regulations, market forces can play an equally constructive role for rehabilitation and utilization of CPRs. Formulation and implementation of these rules and regulations is a task facing those concerned about common property resources.

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Agricultural Markets and Intersectoral Resource Transfers: Cases from the Semi-Arid Tropics of Southeast India

Barbara Harriss*

Summary

Agricultural marketing systems may be means whereby not only commodities but also financial resources are extracted from agriculture. The use to which such resources are put are varied and specific. The means of intersectoral resource transfer via markets include the terms of trade, the taxation of traded goods, and the investment of the profits of private- or public-sector trading institutions.

This paper focuses on intersectoral resource flows via the investments of private agricultural trade in two semi-arid districts of southeast India, one with less imperfect markets than the other. The sectoral origins of trading capital, the profitability and wealth of the trading sector, and the portfolios of investments of trading firms are examined and compared. The most important substantive paradox would seem to be that the more oligopolistic the market structure and behavior, the more directly productive the investments made with trading profits. Explanations for this paradox are historically specific.

Résumé

Marchés agricoles et transferts intersectoriels des ressources—étude de cas des zones tropicales semi-arides du sud-est de l'Inde : *Il se peut que les systèmes des marchés agricoles soient des moyens par lesquels non seulement les denrées mais aussi les ressources financières sont extraites de l'agriculture. Les formes d'usages de telles ressources sont diverses et spécifiques. Les moyens du transfert intersectoriel des ressources à travers des marches comprennent les termes de l'échange, les impôts sur les denrées commercialisées et les investissements des profits des instituts commerciaux des secteurs privé ou public.*

Cet article examine la circulation intersectorielle des ressources à l'aide des investissements du commerce agricole privé dans deux districts semi-arides—dont un ayant des marchés moins imparfaits que l'autre—du sud-est de l'Inde. Les origines sectorielles du capital commercial, la rentabilité et les richesses du secteur commercial ainsi que les options d'investissements des maisons de commerce sont examinées et comparées. Le paradoxe le plus important et réel semblerait qu'à mesure que la structure et le comportement du marché deviennent plus oligopolistiques, les investissements avec des profits commerciaux deviennent plus directement productifs. Les explications pour ce paradoxe sont historiquement spécifiques.

Introduction

There are two major aspects to the role of an agricultural marketing system in economic development.

The first role is allocative. Producers respond to prices with varying degrees of sensitivity by allocating resources to production oriented towards the market (Bressler and King 1970, von Oppen 1978). Data on prices (through space, over time), costs (of transport, storage, processing, arbitrage), and on the structure of trade need to be marshaled in order to assess the precision with which signals of effective demand and supply are transmitted

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through the marketing system. Data on production, market supply, and farm-level factors that condition sale facilitate the evaluation of the price responsiveness of agriculture, in relation to other factors causing or constraining the marketed surplus. They also facilitate assessment of trends in aggregate productivity. According to classical theory, the latter is expanded when an allocatively efficient marketing system creates responses in production on principles of comparative advantage.

But this paper addresses the second role, which is extractive. Markets are mechanisms whereby resources are mobilized. Economic markets activate physical commodity flows. Food, the basic wage good, is transferred to nonfood, owning or controlling sectors of society. Raw materials are supplied to domestic agroindustry. Both food and raw materials may be exported.

Financial resources are extracted from agriculture "invisibly" in a number of ways. If we judge by existing literature, the most notable means of resource extraction is terms of trade. If producers market physically more through time in order to acquire a static or shrinking physical bundle of nonagricultural goods, then they contribute more to social savings (Byres 1974, 1977).[1] Urban (or nonagricultural) money wages will, (if they are inflexible downwards) increase in value, relative to food prices. The sectoral pattern of savings will be affected. Rates of profit in industry may rise, and thus attract investment in industry. The barter terms of trade may be turned against agriculture not only by changes in the factors of technology, but also by a number of market characteristics. This could happen when the agricultural marketing system is reasonably competitive and allocatively efficient, but where the power of nonagricultural class fractions is sufficient to manipulate to its own advantage—and in a manner adverse to agriculture—the levels and fluctuations of nonagricultural prices. The terms of trade could also be adverse when monopolistic markets enable the depressing of producers' selling prices below the levels that would obtain in a competitive market. The state could also shift the terms of trade in a manner adverse to agriculture by evolving and effectively implementing 'cheap' pricing policies and procurement interventions.

The appropriation of resources via the terms of trade is intimately related to conditions of production. On the one hand, the emergence of a class of capitalist farmers can inhibit the investment of productive forces in industry by using their political power to turn the terms of trade against industry, evade cheap price/procurement interventions, and thereby appropriate investible surplus. On the other hand, the adverse trends discussed above may only be achieved under circumstances where peasant households meet their survival and maintenance costs by nonmarket productive activity at rates that cannot be imputed by market proxies, but lie much below them.[2]

But substantial financial resources may also be extracted through the marketing system via the state taxation of traded goods if the burden of taxes is transferred back to producers. This source is the single most important generator of revenues to state governments in India (Harriss, B. 1983a). Financial resources may be extracted via the compulsory element in the marketing of producers who need cash to pay other types of taxes.[3] Resources are also extracted via the profits of private or public trading institutions which operate in imperfect, oligopolistic, or monopolistic markets.

Analysis of the extractive role of agricultural markets demands time-series data on relative prices, data on the taxation of marketed commodities,

1. There is a case that the preoccupation with the terms of trade in India is excessive. Trends in the relation between agricultural and nonagricultural prices will be affected by choices of base lines, weights attached to production of components of the two elements of the ratio, the actual choice of goods comprising the agricultural and the nonagricultural sectors, and the sources of data on prices. Official procurement prices for agricultural commodities, assumed paid to farmers will abstract from the reality of higher, distorted market prices affected by levies on traders rather than farmers, and will abstract from the distortions of imperfect markets. Market prices, computed as large geographical averages, mask important fluctuations in region, also according to season, crop production conditions, and class and exchange relations. Nonagricultural prices may be similarly either officially administered or (black) marketed and subject to the same provisions. In addition they may be distorted by sales taxes, and therefore be no accurate indicator of sectoral gains over time. Barter terms of trade are no guide to trends in agricultural income in the absence of data on output. Whether *all* agricultural output or the marketed or net marketable surplus should be assessed in calculations of the income terms of trade is also controversial. It can further be argued that yield and particularly price instability are more serious practical problems than is the long-term trend in relative prices measured in national aggregates (see also footnote 4).

2. There is a large body of literature on this point. See Goodman and Redclift (1981, for Latin America); Allen and Williams (1982, for Africa), Harriss, J. (1982a, for South Asia and generally). See also Young et al (1981), and Deere (1979, for its implications for female production and reproduction).

3. This is more common in the SAT of West Africa. See Harriss, B. (1982b).

on the profitability of trade, on the sectoral origins and invested destinations of private or public sector trading capital, and on linkages between markets for commodities, land, labor, and capital. Without these considerations, it may not be possible to assess the profitability of trade. To my knowledge such a complete analysis has not been carried out empirically anywhere in the world.

How the resources extracted in these various ways are used is a major issue in classical political economy (Johnston and Mellor 1961). They may be used directly, or via channels of savings and investment, in rural or urban, private- or public-sector infrastructure, commerce, or industry. In the latter case, the further division of invested resources between profits and wages is a product of class forces. They may be returned to agriculture, or used in conspicuous consumption, or for the maintenance of sectors such as the bureaucracy or the military (Nadkarni 1979).

This extractive activity of agricultural markets leads to the development of a home market involving demand for agricultural commodities by the nonagricultural sector and vice versa. It is because of this crucial role that Dobb writes: "If there is any factor to be singled out as the fundamental limiting factor upon the pace of development, then I suggest that it is this marketable surplus of agriculture, this rather than the total product or the productivity of agriculture in general" (Dobb 1951, p. 45)

It is clear that there are many combinations of ecological, economic, political, and juridical circumstances—involving policies and interventions on land tenure, credit, pricing, procurement, trade, and taxation—under which financial surpluses can be mobilized via the market. There can also be a net extraction of resources out of agriculture (Mitra 1975). Evidently there is so much regional variation in this process that specific and historical analysis is required.

This paper represents two such attempts. It is severely confined to a description of one aspect alone of the extractive role of agricultural markets: that of intersectoral resource transfers via private trade.[4] But, in justification, virtually nothing is known about this subject. The analysis is comparative. Intersectoral resource transfers via trade are compared and contrasted in two semi-arid districts of southern India (North Arcot and Coimbatore).

Intersectoral Resource Transfers by Private Agricultural Merchants

Four aspects of the role of private merchants in the transfer of resources from agriculture can be examined. These are as follows:

1. The sectoral (and geographical) origin of financial resources invested in trading. The origin of initial capital can be one source of direct transfer from the sector of agricultural production. Indeed the investment out of agriculture of the profits and savings of peasants has been identified in Marxist political economy as one—"the more revolutionizing path"—of two principal means whereby capitalist production relations expand [Marx 1974 (Book 3), p. 344, Lenin 1960 (pp. 185-186), and Sau 1972]. The other is via the accumulation, from other sectors of the economy, of merchants' capital. In regions long commercialized, such as the two we analyze here, we may expect a mix of several processes of resource transfer. It has been contended, for instance, with limited supporting evidence, that land ownership, and profits and rent accruing from it, are the principal sources of merchants' capital in Tamil Nadu (Djurfeldt and Lindberg 1975, p. 164). Elsewhere in South Asia, peasants can be found financing trade themselves, often on a part-time basis (Blaikie et al. 1979, pp. 6, 34). Unproductive capital mobilized via hoarded consumption goods can be utilized (Hazlehurst 1966, chapter 7). Capital can be extended from big industry, and from private or public sector financial institutions. Each of these sources has different implications for intersectoral resource allocation and thus for economic development.

2. The profitability of agricultural trade. The profitability of trade is the manifestation of the ability of merchants in any given commodity market to exploit—sometimes to create and exploit—discrepancies between purchase and sales prices. The rate of profit is defined as

$$\frac{O - C}{CS + WC}$$

4 There has been considerable debate on the terms of trade. Kahlon and Tyagi (1980) record little trend. Lipton (1977) contends that comparisons ought to be made with international border price relations. Venkataramanan and Govindaraju (1983) show that the terms of trade have tended to move against agriculture in the mid and late seventies. On the mobilization of resources via taxation see Toye (1982), and on taxation of agricultural markets see Harriss, B. (1983a, chapter 10).

where O is the gross value of output;
C is total fixed and variable costs;
CS is the value of capital stock; and
WC is the value of working capital
(Harriss, B. 1981a, pp. 72-76).

It may be compared with the rate of return on capital in other sectors of the economy. If marketing is more profitable than any other activity, allocations of capital will be diverted from other areas—like agriculture—and accrue to the commercial sector. The extent to which this process can be perpetuated will depend on the degree of protective oligopolistic practices which can be maintained. Processes favoring concentration, economies of size, and large-scale operation, will conflict with the numerical expansion of small firms drawn into existence by the higher profitability of commerce than that of other economic sectors. If the mercantile sector is characterized by firms engaged in buying, storing, and selling, then the scenario described above will take resources away from productive activities, such as agriculture, possibly only to be made productive in an indirect way via savings and state taxes.[5] We know, however, that in these long commercialized regions, not only are mercantile firms frequently multiproduct and heterogeneous (so that it is virtually impossible accurately to disentangle the behavioral characteristics of individual commodity markets), but we also know that mercantile firms are sometimes directly involved in productive activity such as transport and processing (so that it is virtually impossible accurately to discern the rate of return from unproductive as opposed to productive activity).[6]

Furthermore, estimations of profitability are fraught with practical problems. The tendency of merchants to overestimate their costs and to underestimate their turnover will lead to underestimations of profitability. The total absence of wages for members of the family labor force, which can include children, both qualifies the concept of profit and leads to an overestimation of profitability. The latter problem has been approached by reducing the net profits of each firm by an amount representing the cost of an urban minimum needs package for each household (Kurien 1976, and Government of India 1981). This will lead to an overestimation of the profits of richer mercantile firm-families because consumption is actually income elastic. However, it will lead to an unde estimate of the profitability of the particular firm or commodity studied in so far as that firm is a component of a portfolio of investments, and subsistence or maintenance costs can be met from any return on investment. It is far easier to catalog these problems than to resolve them.[7]

3. The income and wealth of merchants. The income and wealth of mercantile firms is relevant to an analysis of resource extraction from agriculture via trade on a number of counts. Most importantly it is an indicator of the economic power facing the agricultural producer with marketed surplus to sell. It is a powerful index amongst a number of other structural attributes of the imperfection of the market. It is of interest as a crude indicator of the financial importance of agricultural commerce among the total income from the trading family's portfolio of investments. We can also assess the financial importance of the direct involvement of merchants in agricultural production through their own landholdings. It is thereby possible to assess empirically the linkages within single portfolios between commodity markets and those for money and for land. Income is also indicative of the size of investible surpluses realized through marketing.

We have approached the methodological problem of comparability of the incomes of mercantile firm-families with those of agricultural producers—interregionally and over a time span of a decade—by converting income into a multiplier of the urban minimum needs package costed appropriately to each household and year (Kurien 1976).[8]

4. The nature of mercantile investment portfolios. Lastly we consider the use made by mercantile firms of their investible surplus. The portfolio of investments is a guide to the sectoral and geographical transfer of resources via agricultural marketing. It also indicates the degree to which transfers are productive of use value (in Marxist terms) or are—like buying and selling—necessary to

5 These are activities in which there is widespread evasion and 'black', unaccounted activity, for which information is highly defective.

6 S.S. Sivakumar provides a sharp critique of my inadequate theorization of this problem (Harriss, B. 1981a). See also my reply (1983b).

7 For fieldwork methodologies to maximize the accuracy of data, see Harriss, B. 1981a, pp. 226-229.

8 Details of estimation procedures for the investment portfolios are to be found in Harriss, B. 1981a, pp. 90-100.

Table 1. Production by crop (t) and its share (%) of total agricultural production in North Arcot district.

	1921[1]	1961-62[2]		1965-66[2]		1970-71[2]	
	%	(t)	(%)	(t)	(%)	(t)	(%)
Rice	46	387470	47	384430	51	559400	52
Groundnut	18	227930	28	143130	19	194750	18
Sugar cane	1	110600	13	140580	18	222650	21
Ragi	11	35770	4	32940	4	33000	3
Sorghum	4	33800	4	30510	4	34600	3
Millet	11	10120	1.2	8840	1.2	17300	1.6
Total production		816380	100	749555	100	1071010	100

Residual percentage.		
1921	coconut, hemp, coffee, tobacco, spices, fruit, and vegetables	5%
1961-62	green, red, black, and bengal gram	3%
1965-66	" " "	2%
1970-71	" " "	1%

1 Source: Statistical Atlas, 1922
2 Source: Department of Agriculture, Tamil Nadu

society, adding to exchange value but not productive of use value.

Constraints of data prevent the comparative analyses of portfolios and of profitability from being dynamic. Inferences about the processes involved can only be based on cross-section data from firms of differing ages. Information on the portfolios of mercantile firms is quite difficult to obtain. Quantitative data on capital invested and income accruing are the most difficult. The mode of extraction of surplus of these investments—whether direct via surplus value, or indirect through renting or hiring out of plant or property—is also very hard to get; as is information on savings, dowry, marriage expenses, and education. Chronological, qualitative information is more easily volunteered, whereupon it becomes obvious that the sampled commodity or firm can frequently be a minor rather than prime mover of resources. In a situation of 'conglomerate property', consisting of linkages of ownership or control over many sectors of the economy, where resources are extracted by different modes, the rates of return to one sector are hard to dissociate from gross returns right across the portfolio. Yet, though such problems are exceedingly thorny to resolve, no apology is made for introducing them into agricultural marketing, a subject area usually noted for heroism in its simplifying assumptions.

The two regions, whose intersectoral resource transfers through trade we describe and contrast, are in the North Arcot and Coimbatore districts of Tamil Nadu. The eastern plains of North Arcot, comprising 3300 sq km in 7 taluks, were studied through fieldwork in 1972-74 (Harriss, B. 1981a). Two taluks of Coimbatore, comprising 2500 sq km on the south western edge of the Coromandel plain, were studied in 1979-80 (Harriss, B. 1983a).[9] Both regions are in the semi-arid tropics as defined by ICRISAT (Bapna et al. 1979), and receive 500-1000 mm of rainfall per year.

North Arcot District

North Arcot (Figure 1) is a dry district with a simple agricultural economy (Table 1). The eastern plain is dominated by paddy production on wet land, irrigated historically from tanks but increasingly now from energized open wells, and by groundnut production on dryland. Production of coarse grains has dropped from 26% in 1921 to 7.6% in 1970-71. Scattered over the region in 1000 villages and 7 towns, is a population exceeding 2 million with an average land area of 0.4 ha per person. Whereas at the turn of the century there were 2 landless laborers to 11 farmers, there were 10 in 1970-71. The average holding size is 1.27 ha (3.05 acres). Owner occupancy is the rule with a tenancy incidence of 5% (Harriss, B. 1981a).[10] Though about two-thirds

9 See also Harriss, B. (1981b)
10 See Harriss, B. (1981a, chapter 2). For fuller historical accounts, see also Harriss J. (1982b) and Washbrook (1973)

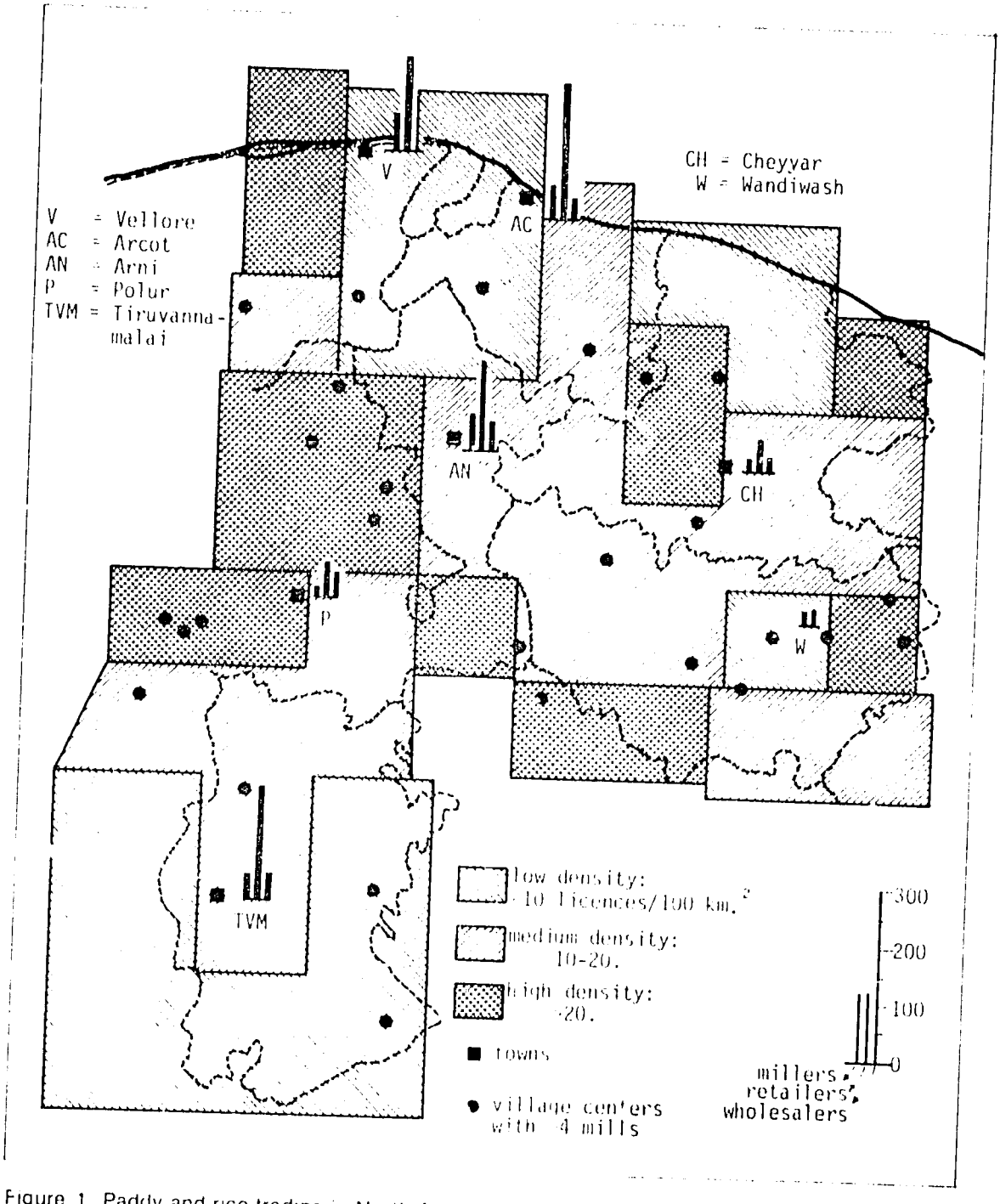

Figure 1. Paddy and rice trading in North Arcot district.

of cultivator households—and virtually all landless labor—fall below the official poverty line, about 200 000 producers are estimated to engage in commodity exchange. They face what is numerically a very large marketing sector. In 1973 there were 2350 active, licenced wholesale traders in paddy and rice alone (located as shown in Figure 1) from which population, 100 were interviewed at

Table 2. Size structure of trading firms dealing in paddy and rice, North Arcot district.

Category size (Rs × '000)	Mainly milling		Mainly wholesaling		Mainly retailing		Mainly fertilizer		Mainly pumpsets	
	U	R	U	R	U	R	U	R	U	R
Annual turnover	(%)		(%)		(%)		(%)		(%)	
0-49	4	4	3	-	23	-	-	11	5	5
50-99	2	2	3	-	42	-	3	10	5	-
100-249	13	6	3	-	17	-	14	19	30	-
250-499	13	11	24	-	-	-	6	6	35	-
500-749	9	4	8	3	-	-	5	3	5	-
750-999	9	6	13	3	8	-	2	-	5	-
1000-1490	11	-	6	3	-	-	3	2	5	-
1500-5000	6	2	18	3	-	-	11	-	5	-
Above 5000	-	-	10	3	-	-	3	-	-	-
Total no. of traders surveyed	47		38		12		62		22	

U=Urban, R=Rural.

random and subgrouped as wholesalers, retailers, and rice millers. There were 123 fertilizer dealers, of whom 65 were studied as typifying commerce in modern agricultural inputs; and 65 pumpset traders, of whom 25 were sampled as typifying trade in agricultural investment goods.[11] The numbers involved indicate that conditions exist for competitive agricultural commodity markets.

Structure

Both in terms of their assets (CS + WC), and in terms of turnover (O), there is a large range of sizes of firm for each commodity (Table 2). The modal values for turnover are low (Rs 100 000 to 500 000), but in all cases the combined turnover of randomly sampled firms with turnovers above Rs 1 million each annually exceeded the combined total of all the rest. The profits of the top decile of firms were 40 times those of the bottom decile. These firms came into existence as relatively large firms. By contrast, at the low end are the majority of firms, which started with small capitals and remain small, occasionally prey to dependency relations (through credit, hire of plant, stores, etc.), which perpetuate their inability to expand. Considered in isolation from their family portfolios, some firms produce incomes below the household poverty line. Very poor, socially disadvantaged, unlicenced traders are only—but frequently—encountered at periodic markets (Harriss, B. 1976). Large numbers of traders conceal strong contrasts within the mercantile sector between the economically powerful and the economically weak.

Land

It is to be assumed that agricultural traders underdeclared their landholdings. Yet even if they did, they emerge as relatively powerful agricultural producers (Table 3). Seventy two percent of traders had land, all within 5 to 8 km of their native places. Millers, pumpset and fertilizer traders admitted to owning an average of 5.6 ha; rice and paddy wholesalers to 4.2 ha; the small subsample of "wholesale" traders who actually presided over retail shops owned an average of 2 ha. On the aggregate, agricultural merchants owned 3.5 times the district's average landholding. We would expect agricultural profits to be important sources of commercial capital. While the average land leased out in this district is 5% of total cultivated land, over 25% of merchants' land is rented out and another 25% is managed using attached (rather than free wage) labor. The mercantile sector is congruent with the upper echelons of the sector of agricultural production; it is also set apart by its renting of lands.

11. Detailed data, from which this account is drawn, are to be found in chapter 4 of Harriss, B. (1981a)

Very few merchants invest in buying land. The land market is sluggish and choice of land is strongly constrained by locational preferences.

The Origins of Mercantile Capital

With the exception of rice milling, the costs of entry into the mercantile sector are low, and real values of starting capital have probably decreased through time (Figures 2 to 6). Most firms do not mobilize more capital than would have been necessary to purchase the average farm in 1973.

Sectoral and geographical origins of agrocommercial capital are the subject of Tables 4 and 5. From these it can be seen that direct transfers from agriculture provide about 30% of initial capital for firms in agricultural marketing. Twenty-two percent of trading capital represents invested agricultural profits, while a further 7% came from the sale of land, a practice which unhitches commerce from its agricultural roots. Agricultural resources are far more important as sources of trading capital in old and rural firms than they are in young and (increasingly) urban firms.

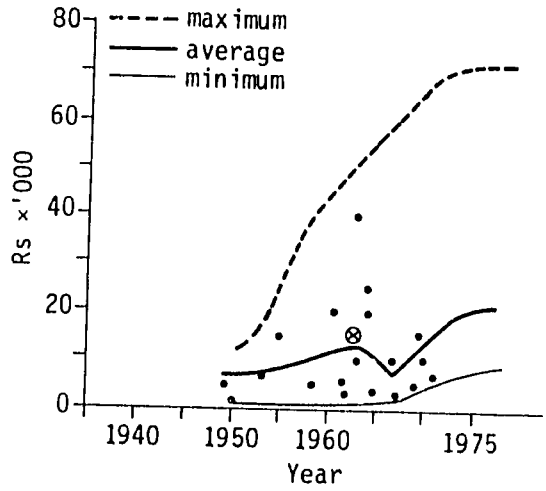

Figure 2. Starting capital of wholesalers/commission agents, North Arcot district.

Table 3. The landholdings of agricultural traders, North Arcot district.

Group/ Variable	Millers	Wholesalers	Retailers	Fertilizer dealers	Pumpset traders
Proportion of traders with land (%)	70	63	42	85	77
Average (ha)					
wetland	3.16	2.59	1.38	3.56	4.21
dryland	1.98	1.42	0.08	1.62	1.34
gardenland	0.73	0.11	0.65	0.20	0.20
Total	5.87	4.12	2.11	5.38	5.75
Wetland					
% self-operated	32	30	10	28	13
% farmed by joint family	42	40	90	39	19
% rented out	26	30	-	33	68
Dryland					
% self-operated	23	27	-	21	36
% farmed by joint family	42	87	100	31	5
% rented out	33	36	-	48	59
Gardenland					
% self-operated	-	-	-	-	-
% farmed by joint family	100	100	100	100	100
% rented out	-	-	-	-	-
Total Area					
% self-operated	25	28	20	25	18
% farmed by joint family	49	41	80	39	19
% rented out	26	31	-	36	63

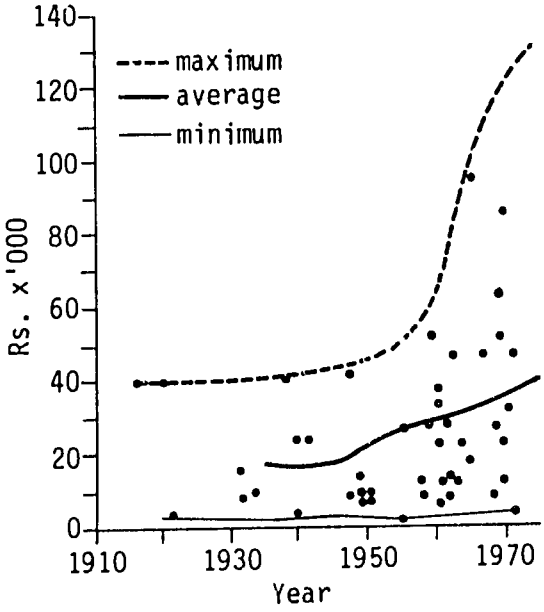

Figure 3. Starting capital of millers, North Arcot district.

But agriculture is not the most important source of capital. Profits from marketing provided 42% of starting capital for separate firms, often the result of splitting or diversification of the businesses of erstwhile joint families. Agricultural trade was three times more important than nonagricultural trade in this process of commercial expansion.

By contrast 25% of all starting capital was borrowed, overwhelmingly from private financial institutions and very little indeed from the State sector.

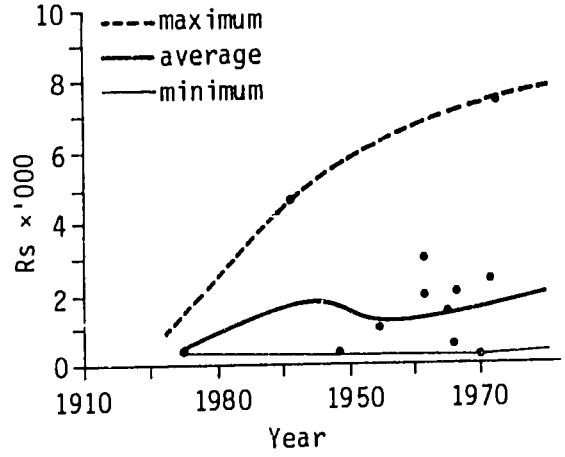

Figure 4. Starting capital of retailers, North Arcot district.

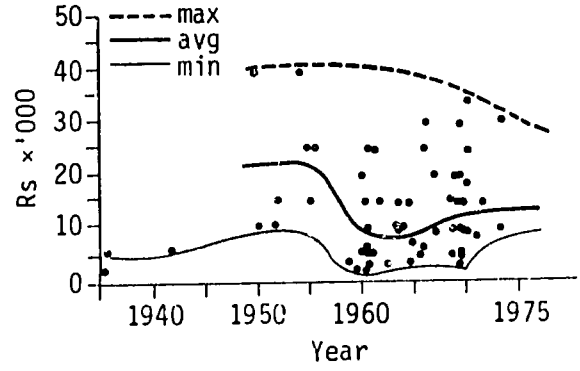

Figure 5. Starting capital of fertilizer dealers, North Arcot district.

Table 4. Contribution of different forms of starting capital (%) to all agrocommerce (weighted), North Arcot district.

Origin	Fertilizer trade	Pumpsets	Rice retail	Rice wholesale	Rice milling	Total weighted contribution
Agriculture						
Profits from agriculture	1.0	0.8	2.8	4.9	14.1	
Sale of land	0.2	0.4	0.6	3.0	3.8	30.58
Finance						
Private loans	0.5	0.2	1.4	8.7	2.4	
Govt. and co-op loans	0.005	0.1	0.01	-	1.4	
Friendly loans	0.005	-	0.01	4.1	3.8	
Savings	0.16	0.4	0.05	4.1	0.5	25.65
Commerce						
Ag-based business	0.6	-	1.7	14.1	15.5	
Non-ag-based business	0.6	1.5	1.7	3.0	5.17	42.00

Table 5. Contribution of different forms of capital to trade (%) by rural and urban locations, North Arcot district.

	Urban					Rural			
	Fertilizer trade	Pumpsets	Rice retail	Rice wholesale	Rice milling	Fertilizer trade	Pumpsets	Rice wholesale	Rice milling
Profits from agriculture	9	22	21	17	14	59		7	62
Sale of land	4	0.4	11	10	7	5		-	3
Finance Capital									
Private loans	10	6	7	19	6	16		29	11
Govt. and co-op loans	19	3	-	-	3	3		-	-
Friendly loans	6	5	7	18	14	2		-	17
Own savings	11	16	42	8	11	1		27	-
Commercial Capital									
Ag-based business	28	-	11	37	32	-		-	-
Non-ag-based business	12	37	-	-	14	13	100	37	9

Each commodity group has a unique pattern of resource mobilization. Agricultural profits are relatively unimportant in paddy and rice wholesaling firms—which rely on loans and on agrocommercial profits—and in the pumpset trades, where savings from wage labor is the main source of investment. Agricultural resources figure prominently in the relatively large starting capitals of rice milling enterprises and of fertilizer dealers, in the latter case because manufacturing companies deliberately select rich peasants and nascent capitalists for fertilizer marketing.

By and large, as the commercial sector expands in North Arcot district and second generation firms come into being, direct resource transfers from agricultual production into agricultural marketing wane in importance.

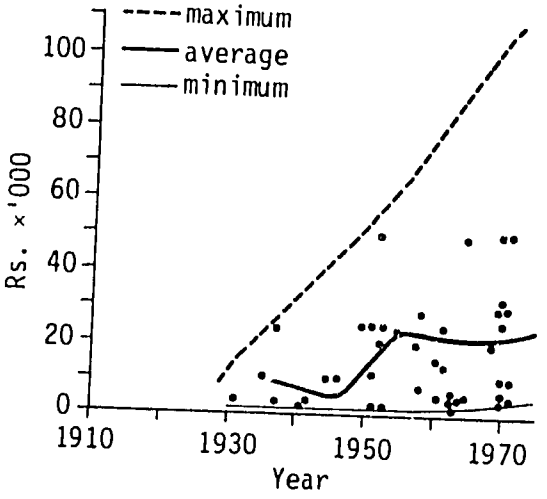

Figure 6. Starting capital of pumpset traders, North Arcot district.

Profitability

Despite its apparently crowded structure, agricultural commerce is highly profitable. On the basis of accounts of sampled commodities alone, the average rate of profit, net of the minimum costs of family maintenance, is 63% for pumpsets, 24% for paddy and rice wholesaling, and 14-15% for fertilizer and rice milling. The weighted average for agrocommerce as a whole is 24% (Table 6). Agrocommerce is therefore more profitable than is private moneylending (18-20%), formal sector moneylending (9-12%), or agricultural production itself whose rate of profit varies positively with holding size from 4 to 11.3% (Table 7).

Despite high average rates of profit, 53% of the weighted sample reap a rate of return on capital no greater than the formal ceiling on interest rates. The remaining 47% however obtain a return that is 250% of the legal maximum interest rate on loans or of the maximum achieved in agricultural production, and 160% of the average for the local agroindustry. Rice milling reaps lower returns than does marketing, because of its higher capital intensity, because incremental expansion is more difficult than in trade, and because low capacity utilization (exacerbated by public policies on procurement, movement restrictions, and curbs on storage) will increase fixed, and therefore total, processing costs.

Table 6. Profits and profitability in agricultural trade, North Arcot district, 1972-73.

Criterion	Mainly milling	Mainly paddy/rice wholesaling	Mainly retailing	Mainly fertilizer	Mainly pumpsets	Weighted avg. for agl. trade
ANP[1] per annum (Rs × '000)	10.3	30.6	3.7	14.8	39.5	
ANP as % of gross margin	39	59	74	60	72	
ANP as % of annual turnover	2.5	2.3	3.6	3.4	15.4	
ANP/wage labor costs	2.1	6.9	-	8.6	11.9	
ANP as % return on capital	29	56	144	25	80	53
PNS[2] for firm family (Rs × '000)	5.9	18	-	10.6	33	
PNS as % of gross margin	16.3	35	-	25	50.5	
PNS as % of return on capital	15	24	-	14	63	24

1. ANP = Absolute net profit.
2. PNS = Profit net of subsistance.

Formal Sector interest rates 9-12%.
Informal sector interest rate (multiplied from per season to per annum) 12-30%, averaging around 18-20%.
Rate of return on capital in agriculture 4-11%, varying with holding size (J.C. Harris, 1982a, Table 5.10).

Table 7. Annual rate of profit from agriculture, North Arcot district, 1972-73.

Category and use		A[1]	B	C	D
Traditional	(NI)	1161	1119	981	731
Paddy	(RP)	5.8	4.6	4.1	2.4
HYV	(NI)	2051	2357	902	914
Paddy	(RP)	10.2	11.3	3.5	3.9
Garden groundnut	(NI)	1527	1290		
	(RP)	8.4	6.7		
Dryland groundnut	(NI)	324	712	749	494
	(RP)	6.3	7.5	7.9	5
Sugarcane (wetland)	(NI)	9884			
	(RP)	44			
Total farm business	(NI)	1789	1660	1245	1001
	(RP)	11.3	8.4	7.6	4

1. Categories:
A = nonproducers disposing of means of production — > 4 livelihood farm units
B = producers disposing of means of production — 2-4 livelihood farm units
C = producers disposing of means of production — 1-2 livelihood farm units
D = producers separated from means of production — < 1 livelihood farm units
NI = Net income (Rs/ha)
RP = Rate of profit.
Source: J. Harriss, 1982a, Table 5.10.

There appear to be two subcircuits of capital in trade: i) a rural subcircuit of small size, recent origin, and relatively low profitability, whose initial capital is largely derived from agriculture; ii) an urban subcircuit of larger size and greater profitability, with components of larger commercial, financial, and rental income portfolios. It is this latter type of agrocommercial firm which is expanding, increasingly unhitched from contact with agricultural production in relationships other than that of physical commodity supply.

Wealth and Income

Income was estimated from statements about the trading family's portfolio (Harriss, B. 1981a)[12] and converted into multipliers of the household's minimum maintenance costs (firm-family livelihood unit or FFLU, as discussed earlier in this paper). In FFLU terms, pumpset traders again emerged highest with 11, paddy and rice wholesalers averaged 7.8, millers and fertilizer dealers 4.8, while retailers averaged 1.1. The weighted average for the entire

12. See footnote 11.

paddy-rice marketing system was 6.5. This compares with 1.1 for the average cultivator household, and 0.7 (well below the official poverty line) for landless labor. On aggregate, those who control the marketing of rice are six times wealthier than those producing it.

Investment Portfolios

The most strikingly frequent form of investment of profits from agricultural marketing takes the form of a return of resources into agrocommerce, not necessarily into expanded marketing of the sampled commodity, but consistent with the high relative profitability of this sector in general (Table 8). Characteristically, agricultural marketing firms also add moneylending to their functions. The volume of such private finance far exceeds that of state loans to agriculture. It enables merchants indirectly to control agricultural production, and, most importantly, it guarantees to the lending firm supplies exceeding that required for kind repayments with which to speculate on imperfect commodity markets. Such money is lent even to small and marginal peasants who do not borrow from cooperatives.

Next in frequency of investment comes agricultual production. It is the richer mercantile families, with larger landholdings, who choose this avenue for some of their capital. Merchants rarely purchase land; they invest in the improvement of land, the conversion of dry to 'garden' land through well-digging, energization, and leveling.

Less wealthy mercantile firms invest in property: houses for accomodating joint families now disbanded, shops and godowns in rural areas. Towns in North Arcot district are characterized by concentration of specialized property ownership. Even very large merchants rent rather than own their premises.

Transport vehicles—lorries, tractors, cars,—are unusual forms of investment and feature only in the portfolios of the richest.

Discounting the plow-back investments of rice millers in mills, only 2.5% of other agricultural traders—all paddy and rice wholesalers used profits to invest in milling. Other forms of productive

Table 8. Use of investible resources, North Arcot district.

	Mainly milling		Mainly wholesaling		Mainly retailing		Mainly fertilizer		Mainly pumpset	
Type of use/Group	PI	FFLU	PI	FFLU	PI	FFLU	PI	FFLU	PI	FFLU
Subsistence	100	4.9	100	7.8	100	0.99	100	4.7	100	11
Reinvestment in trade (agl)	9	5.3	35	8.3	8	2	89	4.8	70	11
Reinvestment in trade (non-agl)	4	3.5	13	15	-	-	26	12.3	18	11
Agriculture, land	50	5.9	29	12	8	?	23	6.6	45	11
Education	4	2.5	21	8.2	8	?	18	5	23	11
Marriage expenses	2	?	?	-	-	-	7	?	9	5
Property - houses	13	?	50	6.9	33	?	23	5.4	9	5.8
Property - shops	11	?	18	10	-	-	30	5	9	5.8
Vehicles - lorries	9	?	11	10	-	-	4	10	-	-
tractors	9	?	3	12	-	-	4	10	9	9
cars/jeeps	2	?	-	-	-	-	2	10	14	15
- motorcycles	-	?		-	-	-	6	3.8	9	16
- bicycles	-	?	3	3	-	-	-	-	-	-
- bullock carts	15	-	-	-	-	-	-	-	-	-
Total property	30	8	37	8.4	33	?	39	10	54	11
Agroprocessing	72	4.8	8	6.3	-	-	1.6	10	-	-
Manufacturing	-	-	2	13	-	-	3	54	18	18
Misc. (cinema)	-	-	-	-	-	-	1.6	10	-	-
Average	47		38		12		63		22	

PI = Percentage investing
FFLU = Economic status in firm-family livelihood units
? = information not obtainable

Table 9. Cropping pattern, Avanashi and Palladam taluks, Coimbatore district, 1971.

	Avanashi				Palladam			
	Irrigated		Rainfed		Irrigated		Rainfed	
Crop	ha	%	ha	%	ha	%	ha	%
Rice	2100	11	51	0.09	2034	5	40	0.05
Sorghum	2629	14	25285	47	886	2.3	36034	52
Pearl millet	1816	10	2475	4.5	1121	3	1390	2
Other millets	1545	8	3391	6	4279	11	1107	1.5
Groundnut	523	3	11701	22	14117	37	8351	12
Cotton	5807	31	2403	4	848	2	1624	2.3
Tobacco			----------data not available----------					
Gross cropped area	18962	100	54106	100	37749	100	69901	100
Sample crops as % total area	76		84		83		69	

Source. Govt of Tamil Nadu 1976 World Agricultural Census, 1971, Coimbatore District, Madras, pp 15, 198 99

industrial investments are conspicuous for their rarity. In a total of 190 firms, two portfolios included the assembly of diesel engines, one included the manufacture of trailers. One firm invested in a primitive metal tools workshop; another in an acid factory; one firm intended to invest in a bran oil solvent extraction plant. There was little evidence in general either of entrepreneurship in agrocommerce, or of productive nonagricultural investment.

Thus, in North Arcot district it is agrocommerce which feeds itself with resources and allows the evolution of a relatively competitive moneylending sector, where interest rates seem to be quite effectively regulated by competition from the subsidized rates of state loans through agricultural cooperatives and nationalized banks. This provision of production credit has increased marketed surplus. Profits from its marketing get fed back into investments in commerce. Simultaneously, moneylending to small and marginal peasants, upon whose land the physical productivity of agriculture is at its minimum in this district, perpetuates the survival of such households without recourse to the sale of land (Harriss, B. 1981a, and Harriss, J. 1982b). In this way increases in aggregate production are actually constrained. Rice prices are high enough at the retail end of the marketing system for the swollen and swelling mercantile sector to reap the profits characteristic of an imperfect system. Market imperfections are actually exacerbated by interventions of the state, which policymakers conceived with the opposite effect in mind (Harriss, B. 1977, Prabha 1983). The increased crowding, which normally suggests declining profits and incomes, here suggests the reverse. Resurveys over the decade have confirmed the perpetuation of this process and these relationships with agriculture.

Coimbatore District

Coimbatore was such a large district that it was divided for administrative convenience in 1979. The study region consists of only two taluks, but they cover about 2500 sq km and present many contrasts with North Arcot. The region receives less rainfall (725 mm on average over the last decade). Soils are less fertile and more stony than in North Arcot. The water table, which is probably sinking in North Arcot (Madduma Bandara 1977), is definitely sinking in Coimbatore (Sivanappan and Aiyaswamy 1978), where the average depth of a well (wells irrigate 30% of our study region) is 35-40 m and where the cost of raising water to the surface exceeds any gains to be got from its use in agricultural production in some areas (Sivanappan and Aiyasamy 1978). To an extent the region retains its frontier character (Baker 1982); 43% of the district is forest, scrub, or fallow land.

The agricultural economy of the district is much more complex and diverse than that of North Arcot (se Table 9 for details of the study area). Cereals are less important crops in Coimbatore district than in North Arcot. Rice covers only 13% of cultivated area, dryland coarse grains amount to 33%, and

Table 10. Concentration in trade in two taluks (Avanashi and Palladam) in Coimbatore district.

	1978-79			1979-80			1979-80		
	Trader-farmer transactions[1]			Total turnover[2]			Total assets[2]		
	Top 1%	Bottom 50%	G-coeff	Top 1%	Bottom 50%	G-coeff	Top 1%	Bottom 50%	G-coeff
Paddy/rice	5	13	0.51	7	5	0.68	7	8	0.65
Maize	45	2	0.71						
Coarse grains				7	4	0.67	4	10	0.55
Groundnut	12	10	0.63	7	7	0.61	8	11	0.40
Tobacco	14	5	0.72	20	3	0.82	4	19	0.43
Cotton	28	0.4	0.89	6	9	0.62	9	12	0.61

1. Complete enumeration of fees registers of 4 regulated markets
2. Primary data from systematic stratified random sample (N = 150)

pulses take up another 13%. Of the 46 crops grown in the study region, cotton (10%) and groundnut (15%) figure prominently (Government of India 1976). There is no evidence of any widespread diffusion of new technology for the production of dryland food grains; consequently, dryland yields and farm incomes fluctuate considerably (Rutherford 1980). While North Arcot is a surplus district for cereals, Coimbatore is much in deficit.

The average land : man ratio (at 0.3 ha per person in 1981) is about the same as in North Arcot; so is the incidence of tenancy, at about 5% of holdings.

But the average holding size (2.8 ha) is over twice as great, the incidence of rural landlessness (at 14 laborers per 10 cultivators) is much higher, and the emergence of a class of capitalist farmers is much more prominent (Guruswamy 1980).

This diversified, dryland, rural economy further differs from that of North Arcot by dint of the widespread and long-standing diffusion of rural industrialization, mostly based on agriculture (dairying, sericulture, hand and powerloom weaving, cotton ginning and spinning, hosiery, tobacco curing), but also including rural or semirural foundries and small engineering works (Canara Bank 1980). The district is also the most highly urbanized in Tamil Nadu (36%, compared with North Arcot's 19%) (Kurien and James 1979), with Coimbatore city dominating the urban population.

The study region has been longer commercialized than that of North Arcot (Baker 1982). Major commercial crops (cotton, groundnut, tobacco, turmeric, chillies) have been characterized not only by higher price rises than those of North Arcot, but also by greater seasonal and secular price and yield instability (Harriss, B. 1983a, Nadkarni and Deshpande 1982). The marketing system too is materially different. Some 80 000 cultivators in the study area deal with only about 220 licenced rice and millet merchants. There are 108 licenced merchants for groundnut, 280 for tobacco, and 700 for cotton. All of these merchants are not engaged in purchasing local produce exclusively, as they also procure raw materials for agroprocessing industries located within the region from distant centers. Our field research (comprising the 5 crop groups just mentioned) covered the production of 77% of cultivated land and the trade of 90% of all licensed merchants dealing in agricultural produce. The analysis reported here mainly refers to 95 of the 150 merchants in the region, randomly sampled and interviewed.[13] The break-up is as follows: millets 20, rice wholesaling 15, rice milling 20, cotton wholesaling 15, and tobacco processing and wholesaling 25. Our study was confined to agricultural commodity marketing and excluded trade in inputs and investment goods.

Structure

Each commodity market consists of a concentration of merchants in different specific towns, and a thin scatter in rural areas. This locational concentration is matched by a higher degree of concentration of assets and turnover (Table 10) than in North

13. Constraints of time have precluded the processing of the financial data of firms mainly engaged in cotton ginning and groundnut processing. These are very powerful sectors and, to that extent, the following analysis is provisional.

Arcot. The concentration of control over commodities—where Gini coefficients average 0.7—is greater than that over land (0.48). Control over the first transaction—between farmer and trader—is more concentrated in Coimbatore than in North Arcot over all transactions, except when paddy-rice trading firms receive flows of paddy from wholesalers in Thanjavur. We have estimated that 24 millet traders and 66 paddy and rice dealers operate without licenses in the 33 periodic markets of our study area. It is most likely that inclusion of these small firms would only serve to increase the value of the coefficients of concentration (Harriss, B. 1983a, chapter 2). We conclude that the structure of the agricultural marketing system is characterized by the coexistence of oligopoly and petty trade. The profits and restrictive practices of the oligopolistic subsectors perpetuate margins attractive to petty firms, but the latter are kept small by their dependence (for credit, stores, transport, long distance contacts, etc.) on larger firms.

Land

Agricultural merchants are relatively and absolutely larger landholders in Coimbatore than in North Arcot (Table 11). The average landholding in Avanashi and Palladam taluks is 2.9 ha and while the top one percent control 6% of land, the bottom 50% of cultivator households control only 18%. Among the agricultural merchants 80% admitted to owning land. The average landholdings of merchants vary from twice the regional average (among groundnut merchants) to seven times the average (among cotton and paddy-rice merchants). The concentration coefficient for the landholdings of merchants, at 0.56, exceeded that for the total population involved in cultivation. Taking the data for individual blocks, we have observed a spatial association between the degree of concentration of land ownership and that of control over agricultural commodity markets (Harriss, B. 1983a).

The Origins of Mercantile Capital

As in North Arcot, the minimum costs of entry into the purely mercantile sector appear to be low, to have declined in real terms over time, and in 1980 would not greatly exceed the costs of purchase of the average dryland farm. In contrast, fewer firms than in North Arcot are purely mercantile, and the real costs of entry of firms into agroprocessing have indeed risen to a point where they might constitute definite barriers to entry. Yet this has not prevented an expansion of processing and mercantile firms during the last decade.

The sectoral origins of starting capital are presented in aggregate form in Table 12 and cumulatively over time in Figure 7. It is profits from agricultural commerce which have provided over half of the initial capital; and profits from agro-industry have provided a further 20%. Profits from agriculture are far less important in Coimbatore than in North Arcot, providing only 11% of starting capital, while the sale of land provided just 2% of this capital.

Direct transfers of resources from agriculture into marketing are least important in the millets trade (6%), where it is the profits of related agricultural trading which provide 88% of starting capital. Direct transfers are most important to cotton wholesalers to whom they provide 30% of starting funds. For the rest, profits from agricultural production accounted for between 14 and 19% of starting capital. Agroprocessing profits supplied important

Table 11. Landholdings of merchants in two taluks (Avanashi and Palladam) in Coimbatore district, 1979-80.

	% traders with land	Average holding size (ha)	Percentage command		
			Top 1%	Bottom 50%	G-coeff
Millets	75	6.9	9	42	0.47
Paddy/rice	69	20.6	12	6	0.73
Groundnut	87	5.7	4	20	0.44
Tobacco	96	9.7	7	13	0.56
Cotton	67	18.6	11	9	0.62

N = 150 merchants

Table 12. Absolute contribution of different sources of capital to initial investments in agrocommerce (Rs × '000), Coimbatore district, 1979-80.

	Millet wholesale	Rice wholesale	Rice milling + wholesale	Cotton wholesale	Tobacco processing + wholesale	Proportion of grand total
N	20	15	20	15	25	
Agriculture						
Profits	29.5	53	70	60	90	
Sale of land	-	-	67	-	-	13%
Finance						
Private loans	15.5	15	83	50	56	
Government loans	-	-	-	-	-	
Family loans	5	-	-	3	-	
Profits from moneylending	-	-	-	-	15	
Savings	4.05	10	-	-	25.5	10%
Commerce						
Agricultural	406.6	160.5	537.5	89	214	53%
Nonagricultural	-	50	35	-	1	3%
Industry						
Artisan	1.05	0.3	-	-	-	
Agroindustry	-	-	241	-	328	20%
Property						
Sale					35	1%
Total	461.3	288.8	1033.5	202	764.7	2750.3
Avg. per firm	23	19.25	52	13.5	31	

N = 95 merchants (cotton ginning and groundnut omitted)

quanta of capital only to other agroprocessing firms—rice milling and tobacco curing. From Figure 7 we conclude that resources for agricultural marketing increase with time and come from the marketing and processing sectors. The process appears to be more pronounced in Coimbatore, where the commercialization of farm produce has gone on longer than in North Arcot.

Profitability

In Coimbatore we also encounter high profitability (Table 13). The weighted average rate of profit for agricultural trade in the region is 53%, net of minimum family maintenance costs. Millet merchants constitute a third of the trading firms. Generally small firms' capital turnover is high. They achieve spectacular rates of profit, use an unpaid family labor force, and often minimize costs through operating without fixed premises. The remaining two-thirds are larger firms with higher fixed capital components: salaried labor forces, rents on shops and stores, etc. Their rate of profit is 47% gross, and 29% net of family expenditure. Rice wholesaling firms are more likely to be heterogeneous, multicommodity businesses, but they have a similar rate of profit to that of millet firms: 49% gross and 34% net. Cotton wholesaling is the most highly profitable oligopoly with a profit of 83% gross and 71% net. Rice milling is dominated by agroindustrial magnates. The rate of profit (31% gross, 27% net) is minimized, probably for the same reasons as in North Arcot. Tobacco firms have extremely high rates of profit given that they are agroprocessing activities: 48% gross and 42% net. On the whole they are not among the largest firms, and the profits from trading to Kerala far exceed those obtained in Coimbatore from processing and local sale during the period in question. These firms are perhaps

better conceptualized as mercantile rather than agroindustrial.

These rates of return far exceed those from agricultural moneylending (18-24% interest in the locality) and from state lending (10-15%). The rate of return from agricultural production is not known. But we can hypothesize that rational allocation of resources favors trading.

Wealth and Income

Wealth and income were estimated for Coimbatore in the same way as for North Arcot (Table 13). Income from wholesaling millet averaged 10.8 FFLU, net of family maintenance costs. Marketing millet provided an average 28% of the income from the entire portfolio of investments of trading families. Two households sampled were below the poverty line when trade in millet was taken in isolation, but no household was below the poverty line when income from its entire portfolio was taken into account.

Rice wholesalers are relatively less wealthy and more dependent on rice wholesaling. Income from trade averaged 5.2 FFLU net, and rice trading constituted 49% of estimated income from their portfolios. Tobacco curing and trade generated average

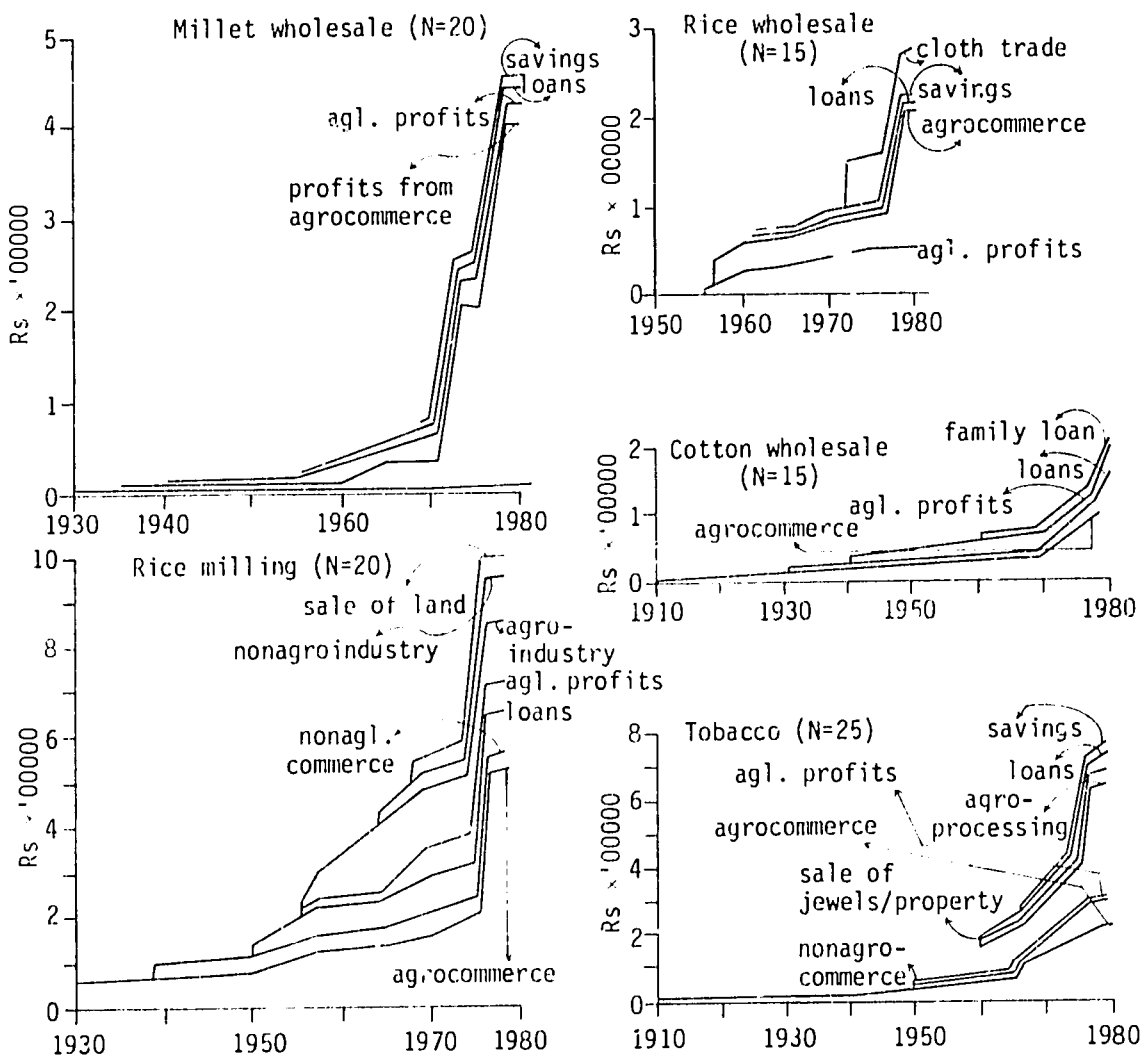

Figure 7. Cumulative origin of capital for Avanashi and Palladam taluks of Coimbatore district by indicated crops/activity.

Table 13. Profitability of agrocommerce and wealth of the agrocommercial sector, Coimbatore district, 1980.

	Millet wholesale	Rice wholesale	Rice milling	Cotton (kapas) wholesale	Tobacco processing and wholesale
Firms alone					
Max Net income (Rs)	200000	170000	660000	800000	210000
Min Net Income (Rs)	2105	1600	6000	5000	7000
Avg Net Income (Rs)	60000	315000	151000	218000	60000
Avg rate of profit[1] (%)	29 (N = 14) 322 (N = 6)	49	31	83	48
Avg gross FFLU[2]	12.11	6.2	26	40	12.3
Avg Annual minimum consumption expenditure (Rs)[3]	5500	5100	6400	6300	5000
Avg annual net income minus consumption (Rs)	54500	26400	145300	211200	55000
Avg rate of profit (%) minus consumption	29 (N = 14) 220 (N = 6)	34	27	71	42
Avg net FFLU	10.8	5.2	25	39	11.5
Family portfolio					
Estd avg net income (Rs)	217000	64000	510000	328250	141000
Max est (Rs)	900000	275000	2186000	1584000	940000
Min est (Rs)	8600	3000	46000	18000	18000
Avg FFLU[2]	38	12.5	82	52	26
Avg % total family income from sampled firm	28	49	30	66	42

N 95 merchants
1 O-C/CS+WC as explained in text
2 FFLU Firm family livelihood units
3 Estimated at Govt of India's poverty line for minimum needs in urban areas

incomes similar to millet: 11.5 FFLU net, and constituted an important part (42%) of the family portfolio as it did for rice wholesaling.

The richest firms, however, are rice mills, where annual income amounted to 25 FFLU (30% of the portfolio), and cotton wholesaling, where annual income averaged 39 FFLU (66% of the portfolio). In these sectors, an immense concentration of economic power faces the producer of marketed surplus, and there exists a serious potential for large-scale transfer of resources through profits from sellers, and the accumulation of investible surplus.

The weighted average income for agrocommercial firms in Coimbatore was 18 FFLU. This compares with an estimated average from crop production and livestock rearing (but excluding labor costs) of 1.45. Those who control the marketing of agricultural produce average some 12 times more income than those who control agricultural production.

Investment Portfolios

Table 14 gives details of investment portfolios. They enhance even further the incomes of agrocommercial families. The estimated average total incomes from portfolios amount to 12.5 FFLU for rice wholesalers, 26 for tobacco curers, 38 for millet traders, 52 for cotton wholesalers, and 82 for rice millers. In the millet trade, income from agriculture amounts to only 5% of the estimated total for the portfolio. But some mercantile profits must be returned to agriculture. Eighty acres of land had been purchased, and there were a few instances of land improvement and of investment in livestock. The main investments had been focused on the

marketing of other commodities: tobacco, onions, rice. and cotton; on small-scale industries, a saw mill, hosiery firms and their ancillaries; and on lorries.

Profits from agriculture are relatively more important for rice wholesalers, and constitute 15% of their income. Virtually nothing is returned to agriculture, investment being concentrated on agrocommerce and property.

Agriculture is most important in the portfolios of tobacco curers (23%), where cash from the sale of groundnut is crucial to the finance of the curing process at certain times of the year. Profits of trade are plowed back into agriculture (44 ha of land purchased) and the tobacco trade. The rural location of much of this activity may explain why other investment was restricted to finance and property.

For the very large firms—cotton wholesaling and rice milling—agricultural profits are a minor element in portfolios (11% and 5%, respectively), even if they represent large income streams in absolute terms. Cotton wholesalers invest massively in agricultural commerce (lint, onions, rice). Rice millers concentrate on other agroindustries (well boring, tobacco, power looms, and textiles), on transport (lorries and bullock carts), and to a minor extent on agriculture.

Rather little is invested in moneylending for agricultural operations, which is said to be risky for all crops except cotton. Such investment is handled by separate specialist 'finance corporations', where money is lent to industry and commerce as well as agriculture, and where repayments are in cash.

Table 14. Investment portfolios of agrocommercial firms, Avanashi and Palladam Taluks, Coimbatore district: Cases of investment over and above sampled firm.

	Millet (N = 20)	Rice (N = 15)	Rice milling (N = 20)	Cotton (N = 15)	Tobacco (N = 25)
Agriculture					
Land	7	-	4	1	7
Improvement	4	-	4	1	7
Livestock	3	2	2	-	1
Urban land	1	-	2	-	-
Commerce					
Agrocommerce	12	7	7	15	7
Agri inputs	1	2	1	-	-
Nonagri commerce	-	-	2	1	1
Industry					
Agroindustry	7	4	30	5	25
Other industry	4	-	8	3	2
Transport					
Lorries	8	1	8	-	3
Bullock carts	3	2	9	-	4
Property					
Houses	7	3	10	5	14
Shops	3	3	1	1	-
Stores	1	1	3	-	-
Cars, motor cycles	7	4	7	7	18
Finance/Rentier					
Finance corporation	2	-	1	2	3
Property for rent	8	5	9	6	20
Miscellaneous					
Education	1	3	-	-	1
Dowry	1	3	2	-	8
Travel	1	-	-	-	-

Contrasts within the Semi-Arid Tropics of Southeast India, and their Implications

Between North Arcot and Coimbatore there are many elements of contrast in the nature of intersectoral resource transfers through the private mercantile sector.

1. Fewer merchants transact with farmers in Coimbatore than in North Arcot, although the production system is more complex in the former region and a greater diversity of crops enter the marketing system.

2. The marketing system in Coimbatore is far more concentrated, both locationally and economically, than it is in North Arcot. It consists of a combination of large oligopolistic firms and petty enterprises; in North Arcot, this tendency, though present, is not as pronounced.

3. Merchants are larger landowners (both absolutely and in relation to average holding size) in Coimbatore than in North Arcot. Their control of land is more concentrated.

4. Despite this, the direct transfer of resources accumulated in agricultural production into agricultural marketing is far less important in Coimbatore than in North Arcot. Merchants in Coimbatore are less likely to borrow capital and more likely to generate the funds they need through agrocommercial operations.

5. While the profitability of marketing exceeds that of agroprocessing in both districts, the rate of profit of both trading and processing is far higher in Coimbatore than in North Arcot. This suggests that the extraction of resources from agriculture via the manipulation of prices is likely to be a more intense process in Coimbatore than in North Arcot. But in both districts, it is the major process whereby the mercantile sector expands.

6. The average income of the firm marketing agricultural produce in Coimbatore is about three times greater than the same type of firm in North Arcot. The difference in wealth between the average firm controlling marketing and the average household controlling production is two times greater in Coimbatore than in North Arcot. This suggests the existence of more considerable investible surplus, as well as of more productive agriculture in Coimbatore.

7. The portfolios of investment made with the help of such surpluses are significantly larger and more diverse in content in Coimbatore than in North Arcot. In North Arcot resources are invested in agrocommerce and agricultural moneylending—the latter in a relatively competitive market—in Coimbatore, relatively more resources are invested in integrated agroprocessing-cum-wholesaling firms, non-agricultural workshops, manufacturing industry, and transport. Most mercantile profits in both districts are reinvested into mercantile activity.

8. It would seem that the land market is less stagnant in Coimbatore than in North Arcot. There are far more instances of land purchase by merchants and a higher incidence of landlessness in the rural population. From the data at our disposal, it is not possible to compare the reinvestment of resources into agriculture in quantitative terms. It is possible, however, to say that in both districts, resources accumulated in trade are not normally invested in land.

9. The diversification of portfolios in Coimbatore may be a consequence of more established commercialization there. It could result equally from the greater seasonality of production and the need for alternative outlets for speculation according to the opportunities afforded by the agricultural calendar. Or it could represent a defense against the vagaries of numerous intermittent state interventions in the sphere of exchange.

10. If merchants' capital is increasingly important in these two regions and if, as demonstrated empirically elsewhere (see Harriss, B. 1983a and 1981a), merchants systematically neutralize or turn to their advantage state interventions designed ostensibly to curb their power, there seems to be a case for the determination of merchants' capital at least in the economies of these districts. In such a context we must look to productive industrial and/or agricultu-

ral capital to weaken the retrogressive features of this domination. This is the first policy implication of our comparative analysis.

11. The mercantile portfolios of North Arcot are much more geographically localized than are those of Coimbatore district. However, the spatial distribution of mercantile resources is the business of the state. It is achieved in two ways, firstly via the use to which taxes on traded goods are put. Such taxes and duties comprised 60% to 75% of state revenue in Tamil Nadu during the 1970s.[14] The major sectoral destinations of state expenditure were social welfare (45%) and state administration itself (20%), overwhelmingly big city and metropolitan in location. Secondly geographical redistribution of mercantile resources must be achieved via the investment by nationalized banks of the deposits made by merchants, though so little is known about such spatio-economic transfers that policy changes can materialize only after much more research.

12. There remains the intriguing paradox that the more concentrated and oligopolistic is the marketing sector, the more directly productive of use value apparently are the investments made by private merchants with the resources accumulated. Exactly the same process has been observed for the even more highly concentrated system of paddy and rice marketing in West Bengal (Harriss, B. 1982a).

Our explanation needs to be drawn from an analysis of the respective regional economies as a whole. Fortunately Baker's agrarian history of Tamil Nadu can be plundered to provide one.[15] Briefly, the historical precariousness of grain production on the plains of northern Tamil Nadu—and the unreliability of its marketed surplus—has meant the opportunistic use of merchants' capital there. Capital has been used for speculative small-scale trading, or has been hoarded or exported. What little productive reinvestment has occurred has been restricted historically to transport (carts) and small rice or oil mills.

By contrast, Kongunad (Coimbatore) was historically a frontier province characterized by early innovation in commercialized, irrigated agriculture and in financial institutions, and by an active market for land. During the first half of the 20th century, the rural elite invested their agricultural profits and rents in the urban production of locally demanded goods.[16] The character of Coimbatore changed in the 1940s when the establishment of state welfare provisions attracted 'scavengers and destitute migrants', making possible the expansion of a second generation of manufacturing (light engineering, metal, and machine industries), dependent more upon cheap labor than on large entry capitals.[17] This early commercialization of agriculture and local industrialization cooped up the economic opportunities generated by the slender home market of an unreconstructed rural society. The last policy implication is that this process cannot, therefore, be replicated elsewhere in Tamil Nadu. Coimbatore district was "an isolated ripple on an otherwise calm lake," and though the lake is now more ruffled, there is little evidence that Coimbatore does not preserve its comparative industrial advantage.

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14 Government of Tamil Nadu, 1979, Statistical Abstracts, Madras, India.

15 See chapters 3, 4, and 5 of Baker (1982)

16 Rural-urban relations at that time appear to have approximated the normative scenario for growth centres advanced by Mellor now for contemporary India (see Mellor, J.W. 1976).

17. It is this industrialization, now ruralized and characterized by "putting-out", rather than the present highly commercialized agriculture per se, which has developed the local rural economy, *pace* Nadkarni, M.V., paper in these Proceedings.

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The Range of Public Interventions

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Designing Marketing Systems to Promote Development in the Third World Countries

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Summary

By definition most of the people in the Third World are trapped in poverty. Existing marketing systems and other political-economic institutions structure opportunity sets such that poor people in the food system acting alone in their perceived self-interest cannot escape the trap.

Our objective is to design changes in the marketing system, institutions, and participant behavior to improve performance and break the poverty trap. This requires diagnostic research to understand the relationships of political-economic organization to participant behavior and system performance, analysis of possible institutional changes, and training for strategic participants. Especially needed are long-term institution-building efforts based on systematic applied research on coordination mechanisms and comparative institutional analysis.

Social traps, market and political-bureaucratic failure, transaction costs, and opportunistic behavior are among the concepts useful in diagnosing problems and in prescribing institutional innovations. Of special importance is the adaptive behavior of food system participants — including merchants, farmers, consumers, politicians, and bureaucrats — as they cope with the problem of food security in the uncertain environments typical of third world countries.

A market failure does not mean that a bureaucratic solution is necessarily appropriate; nor does bureaucratic failure mean that a market solution exists. The design of viable marketing systems involves a mix of market and political mechanisms in the coordination of economic activity.

Résumé

La mise au point de systèmes de commercialisation en vue de promouvoir le développement dans les pays du Tiers-Monde : *Par définition, une partie majeure des peuples du Tiers-Monde se trouve piégée dans la pauvreté. Les systèmes de commercialisation actuels et d'autres institutions politico-économiques structurent des occasions de telle façon que les pauvres, dans le cadre du système alimentaire, agissant seuls dans leur intérêt personnel perçu, ne puissent pas échapper au piège.*

Notre objectif est d'élaborer des modifications au niveau du système et des institutions de commercialisation, ainsi que du comportement des participants, afin d'améliorer la performance et rompre le piège de la pauvreté. Cela nécessite de la recherche diagnostique afin de permettre la compréhension des rapports entre l'organisation politico-économique et le comportement des participants et la performance du système, l'analyse des modifications institutionnelles éventuelles, et la formation des participants stratégiques. Sont nécessaires, en particulier, les efforts à long terme visant au développement des institutions, qui seraient basés sur la recherche appliquée systématique sur les mécanismes de coordination et l'analyse institutionnel comparatif.

Les pièges sociaux, l'échec politico-bureaucratique et du marché, les coûts de transaction, et le comportement opportunistique constituent quelques concepts intéressant le diagnostic des problèmes et la recommandation des innovations institutionnelles. Le comportement adaptif des

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participants du système alimentaire—y compris les marchands, les paysans, les consommateurs, les politiques, et les fonctionnaires—est d'une importance toute particulière, comme ceux-ci font face au problème de la sécurité alimentaire dans les milieux aléatoires typiques des pays du Tiers-Monde.

Un échec au niveau du marché ne veut pas dire qu'une solution bureaucratique soit nécessairement le plus convenable; un échec bureaucratique ne veut pas dire non plus qu'il existe une solution du marché. La mise au point des systèmes de commercialisation viables fait appel à une combinaison de mécanismes politiques et du marché dans le coordination de l'activité économique.

Introduction

How can marketing institutions and behavior be changed to contribute to increasing the real incomes of poor people? What is the relationship between agricultural marketing systems and the poverty trap? What changes in these systems can contribute to the cumulative processes of development? This paper discusses ideas which will contribute to answering these questions. It briefly introduces a general approach to the problem and a few concepts, and then discusses the development problem and markets. A discussion of applications to the conditions found in traditional markets and observations on a few practical innovations follow. The paper concludes with comments on support needed to develop marketing systems, research, and technical advice.

Conceptual Background

General Approach

The approach to marketing systems design we suggest is pragmatic and eclectic. It assumes that unexploited economic opportunities and barriers to improved market system performance exist and can be identified, and that institutional and behavioral changes can be implemented to improve system performance. This requires problem diagnosis, understanding system relationships, and evaluation of alternative prescriptions. It is not assumed that an ideal system exists, but rather that attention to details of the institutions structuring incentives is critical to performance. Because new opportunities and barriers arise as an economy evolves, an adaptive pattern of institutions is required (Shaffer 1969). It is assumed that an economic system, which is open to a mix of market and political coordination, allows individual economic decisions within a set of political constraints.

The concept of marketing systems includes (1) the physical distribution of economic inputs and products, and (2) the mechanisms or processes of coordinating production and distribution. The emphasis of this paper is on coordinating mechanisms and behavior. Coordination of economic activity takes place through transactions among participants in a system which is defined as simply a set of interrelationships. Transactions take place across markets and within organizations such as firms, households, communities, and government agencies. At any particular time, participants in a system face a set of constraints and opportunities, which we will call their opportunity sets. An opportunity set consists of resources (including knowledge) and the formal and informal mechanisms guiding relationships among participants—a bundle of rights, laws, customs, markets, etc. Participants respond to their perceived opportunity sets, producing, consuming, and engaging in transactions. The aggregate consequences of the behavior of the participants in a system we call system performance. The outcome of participant behavior in one period changes the opportunity sets in the next. It is this process of evolutionary change which is of interest.

The analytical task is to classify key characteristics of opportunity sets, classify participants and their behavioral modes, classify outcomes, and develop meaningful hypotheses and propositions about their relationships. The policy or design task, in turn, is to identify strategic changes in the opportunity sets of participants and to contribute to more effective behavioral responses in such a way as to promote more desirable systems performance. Our emphasis is on the institutional variables and knowledge. The most critical policy goals or performance measures are broadly taken to be growth in real per capita incomes and food security. How-

ever, many outcomes are important in a dynamic analysis, some as instrumental variables, such as level of investment or balance of payments.

Among the concepts useful in analysis and design are those related to social traps (Platt 1973) and market failures. Social traps are of two general types: (1) situations where individuals or groups act in their short-run self-interest in such a way that they produce undesirable long run consequences to themselves; and (2) situations where individuals acting in their self-interest produce undesirable consequences for the group. Problems that cause market failure tend to be social traps. Analysis of market failure involves concepts such as externalities, public goods, transaction costs, opportunistic behavior, uncertainty, impacted information, myopic perception, barriers to entry, and market power. The generalized solution to many social-trap and market-failure problems is to bring the individuals under the control of the long-run consequences of their behavior, by affecting what they take into account in making decisions. These concepts focus our attention on the problems of planning, and on the relationships of micro motives to macro or systems performance, and help us to think about how to change opportunity sets to improve system performance.

This approach may be seen as an elaboration of the structure-conduct-performance framework of industrial organization analysis, which focuses on the relationship of the structural characteristics of markets, a limited set of behavioral responses, and a limited number of performance measures—usually efficiency, progressiveness, and equity. Such an approach is very different from analyses which focus exclusively on efficiency and ask only about the allocation of resources given the existing opportunity sets, assuming maximizing behavior. As used by economists, efficiency is a static concept. A market can be efficient and still result in poverty. The "efficient but poor" observation, often made about individual farmers, is equally possible for traders, markets, and entire economies. There is nothing particularly desirable about equilibrium. The trick in development is to induce a flow of technological and organizational changes, which cause disequilibrium, and to have the institutional and behavioral flexibility to adapt in socially productive ways (Shaffer 1980).

This approach emphasizes the necessity to understand both real and perceived participant opportunity sets and behavioral modes, not simply assumed behaviors: the focus is on the complex flow of consequences from any changes induced into the system, and it emphasizes the evolution of political-economic systems.

The Poverty Trap

Those caught in the poverty trap do not produce enough beyond immediate subsistence needs to invest in the knowledge, technical inputs, and organizations needed to increase their productivity. Workers are unspecialized and unproductive. Food security is primary and this concern frequently encourages large families, which put additional pressure on limited physical resources, sometimes causing them to deteriorate. Concern for subsistence limits innovative behavior that could increase productivity but involves some uncertainty. Increased productivity requires specialization, division of labor, innovation, and investment, which involves more roundabout and complex organization of production and distribution. Coordination becomes increasingly critical to performance. Failure to develop marketing systems that provide effective coordination reinforces the poverty trap.

The production-distribution system for any food product consists of a series of coordinated transformations, including the production of farm inputs, farming, assembly, conditioning and processing, storage, transporting, wholesaling, and retailing. Related functions include credit, insurance, communications, and regulations. As the transition from a traditional, rural economy to a more scientifically based agricultural and industrial economy progresses, a larger percentage of activities in the system takes place outside of farms in the production of knowledge, technical inputs, processing, and distribution. Also important to the transition from traditional agriculture are the distribution of consumer goods (including food) to rural areas and the transfer of labor to more productive activities.

The transition can stagnate at any level of development. Achieving the productivity gain potentially available from a scientific-industrial system requires a continuous search for methods of improving performance.[1] In most activities, there are opportunities to reduce unit costs by larger-scale operations permitting labor specialization,

1. Industrial here refers to the organization of the economy, not to the appropriateness of heavy industry in a country's development

spreading of fixed costs, reducing transactions costs, and justifying the expenditures of effort to discover more economical ways of accomplishing a task. For example, subsistence farm families are not specialized in farming but produce all manner of consumer goods and farm inputs. Diversification can be a strength of the traditional system but a barrier to an improved system. Incentives must be structured to encourage farmers and other food system participants to identify and exploit new economic opportunities. But barriers to improved performance develop within the system. Uncertain and unrewarding farm product prices, unreliable and expensive farm inputs, and high-priced and uncertain supplies of food to rural and urban consumers all encourage the continuance of low-productivity subsistence farming.

Labor markets are likewise of enormous importance in the transition from subsistence agriculture to an industrially based rural and urban economy. Improved productivity requires fewer workers in existing roles. Some become unemployed. The development process stagnates when entry to jobs is restricted. Typically, scale economies and limited markets in manufacturing result in concentrated market structures for manufactured goods. Barriers to entry develop in many areas to protect jobs and incomes. Urban firms and workers have political influence, which is often used to gain additional protection from competition, including restrictions on imports. Improved productivity in the entire system is restricted by groups seeking short-run benefits. The cost of farm inputs such as fertilizer and chemicals remains high, reducing their use. The high cost of consumer goods and their limited availability reduces the incentive for farmers to produce a marketable surplus. The resulting low productivity and output of agriculture produces high food costs that affect wage rates and purchasing power which, in turn, limit employment in all sectors. It is a huge social trap. Without policies directed at improving industrial and labor markets and the generation of nonfarm jobs, improved performance of agricultural production and marketing systems will be slowed or even halted.

Rigid institutions, reinforced by attempts to protect the status quo with regard to the economic and social standpoint, are a major characteristic of the poverty trap. Historically, escape from the poverty trap has often followed events, such as expansion of borders or international trade, which led to significant changes in institutional structure. International trade seems to have a number of effect important to development; it expands the demand for products creating incentive to increase production, it provides access to technical inputs and knowledge, and it stimulates active coordination to promote production, thus changing the institutional structure of the marketing system.[2]

Opportunistic Behavior and Trust

The poverty trap is reinforced by opportunistic behavior, defined as acting in self-interest with guile. Opportunism is taking advantage of position. It may or may not be defined as corruption in a particular culture. It is behavior which brings immediate rewards to the individual and imposes great costs on the system, leaving everyone less well off in the long run than they could be. This is a pervasive social trap and it is one of the most difficult problems in designing improved market systems.

In general, not being able to trust participants in the marketing system adds greatly to marketing costs, restricts the use of markets, and thus limits opportunities. On the one hand, the notable success of ethnic minorities in marketing is attributed to the higher level of trust within the group than within the general population. Implicit contracts are honored; transaction costs are reduced (Barton 1977). On the other hand, the size of market firms in many countries is limited because only members of the family are trusted to hold responsible positions. This limits economies of scale and ability to coordinate activities over wide geographic areas. If the trading partners cannot be trusted, transaction costs go up. For example, lack of trust not only requires visual inspection but adds to the cost of inspection. The use of credit is restricted and interest rates are increased by nonpayment. Special credit programs for poor farmers are sabotaged by officials and their friends converting them to their own use — credit never gets to the intended users; transportation costs are increased by hauling useless material; a law requiring inspection does not improve performance but does produce payments to inspectors; and since farmers cannot evaluate fertilizer and pesticides by inspection, substituted

2 For a historical review see Reynolds (1983). Olson (1982) also makes an interesting argument that institutional rigidity is the major problem to be overcome in achieving and maintaining economic progress.

materials may be introduced which fail to increase yields, making farmers reluctant to use them even when they are assured of quality.

The list could go on and on. While opportunistic behavior creates difficult problems, marketing systems can be designed to reduce the negative effects. And trust can be fostered as a matter of policy.

On the Nature of Markets

Effective coordination requires an enormous amount of information, which exists in bits among all participants in a system. The central economic problem of any society is the organization and use of knowledge to direct economic activity, given the dispersed nature of the essential information. No bureaucrat or central planner can possibly acquire the same level of knowledge held collectively by the participants of the system. The market provides a mechanism for collecting and summarizing an enormous quantity of idiosyncratic information about production possibilities and preferences in the easily understood form of prices, which at the same time carry incentives to produce and conserve. No one person needs but a small part of the total knowledge required for production and distribution.

In industrial economies that rely heavily on markets, a loaf of bread is produced and distributed to a consumer with thousands of people contributing to the process. There is no overall plan to organize all these workers to produce bread. Only a fraction know they contribute. Nonetheless, their activities are coordinated to deliver a loaf of bread requiring the purchasers to give up the income from only a few minutes of work, a small fraction of what would be required of a subsistence farm family. This is the miracle of the market system.

But that is only part of the story. The market may fail to provide effective coordination with economic growth for many reasons—limited perceptions of opportunity sets, high transaction costs, opportunistic behavior, externalities, etc. Coordinators or entrepreneurs, who actively seek knowledge of both production possibilities and potential demand, are essential. If information were perfect, there would be little problem in coordination, but the real world is very uncertain. This uncertainty or ignorance is reflected in prices. Uncertainty is increased in a dynamic economy, requiring a constant adjustment in behavior and organization. Public sector and other forms of group action are needed to deal with market failure.

Those who argue that "free" markets are the solution ignore the fact that markets always reflect political preferences and prior distributional decisions. Demand is determined by the distribution of wealth, and institutions establish the rules of the market. In this respect, the market is always an instrument of the political system. Performance is always a reflection of preferences and power expressed through a combination of market and political processes. Policy is concerned with the mix of these processes.

Application to System Design

We now turn to a brief look at some of the characteristics of traditional markets, then examine a few institutional innovations designed to promote development, and finally discuss the process of initiating institutional change. The theme of active coordination is emphasized, and cooperatives have been selected to illustrate an institution of active coordination in greater depth.

Traditional Agricultural Markets

Traditional agricultural markets are part of a small-scale market system. These systems are typically the major link between farm and nonfarm populations for domestic food and farm family inputs, including consumer goods. These markets expand the opportunity sets of participants compared with customary systems of gifts and barter, so important in subsistence economies. By facilitating transactions among strangers, it is possible to increase specialization and achieve some economies of scale. This system frequently competes for agricultural products with a large-scale and transnational system and the relative effectiveness of the two systems affects the availability of food. Failure of the small-scale system to perform well and to offer incentives to small producers may lead to importing food and other consumer goods, thus reducing the opportunities available to farmers and artisans and slowing development.

Extensive research has been focused on pricing efficiency of traditional markets. The usual questions include: (1) do prices differ among market places by more than the cost of transportation? and

(2) do prices differ over a season by more than the cost of storage? While the evidence is somewhat mixed, it generally supports the conclusion that these markets are reasonably price efficient with respect to place and time.[3] This conclusion is less clear than it might be because of the difficulty in obtaining reliable information on prices, partly because of the lack of standard units of measure and grades (Harriss 1979). Reliable market price reporting is absent. Efficient markets require transparent prices and the fact that observations are so difficult to make is itself some evidence of pricing inefficiency.

But are these the most relevant questions? While pricing efficiency is important, it deals only with marketed surplus after it is produced. It says little about the effectiveness of coordination or its contribution to increased productivity. For example, prices in one period are frequently poor indicators of prices in a future period and are thus poor guides to production decisions.

Price studies frequently show prices to be volatile. Markets tend to be very thinly traded as small quantities available attract few buyers; poor transport and communications restrict the scope of the market. Small variations in supplies have large effects on prices. It is often very difficult to predict prices even a few weeks in advance in order to know when to send a commodity to market, let alone a year or two in advance needed for production decisions. In fact, traditional markets are unpredictable, unreliable, and carry very limited coordinating information and incentives. This price uncertainty increases the risk of commercial production, and thus reinforces the incentives of subsistence agriculture and reliance on the customary system. It inhibits specialization, investment, and use of technological inputs. The result is that farmers have very small lots of any one product to sell at any one time. Because supplies are uncertain and expensive to collect, traditional traders do not perceive it to be profitable to invest in developing either reliable markets for products or inputs for these small farmers. The poverty trap is thus reinforced. Each participant works hard in his own perceived interest, prices are more or less competitive, but the aggregate consequence is much less production and consumption than the system could provide with greater specialization and improved coordination.

Other important functions in the market system are similarly affected. For example, a combination of unreliable markets, opportunistic behavior, and individuals attempting food security on their own, results in poor performance of the storage function. Grain storage is, of course, critical to food security. If the market cannot be counted on for supplies later in the season and information on crops and stocks is absent, those who are able will tend to overstore in their own households. They will market their surplus when the information on the new crop is available, depressing prices late in the season or at harvest time, adding to the volatility of prices and incurring added storage costs. This also discourages commercial storage, adding to price instability. Physical losses can be reduced and timely distribution facilitated by some centralization of storage both locally and regionally, especially if knowledge of amounts stored is revealed. However, public 'warehouses' or cooperative storage will not work if those responsible for the grain in storage convert it to their own use or are expected to do so. It is also difficult for managers of village storage schemes to make informed purchase and sales decisions without realistic knowledge of *both* the local and national aggregate supply and demand situation. A community grain bank program in Upper Volta (now known as Burkina Faso) was undermined by these problems (Ouedraogo 1983). Trust and contract enforcement are important. Government storage programs attempting to deal with this problem are frequently high cost because of high losses, often significantly higher than those of private traders, even though they have better physical facilities.

Marketing Costs

Marketing costs include the cost of physical distribution and of making transactions. Reducing marketing costs expands the opportunity sets of many system participants and facilitates the transition to a more industrialized economy. High marketing costs for products and inputs are a barrier to increased agricultural output and reduce real incomes of consumers and farmers.

Studies of traditional marketing systems usually show relatively low marketing margins, compared to industrial economies, and little evidence of profits above normal. This is often misleading because

3. Considerable research on this has been conducted over the years, especially at Cornell and Stanford universities. For a summary, see Riley and Weber (1983).

of the extremely low returns to labor, the very small service content, limited product selection, and many unobserved costs, such as deterioration in product or high transactions and search costs imposed upon farmers and consumers. More important is the fact that marketing margins are not a good measure of performance. Higher marketing margins attributable to increased services, including improved coordination, can leave consumers and farmers better off (Collins and Holten 1963).

Urban retailers tend to be very small-scale and spend a great deal of time acquiring supplies (Weber 1972, Silva 1976). Because of the lack of reliable measures, grades, and trust, visual inspection is required at each transfer of ownership, which adds to both transaction costs and costs of physical distribution. Long-distance trading and opportunities for greater regional specialization are inhibited. Lack of effective local markets and reliable commercial storage can also result in foods moving to central cities and then back to villages. Sometimes the food does not make it back when needed. Unnecessary and high-cost transportation owing to poor roads adds to marketing costs. Roads, of course, are not provided by the market because of their public good characteristic.

Estimating postharvest losses, quality deterioration, and related costs is very difficult, but evidence suggests that they are substantial. Part of this is attributable to poor containers, handling methods, and storage. And this in part is affected by externalities and opportunistic behavior. An example of an externality problem is the handling of plantains or bananas. They are frequently walked on in handling, causing substantial deterioration, but because the damage does not show up before the product is sold, the cost is not usually imposed on the person causing the damage. We believe the externality problem is very common. It adds costs beyond deterioration because it creates an incentive to deal only with those who are known, limiting specialization and the extent of the market.

Middlemen

The middleman seems to be maligned in most societies. He or she is suspected of opportunistic and monopolistic behavior. Perhaps the most common belief is that the assembly trader takes advantage of vulnerable farmers by buying products at very low prices at harvest and selling them at a huge profit later in the season. He may also provide credit at high rates of interest for the purchase of needed inputs or even food during the hungry season, requiring commitment of the next year's crop at advantageous terms. This certainly happens, but it needs to be kept in perspective. Trading is a risky business. Prices are volatile. Losses in storage and transportation can be substantial. Farmers, retailers, and other traders may behave opportunistically. The trader may provide services that are not apparent. For example, a study in Upper Volta showed that from the point of view of the farmers who received credit and repaid the loans, the interest charge by traders was very high (Ouedraogo 1983).[4] Looked at from the point of view of the trader, the average return on loans was lower because some of the loans were not repaid owing to poor crops. The trader-lender was providing a needed insurance for a group of farmers and the higher interest was the premium.

Significant problems do exist. Opportunistic behavior is always possible and belief that it exists is more common, although local assemblers have an incentive to maintain the trust of their suppliers to promote business. Some barriers to entry exist, allowing monopolistic profits. For example, there are cases of guilds among traders and butchers, although it is not always clear that coordinated decisions among a few traders result in poor system performance (Holtzman 1982).[5] The trader's incentive to abstain from opportunistic behavior is increased by competition. But if opportunistic behavior limits farmers' incentives to specialize, the market may support only one or a very few traders. How to break the trap?

Reformers who attempt to improve the market system by eliminating the traditional traders lose a valuable marketing resource. Traders provide an essential function and have knowledge and relationships that are difficult to replace. It is better to focus on improving behavior and developing competitive mechanisms, rather than to eliminate middlemen. Most importantly, traders have information

4. This study also found that only 8% of farmers in the Eastern ORD of Upper Volta (now Burkina Faso) received credit of any kind from traders when it was popularly believed that a majority were commonly provided inputs or cash credits to gain access to crops at depressed harvest prices (Chapter VII).

5. This research found that in small rural markets butchers often do coordinate their slaughter decisions so as to regulate supply and reduce price fluctuations. Yet returns to butchers were not unduly high and retail prices in two rural markets were comparable to prices in known competitive markets (p. 205)

about market conditions not available to farmers. Standard weights, measures, and grades can reduce opportunistic behavior. Publicly provided information can reduce problems caused by impacted information. Policies promoting trust are especially important, as are examples set by public officials and agencies.

Active Coordination

The greater problem, however, is the tendency for traditional traders to fail to contribute toward coordinating the system. Along with farmers, they live in a world of uncertainty and limited resources. They tend to be passive, accepting the marketed surplus rather than identifying potential markets and promoting production to supply them.

Active coordinators identify potential demands and, to meet the demand, offer information and incentives to potential producers. They influence farm production decisions. They understand producers' problems and help solve them. They promote the availability of critical farm inputs and assure markets, reducing market uncertainty. They actively seek markets for products adapted to local production conditions. They avoid the myopic perception of traditional traders, who generally have a limited knowledge of the marketing system. They would, for example, understand general supply and demand conditions. In order to profitably invest in the needed knowledge, an active coordinator requires an organization of sufficient scale to spread the overhead costs of acquiring the information. A public agency could supply information to a number of firms facilitating the coordination function and reducing the scale requirement.

Larger-scale processors become active coordinators almost by necessity. There are economies of scale in processing. Leaving processing facilities idle for want of supplies is expensive. The characteristics of the raw product inputs affect the quality of processed products and cost of processing. In order to profitably promote demand for their products, processors need reliable suppliers. Thus they have an incentive to develop a reliable supply of specified inputs. They may supply farmers with seeds, technical inputs, specify cultural practices, and influence the pattern of plantings. As they become a larger part of the system, they develop a system interest and a vision of their opportunity sets rather than a purely atomistic interest and perspective.

Instituting such systems in Third World environments is not easy. For example, in Northern Thailand a large modern food processing facility failed largely because its managers could not organize supply of raw materials. Farmers were suspicious of the formal contracts, and when they did sign contracts, they felt little obligation to honor them. Hired field agents did not understand the farmers' problems and sometimes engaged in opportunistic behavior. Yet in the same area, a traditional trader became a processor and active coordinator, and was very successful. She understood the farmers and systematically developed trust. Farmers honored verbal agreements with her when they could, and she understood when they were unable to do so. She offered credit for inputs and cancelled the obligations when they had an honest crop failure. Some might consider this an exploitive patron-client relationship. But such a conclusion needs to be carefully examined. While this enterprise was profitable, based largely on the relationships with farmers, the profit was a payment for valuable services to them (Menegay 1983). The farmers had new and better opportunities. This example and others like it, suggest that training and assisting traditional traders to be active coordinators may be an effective means of promoting development (Harper and Kavura 1982).

Export marketing channels are typically more effectively coordinated than are domestic food channels. Export firms or marketing boards become active coordinators interested in promoting production for export. There are problems with these systems, which may develop bureaucratic costs and insensitivity to producers. They often also impose the equivalent of a tax but generally do expand the opportunity sets for farmers. Another consequence is that partly because they are more effective than the poorly coordinated domestic food marketing systems, they provide incentives for farmers to shift resources to supply export markets and thus domestic food supplies may be adversely affected.

With the growth of large urban populations, large quantities of food are imported, often with the active participation of government. A prime target for active coordinators would be the replacement of imported foods. Government assistance in improving domestic food marketing systems would usually contribute much more to development than importing food, even on a concessional basis. Subsidizing food imports reduces not only the demand for domestic production but also the opportunity to

achieve scale economies in marketing.

Private middlemen have the potential to be effective, active coordinators. Wholesale firms with large-scale operations would find it in their interest to link farmers and retailers, providing both groups with much needed services, technical inputs and credits, and most importantly, reliable markets. To develop such firms requires training, credit, and positive rather than negative reinforcement from government with respect to regulation and access to resources. Of course, attention must likewise be paid to the potential for monopolistic practices and the maintenance of effective competition.

Price Determination and Coordination

Many analysts of the development process are currently emphasizing that "getting prices right" is essential to providing incentives to expand output (Schultz 1978). However, this is not simply a matter of letting the market work, as is sometimes implied. The effectiveness of prices as carriers of information, incentives, and rewards in the coordination of economic activity depends upon the institutional structure organizing transactions. Improving market system performance requires attention to these institutional structures (OECD 1980). For example, prices may be volatile and unrepresentative of underlying conditions of supply and demand owing to the lack of information and monopolistic practices. This situation can be improved by developing organized markets, providing crop estimates and market information, grades and standards, etc. Organized market exchanges with formal auctions attracting wide participation provide different prices than dispersed thin markets. With adequate grades and standards and modern communication, products do not have to be physically present at the central exchange. Such exchanges may not develop because the benefits cannot be captured by individual firms, thus public action to establish them is required. The price information they produce, if disseminated, is useful in coordination for many others who do not participate directly in the exchange. And while transaction costs will be too high for small farmers to participate individually, they may be able to participate effectively through cooperatives or local traders. Given the high costs of transportation and low costs of modern communication, linking local markets through national or even multinational exchanges, with enforceable delivery and specification rules, offers considerable promise of improving price determination and thus improving coordination at relatively low costs.

The problems of planning production for an unpredictable market are acute. Poor farmers cannot afford to invest and specialize when faced with the possibility of prices below their costs of production. Traditional markets do not coordinate production to match future demand at prices uniformly above costs of production. A number of pricing mechanisms may be instituted to contribute to such needed coordination. Contract production and especially markets for contracts have much potential if properly instituted. There is a role for government minimum price guarantee programs and import policies designed to assure minimum prices where import of food is extensive. The futures markets may also be developed to provide a means of shifting some price risk through hedging and to provide some indication of future prices. Again, poor farmers would not use them; however, large cooperatives and traders using them could offer some price security to farmers.

Parastatals

Parastatal organizations in the agricultural marketing systems in the Third World are very common. They are popular with politicians and much maligned by many researchers who have studied their performance. Most of them were intended to solve real problems of traditional marketing systems: to reduce price instability, to reduce marketing costs, to assure food supplies, to improve the availability of farm inputs and to increase export earnings and foreign exchange, to provide needed revenue for the government, etc. They frequently fail to achieve the intended objectives because of inappropriate policies, poor management, and lack of knowledge and resources. In some cases where they attempt detailed planning to replace the market processes, it may be impossible to acquire the essential information about production possibilities and markets because such information is too widely dispersed among participants. Most importantly, they become instruments of political patronage and opportunistic behavior. The managers and employees do not have the incentives to make parastatals work and once organized, employees become a potent vested interest intent on protecting their employment. They often attempt to perform functions, such as food retailing, which can be done at less cost and more effectively by

private firms where rewards are related more directly to performance. Parastatals are likewise notorious for delivering farm inputs too late, announcing price guarantees after planting, failing to live up to announced price guarantees, etc. At worst, they become instruments of exploitation (World Bank 1981, pp. 37-40, 58-69; and Harriss 1980).

Nonetheless, parastatal organizations can be designed to improve the performance of agricultural marketing systems. Direct government participation may be the only way to deal with some problems of market failure. Where traditional systems are stagnant, change has to be induced from outside the system. Direct involvement in the economy by a government organization may be an effective means of inducing change. Minimum price guarantees announced ahead of critical production decisions, or the introduction of critical technical inputs, are examples of changes which may promote agricultural productivity. It is also conceivable that agricultural commodity development boards could be designed to provide functions of active coordination. The problem is to define appropriate functions and standard operating procedures so that they actually contribute to improved performance in a cost-effective manner. A mechanism of effective influence by the users seems critical. For example, farm input supplies could be provided through franchised dealers rather than state ownership.

The design of parastatals is beyond the scope of this brief paper; our point is that key public sector roles are essential to escaping the poverty trap. It is, therefore, more effective to concentrate on the function and design of such organizations than to malign them (see World Bank 1983, Abbott and Creupelandt 1967, and Izraeli and Zif 1977).

Cooperatives and Retailer Associations

Farmer cooperatives that deal with product marketing and supply and food retailer associations (retailer cooperatives and voluntary chains) play important roles in the food-marketing systems of most industrial countries. In Scandinavia, farmer cooperatives have been especially successful and dominate agricultural marketing systems. Similarly, in the U.S. and West Germany, associations of retailers have been very successful in organizing procurement for their members and in effectively competing with large-scale corporate retail entities.

Farmer and retailer cooperatives could play important roles in coordinating production activities and in reducing marketing costs in Third World countries. For example, a village livestock marketing cooperative could synchronize the production schedules of small farmers so that sufficient animals would reach market age at the same time, allowing shipment of truckload lots to urban markets and resulting in lower per unit transportation costs. The cooperative could also buy veterinary inputs in bulk, lowering their cost to farmers. Similarly, it has been shown that retailer associations can improve market coordination and reduce procurement costs. Food retailers in Third World countries tend to be extremely small and specialized. This specialization reduces the potential for economies of scale and increases system transaction costs. The retailer spends a great deal of time procuring supplies and seldom has the capacity or interest to transmit information or incentives back to farmers to improve supplies for future markets. A retailer-owned assembly-wholesaling organization could provide this function, perhaps acting in coordination with farmer cooperatives, and achieve scale economies in performing the assembly-wholesaling functions.

Formally structured cooperatives are frequently not a very significant part of the agricultural marketing system in Third World countries although there are some examples of success. At the same time, there are innumerable examples of informal cooperation among food system participants in these countries. Communal cultivation of fields by Andean Indians on the Bolivian Altiplano, mutual savings societies among migrant cocoa farmers in Ghana, and extensive trading and credit arrangements among Chinese merchants in Southeast Asia all attest to the ability of food system participants in the Third World to capture the benefits of cooperation if individual and group incentives are structured properly. Nonetheless, government efforts to foster cooperatives in the Third World have often ignored the special characteristics of these organizations that affect individual and group incentives.

Among the most important prerequisites for a successful cooperative are trust and a sense of shared interests among the members. A farmer who joins a cooperative agrees to allow group decisions, rather than personal decisions, to govern the use of some of his resources. If he does not trust the group to act in his best interests (for example, if the manager is an outsider, perhaps from an ethnic

or socioeconomic group he distrusts), the farmer is unlikely to participate in the organization. One of the major advantages of cooperatives is their ability to promote better flows of information between suppliers and farmers. If farmers do not trust the cooperative to act in their best interest, this advantage is lost because they lack the incentive to convey truthful information about their production and marketing needs. Furthermore, many of the decisions in a cooperative (for example, the problem of intergenerational transfer of ownership) resemble a social trap, in which acting in one's own selfish interest may lead to mutually less-preferred outcomes. A sense of group solidarity can help overcome these problems, but loyalty to the cooperative is unlikely when it is organized with little attention to the ethnic and socioeconomic divisions present in most Third World countries.

In this regard, it is important to distinguish between farmer-owned and controlled cooperatives, and parastatal organizations. The latter are sometimes called cooperatives, but are essentially owned and controlled by the government. These can also become taxation devices, and some are used as an important instrument to promote political support for those in control of the government (Blandford 1979). We are not arguing that parastatal cooperative-like organizations should not be considered in designing marketing systems. Properly instituted, they might be very effective in performing some marketing functions We would argue that their use as a means of extracting resources from farmers is usually counterproductive.

A system of private merchants, including farmer and retailer cooperatives, is likely to provide more effective marketing functions than a parastatal because the managers are under the discipline of both the market and members, in contrast to the political discipline of the parastatal. The opportunity sets of managers are structured very differently. Cooperatives may especially have the capacity to better control opportunistic behavior.

It would be very unusual, however, for cooperatives to emerge simply at the initiative of poor farmers. They are not likely to have the capacity to organize cooperatives, nor will they have the capital to do so. In addition, cooperatives have some of the characteristics of public goods. An entrepreneur who develops a private firm can expect to be rewarded for his effort in the form of profits. An organizer of a cooperative, faced with a more difficult job, cannot capture the "profits" from the cooperative, for these are distributed to the members. Benefits may also accrue to nonmembers in the form of a more competitive marketing system, lower marketing costs, and improved coordination. (Some of these benefits would also result from assistance to private firms, but it is usually more politically acceptable to assist cooperatives). If the cooperative has an open membership, economies of scale can be achieved without the problems of monopoly that are created if the monopoly is an investor-owned firm. This is very important in Third World countries, where the minimum efficient size of operation may be largely relative to the size of the market. Thus there is theoretical support for government investment to develop cooperatives. Most needed would be: (1) a cadre of marketing technicians to promote and organize the cooperatives and train the managers; (2) regulations to guard against opportunistic behavior by managers and boards of directors; and (3) a special line of credit. Most important is to find the heroes with both the marketing skills and the missionary zeal needed to promote the idea. Too much effort has been invested to form cooperatives with no mission other than to make things better. Good intentions are not enough (Lele 1981).

An important consequence of cooperative movements could be changes in knowledge and attitude of members. The movement would provide them with experience in democratic self-government and expand their perceptions of the economic system; it would also show them that members as a group can affect their political and economic situation. It could also contribute to a more equitable relationship between rural and urban people. However, it should be recognized that those in power may view this potential as a threat, as it portends the rise of a political and economic force not entirely within their control. Perhaps it is for this reason that true patron control of cooperatives is not always fostered in Third World countries. If more farmers and small retailers actively participate in the political system, it would create incentives for political leaders to support such organizations, which is a prerequisite for developing successful cooperatives.

Cooperatives frequently fail. There are many reasons for this, including inappropriate operating procedures, poor management, opportunistic behavior and lack of trust, inability to compete, and failure of members to recognize potential benefits. Some cooperatives have been captured by an elite to the disadvantage of other members. Existing

patron-client relationships may be an obstacle to gaining members. Many private firms also fail of course. So the fact that cooperatives and private firms are allowed to fail—when they do not provide benefits to their patrons which exceed their costs—is part of the discipline required to achieve system performance. Offering training and organizational assistance will compensate them for their contributions to public good; sheltering them from this discipline will inhibit performance. That they are allowed to fail is an advantage compared with a parastatal, which has access to the authority and treasure of the state and thus avoids the discipline of the market and patron voice.

Support for Marketing System Development

A Problem with Priorities

In allocating resources to promote development in poor countries, we tend to emphasize food production and neglect investment in marketing. Apparently, this arises from a belief that the market will somehow develop to deal with whatever is produced, an aversion to assisting middlemen, and a failure to understand the role of marketing systems in development. Relatively large investments are made in research, training, and extension to promote farm production, without similar investments designed to improve the performance of marketing systems. Projects involving large investments in production sometimes fail to consider the market channels needed, or even to make a rudimentary assessment of potential demand. An effective marketing system will stimulate production, transmitting both incentives and technical information to producers. A marketing system can be a source of considerable development leverage or can be a barrier to development. Improvement in the performance of food systems is not likely to occur without investments in research, education, and training. Such programs should receive the same priority consideration as agricultural production.

Research and Technical Advice

How can research and technical advice contribute to improving the performance of agricultural marketing systems? We have stressed the importance of focusing on system relationships. There is no substitute for understanding the opportunity sets of classes of participants and their modes of behavior, and then predicting the consequences of specific institutional changes on system performance. Details of design are important. Designing ideal systems without regard for the realities of political and economic power, opportunistic behavior, and uncertainty will be of little value. In practice, neither market nor political coordination processes work very well. The existence of market failure does not mean that a bureaucratic solution exists, nor does bureaucratic failure mean that the market offers a better alternative. That is the problem. Practical research and technical advice are needed to focus on the mix of feasible coordinating mechanisms, identifying strategic actions to expand the opportunity sets of those caught in the poverty trap. In-country researchers and advisers should recognize the evolutionary and political nature of the transformation process, and become participants in the process. Understanding the process is the first requirement.

Most developing countries lack trained local professionals to carry out tasks essential to the development of dynamic and effectively coordinated market systems. Hence donor-supported agricultural marketing programs should give high priority to building in-country professional and institutional capabilities to conduct action-oriented research, to design and manage marketing programs, and to monitor and evaluate the consequences of market system interventions in achieving country development goals (Riley and Staatz 1981).

Based upon field experiences in several countries, we have developed a conceptual and operational approach for applied research, training, and institution-building activities directed toward food system organization and management problems. Our approach is described and elaborated upon in several publications (see, e.g., Harrison et al. 1974, and Riley and Weber 1983). Some essential elements in it are:

- Task groups composed of local professionals are organized to work collaboratively with our own research personnel, including advanced graduate students.
- A preliminary assessment of market organization problems and related policy issues is made in the context of country development goals.

- A tentative long-term marketing research and development strategy is outlined and discussed with local officials.
- A series of short-term diagnostic-prescriptive studies are planned and carried out within the framework of the longer-term research and development strategy.
- Recommendations for new or revised marketing policies and programs are discussed with local officials and individuals in the private sector.
- Analyses of specific projects and alternative courses of action with follow-up studies evaluate and reorient programs and projects being implemented.

Ideally, this approach will help create local institutional capability to continue research and development focused on problems of market organization and management. However, the long-term needs for trained personnel can only be met by creating local university curricula and the faculty competence to prepare young professionals for effective work in both public and private sector aspects of agricultural marketing systems development. And these more formal educational programs should be supplemented with in-service training of public agency professionals and extension-type programs directed toward the different classes of participants in the agricultural marketing system.

There are many useful ways of organizing the applied research described above. Comprehensive programs of research on farm and food marketing systems is an ideal, but practical projects are limited to a narrower focus.[6] Studies focusing on particular industries, markets, marketing functions, class of participants, organizations, programs, or set of laws can be fruitful. Subsector studies can be especially valuable. A subsector study focuses on the organization and performance of the marketing system for a particular commodity with emphasis on vertical coordination problems. Tracing the marketing channels and describing the operational characteristics of the system would be a first step in assessing the possibilities for institutional changes aimed at improving subsector performance.[7]

Studies comparing marketing systems across countries, across subsectors, and through time, with emphasis on the relationships between institutional differences and performance, are especially important in the accumulation of systematic knowledge about the role of marketing systems in development. Comparative institutional studies are critical in carrying out social science research, since we must rely on observation of actual institutions for our data. International organizations, including the international agricultural research centers, could play an important role in promoting and coordinating such research. Workshops such as this one can contribute to the design and interpretation of the research.

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6. For a number of years, a group of us in the U.S. have had a national program of research entitled, "The Organization and Performance of the U.S. Food Production and Distribution System." The research was organized roughly into three areas: (1) industry studies, (2) subsector studies, and (3) legal-economic studies. The project, known as NC 117, has produced more than 100 reports. A list of publications can be obtained from the Project Executive Director, Bruce Marion, Food System Research Group, 427 Lorch Street, Madison, WI 53706, USA.

7. For examples of subsector studies in Third World settings, see Holtzman (1982), Boombard (1983), and Haggblade (1983).

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Measuring Returns to Marketing Systems Investments for Agricultural Development

John M. Antle*

Summary

This paper outlines some critical issues and a general conceptual approach for planning and evaluating investments in agricultural marketing systems. Marketing development is viewed as an integral component in the agricultural development process, affecting the welfare of agricultural producers, consumers, and resource owners. Conventional welfare analyses indicate how marketing investments affect these groups if the effects of marketing development on agricultural productivity are known. Measuring the effects on productivity is a difficult problem because of the general interdependence of marketing and other investment projects (e.g., research) and the complex dynamics of agricultural production.

Procedures are suggested which may lead to improvements in the measurements of these productivity effects. A stochastic control approach is proposed for planning and evaluating marketing investments, which can incorporate the dynamic interdependencies of agricultural investments into a unified analytical framework. The paper concludes with implications of the analysis for marketing development in the semi-arid tropics.

Résumé

Mesure des recettes sur les investissements dans les systèmes de commercialisation pour le développement agricole : *Cette communication présente un bref résumé de quelques problèmes critiques et expose un démarche conceptuel général pour la planification et l'évaluation des investissements dans les systèmes de commercialisation agricole. Le développement de la commercialisation est considéré comme une composante intégrante dans le processus de développement agricole, ayant un effet sur le bien-être des producteurs et consommateurs agricoles, ainsi que des propriétaires des ressources. Les analyses classiques de bien-être montrent la manière dont les investissements dans la commercialisation affectent ces groupes si l'on connait les effets du développement de la commercialisation sur la productivité agricole. L'évaluation des effets sur la productivité constitue un problème difficile, étant donné l'interdépendance générale de la commercialisation et d'autres projets d'investissement (par exemple, la recherche) et la dynamique complexe de la production agricole.*

L'auteur propose des demarches qui peuvent entraîner des améliorations dans les mesures de ces effets de productivité. Une approche de contrôle stochastique est proposée pour la planification et l'évaluation des investissements, qui peut incorporer les interdépendances dynamiques des investissements agricoles dans un cadre analytique unifié. Enfin, la communication s'achève par des implications de l'analyse pour le développement de la commercialisation dans les zones tropicales semi-arides.

Introduction

Since the early 1960s there has been increasing recognition of the critical role agriculture plays in overall economic development and the welfare of rural people. It has also become evident from data accumulated throughout the world that farm people respond rationally to economic incentives. Thus, wherever markets are relied upon for resource and product allocation, the development of efficient

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agricultural marketing systems is an important part of the agricultural development process.

Marketing of agricultural products has long been recognized by agricultural economists as an important part of agricultural development (Miller 1967, Riley et al. 1970). More recently, marketing and other infrastructure investments have been linked to the process of technology diffusion and agricultural productivity growth (Carenmark et al. 1976; von Oppen 1978; Antle, in press; Riley and Weber 1983).

In this paper I aim to outline some critical issues and a general conceptual approach for measuring, planning, and evaluating investments in agricultural marketing systems. The first section addresses some general issues related to planning and evaluating marketing systems investments. Emphasis is placed on the dynamic and interdependent characteristics of marketing investments, and their contribution to technology diffusion and adoption. The second section discusses measuring of the productivity effects of marketing investments, a critical question for the accurate evaluation of marketing investments. The third section briefly discusses the cost-benefit methodology and its use in evaluating marketing investments. The fourth section outlines a general approach to planning and evaluating agricultural investments using an adaptive control framework. The proposed adaptive control approach builds on general cost-benefit methodology (Gittinger 1982), as well as research on rural roads appraisal conducted by World Bank staff and others (Schuster 1973, Carenmark et al. 1976, Beenhakker and Chammari 1979, Spriggs 1977). I conclude with a discussion of the implications of these questions for investments in marketing systems in the semi-arid tropics.

General Considerations in Planning and Evaluating Investments in Marketing Systems

Appropriate Marketing Systems

The overall goal of marketing systems development is to facilitate agricultural development and growth in agricultural productivity by reducing the costs and increasing the availability of marketing services. A fundamental questions is: what is an appropriate marketing system? The opinion of government planners about what is an appropriate marketing system is likely to have a major impact on the kinds of public investments that are made. The choice of an appropriate marketing system depends on both the judgment of planners and certain objective facts. An inappropriate choice could lead to eventual failure.

A basic issue related to this question is whether to rely on free markets or on central planning to organize and control marketing functions. Several factors seem to have biased development economists toward centrally planned marketing systems. A major factor is a belief that traditional decentralized marketing systems are "inefficient." The corollary to this belief is that only "modern," centrally organized marketing systems are efficient. The error in this reasoning is similar to the error in arguing that traditional agricultural production is inefficient. While it is true that traditional marketing systems operate at a low rate of productivity, owing to reliance on a small capital stock and traditional marketing technology, we cannot infer that they utilize their resources inefficiently in the economic sense. Indeed, it may well be that traditional marketing systems represent an economically efficient use of resources [illegible] the constraint of traditional technology. This seems more likely when traditional marketing systems are highly decentralized and competitive, as is often the case. Moreover, traditional labor-intensive systems are likely to be consistent with relative resource endowments and relative prices. It seems likely that central planners not familiar with the needs of agriculture will attempt to impose socially and economically inappropriate—and thus economically inefficient—marketing systems on farmers. An example is the replacement of small-scale local markets with one large, capital-intensive central market place. In some cases, such marketing centers are underutilized or even abandoned in favor of the traditional markets. Upon careful examination, the explanation appears to be that the new marketing facilities were less cost-effective to marketing firms than the traditional ones.

Another major factor leading to centrally planned marketing systems is the widespread belief that middlemen exploit both farmers and consumers, and a belief in the corollary that a government system would be less exploitative. There seems to be substantial evidence from a number of countries showing that many middlemen do not exercise monopoly power, but in some cases they can and do (Lele 1971, van der Tak and de Weille 1969). As

a general principle, we can expect monopoly and monopsony power to be exploited by marketing firms when the opportunity exists, just as in any other industry. In considering marketing systems investments, the policy question is how best to deal with such cases when they occur. I am not convinced that the best government policy is to resort to centralized marketing systems to prevent or eliminate marketing firms from exploiting monopoly power, particularly when one considers the huge inefficiencies often attributed to governmental marketing organizations. Ultimately, of course, the choice of an appropriate marketing system depends on the judgment of government planners and their political persuasion.

In addition to basic questions of organization and control, other objective factors determine what are appropriate investments on marketing systems. Various critical factors include the types of commodities to be marketed (inputs vs outputs, food grains vs fruits vs livestock, etc.); the physical environment (temperate vs tropical, rainfall, geography); and demographics (dense, established population areas vs new settlements).

Within the regional context of each investment, planners must determine what marketing constraints currently are binding and will be so in the future. Two important economic dimensions of the marketing system, which need to be considered, are unit cost and capacity of the existing system to provide the types of marketing services that are expected to be in demand. These two dimensions can be represented in a stylized supply function for marketing services as in Figure 1. The curve P_1S_1 represents a traditional grain marketing system from a village to a central market. Suppose existing transport, storage, and wholesaling facilities provide a unit cost of P_1 up to quantity Q_0 per time period; at that point, the cost per unit increases until capacity is reached at Q_2. Different possible investments can alter the supply of marketing services. For example, increased storage and wholesaling facilities may increase capacity to Q_2 but not reduce the basic unit cost reflecting transport costs. Similarly, improved roads might reduce P_1 to P_2 but not increase capacity Q_1. When we combine the supply of marketing services with the demand, as in D_1 and D_2 in Figure 1, it is clear that the appropriate investment depends on which component of the marketing system is the limiting factor. With demand D_1, unit cost is the constraint, and increased capacity has no effect, whereas with D_2, capacity is the constraining factor.

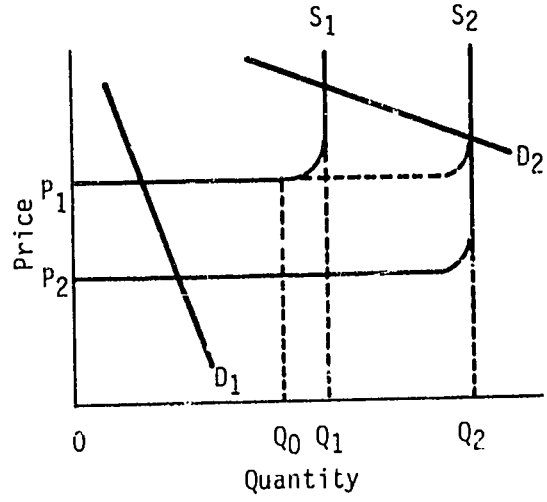

Figure 1. Supply and demand of marketing services: a representation.

Input Markets, Output Markets, and Technology Diffusion

Traditionally, the term "marketing" connoted the assembly, distribution, and sale of agricultural products. However, when considering investments in marketing systems for developing agricultures, this connotation is inappropriate. Indeed, there are many reasons why input markets should be considered at least as important as output markets.

Examining the dynamics of the development process gives insight into the roles input and output markets play. Growth of agricultural productivity depends on the diffusion of technical knowledge and new inputs, such as hybrid seeds and chemical fertilizers. Usefulness of new biological technology often depends critically on diffusion of mechanical technology, most notably irrigation. A farmer's access to new technology and complementary inputs may be constrained to a large degree by the lack of investments in basic transport infrastructure and marketing organizations. Thus, the problem of technology diffusion can be viewed as essentially the problem of input marketing. When planning investments in a marketing system, technology diffusion should be considered a major goal and, hence, a major source of benefits derived from the investments.

Another question concerns the timing of alternative investments. It is important to recognize that

the demand for input marketing services logically precedes the demand for output marketing services in the transition from traditional to modern agriculture. This is because farmers, especially subsistence farmers, can benefit from technology diffusion in terms of increased consumption even if they do not trade any of their increased production. However, if product markets are not developed, then increased local supply will cause output prices to fall, with possibly adverse income distribution effects. Without a reasonable expectation of product markets for their marketable surplus, farmers may rationally resist risking adoption of new, potentially more productive technologies.

Fortunately, investments on basic physical infrastructure, and institutional innovations that facilitate output marketing, also improve input marketing and technology diffusion. Therefore, input and output marketing investments are often complementary. But this is not always true. For example, a fertilizer distribution center and a grain elevator may compete for the same public resources. In assigning priorities to such investments, planners need to understand how each fits into the overall development process.

Dynamics and Dependent Projects

Agricultural investments in research, human capital, extension, marketing systems, etc., are made over time and have effects which persist over time. Understanding the 'dynamic' dimension of these investments and their effects is essential to understanding their role in the development process. It follows that the dynamics of agricultural investments are central to planning and evaluating their returns.

For example, consider the familiar problem of increasing rice production by introducing new seed varieties. The biological benefits of these seeds can be realized only with adequate fertilization and irrigation. Unless product markets exist for this new rice variety at a favorable price, adoption rates may be low because farmers anticipate low market prices or early adopters may revert to the traditional lower-yielding variety owing to its taste or price advantages. Over time, therefore, the dynamics of the development process necessitates that various agricultural investments are appropriately timed. A stylized timing scheme is given in Figure 2. The first investments therein are agricultural research and physical infrastructure. Following investments on

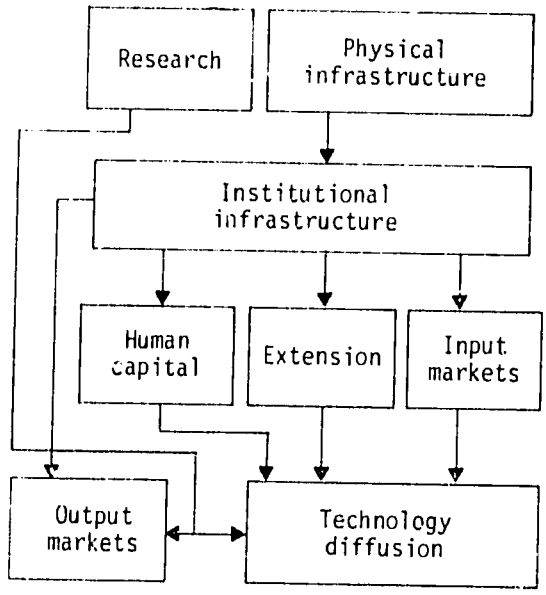

Figure 2. Timing and linkages for agricultural investments: a scheme.

physical infrastructure come institutional developments that lead to investments in areas such as education, extension service, and input markets that facilitate technology diffusion. The physical investments also make possible institutional changes, which in turn facilitate development of output markets. Research produces the new technology for diffusion and further development of input and output markets.

Figure 2 suggests that agricultural investment projects are 'dependent' projects; the flows of benefits and costs associated with each project are affected by investments in other projects. Clearly, the long-run benefits of agricultural research depend on each investment that facilitates technology diffusion. Conversely, the benefits associated with marketing investments depend in part on the state of agricultural technology and consequently, on investments in agricultural research. In fact, project interdependence is so pervasive in agricultural development that one can ask whether it is meaningful to discuss "measuring returns to investments in marketing systems." As benefits associated with each agricultural investment are a function of other investments, we can only meaningfully discuss "measuring returns to sets of agricultural investments."

Viewing marketing and related investments as determining the supply and demand of marketing

services (as illustrated in Figure 1) shows the importance of timing and project interdependence. Institutional and physical investments, which increase the supply of marketing services, will generate social benefits only if there is a demand for those services. The demand depends on the state of agricultural technology and on investments on agricultural research and related production.

Marketing and Uncertainty

Marketing development may have important effects on the uncertainties farmers face. In the short run, increased availability and reduced costs of marketing services could reduce price variability for farmers. However, as new technology is diffused via marketing channels there may be increased yield variability.

It seems clear that as local markets (say, village markets) are replaced by regional or national markets for products, the demand for the output of a village or region is more elastic, and thus local supply variations have less impact on market prices. Similarly, as labor and other factor markets expand owing to infrastructure investments and reduction in transport costs, seasonal wage rates and factor price variations may be damped.

However, as local markets are integrated into regional, national, and international markets, farmers may be subjected to price uncertainty when there is instability in national or international markets. So while local production instability and seasonality becomes less important, external forces beyond the farmer's realm of influence, control, or understanding, take on a more important role.

The diffusion of new technology also appears to have the potential to reduce or increase production uncertainty, depending on the type of technology. For example, there is evidence that the yields of new rice and wheat varieties may vary more when irrigation and cultural practices are inadequate, but this variation does not always decrease with assured water control and appropriate management skills (Mehra 1981). Some elements of new technology, such as pesticides, are explicitly risk-reducing.

Another important, but not well understood, issue is the effect market developments have on the cost of economic and technical information to farmers. Assuming reduced infrastructure and marketing service costs lead to lower information costs, it can be inferred that uncertainty is reduced.

Measuring the Productivity Effects of Marketing Investments

In addition to reducing the costs and increasing the availability of marketing services, and thus bringing about the associated "short-run" economic changes in prices, marketing investments also alter farmers' incentives to adopt new technology, invest in human capital, and move to a new technological equilibrium. Therefore, an important task in measuring the returns to marketing investments is to quantify their productivity effects.

Production Function Approach

Studies related to this question to date have attempted to quantify the productivity effects of investments in roads, or the effects of reduced transport costs (see Antle 1982 for a review of relevant studies). These studies estimate a production function of the form:

$$Q = f[X, M, Z]$$

where Q is output, X is an input vector, M is a measure of road investments or transport costs, and Z is a vector of other exogenous factors such as human capital. It is important to note that these production function models provide estimates of $\partial f/\partial M$, holding constant inputs X. Thus, these models provide estimates only of the technical efficiency effect of transport costs; they do not measure the effects transport cost changes have on the vector X of inputs farmers employ, that is, $(\partial f/\partial X)(\partial X/\partial M)$. This input use effect cannot be measured using a production function approach.

An alternative approach to measure the overall economic effects of transport, marketing, or other investments, is based on the dual profit function corresponding to the above production function. It is known (Lau 1978) that a well-behaved production function has a dual profit function

$$\pi = G[p, w, M, Z]$$

which gives the maximum profit π obtainable with the technology f[X, M, Z], at output and input prices p and w, for given values of M and Z. Using the profit function, a number of effects can be derived. First, the total effects of changes in M on farm returns is:

$$\frac{\partial \pi}{\partial M} = \frac{\partial G}{\partial p}\frac{\partial p}{\partial M} + \frac{\partial G}{\partial w}\frac{\partial w}{\partial M} + \frac{\partial G}{\partial M}.$$

Here, it is recognized that changes in transport or marketing services, measured by M, affect returns through price effects $\partial p/\partial M$ and $\partial w/\partial M$, for a given technology; and that changes in M also alter technology at given prices, hence $\partial G/\partial M$. The profit function can be used to infer the effects of M on input demand X^d and output supply Q^s. By Hotelling's lemma,

$$X^d = -\frac{\partial G}{\partial w}, \quad Q^s = \frac{\partial G}{\partial p}$$

hence,

$$\frac{\partial X^d}{M} = -\frac{\partial^2 G}{\partial w \partial M}, \quad \frac{\partial Q^s}{\partial M} = \frac{\partial^2 G}{\partial p \partial M}.$$

Profit function models have been used successfully to measure the effects of human capital and other exogenous factors on farm-level technology and input use (e.g., Sidhu and Baanante 1981), and could readily be adapted to measure the effects of marketing investments.

However, several serious measurement problems remain to be resolved. First, the statistical data used to conduct such an econometric exercise are often inadequate and the statistical methods themselves have certain limitations. For example, typically the researcher selects as exogenous variables, a few of the many variables that might belong in the model. Since these variables tend to be highly correlated, across regions as well as over time, it is unclear whether the measured effect should be attributed to the particular variable in the model, or to the 'set' of investments that tend to be closely related to that variable.

A second, and somewhat related, problem is that both the production function and profit function defined above are static. Given the importance of dynamics and timing of investments discussed above, this is a potentially serious problem. For example, a cross-sectional model using data from throughout India (as in Antle 1984) captures the "long-run" productivity effects of transport cost differences, assuming farmers have adjusted to the local conditions they face. However, such a model says nothing about the dynamic adjustment process that occurs over time as marketing and other agricultural investments are made. An alternative approach explicitly models production processes as dynamic phenomena (Antle 1983).

The Cost-Benefit Analysis Approach

The tools of producer's and consumer's surplus are frequently used to measure the benefits and costs of agricultural investments (e.g., see Gittinger 1982), and can readily be adapted to evaluate marketing investments (see Freebairn et al. 1982).

Cost-benefit analysis is based on the principle that the present discounted value of net benefits of an investment, summed over all members of society, is the relevant measure of the project's social value. This approach implies that an income gain to any member of society is equally socially desirable, a proposition questioned by some on equity grounds. The analysis of changes in surpluses for consumers and producers can be disaggregated and used to evaluate the distributional impacts on groups such as rural consumers, agricultural producers, and urban consumers.

An example of cost-benefit analysis is Sprigg's study of roads in India. He assumes road investments reduce the cost of marketing services and allow farmers to invest more in agricultural production, and that as a consequence, they also reduce the rural-urban product price differential. The production increase reduces product prices in both rural and urban markets (assuming the output increase is large relative to the market, as would be expected of major investments in the long run). This effect is beneficial to both rural and urban consumers but may make agricultural producers either better or worse off as a group, depending on the relative demand and supply elasticities. However, society as a whole is clearly better off, in the sense that aggregate surplus to consumers and producers is increased. Reducing the rural-urban product price differential lowers agricultural product prices to urban consumers and raises them for rural consumers and producers, with corresponding welfare gains and losses to the groups, and a net welfare gain for society.

Besides the question of the income distribution effects of these changes, there are a number of other difficulties with this kind of analysis. A major limitation concerns the abstraction from the issues of dynamics and project dependence. The measured effects of road investments on agricultural production do not happen instantaneously and, as discussed earlier, are likely to be confounded with the effects of other related investments and changes that result from laying roads.

An Adaptive Control Approach to Planning and Evaluating Marketing Investments

In this section, I propose a comprehensive approach to planning and evaluating marketing investments which take into account the issues discussed thus far. The problem of determining optimal public sector investment in agriculture is viewed as a stochastic control problem; Freebairn and Rausser (1974) give a summary of this approach. The approach is useful at several levels. First, it helps to organize and conceptualize important dimensions of the decision problem facing government officials. Second, it provides a means of quantifying and formally solving problems of planning and evaluation. Moreover, the approach offers insight into the problem, and guides planners, even if all of the relationships in the formal model cannot be accurately quantified.

The goal of marketing and other agricultural investments is assumed to be to maximize aggregate social welfare, subject to technological, economic, political, or humanitarian constraints. Following the cost-benefit analysis approach, welfare in period t is the sum of producer's surplus PS_t and consumer's surplus CS_t. The stylized planning problem is to choose the sequence of marketing investments m_t, and other investments z_t, to maximize the expected present value of social welfare over time. Thus, the objective function for a planning horizon of T periods is:

$$\max_{\{m_t, z_t\}} \quad W = E \sum_{t=1}^{T} (PS_t + CS_t)\beta_t$$

where E is the mathematical expectation and β_t is a discount factor. A concave utility function can be introduced to represent the planner's risk aversion. However, uncertainty has important effects on the solution to the problems of planning even when planners are assumed to be risk-neutral (Antle 1983).

Numerous constraints must be met by an optimal plan. Here I provide some examples of the kinds of constraints that may be involved. First, the stocks of marketing capital M_t and other agricultural infrastructure capital Z_t move over time according to some rule such as:

$$M_t = \delta_m M_{t-1} + m_t$$

$$Z_t = \delta_z Z_{t-1} + z_t$$

where δm and δz are depreciation rates (these may be known or uncertain). Second, the agricultural technology in each period is, say,

$$Q_t = f_t[X_t, M_t, Z_t, \varepsilon_t]$$

where X_t is a vector of inputs and ε_t is a random shock due to weather, disease, and other random events. The surplus accruing to producers is the amount in excess of variable cost, so

$$PS_t \quad t = P_t Q - w_t x_t$$

where P_t and w_t are output and input prices (vectors). Input use is a function of prices and investments, so

$$X_t = X_t(p_t, w_t, M_t, Z_t)$$

Note also that supply-demand factors D_t and d_t in output and input markets, as well as marketing and other investments, determine prices, so

$$p_t = p_t(D_t, M_t, Z_t)$$

$$w_t = w_t(d_t, M_t, Z_t)$$

Both p_t and w_t are random variables because D_t and d_t are subject to unpredictable forces. Third, consumer's surplus is determined by agricultural demand factors D_t and output Q_t. Hence

$$CS_t = CS_t[D_t, Q_t]$$

Fourth, the planners must meet a budget constraint

$$m_t + z_t \leq B_t$$

Finally, other constraints of a political nature may require to be provided for. For example, recognizing that CS_t is composed of rural consumers CS_t^r and urban consumers CS_t^u concern about urban political forces may require constraints such as

$$CS_t^u \geq \overline{CS}^u, \quad CS_t^r \geq \overline{CS}^r$$

which assure minimal levels of urban and rural consumer welfare $\overline{CS}^u$ and $\overline{CS}^r$. Of course, similar constraints can be imposed for producers.

The general solution to the above problem takes the form

$$m_t^o = m_t^o[m^{t-1}, z^{t-1}, Q^{t-1}, D^{t-1}, d^{t-1}, \text{expectations}_t],$$

where $m^{t-1} = (m_{t-1}, m_{t-2}, ...)$, that is, m^{t-1} is the past history of marketing investments, $z^{t-1} = (z_{t-1}, z_{t-2}, ...)$, and so forth. The term "expectations t" in the above equation represents the fact that m_t^o also depends on the expected outcomes at time t of all future random variables over the planning horizon. Thus, as a general principle, we can say that the optimal investment decision will: (a) satisfy technological, economic, and other constraints; (b) depend on the past record of investments and other exogenous factors; (c) depend on expectations about the future.

Another important feature of the optimal investment plan is the interdependence of decisions. The above equation for m_t^o shows that, generally, the optimal marketing investment in each period depends on all past and future expected investments. Similarly, the role of timing is implicit in the expression for m_t^o.

By quantifying the functional relationships in the model, various exercises can be conducted. First, the planning problem can be solved by computing the optimal sequences of investments m_t^o, z_t^o. This can be done under various assumptions about important parameters in the model to evaluate the sensitivity of expected social welfare to alternative plans and constraints. Second, the model can be used to evaluate the returns to alternative investment plans under various assumptions and constraints.

Conclusion

Accurately measuring returns to investments on marketing systems is a complex problem. One aim of this paper is to sensitize the reader to a number of issues that should be taken into account in evaluating marketing, as well as other agricultural investments. Understanding the contribution these investments make to technology diffusion and adoption, and thus to agricultural productivity and growth, is essential to measuring their true benefits. Consequently, the dynamic interdependencies of agricultural investments must be understood. A stochastic control approach is outlined for incorporating these dimensions of the marketing investment problem into a unified analytical framework. This approach can be used both for ex ante planning, and for ex post evaluation of marketing investments.

The many constraints on the planning problem discussed earlier in this paper suggest that a large amount of information is needed to accurately formulate and evaluate a marketing investment plan. While some existing research has quantified the relationships discussed therein, clearly much research is still needed before a reliable quantitative planning model could be implemented. The relationship between marketing investments, technology diffusion, and agricultural productivity seems to deserve greater research effort. Thus a substantial research agenda faces agricultural economists, government planners, banks, and others who are confronted with the task of measuring returns to investments on marketing systems.

The analysis of the timing of investments on agricultural marketing in relation to technology diffusion and growth in agricultural productivity has important implications for the semi-arid tropics. Agricultural research at institutions such as ICRISAT has yet to develop major new technologies that are likely to lead to large increases in the demand for marketing services. Therefore, the analysis in this study suggests that returns to marketing investments in SAT areas may not be as high as in areas where major technological innovations are occurring. The important question facing economists is to determine when expected social returns to marketing investments in the semi-arid tropical regions are likely to be high enough to justify the diversion of scarce resources from other important investment activities such as agricultural research.

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Public Interventions in Agricultural Markets in India

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Summary

The system of regulated markets in India is described, from its beginnings under British rule in the 19th century. The paper examines the effect of regulated village, wholesale, urban, commodity, and livestock markets on: fair prices to the primary producer; legislation governing market regulation; and the role played by market committees and market boards and by government and cooperative organizations. It also considers recruitment and training of market personnel and quality control of products.

The paper stresses the need for proper planning and designing of markets, in keeping with stepped-up production, particularly in the context of the "green revolution" in northern India, where markets are being choked by unprecedented large arrivals of food grains. Other important factors the paper discusses are the mode of transportation of produce to and from the market, and efficient and hygienic storage facilities.

Résumé

Interventions publiques dans les marchés agricoles en Inde : *L' rticle décrit l'évolution du système de marchés réglementés en Inde, depuis ses débuts au XIXe siècle sous l'autorité britannique. Il étudie l'effet des marchés réglementés (marchés du village, de gros, marchés urbains, marchés de matières premières et ceux de bétail) sur des prix équitables au producteur primaire; la législation régissant la réglementation des marchés; et le rôle des comités et conseils de marché ainsi que des organisations gouvernementales et coopératives. L'article examine également le recrutement et la formation du personnel de marché et le contrôle de qualité des produits.*

La communication souligne la nécessité d'une bonne planification et conception des marchés, conforme à une production accrue, en particulier dans le cadre de la "révolution verte" au nord de l'Inde, où les marchés se trouvent contraints par des arrivages des quantités importantes imprévues de céréales. D'autres facteurs importants, à savoir le mode de transportation des produits vers et à partir du marché, des moyens de stockage efficaces et hygiéniques, sont également étudiés.

Introduction

The motivation to produce more generally comes from the prices that a farmer is able to get for his produce. A well-spread out and well-managed network of market operations under the supervision of trained managers contributes significantly toward eliminating a number of malpractices such as underweighment, unauthorized and unjust deductions, and unfair price setting.

Historical Background

Agricultural production has registered a significant increase after independence, resulting in a larger marketable surplus, and brought a consequential pressure on the marketing system. The present marketing structure for agricultural commodities consists of primary markets at village level, wholesale assembling markets generally at block/taluk level, and terminal markets in the cities. The mar-

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keted surplus reaches the ultimate consumer through a circuitous channel. It changes hands at many places in between, and each stage adds to the cost on account of services, commission, and malpractices Though a drastic reduction in the number of intermediaries may not be possible in the near future, the movement of goods from producers to consumers can certainly be regulated by making the market mechanism more efficient.

Regulated markets owe their existence to the anxiety of the British rulers about a century ago to make supplies of cotton available at reasonable prices to the textile mills at Manchester. The first regulated market in India was established as early as in 1886. A tangible progress in regulation came after independence and over 5000 markets are now regulated. However, the spread of regulated markets to all parts of the country is not uniform.

Legislative Measures

As many as 9 out of 31 states/union territories in India have not so far enacted legislation to enable them to regulate marketing practices in their respective regions. Regulation of markets has contributed substantially toward increasing the returns to the farmer for his produce. It has also helped to significantly reduce evasion of commercial taxes.

Most of the state acts were promulgated a decade or two ago. Although these acts have been amended from time to time, recent emphasis on improving the agricultural marketing system has necessitated a complete review of existing legislation. An important issue is the number of commodities regulated under different state acts. Some important commodities like fruit, vegetables, livestock, and livestock products have not been regulated by a number of states.

The composition and functions of the market committees also need a thorough examination. The primary objective of regulating the markets is to protect the farmers from various malpractices prevailing in agricultural markets. A number of state acts provide for a majority representation of the farmers on the market committee. Some of the acts also provide that only a farmer can be the chairman of a market committee. But many traders, who also happen to hold title to some farm land, manage to get elected to the market committee. Such persons cannot normally be expected to safeguard the interest of the producers.

The question of setting up statutory marketing boards has been discussed by the state governments in various forums, but only 13 of them have set up such boards while 5 of them have set up only advisory boards. While advisory boards try to advise and not to encroach upon the autonomy of the market committees wherever these are able to look after themselves, marketing boards are to take up the overall coordination of the activities of the market committees, and provide them the necessary technical and financial back-up.

Regulation of Markets

Not enough attention has been paid so far to the development and regulation of primary rural markets. A great majority of small and marginal farmers bring their produce only to these primary markets. Their marketable surplus is so small that they do not find it economically feasible to take it to distant wholesale markets, even though such markets tend to offer better prices. Rural markets are often devoid of facilities and are generally strips of land serving as a meeting place between buyers and sellers. Market yards are owned either privately or by local panchayats. They are auctioned yearly in some cases, and the successful bidder collects a fee from users of the market. Thus, those who run the markets look upon them as a source of income and are not interested in their development.

The economic impact of the large city wholesale markets, both upstream in the production areas and downstream in the distribution zone, sets these markets apart from all other rural and urban markets and confers a special status on them as markets of national importance.

Sales in most of these markets are conducted under the *Hatha* system, in which the buyer conveys his price to the commission agent in confidence. Unlike the open auction system, this method of sale does not inspire confidence among the sellers. The sellers and buyers are subjected to the levy of a number of unwarranted market charges. Most of these markets are located in congested areas devoid of basic amenities and transact business under grossly unhygienic conditions. All these factors point to the need to regulate and develop these markets.

Many of these markets are managed by junior functionaries, who have neither the expertise nor the stature to manage these markets. Professional-

ization of their management is imperative to ensure their proper functioning.

Government procurement has added a new dimension to agricultural marketing in the 1970s. A number of government organizations, e.g., Food Corporation of India (FCI), State Civil Supplies Corporation, Jute Corporation of India (JCI), and Cotton Corporation of India (CCI), and cooperative organizations like the National Agricultural Cooperative Marketing Federation (NAFED), state marketing federations (MARKFED), and the primary cooperative marketing societies help farmers fetch a better price for their produce. The FCI stores and handles about 20 million tonnes of food grains every year. Their operations not only provide buffer stocks for our food security plan, but also help farmers obtain support prices that the Government offers for certain crops. Purchases of commercial crops made by institutions like CCI, JCI, etc., provide a steady flow of raw material to the industry, in addition to helping farmers get a fair price. However, most purchases by these institutions are from outside the regulated market yards.

The degree to which the legal measures of market regulation are effectively implemented depends upon the availability of skilled and dedicated workers at all levels. The quality of this work force depends upon initial recruitment, in-service training, and morale. Recruitment and promotion policies differ from state to state.

Training Needs

There is an imperative need to provide adequate training at all levels to personnel who manage markets. A number of institutions are engaged in imparting training. There are diploma courses in agricultural marketing, training courses for market secretaries, grading supervisors, and the graders. Ad-hoc specialized training courses on grading select commercial crops, market intelligence, and short-duration training for senior-level officers is also offered by the government and academic institutions.

Quality Control

The government is keen to ensure remunerative prices to producers and quality products to the consumer. By increasing exports it wishes to bridge the gap between imports and exports. To this purpose, enforcement of quality control in respect of agricultural commodities is an important step.

So far, 81 grading and marking rules, covering over 123 agricultural commodities and livestock products, have been notified under the provisions of the Agricultural Produce Grading and Marketing Act 1937. Simple grade standards have been prescribed for cereals, pulses, oilseeds, fruit and vegetables, tobacco, etc., to facilitate grading at the growers' level.

In recent years, the pattern of India's export growth bears testimony to the country's endeavor towards standardization and quality control. India is one of the few developing countries where export inspection in respect of a number of commodities is mandatory. To ensure that goods of the desired quality reach the importing countries, standardization of agricultural produce and preshipment quality inspection have virtually become a *sine qua non* for export promotion. Such measures help build confidence amongst the foreign buyers and also enable exporters to obtain higher unit value for their goods. At present 41 commodities are subjected to compulsory inspection. The annual value of these commodities presently is Rs 355 crores (US $ 300 million appx.), compared to Rs 0.3 crores in 1942-43 when compulsory quality control was first imposed.

A program of grading at producers' level has been introduced. The idea is to subject the produce before it is up for sale to simple tests of quality, which influence its market value. Over 60 agricultural commodities, valued at about Rs 755 crores (US $ 640 million), are being graded at the producer's level.

The National Commission on Agriculture (1976) has inter alia suggested that grading and standardization should be made compulsory for all transactions relating to agricultural commodities, either for internal trade or for export, at the producers' level. However, since huge infrastructural facilities are required for compulsory grading and marking of these commodities, the task is being undertaken in a phased manner.

The consumers have four fundamental rights: right to safety, right to information, right to choose, and right to be heard. However, under our market conditions, the consumer is very vulnerable and is often at the mercy of the trader. Even in advanced countries, where trade practices are relatively clean, legislation for the protection of consumers has been adopted. The consumer in India too

needs more determined protection.

Compulsory quality control prior to export is a very important component of the export promotional measures. However, such compulsion is invariably resented by exporters. While such resentment may be misconceived, the demand for removal of avoidable bottlenecks and simplification of procedures deserve consideration.

A number of institutions are now engaged in formulation of grade standards for agricultural commodities. There have been instances where two organizations have come up with different grade standards for the same commodity. Obviously it is not advisable to have such a multiplicity of institutions doing the same kind of work.

Standardization of commodities meant for export does not appear to have received the attention it deserves. Our standards are based on conditions prevailing in our country, and have little regard for what is required in the international markets. An in-depth study of consumer preferences in the major importing countries and their health regulations is essential. A close coordination with International Standards Organization (ISO) would be very helpful in this regard.

A large number of laboratories are now primarily engaged in testing samples to meet the statutory quality requirement for export of those commodities. Not much attention, however, has been paid to fundamental research. Adequate analytical data—essential for scientific formulation of standards—are not easily available for a number of commodities grown in the country. Ensuring quality control of perishables—fruits and vegetables—is critical to boost their export but has not received the attention it deserves.

With the growing demand for meat products in the export market, it is imperative to lay down the grade specifications for them and develop facilities to enforce strict quality control; it is just as imperative to do this for fruits and vegetables. Wherever grade specifications have been evolved, they are not being used by producers, consumers, and traders, probably because the specifications bear little or no relation to the consumer preferences prevailing in the country.

Market Planning

A concern that is repeatedly voiced is the need to properly plan and design agricultural produce markets. The system of farm-produce marketing that developed in the country during the last century was by and large dictated by the socioeconomic conditions that prevailed at that time. As a result of the change in the pattern of agricultural production from the level of village self-sufficiency to that of export oriented commercial farming, many market centres (or *mandis*) sprang up during the first half of the 20th century at places where transport and communication facilities were available. Each market center initiated and developed its own trade practices and code of business. Most of these markets—in cities and in the rural areas—today are congested, neglected, and outdated to the point that they no longer can play a key role in the local or regional economy. They are inhospitable to producers, incapable of expansion for trade, and inadequate as distribution points in the service of consumers.

Undoubtedly, major changes have occurred in the agricultural economy matched or preceded by equally drastic demographic movements. The last decades have seen the proliferation of urban agglomerations with large and densely populated centers. From a closed, nearly self-sufficient, barter economy, India has developed agricultural operations which now yield a surplus. The green revolution is but one phenomenon in the many changes that have come in the wake of specialization in production and exchange, as well as regionalization of supply.

The fundamental changes in production and distribution have so far not been accompanied by a matching interest in the creation of an adequate physical distribution system. As a result, the surplus agricultural economy is hindered by an inept and lopsided physical distribution. Road transport growth has far outpaced rail; the development of packing and shipping techniques are at an embryonic stage, while storage capacity is insufficient, inadequate, and ill-distributed. Markets—the cardinal points of the distribution network—have received more attention as objects of regulation than as functional elements in the nation's system for distribution of surplus produce.

The profound changes that have occurred in the nation's pattern of production and exchange are accompanied by an equally rapid change in consumer habits. All these trends and changes constitute the broad framework within which the planning of markets should find its proper role and real purpose.

Starting with the Fourth Five Year Plan (1971-75), a number of states have taken up a massive

program of development of agricultural produce markets. The country is today dotted with several new markets established at considerable expense; many more are either being constructed or are at the planning stage. However, many of the newly built markets have turned out to be expensive and less functional than expected Some have become noteworthy monuments of dysfunctionality, because of their unsuitable location, faulty planning, exorbitant cost of construction, or a combination of these factors.

The planning and designing of modern produce markets calls for considerable expertise. The markets have to perform certain specific functions and their needs in terms of layout, design, and structure are also specific to these functions. Each market has specific characieristics and needs. The planning and designing of any market, therefore, has to be related to the individual needs and requirements of the area it serves.

We have terminal markets, assembling markets, and we also have primary markets. Each type of market plays a different role and performs specific functions. Planning and designing techniques have to be dovetailed to suit the role of each type of market.

Construction of a modern market involves huge capital investment. Cost-benefit analysis does not seem to have received the attention it deserves in such construction decisions. The investment in constructing a new market and in creating certain facilities thereon should be fully justified in terms of benefits that accrue to the market users, particularly the producer-seller.

Wider Horizons for Markets

There are more than 22 000 rural markets including periodic *hats* (weekly markets) in the country. The problem is to bring this large number into the mainstream of market development programs. These markets are important, not only for the role they play in assembling small quantities of the surplus, but also for their supply functions. Millions of farmers and nonfarmers visit these markets to meet their day-to-day requirements, such as food grains, pulses, salt, jaggery, oil, and even fish and meat. A number of other services such as tailoring, hair cutting, minor repairs to implements, earthenware, utensils, toilet articles, ready-made garments are all available to them in these *hats*. Even marriages are often settled in these markets. Therefore, rural markets deserve great attention with regard to their planning and provision of facilities.

The primary producers are by and large illiterate and are not organized, vocal, or articulate and consequently, the government needs to stand by them and protect their interests. The consumers too are not organized at present. The consumers' movement is still in an embryonic stage and does not count for much in the marketing of agricultural produce in the country. Exploiting such a situation, traders and middlemen are having a field day. These vested interests are presently able to manipulate marketing operations to their advantage, to the neglect of producers and consumers. The government would fail in its duty if it does not keep the traders and the middlemen in check until producers and consumers are better organized and able to stand up to the guile and machinations of the exploiters.

The Establishment and Reform of China's Agricultural Trade Structure

Du Xiao-Shan*

Summary

The paper gives a brief historical review of the agricultural marketing system in China. The system has been reformed several times, and these attempts have given us both positive and negative experience.

Aspects of the agricultural marketing system in China reviewed in this paper are: (1) purchase of farm products—the principles, forms, and terms of these purchases; (2) supply and distribution of farm products; (3) management of prices; and (4) international trade in farm products. The paper outlines basic features of agricultural marketing in China and recent measures to reform the system to suit the current needs of the country.

Résumé

L'établissement et la réforme de la structure commerciale agricole de la Chine : *En premier lieu, cet article passe en revue l'histoire du système de commercialisation agricole de la Chine. Le système a subi plusieurs réformes, et la suite en a été aussi bien positive que négative.*

L'article traite des aspects suivants du système de commercialisation agricole en Chine : a) achat de produits agricoles, ainsi que les principes, les modes et les termes de ces achats; b) fourniture et distribution de produits agricoles; c) gestion des prix; d) commerce international des produits agricoles. Enfin, l'article donne un aperçu des caractéristiques fondamentales du processus de commercialisation agricole en Chine et des mesures récentes prises pour la réforme du système en vue de l'adapter aux besoins actuels du pays.

Introduction

A rational economic structure in agriculture is an important prerequisite for the smooth functioning and development of agricultural trade. The structure of agricultural trade encompasses the form in which the state organizes and controls the distribution of agricultural commodities (including industrial products intended for rural consumption), the management and establishing of price guidelines, the setting up of commercial organizations, and the division and adjustments in management and limits of authority at every level and type of commercial undertaking. The state is also responsible for fixing regulations and systems involving economic benefit.

Historical Background

After the establishment of the People's Republic of China in 1949, state-run cooperatives were the main mode of supply for the commercial networks and channels of commerce in the countryside. Over the last three decades, the administrative system of supply and marketing cooperatives has undergone six major changes.

1. In 1950, a type of cooperative commercial organization "run by the local people and subsidized by the state" was set up to fulfill state quotas, to aid the peasants in marketing agricultural and sideline (privately produced) products and to supply the means by which articles of daily use can be produced for those residing in the countryside.

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Moreoever, the administration of this system was comparatively sound and democratic. During the period of the recovery of the national economy and the period of the first five-year plan, these institutions played an important role in developing agricultural production.

2. In 1958, supply-and-marketing cooperatives at or above the county level were merged with state commerce, and the People's Communes replaced the grassroots-level cooperatives as the principal unit of commerce. Under this system there was an integration of government administration with commune management, which was deleterious to democracy and the mass spirit. The resulting defects in the management of the system of exchange of rural commodities also had a negative effect on the ability of the supply-and-marketing cooperatives to serve the interests of rural production and improve the livelihood of peasants.

3. In 1962, the supply-and-marketing cooperatives were separated from state-run enterprises, and their management was restored to local people. This change played an active role in developing rural agriculture and improving the quality of life in the countryside.

4. During the decade of the "cultural revolution" beginning 1966, commercial enterprises at and above the county level were once again merged with the state-run sector. This marked a further weakening in organization and leadership, as well as in the management of the supply-and-marketing cooperatives.

5. In 1975, the supply-and-marketing cooperatives were reorganized along the lines of the management system that prevailed before 1966, this was followed by a concomitant strengthening of its managerial function. But despite these instances of separation and re-merging, the basic character of "ownership by the people" did not change. To a certain degree, this had a negative effect on the relationship between the cooperatives and the peasants, and on agricultural trade as a whole.

6. Since 1982, the state has carried out the following experiments in reforming the system: a) restoring the character of cooperative enterprises to the supply-and-marketing cooperatives at the grassroots level; b) transforming the county-level supply-and-marketing cooperatives to become the foundation of a joint economic institution encouraging peasants to invest as shareholders; and c) further restoring and developing the democracy, mass spirit, and flexibility of the supply-and-marketing cooperatives.

China's state-run enterprises are playing a leading role in agricultural trade, by handling the management and administration of certain commodities. During the early years after liberation, state-run enterprises adopted a highly concentrated and unified management system; major reforms were carried out during the first five-year plan, based upon the principle of "unified leadership and graded management." Changes in the system of supply-and-marketing cooperatives and reforms in state-run commerce have become inseparably linked. Moreover, rural markets for agricultural products play an important supplementary role. Despite the several tortuous transformations that free markets have undergone during the last three decades, they remain an important component of China's integrated agricultural trade system, along with state-run enterprises and supply-and-marketing cooperatives.

China has consistently maintained a policy of developing agricultural and industrial production, stabilizing commodity prices, stabilizing the market, and guaranteeing a secure livelihood for the people. Following the principle of "unified leadership and graded management," China has established a management system whereby the prices of major agricultural products are set by the state. At the same time, China has strengthened control over free market activities in order to ensure that free market prices do not exceed state-regulated prices. Till the socialist transformation of the ownership of the means of production—which took place between 1950 and 1956—was complete, the relationship between prices fixed by the state and market-adjusted prices was relatively well managed. During this period, the state maintained a firm grip on market initiative. It carried out timely reforms to correct irrational pricing of certain agricultural products, thus maintaining price stability and narrowing the gap between the prices of industrial and agricultural products.

Owing to serious disproportions in the make-up of the national economy in the late 1950s and early 1960s, there was a decrease in agricultural production coupled with inflation, which brought about increase in prices. Based on the premise of strengthening planned management, the Chinese government brought into full play the function of market regulation and swiftly arrested the soaring prices. During a twelve-year period (1966-1978) encompassing the "cultural revolution," prices were never adjusted, causing serious discrepancies between planned prices and the actual condi-

tions of production in the industrial and agricultural sectors. In 1979, the state affected a large scale increase in the purchase prices of agricultural products and was successful in implementing measures to stabilize the market.

Reforms in the system of agricultural trade represent adjustments and improvements in the relationship of material benefits between the agricultural and other sectors. The reforms carried out during the last three decades have had both their positive and negative aspects. The management system in effect from 1949 through the first five-year plan played an important role in stimulating the development of industrial and agricultural production, ensuring stable commodity supplies and improving management. For quite a period in the past, we had overemphasized the management of economy by administrative fiat. Furthermore, in the process of reforming the system, we overemphasized the division of authority between central and regional authorities; not enough emphasis was placed on the relationship between the central authorities, the local authorities, the enterprises, and staff and workers in the matter of economic benefits. In particular, the economic relationship between the state and the enterprises was not given due recognition. Therefore the results of the reform were not readily evident. Since the third plenary session of the eleventh central committee of the Chinese Communist Party the shackles of "left" thinking have been broken. Even though the reforms in the agricultural trade system are still at an embryonic stage, they have managed to produce significant results.

Facets of the Agricultural Trade System

The existing system of agricultural trade has evolved through several stages of adjustment and transformation. The following aspects of the present system deserve further discussion.

Procurement of Agricultural Products

Procurement of agricultural products is the starting point of the distribution of agricultural commodities. At present, this is handled by the state-run enterprises and the supply-and-marketing cooperatives. Approximately 60 million tonnes of grain (20% of gross production) is handled in this way. The basic monthly minimum of 15 kg of grain is guaranteed to consumers in both urban and rural areas.

The basic principle guiding commercial departments (state trading enterprises) in the procurement of agricultural commodities is to consider simultaneously the interests of the state, the collective, and the individual. Specifically, the objectives could be listed as:

- To determine rationally the ratio between the amount of commodities to be procured by the state, and that to to be retained by the peasants;
- To implement thoroughly the principle of exchange at equal or nearly equal value; and
- To integrate ideological education with material incentives.

At present, the state uses monopoly purchasing, quota purchasing, and negotiated purchasing in its program to procure agricultural products.

Monopoly purchasing. This is a unified policy of purchasing grain, cotton, edible oil, and other products that are an important part of the national economy and the people's livelihood. A reasonable ratio is ascertained between the proportion purchased by the state and that retained by the individual producer.

Quota purchasing. On the basis of quotas, producers sell commodities such as live pigs, flue-cured tobacco, silkworms, and tea leaves, which are of significant importance to the national economy, to the state. Aside from the portion earmarked for sale to the state, the individual producer is free to market surplus produce.

Negotiated purchasing. This form of purchasing applies to agricultural products which lie outside the monopoly and quota purchasing programs; the quantities, quality, and prices of these goods can be negotiated between commercial departments and individual producers. This form of purchasing too falls within the ambit of market regulation.

Despite the limitations that exist in the systems of monopoly and quota purchasing of agricultural products in China, these two systems are essential to ensure timely control by the state of key agricultural products, the fulfillment of national production requirements, and the people's livelihood. There-

fore, they must be firmly and consistently implemented. With the gradual modernization of agriculture, the forms of purchase of agricultural products will change.

At the present stage, commercial departments have adopted two methods for the procurement of agricultural products, purchase by contract and market purchasing.

Purchase by Contract

There are two main types of contracts:

Advance purchase contracts. The state makes partial advance payments to communes or brigades in the form of cash or commodities, and these in turn organize production according to the variety, quantity, and quality stipulated in the contract. Following the harvest, the agricultural products are sold to the state.

Amalgamated purchasing/marketing contracts. These contain the following points: the variety, quantity, quality, and price of the goods contracted for between the state and the producers; delivery time and place; means of transport and details of packaging; as well as the method of compensation in case of breach of contract.

Purchasing by contract should be the chief method of purchasing agricultural produce. It is conceivable that the purchase of agricultural produce in future will be guaranteed and realized entirely through economic policies and a system of mutually and equally beneficial contracts.

Market Purchasing

This is a voluntary, free purchasing system, adopted as a supportive measure.

Within the limits of state policy, surplus agricultural products—over and above the state purchasing quota and not purchased by the state—can be bought and sold by the collective or individual, and transported any distance for sale at urban free markets or at country fairs.

Price Fixing and Management

The prices of agricultural products in China are determined as for all other products, on the basis of value or conversion value; at the same time, p are restricted by state policy and changes in s and demand.

The value of a product determines its price changes in price are controlled by the law of v The price of a product is merely its magnitu value expressed in terms of a certain curr "Price based on value" does not imply that situations the price of a product will accord w value, but implies that it will always fluctuate ar a central point determined by its actual value. is a manifestation of the effect of the law of v

The relation between supply and der directly influences price, and vice versa. supply-demand situation determines the rea tion of the value of a product. In China, the pric agricultural products of major importance t national economy and the people livelihoo not change with changes in supply and dem However, the price of a wide range of agricu products produced in small quantities varies market conditions.

Planned prices are determined by the state thus restricted by state policy. In fixing prices state sometimes deviates from the value of a p uct in order to reach predetermined political economic goals. But the state does not arbit determine price without considering the res tions of the law of value, because its power ultimately be limited by economic condit Hence the law of value is the most important pr ple for the fixing of procurement prices.

In its pricing policy, the state differenti between planned prices (including natio standardized prices and floating prices) unplanned prices (including negotiable prices market trading prices). Fixed prices form the body of market prices.

Unified State Prices

These are the centrally fixed and managed pr of important commodities monopolized by the s and purchased by quota. They are determine relevant departments at the central and regi levels, in accordance with the area of jurisdic under which the produce falls.

Floating Prices

The state fixes a basic price and the rang

fluctuation permitted. Enterprises may then set a price within the fixed range, given the conditions of supply and demand. Prices are of three types: floating prices, fixed maximum-and-minimum prices, and a standard price.

Negotiable Prices

These are selling and purchasing prices negotiated by consultation, in accordance with the conditions of supply and demand and on the principle of mutual benefit to parties voluntarily engaged in the transaction. These prices generally apply to agricultural sideline products, as well as to certain agricultural products monopolized by the state and purchased by quota, which are surplus to the state's purchase quota and are then marketed by producers.

Market Fair-Trading Prices

These are the prices of the various products on urban and rural trading markets. Prices may be freely fixed, but the supervision of state industrial, commercial, economic, and political departments must be accepted.

The purchasing price of agricultural produce occupies an extremely important position in China's socialist market pricing system and forms the basis of all market prices. It forms the base for the state procurement price of agricultural produce, wholesale and retail prices, and influences the production cost of agro-based industries. The state formulates the purchasing prices for agricultural products on the basis of production costs and the payment of rational profits.

In implementing price management, the state lays emphasis on correctly proportioning the purchasing prices for various agricultural products. Most important is the proportion of grain to cash crops. Rational determination of the relative price of agricultural products, with the price of grain at the core, is advantageous to implementing the policy of "never slackening grain production and vigorously developing a diversified economy"; it promotes coordinated proportional development in the various agricultural sectors.

The narrowing of the price differential between the industrial and agricultural products has consistently been, and will continue to be, a policy firmly implemented in our country. China now places more importance than ever on the use of price as an economic lever, and stresses the study of regulation and management of regional price differences, differences between wholesale and retail prices, seasonal price fluctuations, price differentiation according to quality, etc. The Chinese domestic market differs in character from the international market; therefore prices are fixed separately for domestic and foreign trade. This guarantees the basic stability of prices on the domestic market and the development of China's international trade in agricultural products at internationally competitive prices. The price of products imported for sale on the domestic market is fixed according to quality, with domestic prices as the standard, so as to protect domestic industrial and agricultural products. The state purchase of commodities for export is based on the domestic market price and the quality of the product. The sale price of commodities for export is based on the requirements of state foreign policy and changes in the international market, and is determined by various complex, specific factors.

International Trade in Agricultural Products

China's international trade in agricultural products is an important component of Chinese agricultural trade. The trading strategy is based on the principles of self-reliance and finding markets for its agro-products.

For many years, international trade in agricultural products has been carried out through a centralized state management system. The chief international trading administration organ has been the Ministry of Foreign Trade of the State Council and its regional organs. Business channels were the various specialized companies and their regional offices. In recent years, there have been new developments and policy changes in China's international trade.

The principles that guided reform in China's international trade are:

1. Implement unified leadership, separate management, and encourage all aspects of foreign trade.

2. Gradually bring about the separation of administrative bodies from business organizations and 'administration' from 'operation and management'.

3. Unify responsibility, authority, and benefit. All departments, regions, and enterprises engaged in export business must carry out independent accounting and assume sole responsibility for profits or losses.

4. Combine agriculture and trade, so that production and marketing are integrated.

5. Promote well-coordinated and consistent foreign trade practices.

6. Strengthen management and the guiding role of state planning.

To date, experimental reforms in the system of foreign trade have mainly taken the following forms:

a. To facilitate more direct and frequent contacts between producers and the organizations responsible for marketing, the General Import and Export Corporation has delegated some decision-making authority to certain enterprises and localities, so that they will have more say in marketing decisions.

b. In order to open up new business channels, the power of regulating import and export of certain products has been transferred from the Ministry of Trade to newly established import and export corporations; these corporations will be administered by the authorities in charge of production of specific products. Amongst these newly established import and export corporations are The China Seed Corporation, China Stock Breeding Import and Export Corporation, Chinese Silk Corporation, etc.

c. In addition to handling the centralized import and export of a variety of agricultural products, specialized import and export corporations also act as import and export agents and are encouraged to conduct business abroad.

d. With the decentralization of the management of foreign trade, measures enhancing the administrative work of foreign trade have been adopted to ensure consistency in trade practices. Specialized import and export corporations are to be empowered with coordinating the import and export of the major trade commodities. Such reforms represent an accommodation to international capitalism rather than a capitulation to it.

Plans for Reforms in Agricultural Trade

In its present form, China's system of agricultural trade will be unable to meet the demands of the economic upsurge in the coming years. It is imperative, therefore, that China carry out methodical reforms in accordance with real conditions, thereby blazing a trail of its own in agricultural trade. This system should adhere to socialism and protect the socialist unified market. It should uphold the principle of relying mainly on a planned economy, and supplement it by market regulation. This will invigorate agricultural trade under the precondition that first priority is given to the targets designated in the state plan. In China's new agricultural trade system, state commerce and the supply-and-marketing cooperatives will continue to play a predominant role.

In order to realize these goals, the following steps must be taken.

Relaxing State Control

All the purchasing institutions must ensure the quality of the agricultural products which are purchased under state monopoly or under fixed quotas. With the improvement of the economic situation, the limit on the number of agricultural products purchased and sold at negotiated prices will be relaxed in stages. All commercial bodies—state owned, collectively owned, or private—are entitled to deal in products not specified in the state plan. With the sole exception of cotton, they are also permitted to deal in items specified in the state plan, provided the production targets designated for them in the state plan are fulfilled first. Their transactions may be conducted through all available trade channels and in every possible form. The state commercial institutions must play an effective role in market regulation by actively participating in purchasing and sales at negotiated prices. Supply-and-marketing cooperatives, as well as other cooperative commercial organizations, can enjoy more freedom and flexibility in their purchasing and marketing. Peasants may engage in private commercial business and conduct business in cities outside of their local counties and provinces. After the targets of the state plan have been met, prices for both the purchase and sale of surplus agricultural and sideline products may be allowed to fluctuate.

Rational Distribution

Commodity distribution should take into consideration the special features of each economic region and a rational system, which distributes commodities according to type and lowers the trade barriers between city and countryside, should be evolved.

Wholesale trade in agricultural produce must be allowed to reach beyond the rigid limits of administrative areas. Wholesale departments should be set up in accordance with the patterns of consumption, with the aim of cutting unnecessary movement of commodities and giving full play to the commercial role which county seats and towns play in collection and distribution. Efforts must be made to facilitate direct contact between the producers and marketing outlets; in particular, greater efforts must be devoted to organize and speed up direct supply of fresh produce (such as vegetables, fish, poultry and animals for slaughter) to all areas. Large and medium-sized cities must gradually establish their own markets for wholesale trade of agricultural products in the state and private sectors.

It is imperative to break down the commercial barriers between urban and rural areas, higher and lower administrative levels, as well as between different governmental departments and regions. The wholesale departments responsible for various manufactured goods must organize supplies of goods that are readily marketable in the rural areas. State commercial departments and supply-and-marketing cooperatives should establish branches in both rural and urban areas, to conduct wholesale as well as the necessary retail business transactions. Collectively owned and private commercial bodies may also transport their goods for sale out of their local counties or provinces. As private accumulations of capital increase, these can be invested in private trade that is carefully regulated by the authorities.

Reforms in the Supply-and-Marketing Cooperatives

As they constitute an essential link between the rural and urban economy, supply-and-marketing cooperatives have two functions: they are responsible for the purchase and marketing of products as per the quantum designated in the state plan; they are also to promote the sale of the peasants' produce, and supply them with daily necessities and the means of production. It is necessary to inculcate the spirit of the supply-and-market cooperatives at the grassroots and county levels, and to restore the fine qualities of democracy, flexibility, and mass participation. The original county supply-and-marketing cooperatives should be transformed into county cooperative associations; the specialized companies administered by the original county supply-and-marketing cooperative should be transformed into special business departments within the county cooperative association. It is the duty of the county cooperative associations to provide guidance to the grassroots level cooperatives, in accordance with the state economic plan and the market situation, as well as to handle those tasks of purchasing, marketing, storage, and transportation that are beyond the capacity of the cooperatives at the grassroots level. The leadership of all the supply-and-marketing cooperatives is elected democractically and their workers are employed on a contractual basis. The supply-and-marketing cooperatives should develop into comprehensive rural service centers so that rural economic activities can be channeled into the track of planned development.

Specialized Companies to Market Agricultural Produce

The separation of administration and business bodies and the establishment of specialized companies for enterprise management is imperative. Three categories of specialized companies should be established according to commodity type, which will exercise unified authority over their respective commodities in both rural and urban regions.

Companies of the first category should deal in key commodities whose allocation and distribution is centralized by the state, such as grain, oil, cotton, and the major means of agricultural production (including agricultural machinery). Such companies will be directly under the control of the general corporations at the national level dealing in these respective commodities.

Companies of the second category should allocate and distribute commodities such as processed food, tea, livestock, fodder, etc., exercising control at the regional level. They should operate mainly under the control of the provincial commercial administrative organs.

Companies of the third category should handle commodities like vegetables, nonstaple food, and service industries. These companies should oper-

ate under local business management, while receiving professional supervision and guidance from the general corporations and business bureaus at higher levels.

Instead of being merely administrative bodies, companies of all three categories should gradually set up their own business enterprises to facilitate the management of commerce and speed business development.

Attention to Characteristics of Foreign Trade

Although the structural reform of China's foreign trade in agro-products conforms to the overall reform of China's domestic agricultural commercial system, attention must be paid to its special characteristics. Real decision-making power over foreign trade transactions should be in the hands of individual enterprises or jointly shared by them; such enterprises should be allowed to set up special commodity offices and export associations to coordinate and handle problems concerning pricing, marketing, and client relations. They should also encourage active participation of specialized foreign trade enterprises and joint enterprises in business both at home and abroad.

Under the present conditions of decentralized foreign trade management, the focus of our work should be to streamline the administration so as to ensure consistency in foreign trade practices. We must reinforce the guidance of state planning, adopt unified business practices, draw up a comprehensive system of laws concerning foreign trade, and gradually restructure the relevant rules and regulations now in force. Efforts must also be made to enhance inter-enterprise coordination in export.

More Responsive Management

Both state commerce and supply-and-marketing cooperatives must actively adopt a 'responsibility system' of management. They must integrate responsibility and authority with the level of compensation, in accordance with the socialist principle of distribution "to each according to his work," and do away with the practice of "everyone eating from the same common pot." Under the responsibility system, it will be in the enterprises' own economic interests to better their actual performance.

The responsibility system may take various forms, but all enterprises must safeguard the socialist nature of business. They should simultaneously consider the interests of the state, the enterprise itself, their employees, and the consumers. China's enterprises must also strive to provide better service to the nation's 800 million peasants. The structural reforms in enterprise management must be combined with more frequent introspection to consolidate their own growth, and to increase the work efficiency and discipline of their leadership and staff members.

Invigorate Economic and Market Forces

Market management must be reinforced and the economic structure should be invigorated. These two processes must occur concurrently.

Improve Transport and Storage Facilities

The equipment and services for reaching commodities to the consumer—such as storage and transport facilities—must be strengthened, as also the commercial network and scientific and technological information services. Investment for this will of course come largely from the state, but collectives and individuals should also be encouraged to contribute to these efforts.

Rice Marketing in Japan

Hiroyuki Nishimura*

Summary

Rice is the most important staple food in Japan. From the 1920s rice marketing has been indirectly controlled by the government. The Food Control Law, which meant the direct control of rice price, production, supply, and demand was enacted in 1942. After World War II, systems and management of rice marketing have gradually changed.

Since 1966 annual rice production has met or exceeded domestic demand. At present, the government is trying to control the surplus production of rice, and to lessen the financial burden by way of supporting rice price for producers as well as consumers.

Rice-marketing systems in Japan are closely related to the price control systems and agricultural cooperative activities. The buying and selling prices of rice are mainly determined by the government. The agricultural cooperatives maintain strong and integrated marketing channels under the government program. Their business is heavily dependent upon rice marketing.

In 1969 a part of rice marketing was officially released from the rigid control system. The present system has substantially improved rice marketing. However, as new problems crop up, the search will be on for policies that will continuously adjust the entire marketing process to current needs.

Résumé

La commercialisation du riz au Japon : *Le riz constitue la denrée de base la plus importante au Japon. Dès les années 1920, la commercialisation de cette céréale a été contrôlée indirectement par le gouvernement. Le Food Control Law (la Loi du contrôle des produits alimentaires), autrement dit le contrôle direct du prix, de la production, de l'approvisionnement et de la demande du riz, a été promulguée en 1942. C'est à partir de la IIe Guerre Mondiale qu'on constate un changement progressif des systèmes et de la gestion de la commercialisation du riz.*

Depuis 1966, la production annuelle du riz a pu satisfaire ou même dépasser la demande interne. Le gouvernement tente, à l'heure actuelle, de contrôler le surplus de production et de réduire la contrainte financière au moyen de subventions du prix du riz tant pour les producteurs que pour les consommateurs.

Au Japon, les systèmes de commercialisation du riz sont étroitement liés aux systèmes de contrôle des prix et aux activités de coopération agricole. Les prix d'achat et de vente du riz sont déterminés principalement par le gouvernement. Dans le cadre du programme du gouvernement, les coopératives agricoles retiennent des circuits puissants et intégrés de commercialisation. La commercialisation du riz est une activité prépondérante de ces coopératives qui en dépendent fortement.

C'est en 1969 que la commercialisation du riz était en partie dégagée officiellement du système rigide de contrôle. Le présent système a donc amélioré d'une façon importante la commercialisation du riz. Cependant, au fur et à mesure que de nouveaux problèmes se posent, les décideurs seront toujours à la recherche des politiques qui adapteront en continu l'ensemble du processus de commercialisation aux besoins actuels.

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Introduction

The objective of this paper is to describe rice marketing systems and activities in Japan, which are mainly carried on by agricultural cooperative organizations. The paper will identify problems that exist in the present system and discuss policies directed toward solving them.

Rice Production and Demand

Rice is the most important staple food in Japan. The peak per capita annual consumption of 118 kg was reached in 1962; the figure dropped to 78 kg in 1981 (Fig. 1). Total rice consumption peaked in 1963 at 1.34 million tonnes. This figure subsequently decreased to 1.12 million tonnes in 1980.

Food preferences have changed during this period of rapid economic growth. Demand for fruit, vegetables, and livestock products is greater than that for cereals. While the demand for rice decreased during this period, it is still an important commodity.

Until 1965, the production of rice fell short of domestic demand (Fig. 2). Since 1967, improvements in rice production have resulted in a much higher yield per hectare (Fig. 3), with annual rice production exceeding demand in all years except 1971. The stock of rice held by the government

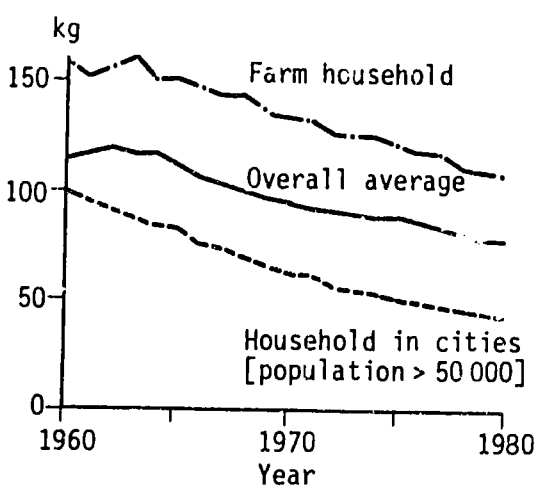

Figure 1. Per capita consumption of rice in Japan (kg/yr) [Sources—Ministry of Agriculture: Agricultural statistics (each year); and Office of Prime Minister: Household statistics (each year)].

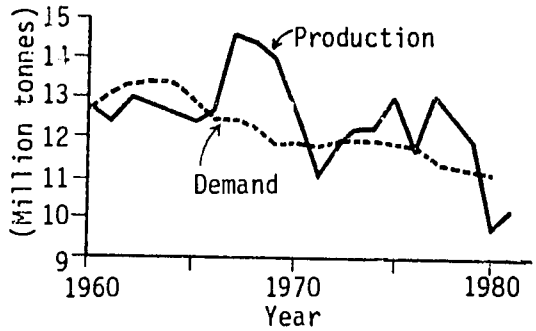

Figure 2. Rice production and total domestic demand in Japan. (Source: Food Agency: Materials for prices of cereals, 1981).

reached 0.53 million tonnes at the end of 1974, a quantity nearly equal to the total annual government sales of rice.

To cope with this surplus, the government took steps to adjust rice production and to divert a part of the rice land to other crops. This step was taken in 1970 as an emergency measure, and was followed by a five-year program beginning 1971 designed to attain an annual equalibrium between domestic demand for and supply of rice. There has been no decrease in the stocks of old rice held by the government. In 1976 the government set a target of annually reducing rice production by 0.9 million tonnes on 0.21 million ha. The conversion ratio of rice into the other crops was 7.3%. However, this move met with little success. A new program started in 1978 and will be in effect for a period of ten years. In 1982, 2.95 million tonnes (0.63 million ha) was a new target and the conversion ratio became 22.2%. At present, the government intends to control the production of rice on the one hand, but increase the rates of self-sufficiency of a wide range of cereals on the other.

Mechanism of Rice Marketing and Food Control

Price Control

The Food Control Law was enacted during World War II. Since the war, however, production and management systems of food have gradually changed. The basic aim of the law is to control food supply in such a manner that distribution ensures

Figure 3. Rice paddy production in Japan (1946-1981) [Source: Agricultural statistics, Ministry of Agriculture, Japanese Government (each year)].

an adequate supply of food for the population and keeps the national economy stable.

At present the government purchases rice only to replenish its buffer stocks. The purchase price is decided during July every year. The government buying and selling prices of rice are determined after consultation with the Committee for Rice Prices. Under the Food Control Law the buying price is decided at a level that will assure the following years' rice production, and the selling price at a level that will help stabilize the consumers' household economy.

The government fixes a purchasing price after considering production costs, prices, and other economic factors, in order to ensure a continued production of rice. Thus the price paid to producers is calculated to compensate production costs and ensure an adequate income to the producers. At the same time, the government has to take into account the effect prices will have on the household economy of consumers. The price that consumers will pay for rice is determined with reference to the growth in incomes. Recently the share of food as a percentage of living expenses has declined (Fig. 4). The government selling price of rice is determined by deducting the milling fee and sales margin from the consumer price.

Rice Marketing and Distribution

The government purchases rice in the producing areas immediately after harvest. In order to ensure fair and smooth transactions in agricultural prod-

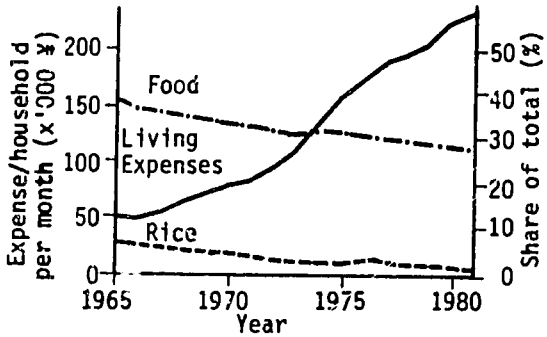

Figure 4. Family living expenses, and shares of food and rice, Japan [Source: Office of Prime Minister: Household statistics (each year)]. Number of members in a household changed from 4.13 in 1965 to 3.80 in 1981.

ucts and to promote improvements in quality (and thereby benefit both farmers and users), the quality of rice which the farmers want to sell to the government has to be checked by government officers. The producers sell rice at harvest time in rice-producing areas, and the government—as the main buyer—has to store the rice for a certain period and transport it for year-round sales in consuming areas. Rice is usually stored in warehouses located in the producing areas. Rice purchased by the government is stored in warehouses owned either by the government or privately.

There were no quantitative limits to government purchases until the 1970 crop. From 1971, however, the government has established a production control policy which sets maximum quantities in the sales contracts that government makes in advance with individual producers. Advance sales are acceptable only within these individual limits, and the government purchase is applicable only to the quantity of the contract minus the quantity of sales under the *jishu-ryutsu* system (*jishu-ryutsu-mai* is rice handled by designated dealers, but not bought by the government).

The maximum quantitative limits of contracts on a national basis are determined on the basis of estimated demand. It amounted to 0.67 million tonnes for the 1981 crop, consisting of 0.32 million tonnes under the *jishu-ryutsu* system and 0.35 million tonnes purchased by the government. The *jishu-ryutsu* system was initiated in 1969 under the Food Control Law to introduce a freemarket mechanism alongside the existing distribution system, and to allow greater flexibility to meet consumer preferences. Under this system, authorized quantities of rice are sold to wholesalers through designated collection agencies. The designated national organizations of collection agencies (the National Federation of Agricultural Cooperatives and the National Organization of Rice Merchants) sell rice sent from producers via designated collection agencies (Agricultural Cooperatives and Merchants) at the local and prefectural levels to registered wholesalers. The scope of their activities must be approved by the government. The rice is then sold to consumers through registered retailers under a rationing scheme. Figure 5 shows a rough sketch of the rice marketing system. The whole process of rice distribution is under the umbrella of the Food Control Law.

The marketing channel for *jishu-ryutsu* rice is similar to that of government-purchased rice. Producers agree to sell their produce to designated dealers, and the distribution of this freely marketable rice is carried out by wholesalers and retailers under a rationing scheme. For rice so marketed, the government does not fix the price.

At the beginning of 1982, the number of designated collection agencies of the agricultural cooperative systems (4621) represented 70% of the total number of collection agencies (6620).

Problems in Marketing and Government Policies

Although the government tried to control surplus rice supplies, it was unsuccessful. To maintain the present rice marketing system, the government incurs substantial expenses. This subsidy to rice marketing is a consequence of the government's buying price exceeding its selling price, plus the administrative costs of rice distribution, which have also been increasing (Fig. 6).

A reverse price relationship in which the buying price of rice is above the selling price is unusual; this imposes a substantial financial burden on the government and hampers the development of the *jishu-ryutsu* system. The government deficit incurred as a result of the reverse price relationship of rice has been very large in recent years (Fig. 7) The cost of administration shown in Figure 7 includes loss resulting from the sale of rice, interest paid, cost of collection, transportation, storage, and administration; the cost of administering the production control policy is also included.

To support the *jishu-ryutsu* system, the govern-

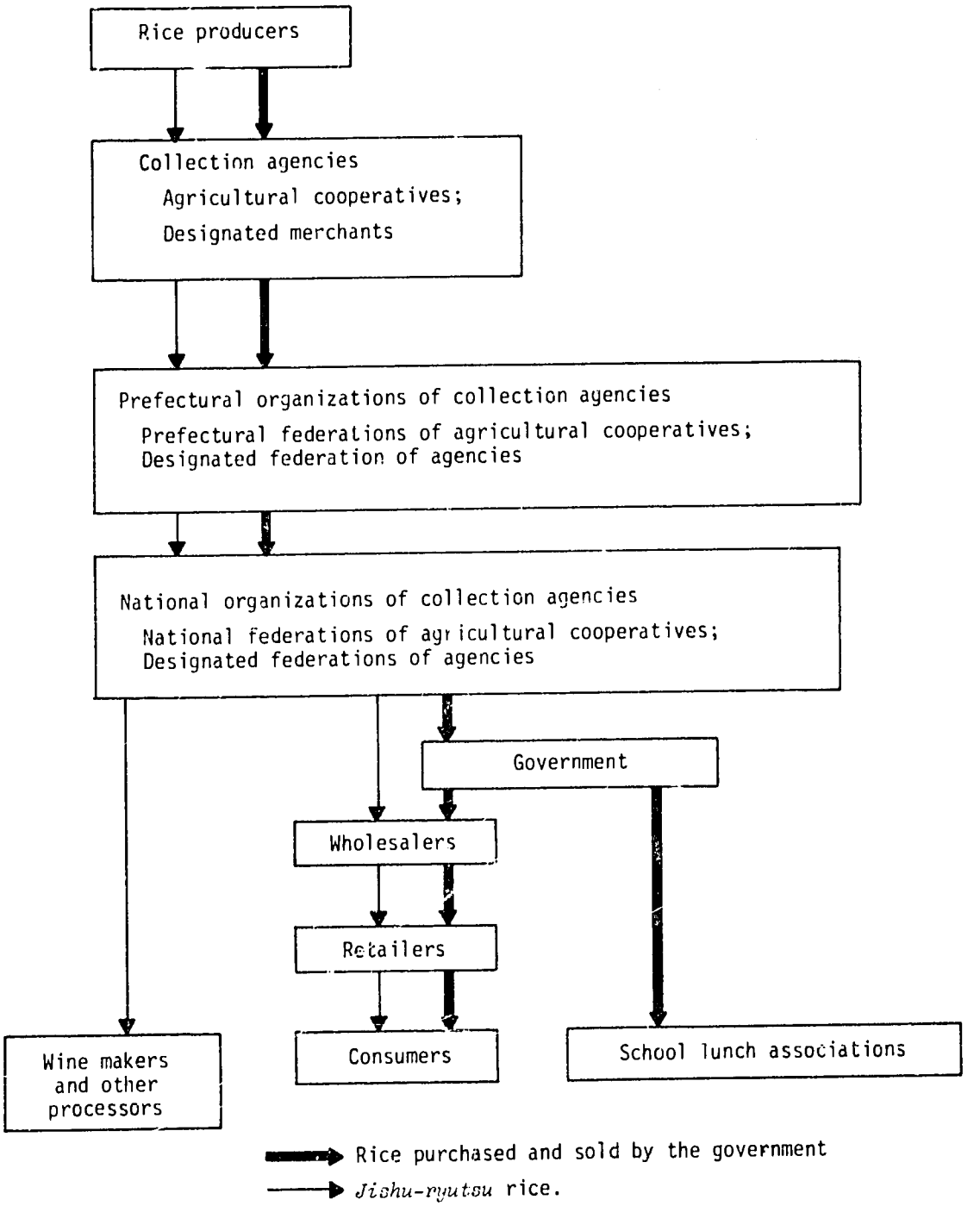

Figure 5. Rice marketing system in Japan: a schematic representation.

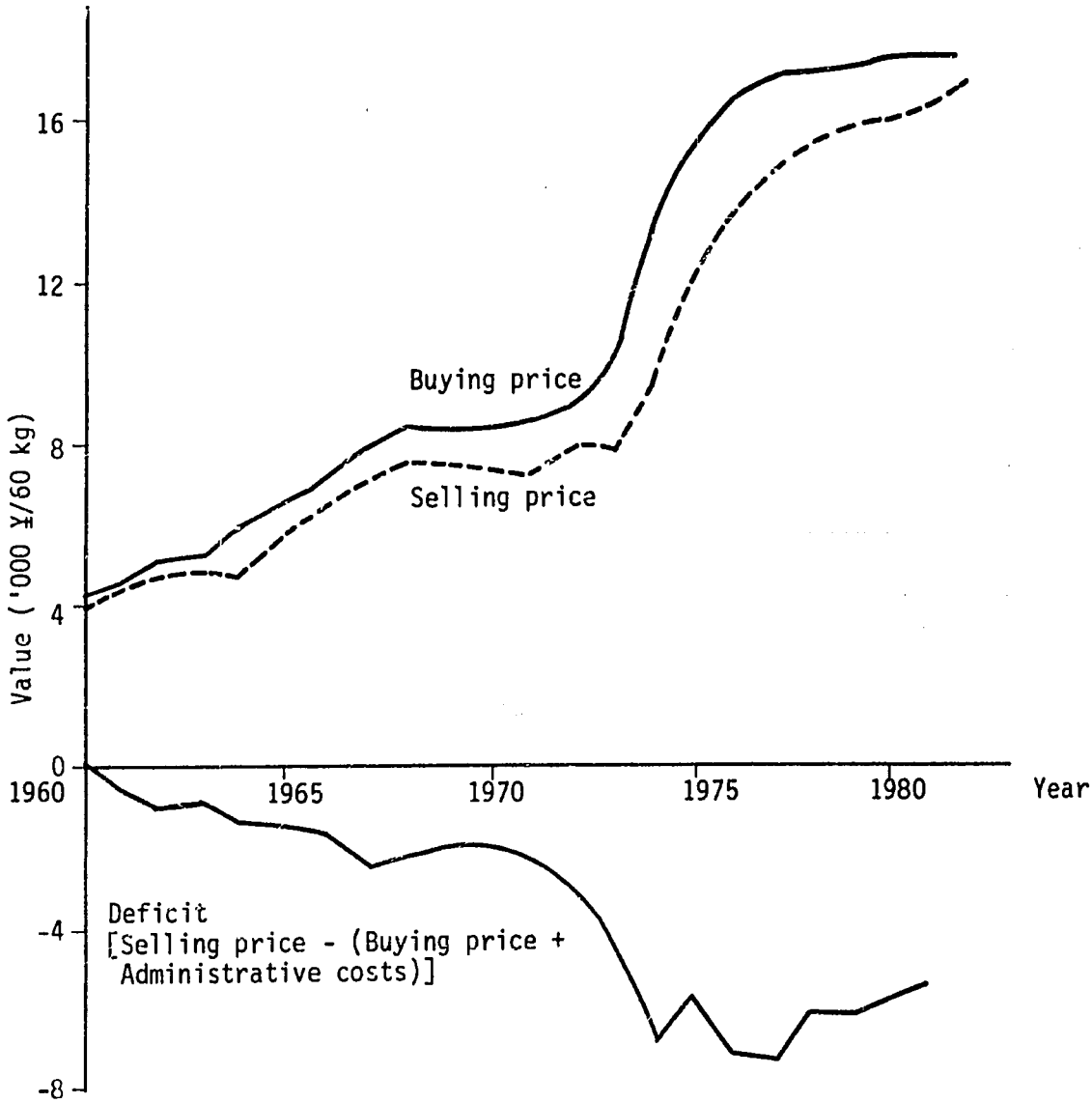

Figure 6. Buying and selling price of rice and related administrative costs for the government, computed for June-August each year (Source: Food Agency: Materials for prices of cereals, 1981.).

ment provides financial assistance in the following ways:

1. Credit supply to the Agricultural Cooperative Bank from a government controlled fund;

2. A subsidy on interest and handling costs incurred from the time of collection to the time of selling, to ensure stable prices throughout the year;

3. A subsidy for setting up marketing facilities that deal with *jishu-ryutsu* rice; and

4. A subsidy to improve the quality of rice and thus increase rice consumption.

There are several other programs which facilitate rice marketing and ensure adequate supply. Three such examples are: (1) Although the government fixes the maximum quantity limits on which it will

extend subsidy, the National Organizations of Collection Agencies subsidize rice output in excess of these limits as well as with *jishu-ryutsu* rice; (2) In order to prevent a hike in the consumer price for rice, a standard price is fixed for a few varieties of rice, and rice is always available at this price to the consumer; (3) The Food Control Law lays down other regulations concerning transfers, storage, and transportation of rice. Imports of rice also require a government permit and all imported rice must be sold to the government.

In order to increase the demand for rice, the government and agricultural cooperatives have taken several measures. These include a program started in 1977 to sell rice for a school lunch scheme at a 35% discount, subsidies for research, and experiments into further practical uses for rice.

The deficit from increased government stocks of old rice has been growing. The stock of old rice at the end of October 1979 was 0.65 million tonnes. Owing to the rice production control program and the poor crops in 1980, 1981, and 1982 because of unfavorable weather, the present stock of old rice has fallen to 0.15 million tonnes; it probably will continue to be in stock at the end of 1983.

The financial burden caused by rice for 1981 exceeded ¥ 828 billion (cost of administration for domestic rice and loss of surplus rice, equivalent of US $ 3.75 billion). Recently (1983), the government decided to lower the subsidy for market promotion of *jishu-ryutsu* rice.

Rice Marketing in Agricultural Cooperatives

The marketing operations of the agricultural cooperatives are based on the systems of unconditional consignment, commission, and pooling account. Usually agricultural cooperatives try to have planned production and to maintain standardized products. The rate of commission they charge varies with the product. Commission on rice handled by them in 1980 were 1.7% for the government rice, and 2.7% for *jishu-ryutsu* rice.[1]

1. Commissions of rice at prefectural and national levels (%).

Level/kind	Prefectural Federation	Zen-Noh (National Economic Federation)
Government rice	0.2	0.06
Jishu-ryutsu rice	0.6	0.3

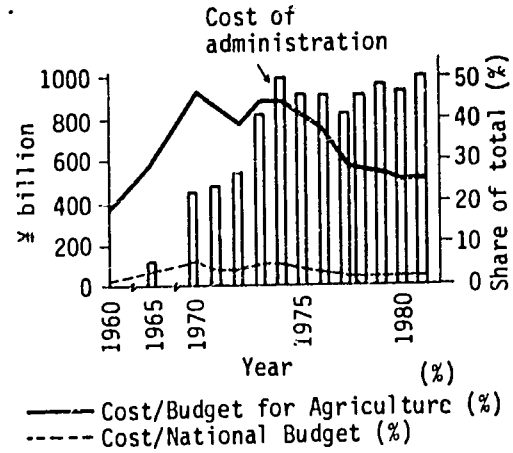

Figure 7. Cost of administration of the rice distribution system in Japan. [US $ 1.00 = ¥ 360(1949-71); ¥ 230-308(1972-74); and ¥ 170-230(1974-81).]

Most of the products from agricultural cooperatives are sold in the wholesale market through the Prefectural Economic Federation and National Economic Federation (Fig. 8), but some are sold at the local market. Yet others are sold directly to cooperative stores or contracted customers. In order to strengthen their marketing activities, agricultural cooperative ferderations maintain distribution centers of their own, which do not use ordinary marketing channels.

Total sales by the agricultural coperatives in 1980 amounted to ¥ 5 501 billion ($1.00 = ¥ 227), of which 36% (¥ 1 977 billion) was from sale of rice. Advance sales records in 1981 crop year show that the quantity of rice traded by the agricultural cooperative systems (0.64 million tonnes) amounted to 95% of the total quantity marketed (0.68 million tonnes).

The agricultural cooperatives have strong and integrated marketing channels. They not only have well-organized facilities for marketing, storage, and transportion, but also strong financial power and good advisory services for improving the quality of rice. They make available to producers a wide range of up-to-date information. The system is in a favorable position to coordinate several businesses. For example, rice centers, country elevators, and group farming can all be tied in with the cooperative marketing network.

Because of direct and indirect costs such as management, internal interest cost, etc., the com-

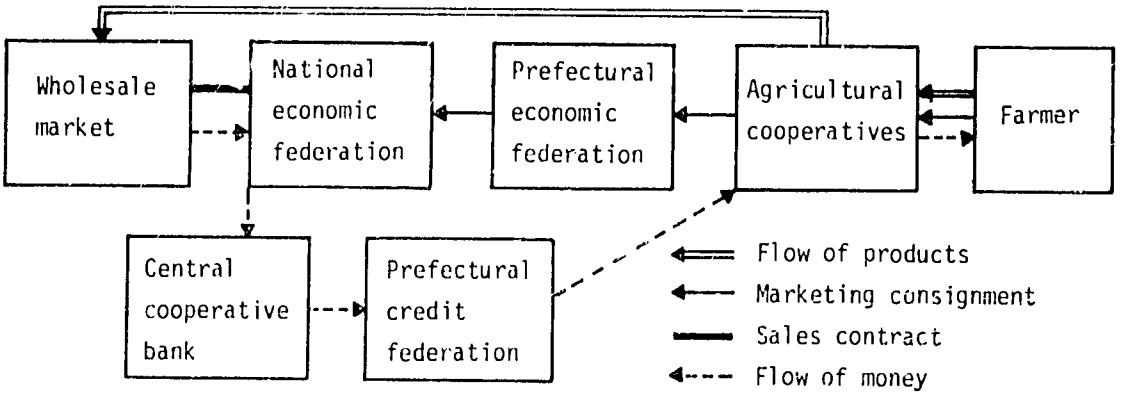

Figure 8. The marketing operations of agricultural cooperatives in Japan: a schematic representation [Adapted from The Central Union of Agricultural Cooperatives: Agricultural cooperative movement in Japan, p.28].

mission that agricultural cooperatives receive does not appear to be profitable except at the prefectural and national levels, since the amount of the commission is not large. The agricultural cooperatives have recently asked the government to raise the storage fee, because the business is no longer profitable. Indirect benefits, such as credits prepaid by the government through agricultural credit banks, cannot be considered as profit for agricultural cooperatives; their effect is an eventual increase in the saving accounts of farmers. The marketing of farm produce by the agricultural cooperatives ensures that the saving levels of members stay high.

The disadvantages and problems cooperative marketing systems pose are many:

1. The integrated agricultural cooperative systems as a whole call for several stages of cooperative marketing. Some organizations in the system which do not take an active part in marketing the farm produce, take commissions for trading. This contributes to an increase in handling costs.

2. Cooperatives are likely to take more time for payments to farmers in comparison with merchants, because of their system of pooling accounts.

3. The present system is not flexible enough to consider consumer tastes and preferences. The way of grading is overly simple. The system of evaluating the taste of rice is poorly developed.

4. The agricultural cooperative system does not only act as a wholesaler in the main consuming areas, but is also expected to look for new customers (hospitals or factories to supply food, consumer cooperatives, etc).

5. The agricultural cooperative neither supplies detailed information on the rice market nor provides the elaborate services that other merchants extend to producers.

6. The quantity of rice that each agricultural cooperative has a contract to buy is stipulated by the government. However, they often end up buying the excess rice the farmers produce and having to find a market for it, because they wish to keep the goodwill of their customers.

Issues on Improvements in Rice Marketing

The system of rice marketing has evolved over the years and the search is on for new and improved methods. The role of the agricultural cooperatives has to change as well. Rice marketing by agricultural cooperatives would improve if attention is paid to the following suggestions.

1. Efforts need to be made to control production and obtain an optimal stock of rice, as it is

necessary to cooperate with the government policy to control surplus production.

2. Research and advertisement aimed at expanding rice demand, including development of a multiuse type of rice, are desirable. It would be preferable to brand name and grade the rice for each area, because consumers tend to shift from ordinary grade rice to branded commodity of a better grade.

3. New investments ought to be made for a more efficient marketing system and creating storage facilities for high quality rice.

4. New entries into the wholesale and retail business are restricted to some extent by the system of registration and designation. This maintains an orderly marketing system. The agricultural cooperative system can be expected to expand its business in all fields. The number of wholesalers (43) connected to the National Economic Federation of Agricultural Cooperatives is not large, compared to the total number of wholesalers (332). They represented only 13% of the total in April 1981. Only 17% of all rice retailers (11 231 of 64 810) were connected to the National Economic Federation of Agricultural Cooperatives.

The cooperative rice marketing systems are entirely based upon the Food Control Law. Under the present competitive conditions, the agricultural cooperatives will have to pay attention to the creation of a truly efficient and widely based management system. One proposed device to improve the present system at the agricultural cooperative level is a Rice Farming Complex, which will integrate organizations such as village or city offices, extension services, and other related organizations within the cooperative structure. The functions of this organization would include the management of country elevators, machinery, seedlings, and other types of production inputs and facilities. The size of the land managed under this scheme would range from 1000 to 5000 ha, and its production is expected to range from 4500 to 22 000 tonnes. The committee to administer this system would be composed of a broad membership of farmers, and would include both the "quasi-tenant" and "quasi-landlord" types.

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Agricultural Marketing in the United Arab Emirates: A Note

S. Hatahit*

Summary

This note briefly discusses the nature and quantum of agricultural produce in the United Arab Emirates and the market structure for its sale. It details government interventions by way of subsidies and incentives to encourage local production.

Résumé

La commercialisation agricole aux Emirats arabes unis—une note : *Cette note examine brièvement la nature et le quantum de la production agricole aux Emirats arabes unis, ainsi que la structure de marché selon laquelle s'effectue sa vente. Elle expose en détail les interventions gouvernementales par des subventions et des primes destinées à encourager la production locale.*

The union of the United Arab Emirates (UAE) State was established in 1971 from the following seven emirates: Abu Dhabi, Dubai, Sharjah, Ajman, Umm al Qawain, Ras al Khaimah, and Fujairah. The total population of the union is about 1.1 million and the total area of the state is 77700 km². Potentially cultivable land amounts to 60-100000 ha, while the area actually cultivated is about 27000 ha. Forestry projects cover an estimated 30000 ha. The United Arab Emirates plans to become self sufficient in vegetables, dates, fodder, poultry, and fish.

The government subsidizes agricultural production to the tune of 50% of production costs. It gives loan in kind for machinery and irrigation pumps, and controls the distribution of inputs such as seeds, fertilizer, and extension. As a result of these policies the number of agricultural holdings increased from 4940 in 1973 to 12548 in 1982, and the number of fishing vessels increased from 1073 to 2200 in the same period.

The total agricultural production of UAE for the year 1982 is as follows:

Vegetables	160000	tonnes
Dates and fruit	61000	"
Fodder	123000	"
Meat	6200	"
Milk and milk products	24300	"
Poultry	3400	"
Fish	70000	"
Eggs (no.)	More than 1 million.	"

Local production, however, covers only about 28% of the total consumption, with imports constituting 72%. Individual crops show great variation. For example, local fish production covers more than 80% of consumption. After harvest, vegetables like tomatoes and eggplant are in exportable surplus.

Despite government control of agricultural inputs supply, the product markets in UAE are open and free, and there is a specialized wholesale vegetables and fruit market in Dubai, which caters for both local and imported produce. There are no licensing

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ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 1985. Agricultural markets in the semi-arid tropics. Proceedings of the International Workshop, 24-28 October 1983, ICRISAT Center, India. Patancheru, A.P.502324, India: ICRISAT.

restrictions or customs duties on the import of agricultural commodities. Liberal import policies ensure adequate levels of consumption. Even so, the government is trying to build a strategic stock of the main commodities. A further new policy will be implemented shortly with the coordination of the Cooperative Committee Council of the Gulf countries to improve interregional trade.

The main marketing problems arise from the peaking of vegetable production, which starts from the middle of January to the end of March each year. During this period surpluses arise, especially in tomatoes. The aggregate surplus is estimated between 20-30 thousand tonnes. At this point in time producers with surplus have to contend with competition from imports which depress prices, and with price discrimination by local middlemen and brokers, who actually pay very low prices to farmers and who bind them in various ways, e.g. by advancing loans or containers. The middlemen and the commercial establishments and stores find agricultural trade highly profitable, and are in a position to export at a profit.

In 1980, the Ministry of Agriculture and Fisheries issued a legal rule (number 340) for the Public Establishment of Agricultural Marketing to help local farmers in facing problems in marketing their produce. But the final form of organization of procurement has not yet been decided. The Ministry planned to build three collecting and grading centers in the main production areas to purchase produce at high prices, with a view to encourage and help farmers increase production, modernize technology, and reduce dependence upon imports.

There is another Agricultural Marketing Center belonging to Al Ain Agriculture Department in Abu Dhabi. In 1972 it began receiving local supplies, and paid farmers the same price at which it sells to consumers, bearing the costs of marketing itself. This center has many retail outlets throughout Al Ain and Abu Dhabi regions. The role of these Gulf countries as entrepots for the re-export of foodstuffs is of growing importance.

Effect of Policy Changes on Paddy Marketing: A Microlevel Study in Sri Lanka

C. Bogahawatte*

Abstract

In 1971, the Government of Sri Lanka enacted the Paddy Marketing Board (PMB) Act to take virtual control of paddy marketing. The Act allowed the PMB to be the sole authority to collect paddy from farmers, and to store, process, and distribute rice to consumers. However, in 1978 the government amended the Act to allow private enterprise to market paddy. This policy resulted in lower purchases of paddy by the PMB under its price guarantee scheme and a reduced market share in the sale of rice.

This study evaluates changes in the village-level paddy marketing system as a consequence of the policy changes, and explains why some of these changes have taken place. An initial survey of select villages in Polonnaruwa district was conducted in 1976; to assess changes in paddy marketing, the area was resurveyed in 1982.

Results indicate that the average size of farm holdings decreased in spite of the increase in per hectare yield as farmers adopted new technology. Even as more paddy was retained by farmers for home consumption, marketable surplus per farm increased. In 1976 the major factors that affected market surplus included family size, cost of fertilizers, pesticides, and tenancy. In 1982, other variables—such as repayment of credit, prices received for paddy as compared with other subsidiary crops—were important in determining marketable surplus of paddy per farm.

Problems associated with disposing paddy to the PMB were: 1) delays in payment, 2) stringent grading, 3) transport problems, 4) absence of storage capacity in cooperatives, and 5) higher prices offered by competing private dealers.

Even though they underweighed produce, private dealers offered succor to distressed farmers by providing them credit with repayment scheduled from future harvests, less stringent grading, and making spot payments in cash. Owing to the installation of modern milling equipment provided through governmental funding and foreign aid, the rice-milling capacity and the quality of milled rice has improved.

Résumé

L'effet des changements de politique sur la commercialisation du paddy—une étude micro-niveau au Sri Lanka : *C'est en 1971 que le gouvernement du Sri Lanka a promulgué la Loi du Paddy Marketing Board (PMB—"Commission de la commercialisation du paddy") afin de pouvoir acquérir un contrôle virtuel de la commercialisation du paddy. La Loi a permis au PMB d'être l'autorité unique en ce qui concerne la collecte du paddy auprès des paysans, ainsi que le stockage, le traitement et la distribution du riz aux consommateurs. Mais, en 1978, le gouvernement a par la suite amendé la Loi afin de permettre à l'entreprise privée de commercialiser le paddy. Cette politique a eu pour conséquence des achats réduits de paddy par le PMB dans le cadre de son programme de prix assurés, d'une part, et une part réduite au niveau du marché dans la vente du riz, d'autre part.*

La présente étude évalue les changements constatés dans le système de commercialisation du paddy au niveau du village par suite des changements de politique. Elle expose également quelques facteurs à l'origine de ces changements. Une première enquête sur quelques villages choisis dans le

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district de Polonnaruwa était conduite en 1976; en 1982, une deuxième étude était réalisée dans cette région afin d'évaluer les changements dans la commercialisation du paddy.

Selon les résultats, la taille moyenne des exploitations a diminué en dépit de l'accroissement du rendement par hectare, puisque les paysans avaient adopté des techniques nouvelles. Si plus de paddy a été retenu par les paysans pour la consommation à la maison, le surplus commercialisable par exploitation a, par contre, marqué une augmentation notable. En 1976, les facteurs majeurs limitant le surplus commercial étaient : la taille de la famille, le prix des engrais, les produits pesticides, et le fermage. Mais en 1982, d'autres variables telles que le remboursement du crédit, les prix obtenus pour le paddy par rapport à ceux offerts pour d'autres cultures secondaires, etc., ont constitué des éléments importants dans la détermination du surplus commercialisable de paddy par exploitation.

Les problèmes liés à la vente du paddy au PMB sont nombreux : 1) paiement retardé, 2) triage rigoureux, 3) problèmes de transport, 4) capacité de stockage insuffisante au niveau des coopératives, et 5) meilleurs prix offerts par les marchands privés en concurrence.

Bien qu'ils sous-pèsent les produits, les marchands privés prêtent secours aux paysans affligés en leur fournissant du crédit avec la possibilité de remboursement au moment des récoltes suivantes. Le triage est moins rigoureux chez eux, et ils paient toujours en argent liquide. La capacité d'usinage du riz ainsi que la qualité du riz usiné ont pu être améliorées grâce à la mise en place du matériel d'usinage moderne procuré à l'aide de fonds gouvernementaux et de l'assistance étrangère.

6
Discussion

Introduction

As explained in the preface, this section attempts to summarize all discussion at the Workshop cumulatively. This has become necessary because the papers reproduced here are not in the order in which they were presented at the Workshop.

As a measure of convenience, comments by major discussants, who were responding to formal papers assigned to them in advance, are presented under their names. But all supplementary or additional comments are grouped together—without identification—and summarized as "further discussion", under subheadings linked as far as possible to the major issues they address.

In recording such discussion, Dr. B. Harriss acted as the rapporteur.

Discussants' Comments

Michael Lipton:

I have been given only two papers (P. Parthasarathy Rao, pp. 97-107; and J.R. Sherman, pp. 81-95) but enjoyed the verbal presentation of four others. The papers appear to raise three main issues: (1) Where does improvement of markets matter most? (2) How efficient is marketing investment? (3) How is the marketing process affected by the nature and motives of traders?

1. Where do markets matter most?

Dr. Shaffer (pp. 305-318) rightly stressed that lower marketing costs increase welfare of all producers, and of all consumers. But the process of lowering marketing costs is itself costly. Where and when will the incurring of such costs lead to more—or less—efficiency or equity gain?

First, where intravillage inequality is high, as Sherman points out, surpluses tend to be sold to pay rent, wages, or debts. Even if the surpluses are transferred in kind, the landlord, for instance, often has to sell them. The "demand for output markets" is thus higher in less-equal areas. Conversely, equalization can substitute for investment in output marketing facilities.

Second, marketing facilities are essential where local production is highly concentrated. But in such circumstances the facilities—not necessarily good or adequate ones—must have developed alongside the concentration. More importantly for investment policy, there is a relatively high benefit from marketing facilities in areas that each feature currently varied, but potentially specialized, production—what Viner called "happy union of similars"—especially to the extent that there are either scale economies or interarea differences in the ratios (as between products) of average production costs. Fairly uniform semi-arid areas, where places are often similar in the range of potential farm products and in their production costs, seem relatively less likely to gain from improved internal marketing. Exchange between SAT and other ecological zones—or between black soil and red soil SAT areas—might show higher returns, as might urban-rural exchanges. Unfortunately, the equity effects of such links are probably worse than those of short-distance, rural-rural exchanges: rural-urban exchanges can readily become extractive; long-distance exchanges disadvantage those farmers with small loads and inadequate information. Thus "SAT marketing investment" either has rather low benefits, or runs a rather high risk of inequity, compared to such investment in other regions.

Third, sparse population increases the per person cost of marketing, as does sparse output per unit area. Distribution of persons among places often appears unrelated to the extent of pressures to cut marketing costs, and may partly reflect (a) political history or (b) long-past periods of self-sufficiency. The SAT, especially in Africa, appears, however, to be relatively sparsely populated and to feature low valued-added per acre. Thus "SAT marketing investment" is likely to have higher costs, per person and per unit moved, than similar investment in other regions.

Fourth, market development is especially helpful when it cuts risk—helpful to equity, because risk hurts the poor most, and helpful to efficiency, because risk distorts and reduces profit-seeking investment. Rao has shown that food, with its higher value/weight and marketing/output ratio, enjoys much more price stability than fodder, and that better markets do normally stabilize producer prices. However, produce-price stability can well bring producer-income instability; and the experience of the 1943 West Bengal famine shows how open rural-urban markets can bring disastrous rural consumer-price instability. Coulibaly's study (pp. 75-80) has shown us extreme upward fluctuation of purchases in the hungry season. Sherman's shows little fluctuation of sales, except in the (presumably least market-integrated) traditional region. We need to know much more about how markets in different products affect risks, and for whom.

A few obvious closing points on "where markets matter". Potential output explosions need to be anticipated, or postproduction and marketing technology may prove inadequate—as witnessed in the serious, but temporary, wheat losses in the Punjab in 1966-67. Intermarket substitutability (e.g., between charcoal and firewood in Dunkerley's study, pp. 109-118) can reduce strains; notably, land-rentals can substitute for the labor-market inadequacies discussed by Shaffer. Finally, as he stresses, markets are political, not just economic;

they do least good when most likely to be used for levy, extraction, or price repression to benefit townspeople at the cost of (generally poorer) villagers—and they may be a disincentive to farm output.

2. How efficient is investment in marketing? For whom?

Before turning to this question, let me turn the other side of the coin. Nonmarketed output is self-consumed. Self-consumed output is now known to be produced (a) efficiently, and (b) mainly by poor farmers. It is not logically necessary, but it has been empirically proved (by the work demonstrating the positive price-elasticity of marketed surplus, chiefly by P. Bardhan and S. Ghatak for India), that cuts in marketing costs stimulate marketing at the expense of self-consumption. We must be very careful in assessing the effects of this.

That said, efficiency of traditional markets seems rather high, as Sherman has shown. The conference will later discuss von Oppen's and Antle's evidence that investment to modernize and improve markets shows high rates of return. However, Sherman's evidence supports earlier work by Lele for India and Jones for Africa (see references in my paper). Perhaps traditional markets are "efficient" but only under constraints—e.g., bad roads—that inevitably raise costs.

3. How is marketing affected by the nature of traders?

H. Koré (pp. 61-67) has pointed to a fairly strict hierarchy of millet trade in Niger. Grain moves up and down, not across, rural markets. Perhaps we need to know more about what sorts of trader (and, a la Harriss, of capital) operate at each stage of the hierarchy. Then, if rural-rural exchanges were efficient—as they are almost certainly equitable—we might seek cost-effective ways to stimulate them. Hierarchies do seem to be bypassed for firewood around Hyderabad (Dunkerley)—perhaps because high weight/value ratios prohibit cross-haulage—and in several of Sherman's examples. Why the difference?

Hierarchies persist partly because "the State" seeks to use markets extractively. Sherman points to the recurrent failure of attempts in Burkina Faso at monopoly procurement (will there now be a third round?). What is the nature of "State traders" that induces such repeated mistakes? I am quite dissatisfied with answers based solely on the alleged incompetence, consumption, or ideological hang-ups of bureaucrats. They are no better at optimizing and learning than private traders, but need they be worse? In my mind, I hear ironic cries of "Yes", but are these, too, based on ideological hang-ups?

The size, nature, and power of traders also affects the use they make of government licenses, etc., to restrict entry. I am surprised that this doesn't seem to happen with the *patentes* in Sherman's experience. It certainly does with licenses in Botswana, as the friends, clients, and relations of established traders sit on licensing committees or influence arbitrary "radius rules". The harm done by this far exceeds that from cash extraction via license fees. What is the real impact (not the incidence) of these?

The ability to restrict entry, as among the Manga retailers Sherman speaks of, may depend heavily on local power and clientage relations. We need to know more about these. Similarly it is not always clear how commission agents gain the power to extract commission for services—as Rao points out—and why this occurs in some markets but not others.

We need to know much more about types, origins, and relations (in both senses) among traders, and about their motives. Epstein's recent book suggests that casual, nonmaximizing traders can coexist, in simple but large markets with capitalist, fairly formal profit maximizers. This needs exploration in other contexts.

Some Random Points

(1) Has food aid altered the pattern of performance of markets? (2) Fodder seems tremendously important in the economy of the poor. Rao suggests 36% of the value of some sorghum is fodder. If it is really so much less for HYVs, should they not be screened (not bred, which is very costly) for fodder quality well before the choice among potential releases is made?

John McIntire:

The paper by K. Subbarao (pp. 29-40), in discussing input delivery for seed, pesticide, and fertilizer, raised several general questions:

1. How does one increase supplies of rural services to farmers?

2. How can we increase supplies to the poorest farmers?

3. What is the impact on those services of input use?

He presented a regression model to test hypotheses of input diffusion, using fertilizer in India as a test case. The dependent variable (villages per fertilizer dealer) was regressed on variables for fertilizer use, financial infrastructure, and physical infrastructure. He showed that physical infrastructure does indeed increase supplier density, and that the marginal impact of physical infrastructure on supplier density was greater at the end of the 1970s than at the beginning. The coefficient for fertilizer use variable was significant at the 5% level, but the coefficient for the financial infrastructure variable is not reported (I presume it was not significant?).

The estimations, however, probably suffer from a simultaneous equation bias because the independent variable for fertilizer use may itself be a function of supplier density; hence, the model leaves unanswered the question: which comes first, increased supply density leading to increased fertilizer supply or, increased fertilizer demand leading to increased supply density?

The model also leaves unanswered questions about the path of fertilizer diffusion. While Subbarao shows that improvements in physical infrastructure increase supplier density, he does not separate indirect effects of infrastructure on fertilizer use (via supplier density) from the direct effects. Such a demonstration would have been a useful contribution to the infrastructure question.

Subbarao's general conclusions are that poor infrastructure, via its effect on service supply, hampers poor regions and, especially, the poorest farmers in these regions; and that infrastructure development is superior to subsidies as a means of helping poor regions via better service supply.

In summarizing G.M. Desai's paper (pp. 41-52), I have tried to put his work in broader economic terms, even though Desai has himself told me that this might mislead the reader.

Desai's general argument is that we have neglected supply-side variables in models of fertilizer diffusion, by assuming that fertilizer supply is always perfectly elastic and by assuming that farmers are always perfectly informed about fertilizer-use potential. He argues that fertilizer use is constrained because its implicit shadow price is greater than its market price in the short run; in the long run, demand grows faster than supply so that supplies must be rationed, again leading to the long-run shadow price exceeding the long-run market price. Desai further argues that this rationing favors irrigated areas. His policy conclusion is that governments can increase supply by institutional innovation, such as physical improvements in fertilizer distribution and increase in credit supply.

Desai illustrates his argument with evidence from Gujarat State in India, where he reports relatively high fertilizer use on dryland agriculture. He attributes this outcome to supply push effects associated with the Gujarat fertilizer industry and the integrated cooperative input marketing-credit-product marketing system. He infers from this experience that "fertilizer supply and marketing systems could (and usually do) exert a causal influence on the pace and pattern of fertilizer consumption. This is so because of the untapped viable potential of fertilizer use under both irrigated and rainfed conditions, and various deficiencies in the process that converts this potential into actual consumption."

The general lessons of the two papers are:

1. Governments have important roles in input markets in creating new infrastructures and in supplying information.

2. Untapped input demand exists among farmers, which can be tapped by releasing supply constraints.

3. Exclusively price-oriented supply policies (e.g., subsidies or price supports) are costly and also misguided, because they neglect physical supply policies.

4. Successful government interventions to shift input supply curves can raise income of poorer farmers, irrespective of input-demand conditions.

5. Much potential exists in rainfed areas, and government infrastructure can tap this potential to improve income distribution.

From this work, I make several inferences about the

African situation, based notably on Desai's reasoning:

1. The debate over government and private roles in input supply is misguided, because it concentrates too much on short-term costs.

2. The debate over imported versus domestic fertilizer costs is similarly misguided.

3. To realize the potential of untapped input demand, there is a need to increase farmers' bargaining power vis-a-vis input suppliers.

4. Credit is a major constraint to input distribution.

5. Money spent on rainfed areas is not wasted.

Without denying the value of this "supply-side" perspective, I add several cautionary remarks:

1. That argument of Desai, Subbarao, and Sikder (pp. 21-27) is posed too much in physical units, not in economic units. It seems dangerous to follow Sikder's appeal ("It is therefore obvious that fertilizer consumption in the SAT will have to be increased by intensive marketing") without benefit/cost analysis of input marketing.

2. While the potential exists in rainfed areas, and while it has probably been neglected, it is undeniably less than that in irrigated areas. One should, therefore, be careful about the scope for "intensive marketing" in rainfed areas. While Desai and Subbarao are right to argue that input demand shifters (such as irrigation) have been overemphasized, I do not think they would argue that demand variables are irrelevant.

3. Infrastructure investment will be more costly in areas with low population density, where rainfed agriculture dominates.

4. In African countries, public agencies operate in a noncompetitive environment; there are no private suppliers or producers' organizations to compete with them. They thus have no incentive to be efficient. Appeals for intensive marketing are likely to be interpreted as appeals to reinforce the power of public agencies and such reinforcement would, I think, only reduce their incentive to be efficient.

5. Lack of credit as a reason for nonadoption of technologies (such as animal traction and fertilizers) is an old idea in Africa. However, its economics are fundamentally different from those in India, because the land abundance in Africa makes it impossible to use land as collateral there, unlike the Indian situation. This necessitates higher interest rates or greater public subsidies.

6. While Desai is right in taking the long-run perspective about growth, it is essential not to incur short-run costs that will impair long-run growth. It is also necessary to see that the short-term costs (such as those incurred by subsidizing domestic fertilizer production, or by subsidizing fertilizer distribution) are not borne by those (such as the poor) whom such subsidies are intended to help. An example of this are very high average subsidies on fertilizer in Niger. Because the government cannot supply all the fertilizer demanded at the subsidized price, the subsidized quantities have to be rationed, resulting in an implicit (shadow) fertilizer price that is greater than the original import price to which the subsidy was first applied.

Sudhir Wanmali:

These remarks are addressed to the papers by Drs. S.M. Alam (pp. 139-146), J.A. Gana (p. 131), H.S. Gopala Rao (pp. 147-152), and R.S. Dixit (p. 155).

Terms such as periodic, regulated, wholesale, specialized, and regional markets are mentioned in these papers without sufficient clarity about their definitions. In addition, agroservice centers and growth centers are also mentioned without adequate clarity. It will be useful to indicate what each one of these means, and what its operational significance is, when used.

Various aspects about market development and the action needed to remedy problems have been mentioned. In contexts where resources are scarce, it would be desirable to indicate priorities for such development.

Should the money be spent on structures or on strengthening the links with other similar or feeder markets?

Together, the papers discussed aspects of spacing, timing, periodicity, links, hierarchies, participants, local and regional scales of functioning, and goods traded in the above markets. Further,

aspects of administration, fees, infrastructural development, and regional linkages have also been mentioned. It would be more pertinent to know the overall strengths and weaknesses of the marketing system as a whole, and how to capitalize on its strengths and reduce its weaknesses.

The papers have described and analyzed the situation and sometimes prescribed solutions, all on the basis of a large amount of data. The socio-economic and politico-administrative contexts within which the findings are placed are not always explained. The policy implications of the papers need to be spelt out in the above terms more clearly.

All the papers comment on the need to include the spatial angle in the planning of marketing channels.

The following specific questions arise from the papers:

1. Why is there no nested hierarchy of periodic markets in the rural hinterland of Hyderbad metropolitan region?

2. Why did the new periodic markets emerge as they did, in the northwest sector of the Hyderabad metropolitan region?

3. What is the process of price formation in the grain board markets and traditional markets?

4. How does one organize farmers to bring about increases in agricultural production?

5. If the markets are shrinking in size both at the state and the district levels in Karnataka (because there is a decline in arrivals despite an increase in production), what has happened to the grain from increased production?

6. What, if any, is the difference between regulated and central wholesale markets?

7. If there are as many markets, and as many systems of markets, as have been described, what are the competitive and complementary features of these markets and systems?

John M. Antle:

The papers that I focus on discuss the ways farmers and traders utilize and interact with various types of markets and marketing institutions. The information provided in these papers has important implications for the role that the development of marketing systems plays in agricultural development. These papers seem to be particularly relevant to the problem of designing systems that promote both efficiency and equity in agricultural development. I will attempt to highlight some of these implications in my comments. With the exception of Dr. T.V.S. Rao's paper, these papers do not directly address the linkages between input and output markets. However, other papers in the Workshop consider these important linkages.

I might also remark at the outset that discussing these papers presents a particular challenge to me because they are authored by an anthropologist, two geographers, and an economist. They thus underscore the question of integrating multidisciplinary marketing research.

Dr. Epstein (pp. 221-234) inquires in her paper why existing marketing structures have on the whole encouraged only the large farm operators to increase productivity, largely to the exclusion of the majority of smaller and marginal farms. Leaving for the moment the validity of this initial assumption, I now consider Epstein's analysis of the three farm types she believes are characteristic of India and much of the developing world's agricultures. The three farm types are "sell to subsist" (S), "target" (T), and "profit-making" (P). S type farmers are the poorest, most marginal landless and small holders. S farmers are chronically indebted to their rich patrons, and thus depend on the patron for their minimal degree of income security. Owing to this dependence on the patron, the S farmers cannot respond to price incentives or new technological opportunities unless the patron allows them to do so. T farmers have as their behavioral objective the meeting of certain target expenditures with "periodic bursts in agricultural production." Thus, T farmers may adopt new technology, but only for so long as it takes them to meet their consumption targets, at which time they may revert back to traditional technology. P farmers are the large landlords, the patrons of the S farmers. P farmers are first to have access to and adopt new technology, and are the most integrated into the market economy. They are the main group to respond to economic incentives provided by the market.

The virtue of Epstein's research is its emphasis of the social and political as well as economic constraints which define farmers' incentives to respond to market opportunities. Such constraints

have, of course, been cited in the "green revolution" literature, which is concerned with equity consequences of new technology. While Epstein's analysis probably has validity for certain Indian villages where this type of "patron-client" relationship dominates social and economic relations, I would question its validity as a generalization for either India or the developing world. How does one explain in terms of patron-client relations, for example, the overwhelming evidence that new biological technology is scale-neutral and adopted by virtually all farmers when it proves economically superior to the traditional technology, as was the case with Mexican wheat varieties in the Indian Punjab, and new rice varieties in the Philippines, Indonesia, and other parts of Asia?

I would also question Epstein's basic assumption that only large profit-making farmers adopt new technology in India and elsewhere. Again, the evidence suggests to me that large farmers may indeed exploit their political and economic power over other farmers when they can, but that their ability to exclude new technology from others is limited, especially as basic infrastructure and marketing investments increase all farmers' access to new technology, credit, and inputs.

However, Epstein's analysis does point to the important question of how marketing systems can be designed or restructured to meet the needs of all farmers, who may possess varying degrees of political, social, and economic power. The problem is how this can be done, and a number of the other papers presented in this Workshop address this issue. Epstein and others suggest horizontal developments, e.g., cooperatives for smallholders, which help S type farmers extricate themselves from the exploitative patron-client relationship. I would also suggest public investments in physical and institutional infrastructure that have public good attributes. If the benefits of such investments are public goods, then they cannot be denied to any group of farmers. For example, road investments will help all farmers gain access to markets, not just profit-making farmers.

The bias against larger farms often leads social scientists to neglect the contribution agricultural producers make, whether large or small, to agricultural development, and to only consider larger farm operators as exploiters of the economically less fortunate. I submit, however, that a kilogram of rice produced by a "profiteer" for consumption by a hungry person is just as good for that person as a kilogram produced by any other farmer. Moreover, the role early adopters play in the process of technology diffusion, by bearing risk and disseminating technical information, also brings substantial social benefits to both consumers and other farmers.

Dr. Wanmali's paper (pp. 133-138) is concerned with spatial considerations in both government and private distribution systems, as well as the "informal" trading channels in rural villages. The latter are viewed as important to the functioning of the former. Wanmali emphasizes that rural markets have time and locational dimensions, which fit the various levels of markets into an interrelated system. Goods and services which flow from the urban to rural areas must pass through these market networks. Wanmali describes his field study of markets in rural areas of Bihar. He identifies local market hierarchies, which reflect both location and specialization.

A question I have, as an economist, for Dr. Wanmali and other geographers concerns the usefulness of their concept of market hierarchy. I wonder how this concept helps us to understand the economic organization of markets so that we can better formulate economic policies to stimulate production and solve distributional problems. As an economist I also wonder what insights the hierarchy concept brings into marketing analyses, which cannot be obtained through conventional analysis. It goes without saying that we need to consider the spatial organization of markets, and economists have done so; consider for example Bressler and King's classic analysis of Markets, Prices, and Interregional Trade. The question we need to answer is what those spatial relations tell us about the role marketing plays in development.

Dr. Gormsen's analysis (pp. 121-129) of the role of marketing places emphasizes the diversity of marketplaces. He cites the various characteristics of traders (full/part time; degree of specialization) and relates them to the stage of development. One of his particularly important observations is that traditional marketing systems are long, low-capital intensity chains or levels of markets. This kind of traditional market organization makes economic sense when capital is scarce and labor is abundant; but inevitably more capital-intensive marketing systems will replace traditional ones as development proceeds. This observation raises an important issue that is not addressed in this Workshop, namely, the process of technical change in marketing systems and its relation to technical change in agricultural production. This also raises the question of an "appropriate marketing system,"

which I raise in my paper on measuring returns to marketing investments.

Gormsen also emphasizes that different segments of the rural and urban populations use different kinds of marketing services in each stage of development. This has clear implications for designing efficient and equitable marketing systems, and it shows the need to meet the diverse needs of the rural population. An interesting correlation between social stratification and market interactions is noted. A general conclusion from Gormsen's paper, and one which is consistent with the spirit of Epstein's paper, is the need to account for the differential needs of farmers and the changing role of markets as development proceeds. Gormsen's analysis is consistent with my own view that these dynamic factors are critical in understanding the role marketing plays in agricultural development.

Dr. T.V.S. Rao's paper (pp. 169-176) considers the phenomenon of "interlocking markets," that is, markets in which several transactions or contractual agreements are linked. A typical example is the linking of credit and product market transactions, which is common not only in India but also in many other countries of the world. This is apparently a pervasive phenomenon and thus does deserve research of the type he has undertaken. Despite the general importance of this research, I have a number of questions for Dr. Rao.

First, the term "interlocked markets" needs precise definition. The approach seems to encompass a wide variety of contractual arrangements, which could be undertaken voluntarily to the mutual benefit of both parties, or which could be reflective of some degree of monopoly or monopsony power. These questions seem fundamental to sorting out the economic implications of "interlocking markets." Rao uses the term "exploitation" rather freely in his discussion of credit market interlocking; yet I wonder how he determines, empirically, when an interest rate is "exploitative" and when it is justified by the lender's risk.

Second, Rao finds there is a relation between technology adoption and types of transactions (tied or untied). This is an interesting empirical finding. I would like to see a theoretical analysis of these issues to know what relations we would expect between technology adoption and tied transactions, if any. This would help us to interpret and evaluate the policy implications of Rao's findings.

Let me conclude my comments with several observations. First, these papers all show that the great diversity among farmers, traders, market types, and marketplaces, all must be understood in evaluating marketing development. Yet, there is a need to go beyond these descriptive generalities about markets if we are to resolve basic economic questions about resource allocation and social welfare. Second, as an economist I am challenged by this wealth of information produced by other social science disciplines. The challenge is to know how to integrate the insights and data generated by anthropological and geographical research into economic analyses of marketing problems. I hope one outcome of this Workshop will be a better understanding by all parties of the contributions each type of analysis can play in the further important research that must be undertaken if we are to understand the relation between marketing development and agricultural development.

K. Subbarao:

Dr. Lipton's paper (pp. 205-220) is, as one would expect, highly provocative in that it challenges the conventional wisdom that "more marketing" is desirable. Lipton also raises the issue whether developing countries such as India should accord a priority to marketing improvement programs. I shall briefly discuss these important issues.

Lipton interprets the term "more marketing" in four senses: (a) more quantity is sold (extraction of surplus); (b) interlocked markets are delinked; (c) barter transactions are converted into cash transactions; and (d) subsidies to marketing of specialized crops are enlarged. He contends that in all these cases the poor farmers may lose. Extraction of surplus following marketing improvement may reduce poor farmers' self-consumption. It is not entirely clear whether interlocked markets are necessarily harmful. In an inflationary situation a conversion of barter into cash transaction may reduce real incomes of the poor. Therefore, Lipton argues that "structural reforms" involving redistribution of land should deserve greater emphasis than marketing.

Few of us will dispute his conclusion underscoring structural reforms. But as all of us know, progress on this front has been tardy despite thirty years of rhetoric. A more reasonable question to pose would be: given the existing structure, can anything be done to improve poor farmers' prices by suitably structured marketing reforms? Interpreted in this sense, whether or not "more market-

ing" will harm poor producers is an empirical question. For instance, improved market access via rural roads may raise effective prices of farmers in hinterland villages and may induce them to sell less and retain more for self-consumption. As Raj Krishna has shown, the final outcome depends on the relative magnitudes of the relevant elasticities. Karnataka state invested considerable amounts in rural roads and markets during the 1970s. The recent observed declines in market arrivals could be owing to a rise in self-consumption of millet-growing poor farmers in this region following better net prices. In the same way, interlocking may be harmful in certain situations. However, it must be accepted that marketing reforms by themselves do not improve equity; they must be intertwined with the reforms to improve the resource base of poor farmers.

Lipton rightly cautions against diversion of investible resources from production improvement programs (irrigation) into marketing improvement programs. He stresses the need to carefully examine technology choices to avoid labor displacement, such as modern rice milling. There are undoubtedly choices *within* the agro-distributional infrastructure that need to be carefully examined. Lipton's paper is full of insights and deserves careful reading.

In an interesting case study, Dr. Barbara Harriss (pp. 279-301) has examined the extractive role of agricultural commerce in North Arcot and Coimbatore districts of Tamil Nadu. She empirically estimates several indicators suggestive of the extractive mechanism—relative profitabilities from agricultural production and agricultural trade; income and wealth position of mercantile firms; the nature of investment portfolios of marketing firms, etc.—in the two districts, based on painstaking field work.

Harriss essentially captures the transfer phenomenon *at a point in time*. This does not tell us about the *process* of transfer of surplus via manipulation of terms of trade, which is a dynamic phenomenon. A comparison of the marginal rise in the rate of profit in agricultural production with that of the trading sector at two points in time may give us clues about the transfer mechanism. I am aware of the complexities of field research, and it is probably too much to demand this at the present stage of Harriss's research.

A second important empirical result is the relative wealth position of participants in this process of exchange. Harriss finds that the difference in wealth position between a typical firm controllin marketing and a household controlling agricultur production in Coimbatore is twice that in Nort Arcot. From this she deduces that there ought to b more reinvestible surplus and more productiv agriculture in Coimbatore than in North Arcot. Fror the data in Table 8 it appears that millers are usin 50% of investible resources in agriculture. Thi seems to suggest that the rate of profit from agricul ture has been rising over time (at least for larg farmers and farmer-cum-millers). Unfortunately Harriss does not give a break-up of this for Coimba tore and North Arcot, which would have enabled u to relate the differences in the relative income, wealth position of agricultural producers an trader-millers to the differences in investible resources going into the agricultural sector; i would also have facilitated inferences on the nature of extraction in the two districts. Furthermore, there is the question of *aggregate* profits from multiple activities and its implication for the extraction which, I am sure, her data set will enable Harriss to explore. Her paper is based on sustained field work in Tamil Nadu and deserves serious reading

I shall now comment on the Nigerian study by Dr. C.L. Delgado (pp. 251-261). To me this paper is refreshingly different from the prolific literature on market integration, based on correlation coefficients of data from African countries. Delgado avoids using this stereotyped methodology. His objective essentially is to consider the implications of market-price integration between regions for interregional equity under conditions of technological change, when a subregion consists of two or more regions endowed with different production potentials.

Given such differences in production potential between the regions, if a technology-induced rise in output results in a fall in the output price in the advanced region, and if this is transmitted immediately to the low-potential region depressing the average price for farmers in that region, the income position of the farmers in the latter region deteriorates because of market-price integration. At the same time, the yield effect protects the farmers in the advanced region from this unfavorable outcome. Thus, if two regions differ significantly in production potential, market-price integration may accentuate regional inequity.

Delgado examines the above hypothesis with price data from northern Nigeria, after gleaning the data carefully. The basic conclusions he draws

from this paper are: (a) within the project area, there are strong seasonal differences in food-grain market-price integration between harvest and post-harvest periods; and (b) markets in Funtua and Gusau are clearly not well-integrated in the harvest period, but well-integrated in the postharvest period. Delgado notes that one reason for this could be the large amount of distress sales taking place in the harvest season.

He infers from the above findings that farmers in the backward region should not be moved out of cereals into noncereals, but instead efforts to improve market integration in the harvest season might be more helpful. But the validity of this inference depends crucially on prevalent trends in the prices of noncereal crops and livestock products. If these prices show better integration during different seasons, and display a rising trend over time proportionately more than food grains, a switch to these crops might be helpful.

Delgado's paper is interesting both for the refreshing hypotheses advanced and for the sophistication with which he handles price data and the restraint with which he draws conclusions and implications.

Finally, I turn to the interesting case study of the impact of agricultural markets on income distribution in Tamil Nadu by Dr. H.-G. Bohle (pp. 235-241). Bohle examines the operational side of marketing, and explores the intersize class differences in such aspects as marketing costs, market accessibility, and impact of operational efficiency on the income of different classes of farmers. The study is based on primary data collected from 150 households in the western Salem, eastern Salem, and central South Arcot regions of Tamil Nadu.

Bohle finds considerable market participation by marginal and small farmers owing essentially to the specialization in cash crops. This finding is important because marketing in these regions crucially affects income formation of poor farmers.

Bohle finds that tie-in sales and financial constraints depressed prices for marginal farmers in eastern Salem, thus depressing their incomes. Contrary to Lipton's hypothesis, the marketing environment in this region seems to adversely affect the incomes of poor farmers. Even in central South Arcot, large farmers realized better prices owing essentially to wider market accessibility. Furthermore, marketing costs to sale proceeds are invariably higher for small farmers than for large farmers. Bohle concludes that the prevailing marketing arrangements are biased against small farmers and thus impair equity. A lowering of marketing costs for small farmers (raising operational efficiency) thus appears to be crucial in the study region. In order for this to happen, he suggests that instead of investing in large wholesale or terminal markets, promotion of existing rural markets and establishment of new primary markets should have priority. Bohle's plea for decentralized market development is well argued.

However, that by itself may not promote equity, because from Bohle's own study, small farmers seem to get lower prices even in villages *accessible to markets*. Apart from this, an important theoretical issue relates to evaluation of tie-in sales. It is necessary to compare this situation with the situation of free sales, accounting for interest on money borrowed from the free market. Only then can we draw inferences on the desirability or otherwise of tie-in sales. Bohle's study provides a careful evaluation of the marketing system.

I thank you for this opportunity to share my views on these important contributions.

Waheeduddin Khan:

I would like to make a few general observations, which will serve as the framework in which I attempt to integrate the papers I discuss.

First, about the definition of a marketing system. As I see it, a marketing system, whether for an input or an output, extends in the form of a marketing chain from the stage of production to that of final use and involves the participation of many agents such as producers, processors, transporters, traders, and consumers. The marketing system or marketing chain, thus, consists of different types of transactions at different stages of exchange. The important question, then, is whether one is to judge "efficiency" of a marketing system in its totality, and if so, what can be the purpose of segment or stage-by-stage analysis?

Second, a related methodological issue that deserves attention. It seems to me that in marketing-efficiency studies two different cases are required to be argued concurrently: one to establish that the well-known necessary conditions of efficiency are met in full, and the other to show that historical and institutional factors, which vitiate competition, do not influence the process. The argument about marketing efficiency is not necessarily clinched by evidence that substantially asserts the affirmative of the issue unless it is also

established that distortions do not exist.

My third general observation relates to the commonly implied belief that the marketing problems of all agricultural products are similar. Unlike with markets for industrial products and services, the conceptualization of marketing problems of agricultural products is rarely elaborate or clear. Perhaps this is because we do not bother to define the product cycle of an agricultural output in detail. Selling machine tools, automobiles, air tickets, cosmetics, or recreational services are rarely discussed professionally without reference to their specific demand and supply peculiarities and specific institutional practices, if any. Similarly, in professional discussions on agricultural marketing systems, agricultural products need to be differentiated from one another on the basis of their demand and supply characteristics, processing and storage requirements, and special features of their product cycles, etc. Only on doing so will one realize the extent to which the buyer-seller relationship differs from product to product and from one stage of exchange to another. This understanding will be of immense analytical value.

My fourth general observation concerns the question of measuring returns to investments in marketing systems. How should returns to these investments be measured? At one level, the answer is quite simple. In the analyst's kit there are well-tested sophisticated tools that permit such measurement. Studies undertaken for the purposes of getting research degrees commonly use these methods. However, at another level, the answer is not all that simple, because measurement is not merely a matter of tools but also of an analytical framework or a theory. Some of the dimensions I have mentioned in my earlier general observations need to be considered in this connection. When we incorporate some of these in our analysis, the problem of measurement acquires an altogether different dimension. The question then may become one not merely of how to measure but also of what to measure. I am tempted to say that there is no unique prescription for measuring returns to investments in agricultural marketing systems. Finally, I would like to raise an issue which may sound rather rhetorical: can the same level of incentive for raising agricultural productivity be provided by public authorities through measures other than direct investments in market infrastructure, committing a lesser amount of scarce resources? Surely this is an issue of considerable importance in development policy analysis, where alternatives must be examined and appraised thoroughly.

Dr. Antle's (pp. 319-327) contribution raises important conceptual issues relating to the planning of efficient markets. At the risk of oversimplification, if I am to summarize the thrust of his paper, it is to state: there is no alternative to direct public investments in development of market infrastructure; a comprehensive framework is necessary to measure returns to institutional and physical investments in agricultural marketing systems. He rightly emphasizes the need to consider economic, social, and political dimensions in describing the nature of a marketing system and for evaluating its appropriateness.

While discussing the question of measuring the returns to marketing investments, Antle draws our attention to the dynamic relationships and the interrelatedness of different projects in the agricultural and marketing sectors. It is important to recognize these relationships, something that is unfortunately not often done. It is these factors which make it difficult to establish the direction of causality and to identify and isolate the effects of investments in marketing systems on productivity in the agricultural sector. It is because of these factors that attempts to measure returns to marketing investments *per se* have little practical meaning. Given the interdependence and interrelatedness, Antle points out—and I think very correctly—that returns ought to be measured to sets of investments rather than by marketing investments alone.

Antle's exposition identifies for the researcher new areas for fruitful enquiry. His suggestion raises important questions of direct relevance to policy-making. How are the different sets of investments composed? Are there common elements in the different investment sets? What elements can be manipulated by public authorities and at what cost? When developed further, will the investment-set approach also make it possible to prioritize and phase allocation of scarce resources? Will it also suggest the nature and degree of public intervention in marketing systems?

Another area for research suggested by Antle's paper is the question of what effects marketing investments have on farmers' perception of uncertainties, and on their response to innovations. This is still a twilight area and one is not sure if returns to investments are being measured aptly.

In their paper (pp. 159-168) on the impact of market access on agricultural productivity in India, Matthias von Oppen, Parthasarathy Rao, and

Subba Rao present three main conclusions based on the series of macro and microlevel studies that they had conducted. One of their conclusions is that in the absence of restrictions on movement of agricultural products within a country, agricultural productivity stands to gain positively. In the Indian context, I interpret this finding to mean that gains from investments in marketing infrastructure can be high only if markets are spatially integrated. In other words, policies such as cordoning-off of surplus/deficit areas for procurement purposes by public sector buyers or collusive market-sharing by private traders are not conducive to long-term agricultural growth.

Their second conclusion is that ease and lower cost of movement of agricultural products—measured by relative density of surfaced roads and of regulated markets—have positive effects on productivity levels. Although they make this point with reference to density of surfaced roads and the institution of statutorily regulated markets, I think their conclusion can be generalized to cover other arrangements that minimize movement costs, risks, and uncertainties of the producer-sellers. Perhaps the ICRISAT economists may like to examine whether all regulated markets are always better organized and conducted than other competing arrangements that are not statutorily regulated. The case for increasing the density of regulated markets in a region will need to be argued partly on the basis of the proven inefficiency of other marketing arrangements.

Their third conclusion is that the small farmers' access to marketing facilities increases over time, and that consequently their gains also increase; and once their access reaches a certain minimum level, there is also a desirable equity effect. It seems to me that more evidence is required to establish this convincingly. For the present I will consider it as a hypothesis. With their continuing interest in the study of marketing systems, the ICRISAT economists will, I hope, concentrate on this aspect in their future enquiries.

Now I turn to the only paper in this conference that looks at the marketing system from the consumers' side; this is the paper by Drs. Murty and von Oppen (pp. 179-200), which focuses on the dynamic interaction between consumer preference, income distribution, and nutritional status. The theme of the paper is quite elaborate, but I shall take up only two points for comments.

My first comment is on the policy uses of market studies. The authors clearly bring out the importance of studies analyzing consumer behavior and consumer preference in formulating research perspectives for technology development. It would make the effort meaningful if consumer preferences are heeded in varietal improvement programs. Of particular interest here is not so much the conclusion of the authors as the methodology that they have used to study consumer behavior. Their attempt indicates the possibilities and problems of formulating a unified framework of analysis.

My second comment relates to the point made by the authors that consumers buy bundles of *commodities* and not bundles of *nutrients*. While I do not dispute their observation, I do not consider it as a behavioral constant. There is evidence to show that through propaganda—as distinct from commercial advertisements for processed foods—consumers can be made aware of the nutritional contents of different bundles of agricultural commodities that they buy. Soybean is a case in point. Upper-income vegetarians in India seem to have been won over to this product because of its nutritional value. Perhaps similar propaganda for a few other crops can influence the behavior of consumers belonging to other income groups. It will be worthwhile if in their future researches the authors can examine the role that propaganda can play in making consumers conscious of the nutritional content of various agricultural commodities. If propaganda is an effective means and if it can be implemented on a reasonable scale, its implications for marketing behavior can be numerous.

Thosanguan's interesting paper (p. 177) on contract farming in Thailand describes only the positive aspects of contract arrangements, which reduce farmer's uncertainties and influence their productivity levels favorably. It is likely, however, that such arrangements also lead to undesirable consequences, which the author has not considered. It is observed in her paper—as also in literature elsewhere—that contract farming arrangements generally cover relatively remunerative nonfood-grain crops such as fruits, vegetables, tobacco, and sugarcane, often in rather small geographical areas. The arrangement, by its very nature attractive to farmers, becomes widespread within a short period of time, resulting in a complete shift in the cropping pattern from other, less-remunerative crops to the "contract" crop. But it has also been observed that the vulnerability of farmers to cyclical market trends tends to increase with such crop specialization. This has happened time and again in the tobacco-growing areas in

India, where an arrangement similar to contract farming was initially responsible for the introduction of the crop. I think, therefore, that one should also consider other, wider consequences of contract farming arrangements. For example, spatial inequalities may increase if the "contract" crop cannot be grown except in certain agroclimatic zones; or contract farming arrangements for nonfood-grain crops alone may destabilize the food-grain economy of a country; or contract farming for export crops may have implications for food-grain imports.

Barbara Harriss:

The task of commenting on public interventions in food-grain marketing in two countries with combined populations of nearly 2000 million is facilitated by the two papers from Mr. S.C. Varma (pp. 329-333) and Mr. Du Xiao Shan (pp. 335-342). Varma's discussion of intervention is confined to market regulation (MR) in India. His argument is that MR is good because regulated markets (RM) (1) increase prices to farmers, (2) reduce the tendency to evade commercial taxes, and (3) can eradicate trading malpractices.

Varma has suggested some reforms, which follow logically from this argument. These reforms are substantially similar to those currently being advocated by the Agricultural Services Division of FAO:

a. expand MR to cover more crops;

b. provide technical and financial support;

c. develop rural periodic markets;

d. regulate more than the first transaction;

e. professionalize management;

f. professionalize market design;

g. improve physical infrastructure; and

h. improve grading and standards.

To evaluate these reforms, we need to look at the assumptions behind the argument. Varma asserts the beneficial effect of MR on producer prices. Concrete evidence pertaining to A.P., Karnataka, and Tamil Nadu shows that:

1. Such a small proportion of marketed surplus is transacted through RM yards that their effect on prices must be negligible.

2. There exist massive countervailing forces upon prices, notably pricing policy connected with State Trading, inflation, etc.

3. If RMs have not increased prices neither have they stabilized them. An idea in vogue is that agricultural markets can be reformed through market acts to make them more competitive. If this is so, prices should show greater regional integration and (ceteris paribus) the coefficients of variation of regional price sets should decline with increasing MR. An analysis of prices in all districts of A.P., Karnataka, and Tamil Nadu over the period during which most markets have been regulated shows that the coefficients for grains rose rather than declined. At best, then, RMs slowed an even greater rise in instability and had little or no impact on regional integration.

There is much more evidence of MRs being a weak piece of legislation subordinated to other institutions. RMs are subordinated to state trading institutions, which evade paying the fee on their purchases, and which use merchants' accounts to the RM as a basis for calculating their levies. RMs are subordinated to the commercial taxes department which uses the accounts for levying sales tax. RMs have exhibited no ability to crack monopolies, whether in public sector trading, private mercantile monopolies, or monopoly by industrial units.

RMs are a minimum cost intervention; they are a subsidiary means of collecting a fee by taxing traded goods and often collect more than what they spend. Even while RMs do not benefit farmers directly, they enjoy the support of funding agencies, such as the IBRD or IDA, for the surpluses they generate.

The RM is a limited piece of legislation. It purports to regulate the first transaction and does not regulate (a) credit, (b) freight or transport, (c) processing, and (d) storage. These unregulated aspects of marketing exert a countervailing power over the regulated commodity markets. RMs are the manifestation of an ideology of participation. Indeed Prime Minister Nehru at India's Independence saw marketing in terms of a condominium of participative cooperative institutions. The committee was seen as a community of interests. In reality, it is an arena of conflict and sabotage.

So the reforms suggested can be interpreted in different ways:

1. They are an expression of the need to centralize and bureaucratize the management of an institution originally conceived of as decentralized and participative.

2. In view of the present failure of RMs, these reforms (crop notification, training, etc.) have a limited reach. Only changes in the legislation to cover linked markets and structural changes in production activities can give rise to relations of exchange, thus making the RMs more effective.

3. It is conventional to attribute the original legislation to the colonial state's requirements for good quality cotton. (Actually, RMs expanded after the viceroyalty of Linlithgow, who exported entirely to India his recommendations to the British government for agricultural markets in Britain, which were never implemented in Britain!) Now this rationale has been reintroduced to improve the quality of supply of fruits and vegetables (with a high income elasticity of demand) for export to West Asia—the new international market for Indian agricultural products.

I am not arguing that MR is bad, but that it is a weak piece of legislation. It works where markets are most competitive anyway.

State Trading (ST) in India is a more powerful public intervention than the RM. It is not discussed fully in Varma's paper, but it contrasts with RM on a number of counts and it forms a link with Du Xiao Shan's paper.

ST is based on a different ideology. Private marketing systems are not regarded as competitive. Either they must be made more competitive by partial ST, or they must be abolished altogether by monopoly ST. ST is a maximum cost intervention, highly subsidized both directly and indirectly. Its requirements of technology, capital, and staff are large. There is a high degree of centralization. Prices are technocratically determined and administered, unlike those of the free market. ST is seen as a basis of the socialization of exchange and production. Its subsidy is an essential benefit to consumers in a welfare state.

Du Xiao Shan's paper shows, remarkably, that exchange is less socialized than one might expect in an agriculturally based, communist society. China has much more egalitarian food distribution than India. But like in India and many developing economies, China runs a mixed system of marketing institutions.

The food circuits of China for several decades have been short. The development of localized production and redistribution has been encouraged so that there has been a tendency towards regional self-sufficiency and autarky in grain. This has led to production in some regions at very high costs, and not according to comparative advantage.

Now the policy in China has changed to encourage increased regional interdependence. The patterns of production and marketing reflect this trend. Du Xiao Shan's paper describes these changes.

The basic arrangement for grain is that of quotas levied at fixed price to ST institutions by the production brigade. It would be interesting to know how important is this nonmarket distribution in the grain economy.

As in India, China's ST institutions have been flexible and to an extent even experimental. In India new institutions are accreted, whereas in China they can be abandoned and reassumed (e.g., movement restrictions, periodic markets, and cooperatives). Cooperatives in China were abandoned as undemocratic. Now they are to be rehabilitated. It would be interesting to know how they are to be made more democratic.

China now emphasizes individual sellers as the unit of exchange rather than the production brigade. In this context, what happens to private surpluses from sales? Apparently it can be invested in trade ("private commercial bodies"). Having minimized the power and extent of merchant capital, China is now rehabilitating and redeveloping it. Is this not a retrogressive mode in classical Marxist terms? What is the socialist reasoning behind this?

Price policy in China as in India, is very complex. There are four types of prices (a) fixed, (b) floating, (c) negotiated (all connected with ST and in some way based on technocratic price formation), and (d) free.

For the first three types of prices, determination is complex and is according to:

1. labor theory of value;

2. supply and demand;

3. costs of production plus profits;

4. incentive prices (grain versus commercial

crops); and

5 parity prices between crops used for agricultural and industrial purposes.

In addition, there are seasonal and regional variations in administered prices. It is not clear which process of price formation dominates and how these price forming processes interact.

Lastly, in China—as in India and in several countries of Africa—many reforms in the management of ST have recently been suggested, especially with regard to (a) power with responsibility, and (b) financial incentives, especially for crops which are internationally traded. Here we recognize, as in Varma's paper, the *quality* of produce, not just quantity. It seems that the more sophisticated requirements of the world market impinge upon the internal organization of China's ST institutions.

Is this a capitulation to international capitalism or can it be justified in socialist terms?

Joy Dunkerley:

The papers on agricultural marketing in Japan (pp. 343-351) and the United Arab Emirates (UAE; pp. 353-354) deal with very different situations but they do have a major element in common—a background of substantial changes taking place in agricultural and food policy.

In the case of Japan, this policy change centers on the role of rice. In recent years per capita consumption of rice has fallen while production has kept up, leading to increased rice stocks. The financing of these stocks—plus the subsidies needed to reconcile low prices to consumers with high prices to farmers—has become a major financial burden. The purpose of Japan's new policy is to reconcile the rice-producing sector with the lower level of rice consumption. This involves encouraging the production of new crops to protect farmer's incomes and increase self-sufficiency ratios for crops other than rice. Furthermore, there are plans to upgrade the quality of rice and find new market outlets.

The purpose of the UAE agricultural policy is to diversify the agricultural sector, which is at present highly dependent on fruits and vegetables, by increasing output of cereals.

The current agricultural marketing and distribution systems in these countries offer a wide contrast. The Japanese system is highly controlled. About one half of the rice crop is bought, sold, and stored directly by the government at controlled prices. The other half is in private hands, but it operates within the framework of a government allocation system and receives subsidies from the government. The subsidies are necessary to enable "private" dealers to compete with the already subsidized sale of rice by government.

Agricultural marketing and distribution channels in the UAE are entirely in private hands. The government is, however, active in providing inputs to the sector, extending agricultural loans at favorable rates of interest and providing certain agricultural services, such as plowing and irrigation, free of charge.

Changes are planned in the role that the Japanese cooperatives play, to fit them into the new agricultural policy. The changes will seek to market rice more aggressively through new outlets and by encouraging product improvement. Cooperatives are to improve the efficiency of their services by operating on a larger scale. They are also to provide advice on the introduction of new crops. In the UAE too, cooperatives are to have a major role in implementing the new structure of agricultural production.

Further Discussion

Agricultural Market Channels

Three other points were made with reference to market channels in West Africa. First, marketed surplus gives no indication of the size of investible surplus, which may be very low. Second, domestic market channels may be affected by international policy with regard to grain imports and food aid. Third, trading agencies are gender specific; male traders have command over greater capital and trading at longer distances than do females.

The value of studying channels for by-products—as well as for the main crop—was emphasized. By-product prices may affect the sale prices of producers. The behavior of the by-product market may influence that of the main market. In the past, such markets have been thoroughly neglected.

The Spatial Organization of Rural Marketing

First, differences between concepts of market were aired: economic market, physical place, central

place (for retail facilities), central market (for wholesale facilities), areas of interaction around physical places (vested hierarchies of services and service areas, hexagons, regulated markets' notified areas). But the discussion on geographical terminology stopped short of being able to resolve possible areas of confusion.

Second, the dichotomy between critical evaluations of the organization of markets on the one hand, and normative statements of their possible future roles on the other, was emphasized.

Third, the apparent paradox between World Bank investments in regulated markets (which necessitate careful appraisal) and the increasing relative and absolute diversion of marketed surplus away from such projects was noted. It was clarified that, even when the fee is imperfectly levied on goods not actually flowing through the physical yard of the regulated market, it guarantees high returns to investment and can actually perform the function of a tax on traded goods that are often exempt from sales tax.

Lastly, the appraisal of market projects needs to involve comparisons with alternative types of infrastructural investment in a rigorous cost-benefit analytical framework.

The Economic Efficiency of Agricultural Markets

It was debated whether a change in aggregate productivity of one or two percentage points from liberalization of trade can be considered impressive. In issues such as choice of postharvest technology, it was pointed out, changes of such orders of magnitude represented values sufficient to justify changes in policy. Further, the impact of efficient markets upon interregional resource allocation was shown to grow in importance with the adoption of commercialized agriculture. These aggregate effects exceed the micro-level effects of markets (which comprise the facilitation of other investments, such as extension and the provision of inputs) and are increasingly important through time.

Two other matters of policy relevance were debated. First, whether rural roads and greater ease of access increased productivity and/or whether such productivity gains were negated by adverse equity effects. Second, in view of the now widespread evidence of adverse effects of food zonation upon prices and production, does their persistence indicate powerful beneficiaries, such as traders?

Technical discussion centered around specifications of cause and effect, and explanations of the 2-year time lag between market regulation and a significant impact upon productivity. It was suggested that regression equations on output should employ input market density as an independent variable, not input consumption.

ICRISAT's work on nutrient elasticities is valuable, but it is inaccurate as a guide to individual consumption because data sources ignore inequalities in intrahousehold distribution and seasonal inequalities. The implications of nutritional considerations for agricultural research were emphasized. Cereals should receive higher priority than pulses (despite pulses getting a higher price) because calorie-protein ratios are high enough to solve protein deficiencies, and yields and returns for cereals exceed those for pulses. The demand prospects for coarse cereals did not seem as substantial as formerly thought, even though demand elasticities are positive for the poor.

Equity Aspects of Agricultural Marketing

Do markets act as a supply-push to agriculture, as argued by growth-center theorists and by advocates of regulated markets? Or do they represent a demand-pull from agriculture, as argued by advocates for cheap market information rather than costly physical infrastructure? These issues were debated.

Considerable critical discussion centered around the use of correlation coefficients to indicate market integration, with emphasis on statistical assumptions and refinements. The influence of patron-client relationships upon economic behavior, a subject traditionally the preserve of anthropologists and political scientists, was discussed. Patrons benefit from patronage. Clients benefit when their interests coincide with those of patrons, but not if their interests conflict. The interlocking of commodity, money, and labor markets in the person of the patron could increase the exploitation of the client and insulate the client from market forces. This is clearly an area for fruitful research oriented towards policy.

It was established that the analysis of resource transfers through private markets has to be historical, both in a dynamic sense and in the sense of quantifying and chronicling investment and

resource extraction in entire mercantile portfolios. Such analysis has to incorporate risk and be comparative, in order to generate insights of policy relevance. It was generally agreed that much more research is needed on the commercialization and degradation of common property resources.

The Range of Public Interventions

The power of planning to influence production through investment in physical marketing infrastructure was discussed critically. It was asked whether governments could provide the same level of incentives through means other than markets—and at lower cost. These questions exposed the vulnerability of rigorous cost-benefit analysis to political weightages and distortions. Markets have unique theoretical impacts on production, both directly and indirectly and in both short and long terms. Technical change affects marketing; approaches for exerting controls and levying taxes, which might have been relevant and even beneficial in the past, may prove obsolete in the future in view of the advance of new communication technology. The problems associated with regulated marketing were discussed, but left unresolved.

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Issues and Research Recommendations

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Issues and Research Recommendations

The workshop had assembled a group of persons representing a wide range of disciplinary and professional backgrounds but with a common interest in agricultural marketing. This naturally resulted in an interdisciplinary discussion of unusual intensity and frankness.

Research on agricultural markets, as on other subjects, is a continuously evolving process. Our conclusions represent an attempt to define the state of the art after the opportunity afforded by this workshop for eclectic debate and reflection. The following is a summary of (a) issues on which consensus emerged; (b) unresolved issues; (c) issues on which insufficient knowledge exists; and (d) a research agenda.

A. Substantive issues on which there is an emerging consensus mainly concern 'equity' and some aspects of policy.

1. Exchange relations (the quantity, timing, location, and price of sales and the links between sales of agricultural products and those of other commodities) vary in a given locality according to the social positions of sellers and buyers. These will affect the size of the investable surpluses of households and, consequently, their ability to adopt technological changes which enhance production.

2. The development of marketing for common property resources in rural areas is being accompanied by their privatization. This reduces resources available to poorer people in rural societies.

3. Trading restrictions (which normally accompany marketing by state institutions at administered, not free-market, prices) increase the imperfections of price behavior on the free market. Empirical analysis shows that interventions affect not only the intervened-in crops but also their substitutes, with an overall depressing effect on aggregate production.

4. Periodic marketplaces are accessible to the poorest rural people by virtue of their proximity; therefore they offer potential sites for interventions such as mobile service units targeted to help the poor, and for rural infrastructure such as roads, stores, and banks.

5. Policies on infrastructure, prices, and agricultural research, which succeed in reducing seasonal price fluctuations, will benefit farmers in the SAT, especially those whose grain production is commercialized.

6. Potential benefit can be derived from improving the training and information base of employees of state marketing institutions, so that they have at least the same standard of knowledge about technical and management issues as is achieved by private merchants through their apprenticeships.

B. Some important issues remain unresolved, though they were discussed at the workshop.

1. The impact of physical infrastructure for marketing has been established econometrically. Marketplace infrastructure can lead to an increase in productivity (according to the principles of comparative advantage) and can also provide secondary benefits from expenditure multipliers. However, there is much empirical evidence to demonstrate that social benefits are unevenly distributed, that certain classes and regions may suffer comparative disadvantage from regional integration, and that rural-urban resource transfers may result.

2. Agricultural marketing systems can facilitate the transfer of resources from the agricultural sector to nonagricultural sectors. To the extent that they do this, they may reduce resources available to the agricultural sector for investments enhancing production. However, a clear picture has not yet emerged on how this relationship affects the overall economic development of a region and of social classes.

3. Two thorny questions then arise. (1) Does the development of economic and physical facilities compensate in its productivity effect for social, rural/urban, and regional inequities? (2) Does a centralized ('regulated') market infrastructure have superior effects on productivity

than other alternatives (e.g., investment in rural periodic marketplaces, roads, stores, irrigation, agricultural research)?

4. Evaluations of the efficiency of private agricultural markets may be location specific. It is becoming evident that research findings on market efficiency not only depend upon ideologies and research methods but also reflect regional and intercrop differences in market structure and behavior. These behavioral and locational differences can affect the ability of producers to adopt new technology. Therefore, research on alternative ways of organizing exchange (via contract farming, cooperatives, state trading institutions) also needs to be carried out in a regional and/or crop-specific manner.

5. The discussions remained inconclusive on the constraints to the development of input marketing systems. While conventional wisdom that constraints are demand-related could not be disproved, there was strong evidence that some of the constraints may be supply-related.

C. A third set of issues was identified, on which existing knowledge was considered insufficient.

1. The effects of the interlinking or interlocking of markets on behavior of individual markets.

2. The social impact of technological change in the postharvest subsector of the agricultural economy.

3. The importance and consequences of gender-specific roles in agricultural marketing.

D. Research agenda

Out of the state of the art—as reflected in our listing of issues—a research agenda emerges. This agenda incorporates not only the wish of active research workers to further their research but also the emphasis that emerged from international and interdisciplinary discussion groups at the workshop. Areas of debate and areas of ignorance are both addressed.

1. Comparisons of marketing systems for agricultural products across countries and crops and through time—emphasizing the relationships between institutional differences and differences in market behavior—would contribute to the accumulation of systematic knowledge about the role of marketing systems in economic development, the constraints to market efficiency, and the relationships between private markets and implemented state interventions, all of which are important for policy. Such knowledge will also help in making appraisals and evaluations when planning changes in technology and in the infrastructure of agricultural markets.

2. More research is required on the political economy of interventions in SAT agricultural markets. Many simplifying assumptions are now made in economic analysis because of ignorance about the means of policy formation; legal issues and legislative powers; the real costs of organization, administration, and implementation of policies affecting markets; budgetary allocations and control for such interventions; and the actual beneficiaries of such interventions. Areas of high priority for such research are market regulation and state trading, but other important research areas include taxation, finance, storage cooperatives, etc.

3. Methodological refinements are needed in the areas of (a) cost benefit analysis to model and simulate the immediate and indirect, social multiplier effects of investment in marketing infrastructure and in alternatives, where issues of causality and of interdependence are particularly difficult to trace; (b) algorithms for the modeling of the appropriate spatial distribution of infrastructure for inputs and for product markets; and (c) analysis of price data and market behavior.

4. Areas of comparative ignorance that still remain, on which research is needed, are: technological change in marketing, storage, and agroprocessing; the role of state decisionmaking; the costs, organizational consequences, and physical and income-distributional impacts of technological change; the consequences of interlocking of markets for factors (labor, water, seeds, pesticides, fertilizer) and output upon behavior of individual markets, including the effects of changes in vertical and horizontal integration of markets (e.g., agroprocessing, stor-

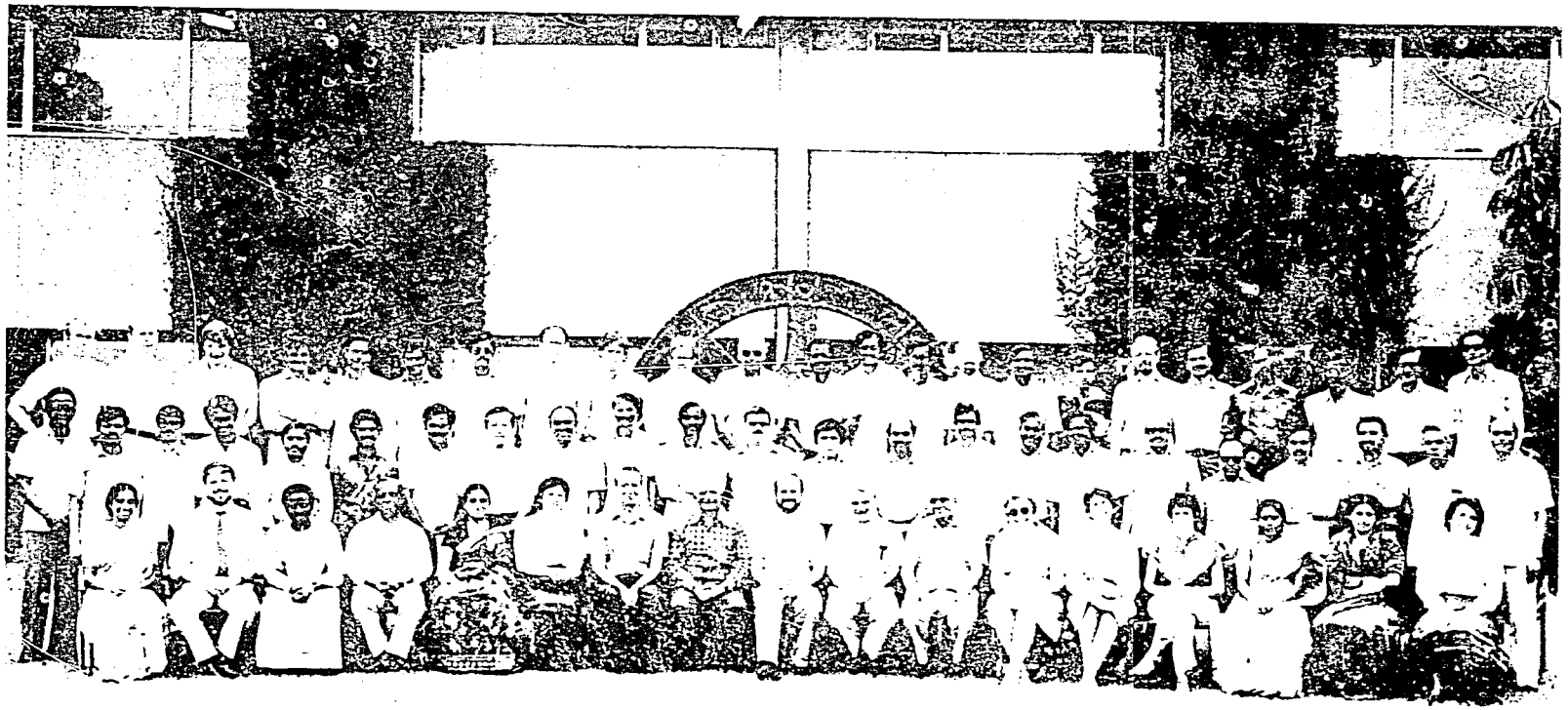
age, transport); social relations of production and their relation to marketing systems, including consideration of gender-specific economic activities; the role of common property resources, and the impact of commercialization upon the poor (landless and small farmers).

5. Interdisciplinary research is needed on rural, periodic markets in particular to increase our understanding of: (i) the spatial and economic relationships between periodic and central wholesale markets; (ii) regional variations in the structure and functioning of rural periodic markets and changes over time, especially in least developed regions; and (iii) the relationships between periodic market systems and settlement systems.

Refinements are needed in our planning and evaluation methodology for measures relating to: (i) the provision of inputs to agriculture and the wholesaling of agricultural products; (ii) the provision of essential consumer goods; and (iii) monitoring the impact of state interventions in agriculture upon the functioning of the periodic marketing system.

The workshop revealed a wide interest among scholars of economics, geography, sociology/anthropology, history, administration, and politics, in the problems of agricultural markets. The relevance and importance of this subject has been clarified in this volume, and a case for more research is made in this section. Because organizations capable of coordinating interdisciplinary and international research are so rare, the economics programs of international agricultural research centers could play a particularly useful role in facilitating the design, collection, interpretation, and diffusion of this necessary knowledge.

Appendix: Workshop Organization and Participants



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