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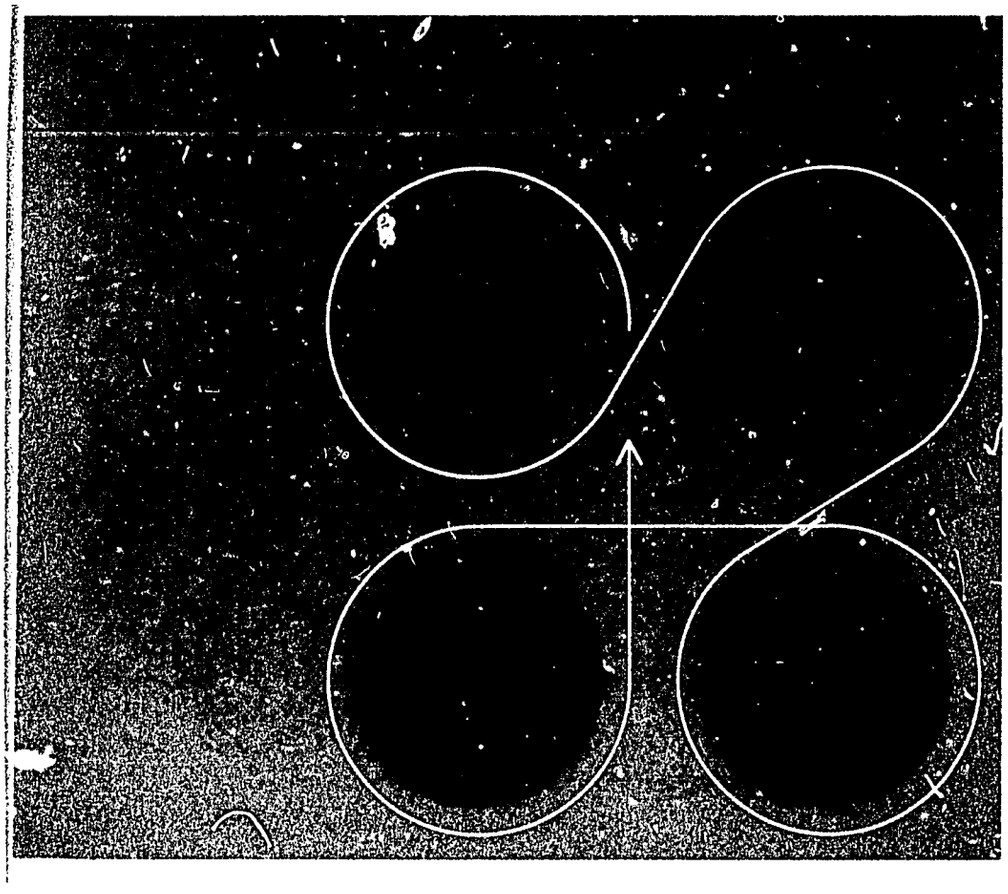

Structure and Performance of the Rice Marketing System in East Pakistan

Muhammad Osman Farruk

NEW YORK STATE COLLEGE OF AGRICULTURE AND LIFE SCIENCES
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This record will be incomplete if I do not express my great sense of appreciation to the field staff and particularly to my friend, Mr. A. Hamid Bhuiyan, who was my constant companion during the difficult and strenuous travels in the far-flung project areas.

My grateful thanks to the many people at Cornell University who assisted me in the preparation of this manuscript.

During the various phases of the research, from field work to analysis and writing, I had to make such drastic deviations in my normal schedule of life that I would now like to publicly acknowledge my deep appreciation of the understanding of my wife, Rana, who has cheerfully shared my agonies and ecstacies during this period.

Data for this bulletin were collected in 1967-68 in what was then East Pakistan. The bulletin went to press in the middle of 1971. Subsequently, the area dealt with in this bulletin became the new country of Bangladesh.

May 1972

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Preface

Political attack, regulation, and displacement of the basic food-grain trade characterize agricultural policy in many nations in the early stages of economic development. These policies have substantial implications to the developmental process in agriculture as well as in other sectors as they influence price relationships and the efficiency of market processes. If such policies are to be effective in facilitating the operation of price signals and the efficient use of resources, they must be based on detailed knowledge of the working of markets. In particular one needs to know how effectively transport and communication lines facilitate market integration and intermarket transfers; how effectively storage resources facilitate transfer of commodities from one season to another; and how effectively processing facilities transform commodities from one form to another. With knowledge of these processes, a basis is established for judging the scope and means of improvement of market operation.

M. O. Farruk has studied these aspects of rice marketing in East Pakistan by first developing and administering a large program of primary data collection to provide detailed, grade-specific, price data for a large number of markets in different parts of the Dacca market hinterland. The data were collected from the market centers in the year 1967-68 and required detailed supervision and a regular program of travel to remote rural markets as well as ingenuity in developing grade equivalencies for comparison of intermarket price differentials. While supervising the field work, M. O. Farruk developed close working relationships with numerous market functionaries, thereby creating the basis for an intuitive perception of the working of the rice market system which has greatly facilitated the processes of data analysis and formation of policy-oriented judgments.

The data analyzed are large in quantity, posing a number of complex processing problems, and are of high quality. Since the data are largely restricted to one year, a number of questions remain unanswered. In addition, this study raises a number of questions about the relation between the several diverse market structures he encountered and the long-term processes of modernization. These and related problems are the subject of additional lines of inquiry now being prepared by M. O. Farruk from his position at the East Pakistan Agricultural University.

M. O. Farruk's study of rice marketing in East Pakistan is one of a series of studies being carried out at Cornell University as part of a USAID-financed contract for research on agricultural prices. We are grateful for the assistance provided by the Agriculture and Fisheries Division of USAID and, in particular, to Douglas Caton and Carl van Haeften of that division.

The broad program of study of which M. O. Farruk's work is one part, covers three major areas of enquiry: the role of prices in intersectoral income and capital transfers; the effect of price relationships on agricultural production and marketings; and the factors affecting urban prices of

agricultural commodities. Thus in total, these studies are concerned with the effects of agricultural prices on the nonagricultural sectors of the economy, with their effects in the agricultural sector, and with the manner in which agricultural prices are determined. Over the course of the contract, a substantial number of studies will be carried on in various countries and dealing with various aspects of the processes. At the completion of these studies an effort will be made to pull them together into an integrated view of the role and functioning of agricultural prices in the development process.

A basic objective of the contract with USAID for this study is not only to produce useful research results but also, by providing a structured research experience, to enlarge the pool of trained manpower for the analysis of such problems. For this purpose, the research in this project is accomplished primarily by doctoral candidates at Cornell University who use the specific studies conducted as Ph.D. dissertations. The definition of the overall project has purposefully been kept broad and flexible to facilitate the attainment of this additional objective. This study by M. O. Farruk is part of that program and is drawn from his Ph.D. dissertation, completed at Cornell University in 1970.

John W. Mellor

Structure and Performance of the Rice Marketing System in East Pakistan

Muhammad Osman Farruk*

Chapter I. Objectives and Research Methodology

During the past decade and a half, development economists have shown a growing recognition of the positive relationship and interaction between the goals of development planning on one hand and the structure, conduct, and performance of the marketing system on the other (see 33:344-61, 47:129-68, 11:252-59, 46:414-25, 43:307-15). Efficient resource use leads to a competency in the marketing system that prevents wasteful costs as well as qualitative and quantitative losses in the development of time, form, and place utility of products. In addition, commodity prices, which perform the functions of resource allocation, intersectoral income distribution, and capital formation, (44) are generated within the framework of the marketing system. Unless a market structure is conducive to efficient pricing, these 3 functions of price will be poorly performed.

Once we recognize that an efficient marketing system is essential to the development process, we must consider the 2 principal elements: namely, the degree of efficiency in the present systems and the potentials for improvement. Within this frame of reference, the following important issues should be included in an analysis of the marketing system in the developing economies.

First, are the agricultural markets functioning according to the socially and economically accepted norms of efficiency within the constraints of the given level of technology and other environmental factors? The causes of observed inefficiencies should be determined and the possibilities for institutional as well as technological changes that might lead to increased physical and economic efficiency should be explored.

Second, the importance of the analysis of marketing efficiency in a development context relates to the elasticities of supply of marketing services. When a dualistic agrarian economy begins a structural transformation, rapid urbanization and industrialization exert strong pressures on the demand for industrial raw materials and for food, necessitating a steadily increasing flow of these commodities from the rural to the urban areas. Also, technological innovations sharply increase the total volume of production and, consequently, the volume of marketed surplus is expected to grow. It is important to know whether the present institutional and functional organization can adjust itself to the increased demand for marketing

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services, and whether it can determine the direction and magnitude of the required resource allocation by the public sector toward marketing improvement programs.

Third, even a casual view of the agricultural markets in the developing countries will reveal the preponderance of government participation and regulation in the marketing system. The origin of many such policies can be traced to socio-political and economic considerations, which are often based on incomplete, incorrect, and imperfect understanding of the working of the present structure. There is a vast potential for testing such assumptions by objective, empirical studies and thereby providing the policy formulators with better knowledge and tools for initiating viable marketing improvement programs.

The existing literature on marketing efficiency in developing economies can be grouped into 2 categories. First, a large number of studies have generally described the marketing systems with little emphasis on a statistical analysis of pricing efficiency. The major conclusions are based on the researchers' subjective appraisal of the situation (32, 10, 11, 21, 42). The second group of studies have been concerned with an analysis of pricing efficiency in order to quantify the variables that could be used to interpret the nature of competition in the marketing system within the domain of relevant economic theories of firm behavior (40, 57, 41, 51).

Review of these studies shows that development economists and policy makers still lack a universally applicable and valid set of hypotheses on marketing efficiencies in underdeveloped countries. The divergence in the conclusions reached could be the result of differences in the approach to the problem, the respective methodologies used and, above all, problems specific to the commodity or country studied. On the other hand, we might also argue that in spite of broad similarities in the traditional market economies, a multiplicity of social, environmental, economic, and political factors may cause market structure and performance to differ among regions. The implication of this is clear: We need more micro-level studies in different geographical areas and economies to evolve a proper methodology for analyzing the marketing efficiency in underdeveloped regions, to generate new hypotheses, and to test the existing ones under varying conditions.

Objectives

The broad objective of this study is to analyze the salient organizational and operational features of the rice marketing system in East Pakistan with a view to testing the existing hypotheses on the performances of traditional markets and generating new ones. The analysis describes the marketing channels, institutions, intermediaries, and other functionaries involved in the marketing process; describes the overall geographic pattern of interregional transfer of rice and paddy in East Pakistan with specific reference to the urban wholesale markets of Dacca; analyzes the methods and costs of paddy processing; analyzes the nature of marketing margins and costs in relation to spatial price differentials; analyzes the extent of

interdependence in intermarket price formation; analyzes the extent of seasonal price variations and its relationship to storage practices and costs; and lastly, evaluates the present marketing system in terms of efficiency and the nature of competition.

Research Methods

Market structure research has been defined more precisely than when J. S. Bain provided researchers with a set of comprehensive definitions of the tools of research, later known as "market structure analysis." (3)

In spite of the limitations and constraints imposed by the deficiencies in the available data, one can fruitfully use the basic concepts of market structure analysis. First, through direct observations of the functioning of the markets and discussions with the functionaries, some evaluation can be made of structural variables such as the number and size distribution of sellers and buyers, conditions of entry and exit, and other aspects of interfirm and intrafirm relationships. Secondly, by studying price relationships among geographically separated markets as well as price formation within a particular market, some approximations of market conduct can be made. By analyzing marketing costs, margins, intermarket price differentials, seasonal price variations, and the pattern of interregional commodity transfer, it is possible to evaluate the system in terms of market performance.

Within this broad analytical framework, the structure, conduct, and performance of the rice markets in East Pakistan have been analyzed in the present study.

Choice of project areas

Metropolitan Dacca and its suburbs, with an estimated population of nearly 750,000 persons in 1967, represents the largest concentration of urban consumers in East Pakistan. The two wholesale rice markets, Badamtali and Zinzira, were selected as the focal point of this study because they are the main suppliers of rice for the retail shops in Dacca. Two other terminal wholesale markets, Madanganj and Narsingdhi, in the district of Dacca were selected because they supply rice for the industrial, urban, and semiurban population living in the Narayanganj subdivision (fig. 1).

To delineate the supply hinterland for these markets, we interviewed the various traders in the area as well as relevant government officials. We then visited the different interior markets reported to be the major sources of supplies for these consuming markets. These preliminary investigations led to the selection of 7 markets in the northern district of Dinajpur, 2 each at Rajshahi and Bogra, and 11 in the southern district of Barisal[1] (fig. 2).

[1]Markets selected were: Pulhat, Chirrirbandar, Setabganj, Pirganj, Phulbari, Birampur, and Kaharole in the Dinajpur district; Naogaon and Matajeehat in the Rajshahi district; Talora and Dhap in the Bogra district; and Banaripara, Patuakhali, Chamta, Neamati, Betagi, Botolbunia, Bogabandar, Lebukhali, Maukaran, Galachipa, and Ulania in the Barisal district.

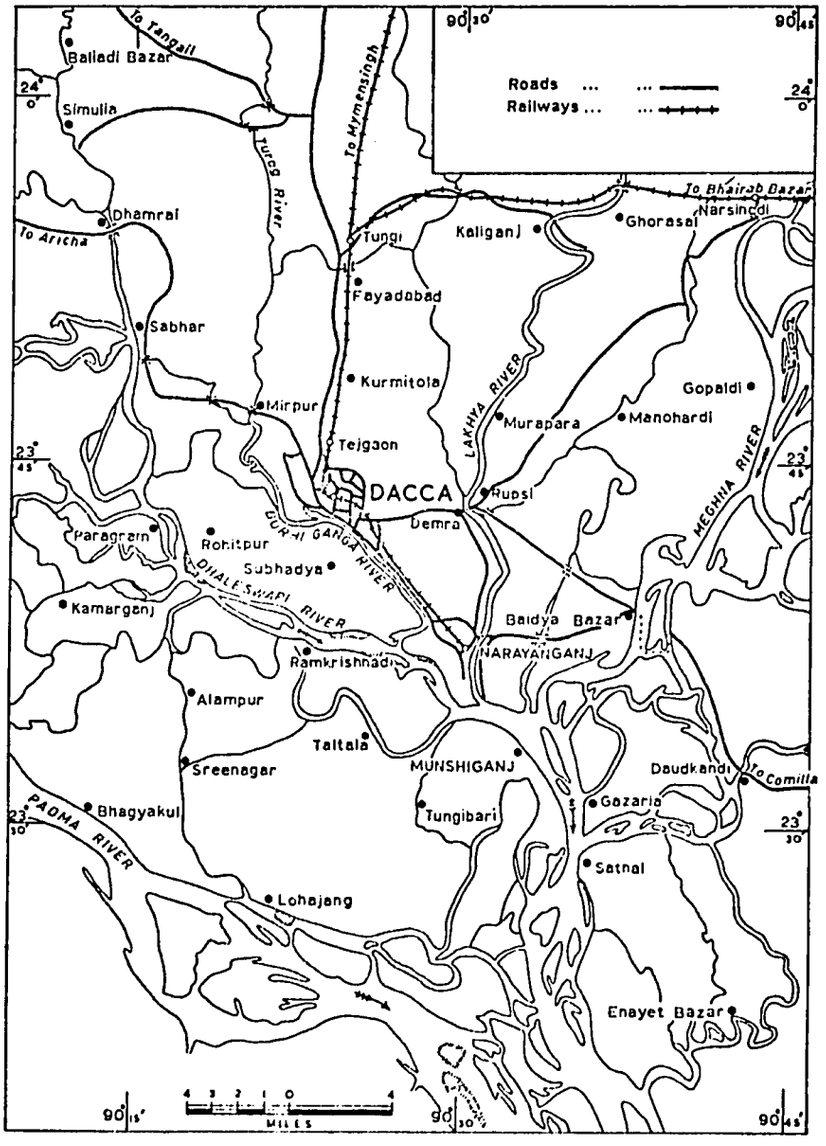


Figure 1. Dacca and environs.

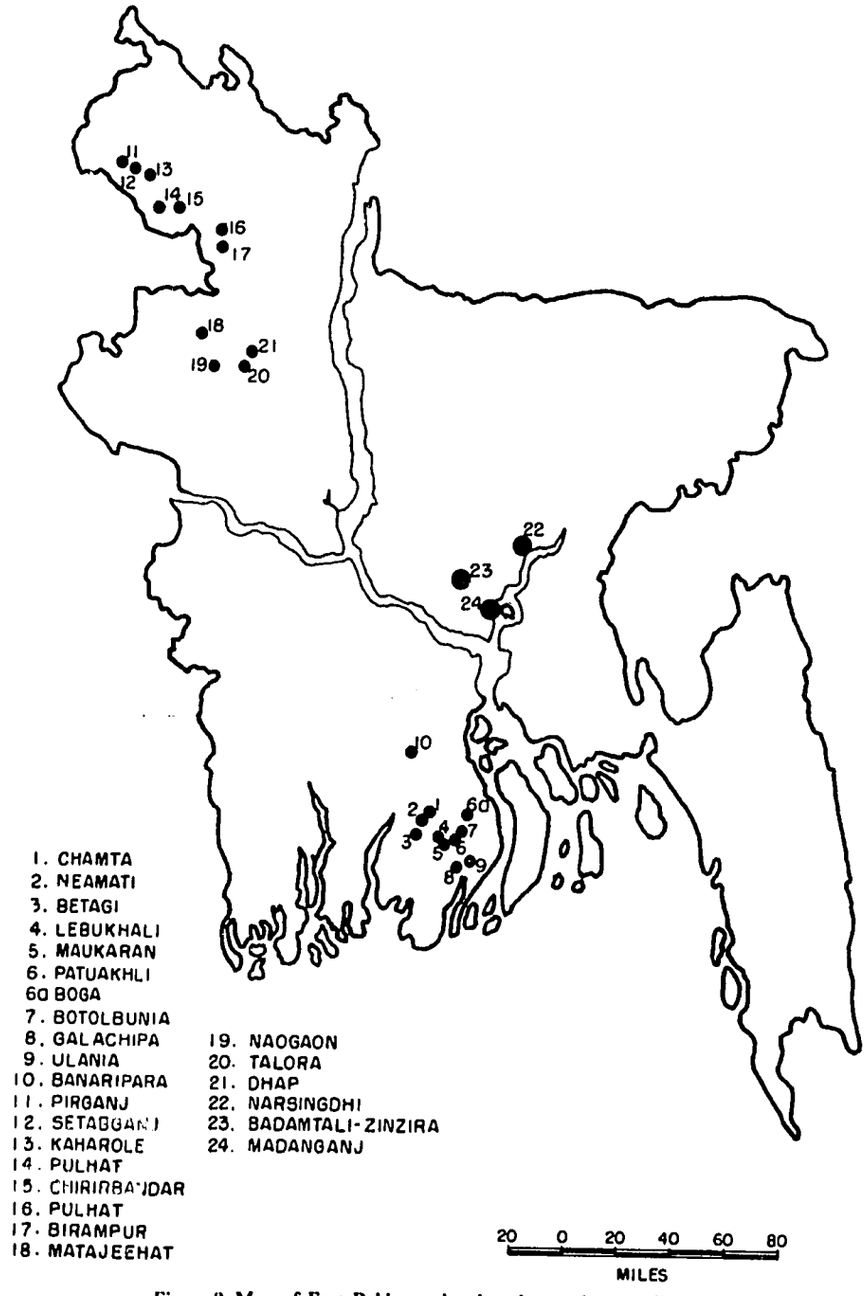


Figure 2. Map of East Pakistan showing the markets studied.

Methods of data collection

The following data were used in this study: (1) prices of rice in the different markets for comparable grades, (2) quantities and sources of rice arrivals in the different markets, (3) quantities and destination of dispatches from the different markets, (4) components of handling and transportation costs, (5) components of processing costs, and (6) relative market shares of different market functionaries.

Secondary sources where available were found to be inconsistent. In addition, the prices reported by the government agencies are not sufficiently grade specific, and most of the prices collected and reported represent gross averaging of several observations prevailing over a period of time in different areas.

To overcome these as well as other data problems, special arrangements for field collection of data were made. One field investigator was appointed in each of the markets selected for study. To ensure uniformity in data collection, all investigators were specially trained. They were instructed to record prices by observing transactions, varieties traded, quantities and sources of arrivals, quantities and destinations of dispatches, and the mode and cost of transportation. These data were collected for each market day from October 1967 to November 1968. The estimates obtained were cross-checked for accuracy and consistency by comparing them with the records kept by market cess collectors (where possible) and also by asking the traders about their estimates. In markets where most shipments were by rail, more accurate dispatch data could be obtained.

Data on processing costs were obtained mostly by discussion with the owners of the establishments. The data available were not large enough to derive a cost function statistically but were adequate for making rough approximations about the overall cost structure of the alternative methods for processing paddy. The same procedures were followed for data on storage.

The price analysis was based on data collected during the 3 rice crop seasons for the year 1967-68. Although the lack of true series data somewhat limited its usefulness, this study tested existing hypotheses by using data that were more grade specific and had been collected under more rigid supervision. Constant supervision, and the fact that the field staff were local people, made them less prone to record data without actual observation.

A significant part of the study relating to market organization has been based on information gathered through direct observation. Traders from different categories in each of the markets studied were personally interviewed in informal discussion.

Chapter II. Production and Consumption of Rice in East Pakistan

Most of the surface of the monsoon-drenched and monotonous plains of East Pakistan are composed of silt loams and sandy clay loams which make the area an ideal place for the cultivation of rice. For centuries,

rice has occupied the dominant position in the economy of this region. Jute, now the main cash crop, was possibly introduced into this area in the early 19th century, although its large-scale cultivation did not start until 1865 (1:75-88).

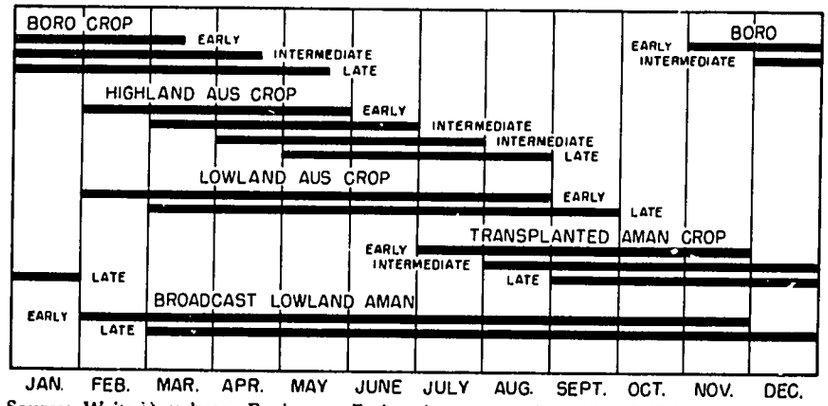
Rice is the dominant commodity in the economy of East Pakistan. About 77% of the crop area in the province is under paddy cultivation which constitutes more than 98% of all food grains produced in this part of Pakistan. Although the value of rice produced comes to more than 30% of all gross domestic product, the per acre yield in East Pakistan is still one of the lowest in the world (49:317-24).

Seasonal Pattern of Production

On the basis of harvest time and growth period, we classify rice cultivation into 3 categories: Aus, Aman, and Boro. The Aus crop has 2 subgroups: the highland Aus and the lowland Aus (Bhadoi). Bhadoi is produced in low-lying areas and has a growing season of about 7 months, beginning February and March. Highland Aus is the more important of the two and has a short growing period of about 3 to 4 months. The total Aus crop covers about 6 million acres and contributes a little less than a quarter of the total rice group.

Cultivation of Aman falls into 2 groups: transplanted Aman and broadcast Aman. About 45% of the total rice plantings are transplanted Aman and, depending on the area, it is planted during June, July, or August and harvested during November, December, and January. Broadcast Aman has a relatively longer growing season of about 10 months. Seeds are sown in February and March and harvested during November and December, except for some early varieties harvested in September. Broadcast Aman covers nearly 5 million acres of low-lying areas in the center of the Delta and constitutes a little more than one-fifth of the Aman crop.

Figure 3. Sowing, growing, and harvest periods of rice, East Pakistan.



Source: Weitz-Hattelsater Engineers. *Food grain storage and handling facilities, East Pakistan,* p. 50. Kansas, U.S.A. Sept. 1964

Boro is a winter crop planted in November and December and harvested by the middle of March or April. Its production is contingent upon the availability of winter irrigation. Figure 3 summarizes the sowing, growing, and harvest periods of the 3 rice crops.

Table 1 and figure 4 summarize the trends in the production of rice in East Pakistan. Although production in 1967-68 was nearly 62% higher than in 1947-48, the vagaries of nature still cause a year-to-year variation in total output. While Aus has steadily increased in production and acreage, Aman and Boro have declined slightly. But in the last 2 decades, there has been little change in the ratio of Aus-Aman-Boro.

Regional Pattern of Production

Table 2 shows the relative position of the different districts in the total provincial production of rice. The 5-year averages show that the districts of Mymensingh, Barisal, Sylhet, Comilla, and Rangpur produce nearly 50% of the total provincial output of rice. Little change has occurred in the last decades in the ratio between the production of the individual districts and the province.

Table 1. **Annual variation in the production of rice East Pakistan, 1947-48 to 1967-68**

Year	Production	Change from previous year	
	million tons	million tons	percent
1947-48	6.7	--	--
1948-49	7.7	+.936	+13.9
1949-50	7.4	-.296	-3.9
1950-51	7.3	-.034	-0.5
1951-52	7.0	+.309	+4.2
1952-53	7.3	+.301	+4.3
1953-54	8.2	+.890	+12.1
1954-55	7.6	-.636	-.7.7
1955-56	6.4	-1.205	-15.9
1956-57	8.2	+1.800	+28.2
1957-58	7.6	-.586	-7.2
1958-59	6.9	-.676	-8.9
1959-60	8.5	+1.560	+22.5
1960-61	9.5	+1.038	+12.2
1961-62	9.5	-.054	-0.6
1962-63	8.7	-.736	-7.8
1963-64	10.4	+1.726	+19.8
1964-65	10.3	-.117	-1.1
1965-66	10.3	-.502	-0.03
1966-67	9.4	-.911	-8.81
1967-68	10.9	+1.506	+16.0

Source: Govt. E. Pakistan, *Agricultural production levels in East Pakistan (1947-1965)*, (Dacca: Bur. Agr. Statis., Dir. Agr. 1966) and Govt. of Pakistan, *Yearbook of agricultural statistics*, (Rawalpindi: Min. Agr. and Works 1969).

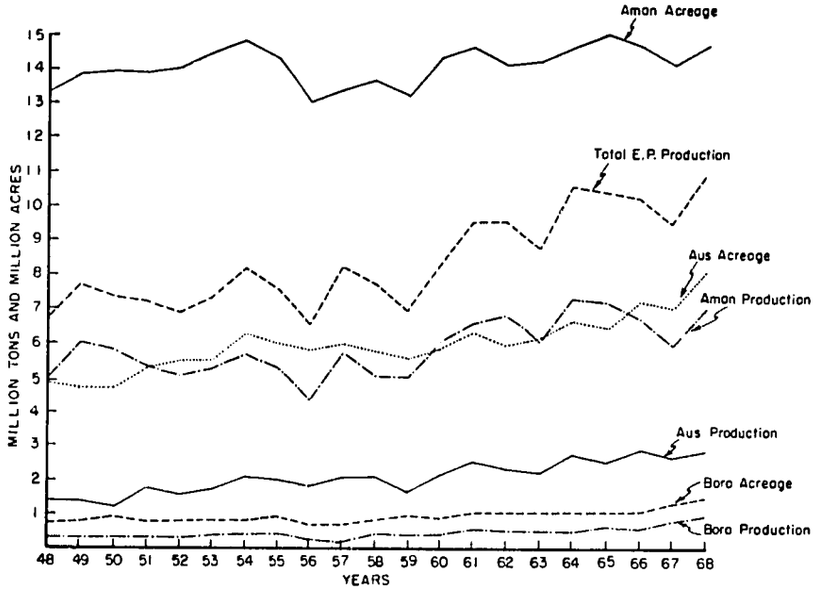


Figure 4. **Trends in the production of rice in East Pakistan, 1947–48, 1967–68.**

Surplus and Deficit Districts

Knowledge about the regional production-consumption balance assumes great importance in a marketing improvement program. Identification of the areas with marketable surplus enables one to determine the possible sources of supplies for the urban consumers. This helps in planning the location of marketing facilities as well as investments in regional transport development.

Table 3 presents the per capita consumption estimate for East Pakistan derived from various cross-sectional studies. Beside the fact that the alternative estimates differ significantly, the size of the samples studied and the methods used raise serious doubts about the accuracy and representativeness of the results.

Table 4 shows estimates of average per capita consumption for the period 1955-56 to 1966-67 based on data on production, imports, exports, and off-take from government stores. Since it does not take into consideration the storage practices of the farmers and traders, this estimate suffers from the deficiencies of the assumption that production in a particular year is consumed within the same year.

Based on the cross-sectional studies of consumption and analysis of the food-balance sheet it was assumed that per capita annual consumption of

Table 2. **Production of rice in the districts in relation to total provincial production**
East Pakistan, 1947-48 to 1967-68

Districts	1947-48 to 1951-52	1952-53 to 1956-57	1957-58 to 1961-62	1962-63 to 1967-68
	percent of total provincial production			
Dacca	6.2	5.1	6.5	5.4
Mymensingh	13.7	13.6	15.1	13.8
Faridpur	6.1	7.0	5.3	4.4
Chittagong	3.9	5.2	4.6	5.2
Chittagong Hill Tract	0.8	0.9	0.9	1.2
Noakhali	3.6	4.1	4.0	4.4
Comilla	7.3	7.7	7.8	7.4
Sylhet	8.6	8.5	8.7	9.3
Rajshahi	6.3	7.1	6.4	6.5
Dinajpur	5.0	4.6	4.1	4.8
Rangpur	6.7	8.2	7.3	8.6
Bogra	4.0	3.5	3.2	3.6
Pabna	3.8	3.2	3.3	2.9
Khulna	7.2	5.7	5.1	5.8
Barisal	9.5	8.8	10.2	10.1
Jessore	5.0	4.8	4.8	4.8
Kushtia	2.3	2.3	2.2	2.3
Total	100.0	100.0	100.0	100.0

Source: Govt. E. Pakistan, *Agricultural production levels in East Pakistan (1947-1965)*, (Dacca: Bur. Agr. Statis., Dir. Agr., 1966) and Govt. Pakistan, *Yearbook of agricultural statistics*, (Rawalpindi: Min. Agr. and Works, 1969).

Table 3. **Daily per capita consumption of foodgrains**
East Pakistan

Survey	Year	Cereals consumed			Total
		Rice	Wheat	Other cereals	
		ounces			ounces
NSS (first round)	1950	—	—	—	18.48
NSS (second round)	1960	16.863	0.609	—	17.47
Ministry of Food and Agriculture	1959-60	—	—	—	18.06
Dacca University	1962-64*	17.93	0.653	0.476	19.06
Dacca University	1962-64†	13.99	0.634	0.234	15.06

Source: Govt. of Pakistan, *National Sample Survey (first round)* (Karachi: Cent. Statis. Off., Manager of Pub. 1959).
Govt. of Pakistan, *National Sample Survey (second round)* (Karachi: Cent. Statis. Off., Manager of Pub. 1960).
Govt. of Pakistan, *Nutrition survey of East Pakistan, March 1962-January 1964* (Min. of Health, published by U.S. Dept. of Health, Educ. and Wel., Nat. Inst. of Health, Bethesda, Md.)

*Rural locations.
†Urban locations.

rice in East Pakistan is 0.16 ton and that there are no differences in the consumption level between the districts. Any district with a per capita annual production higher than this amount has a marketable surplus and is a source of outward rice movement.

Table 5 shows that the districts of Barisal, Rangpur, Sylhet, Rajshahi, Khulna, Jessore, Dinajpur, Bogra, and Chittagong Hill Tracts had marketable surpluses of rice during all the three 5-year periods analyzed. The districts of Dacca, Comilla, Chittagong, Noakhali, and Pabna have been suffering an adverse production-consumption balance all through these years.

To examine the future trend in the districts' marketable surpluses, some simple projections of the production-consumption balances for 1970 and 1975 were made. In this analysis it was assumed that during 1970 and 1975 per capita consumption in East Pakistan will be approximately 3.8 percent and 5 percent higher, respectively, than 0.16 ton.[2] Table 6 presents the results of the analysis.

The analysis of the district-level production-consumption balance reveals that most of the province's marketed surplus is from the northern districts of Rangpur, Dinajpur, Rajshahi, Sylhet, and Mymensingh, and the southern district of Barisal. These areas, particularly those in the northwestern

[2]In the absence of reliable estimates of various elasticities needed for projection, this net quantity increase was assumed to represent the results of aggregate changes in income and other related variables.

Table 4. **Per capita net supply of rice**
East Pakistan, 1955-56 to 1966-67

Year	Net supply	Per capita consumption
	million tons	**tons**
1955-56	5.79	.132
1956-57	7.76	.173
1957-58	7.07	.154
1958-59	6.61	.141
1959-60	8.14	.169
1960-61	8.77	.178
1961-62	8.76	.173
1962-63	8.36	.149
1963-64	9.53	.179
1964-65	9.42	.172
1965-66	9.52	.171
1966-67	8.95	.155
Average	8.22	.162

Notes: (a) Net supply = carried-over government stock + local procurement + imports + supply from domestic production.
Supply from domestic production = 1/9 (total domestic production) — government procurement.
(b) 89% of total population assumed to be effective consumption units.
(c) Data on government stock, procurement + imports taken from Food Department.

sector, also have relatively lower densities of population and therefore a better man–land ratio. Thus it is possible that new technologies will show more rapid progress there; consequently increasing the marketable surplus more rapidly. This potential for increase indicates that these districts will continue to play the role of suppliers of rice and paddy to the urban and semi-urban areas situated in the densely populated Padma-Meghna basin. If through rapid innovation and diffusion of technologies, the deficit areas do become self-sufficient in rice production, these districts then can form a core of export supplies, since some of the finest strains of rice are produced there. This suggests that, commensurate with the needs of these different regions, steps should be taken to evolve an integrated plan for investment in the development of marketing services and facilities, particularly processing, storage, and transportation in these districts.

Interregional Shipping Pattern

Knowledge of shipping patterns is advantageous for several reasons. First, by studying the geographic pattern of distribution, the relative importance of the different supply areas to the centers of demand becomes apparent and can aid in planning the location of marketing facilities. Second, uneconomic trade routes cause excessive transportation costs, which result in higher marketing margins and waste. The reasons and remedies for any uneconomic or circuitous trade routes should be explored. Third,

Table 5. **Per capita average annual production**
East Pakistan, 17 districts, 1952-53 to 1966-67

District	1952-53 to 1956-57	1957-58 to 1961-62	1962-63 to 1966-67
		tons	
Mymensingh	.154	.172 +	.175 +
Dacca	.083 -	.107 -	.079 -
Comilla	.136 -	.133	.126 -
Barisal	.164 +	.185 +	.177 +
Rangpur	.191 +	.169 +	.194 +
Sylhet	.173 +	.178 +	.185 -
Faridpur	.175 +	.134 -	.107 -
Chittagong	.159 -	.106 -	.115 -
Rajshahi	.217 +	.195 +	.192 +
Khulna	.182 +	.163 +	.176 +
Noakhali	.120	.119 -	.125 -
Jessore	.187 +	.188 +	.178 +
Pabna	.139	.141 -	.123
Dinajpur	.223 +	.199 +	.227 +
Bogra	.175 +	.163 -	.174 +
Kushtia	.174 +	.157 -	.164 +
Chittagong Hill Tract	.191 +	.211 +	.252 +

Notes: (a) Estimates of district population derived from Planning Commission's estimate of provincial population. Assumed that ratio of district and provincial population prevailing in 1951 remains unchanged during years of analysis.
(b) Assumed that per capita consumption is 0.16 ton and same for all districts.

underdeveloped countries tend to restrict and alter normal pattern of commodity movement in the name of improving marketing efficiency. Unless the natural forces responsible for certain patterns of shipment in the traditional system are heeded, government policies may create serious marketing problems at the consuming as well as the producing centers.

An analysis of the existing pattern of interregional transfer of rice and paddy serves to identify the geographic direction and magnitude of the major movements and relate them to the production–consumption characteristics of the different regions and to evaluate the present pattern in terms of economic and physical efficiency.

In the previous sections we have grouped the various districts according to the production consumption balance and identified the surplus and deficit districts. To study the shipping patterns between these districts empirically, arrival and dispatch data were collected from several markets for the crop year, 1967-68. The markets at Badamtali and Zinzira catering to the needs of metropolitan Dacca, the market at Madanganj supplying the industrial and commercial city of Narayanganj, and the market at Narsingdhi supplying the semiurban, semicommercial population of the northern regions of the district were selected for the collection of arrival and dispatch data. In addition to these, the 5 biggest dispatching markets in the district of Dinajpur, one each at Bogra and Rajshahi, and 2 large

Table 6. **Production-consumption balance for rice**
East Pakistan, 17 Districts, 1970 and 1975

District	1970			1975		
	Population	Production	Population/production	Population	Production	Population/production
	millions	million tons	tons	millions	million tons	tons
Mymensingh	9.61	1.71+	.200	11.08	2.02+	.204
Dacca	6.74	.62−	.103	7.77	.70−	.101
Comilla	6.17	.85−	.154	7.12	99−	.156
Barisal	6.03	1.11+	.206	6.96	1.38+	.222
Rangpur	4.70	.86+	.205	5.42	1.00	.207
Sylhet	5.33	.97	.204	6.15	1.13	.206
Faridpur	4.35	.50−	.129	5.01	.53−	.118
Chittagong	4.77	.52−	.122	5.50	.61−	.124
Rajshahi	3.68	.73	.22	4.12	.85+	.231
Khulna	3.44	.39−	.127	3.96	.38−	.107
Noakhali	3.72	.46−	.138	4.28	.54−	.141
Jessore	2.80	.48+	.192	3.23	.54	.188
Pabna	2.52	.30−	.133	2.91	.33−	.127
Dinajpur	2.24	.40	.201	2.59	.44	.190
Bogra	2.17	.27−	.139	2.50	.29−	.130
Kushtia	1.47	.24	.183	1.69	.27−	.180
Chittagong H.T.	.49	.10	.229	.56	.12	.240

Notes: (a) Production estimates derived from trend of population 1955-56 to 1963-64 and adjusted for seed, feed, waste, etc.
(b) Estimates of population derived as discussed in text.

and 7 smaller ones in the district of Barisal, were intensively studied for dispatch patterns. Interviews with the traders at the other two big urban centers, Chittagong and Khulna, were used to make some overall assessments of their sources of supply. The conclusions drawn are based on data collected to determine the movement patterns of rice in East Pakistan. The data are presented in the Appendix I tables.

On the basis of the detailed study of the markets in North Bengal and Barisal, as well as careful observation of the markets in other nonsurvey areas, we can identify the following rice movement patterns:

a. The south and southeast flow of rice from the areas in the Teesta Tract, which includes the northern part of Dinajpur district, Rangpur district, and East Bogra.
b. South and southeast flow of rice from the Barind Tract, which includes the southern section of Dinajpur, West Bogra, Naogaon, and Nowabganj subdivision of Rajshahi district.
c. North, northeast, and northwest flow of rice from the Barisal district and Satkhira, Bagherhat areas in the Coastal Saline Tract.
d. South flow of rice and paddy from the Comilla, Sylhet, and Mymensingh districts in the Brahmaputra Alluvium.

From the markets in the area described under (a), rice moves to all the important consuming centers such as Dacca, Khulna, and Chittagong. Dispatches to the markets in the areas east of the Ganges are most important. Nearly 40% of the supplies for metropolitan Dacca come from the markets in this region. Some of the produce from here also goes southward into the deficit areas of Pabna, Iswardi, Chuadanga, Kushtia, and Faridpur.

The important markets under classification (b) are situated on the broad-gauge railway tract, and most of their dispatches go to the deficit areas connected by this railway track, namely Pabna, Iswardi, Kushtia, and Faridpur. A small portion of its supplies are also sent to markets east of Jamuna, namely Dacca, Chittagong, and Noakhali.

The existing facilities for transportation have influenced the distribution pattern from the markets in regions (a) and (b). In the former area, the markets lie mostly on metre-gauge railway track (except for some part of Rangpur) and hence distribute mainly to the areas accessible by this type or railway to avoid costly, time-consuming transshipments. The market at Naogaon, however, is situated at the junction of the two types of railway tracks and, therefore its distribution areas stretch to the south as well as the east. The markets in Kahaloo and Talora in the Bogra district supply the areas east of the Ganges almost exclusively.

From the Coastal Saline Tract comes the most powerful and significant flow of rice to the north. The markets at Patuakhali and Pirojpur subdivisions supply nearly 60% of the need for metropolitan Dacca and 80% for the industrial and commercial population along the river Lakhya. Supplies from these areas reach as far north as Narsingdhi. Some part of this supply goes to the deficit district in Faridpur and a substantial por-

tion goes to the riverport at Chandpur to meet the industrial and commercial demand there. The other part of this flow is from the rice-producing areas in the Satkhira-Bagherhat region of Khulna district. This caters largely to the need for urban areas in Khulna and bordering areas in the Faridpur district.

Between the Satkhira–Bagherhat region and the northern Pirojpur region there are some counterflows. Large quantities of paddy from the areas in south Khulna come into the north Pirojpur areas where they are handled by the huge rice-processing industry. Only a portion returns to Khulna as clean rice.

The movement of rice from the districts of Mymensingh, Sylhet, and Comilla is unusual. Although in the aggregate, Comilla district is a net "importer," some of its northern and western regions are excellent rice-growing areas. Rice supplies from this area come in significant quantities into the Narsingdhi market in the Dacca district and account for about 5-6% of the supplies at metropolitan Dacca. There is also a flow of paddy into the milling centers at Chittagong as well as Madanganj in the Dacca district.

The rice flows from Sylhet and Mymensingh districts are important sources of supply for the northern areas of the Dacca district. Supplies from these two places are negligible as far as the Dacca city is concerned, but about 5% of those at Madanganj come from Sylhet district. A large part supplies the urban needs of Chittagong city and its suburbs. Some of the paddy supply from Mymensingh (possibly the Shail crop) and Sylhet finds its way into the processing markets at Banaripara, Mirerhat, and Satla.

The most important point of the previous analysis is the economic efficiency of the shipping pattern in the traditional marketing system. The interregional movements are fully consistent with the existing methods and facilities of transportation as well as the dictates of the topography. Efforts to alter the shipping pattern through "cordoning and zoning" by public policymakers may well prove to be factors inhibiting the development of an optimum trade-route plan as well as encouraging wastes in the process of interregional commodity movements.

Chapter III. Organization of the Marketing System

Government intervention in rice marketing in Bengal began in 1938. Subsequently, the government has imposed various regulations, such as periodic price controls, inter-district embargo on rice movements, government ration shops, government control over rice processing, and government procurement (16). At the time of partition of the Indo-Pakistan subcontinent, the East Pakistan government inherited the Bengal Food Department rice restrictions, including rationing, and decided to retain them as measures of assuring fair prices for rice to both consumers and producers. Since then the government has been actively involved in the marketing of rice in the province.

Public Sector: Organization and Operation

It is usually believed that since the public sector handles only about 4% to 5% of the total net supply of rice, its effect on the marketing system should not be of any consequence. However, more careful study of the issue will show that although the government's share in the total supply is small, in effect it handles from 40-50% of all rice in the marketing channels (table 7). The calculations were based on the following assumptions:

a. The aggregate marketed surplus for rice in East Pakistan is 10% of the total production (50, 25) after allowing one-ninth for seed, feed, and waste.[3]

b. Public sector's share of the marketing system during a particular year is equal to the quantity imported during the year, quantities procured from local production, and carryover stock from previous years.

c. Total aggregate quantities of rice moving through the marketing channels are defined to be the sum of quantities as calculated by (a) and (b) above.

Marketing practices of the public sector

In addition to the government's monopoly right to import rice from West Pakistan and exporting countries, the government procures rice and paddy at specified prices from farmers. The procurement is done on a compulsory basis as an anti-smuggling measure and also on a voluntary basis. Theoretically, anybody can sell rice to the government at a price specified by the government, thus presumably giving price support to the

[3]This proportion is used by the Planning Commission of Pakistan.

Table 7. **Relative shares of public and private sectors in the total quantity of rice entering into marketing channels**
East Pakistan, 1956-57 to 1966-67

Year	Quantity in whole marketing system			Share of public sector
	Public	Private	Total	
	million tons			percent
1955-56	.181	727	.908	19.9
1956-57	.633	.671	1.304	48.5
1957-58	.768	.615	1.383	55.5
1958-59	.892	.754	1.646	54.19
1959-60	.831	.846	1.677	49.55
1960-61	.728	.841	1.569	46.39
1961-62	.620	.776	1.396	44.4
1962-63	.775	.929	1.704	45.48
1963-64	.627	.919	1.546	40.55
1964-65	.430	.909	1.339	32.11
1965-66	.669	.913	1.582	42.28
1966-67	.675	.844	1.519	44.43

Source: See text for method of derivation.

producers. Usually all areas within 5 miles of the international border come under the jurisdiction of compulsory procurement, where all rice produced must be sold to the government agents after the producer removes a portion for food, seed, and feed. Table 8 shows the volume of rice procured by the government and the prices paid. Data on the proportion of voluntary and compulsory procurements could not be obtained. However, the area under the compulsory procurements zone along the border represents over 10% of the total area of the province, in addition to encompassing the districts with the maximum per capita production and as such, marketable surplus.

The government-owned rice and other food grains are not usually sold in the open market but are distributed through ration shops, which are run by government-employed, commissioned agents. Consumers are given quotas against which these ration shops supply rice to the bona fide ration card holders. The imports and the quantities locally procured are stored in government-owned and -rented godowns all over the province. During

Table 8. **Volume of rice procured by the government and prices paid**
East Pakistan, 1947-48 to 1967-68

Year	Procurement	Prices paid			
		Milled medium	Milled coarse	Dhenki coarse	Paddy
	million tons	**rupees per maund**			
1947-48	.081	–†	–†	–†	–†
1948-49	.122	–†	–†	–†	–†
1949-50	.009	–†	–†	–†	–†
1950-51	.019	12.50	12.00	–†	7.50
1951-52	.015	12.50	12.00	–†	7.50
1952-53	.026	14.00	13.50	–†	8.50
1953-54	.125	14.00	13.50	–†	8.50
1954-55	–	–†	–†	–†	–†
1955-56	–	–†	–†	–†	–†
1956-57	.003	18.12‡	17.75‡	–†	11.00‡
1957-58	.033	19.50‡	19.15‡	19.00‡	12.00‡
1958-59	.197	19.69	19.31	19.00	12.00
1959-60	.024	19.69	19.31	19.31	12.00
1960-61	.027	19.69	19.31	19.31	12.00
1961-62	.010	19.69	19.31	19.31	12.00
1962-63	.004	21.19	20.81	20.81	13.00
1963-64	.123	22.55‡	22.12‡	22.55‡	13.50‡
1964-65	.013	21.10‡	21.34‡	–†	12.75‡
1965-66	.093	22.10‡	21.70‡	–†	13.50‡
1966-67	.000	27.02‡	26.96‡	–†	16.25‡
1967-68	.000	28.00‡	27.90‡	–†	17.50‡

* Milled rice equivalent.

† Not available.

‡ Average of quoted prices.

Source: Govt. Pakistan, *Yearbook of Agricultural Statistics* (Rawalpindi: Min. Agr. and Works, Food Dept., 1969), p. 128. Weitz-Hettelsatter Engineers, *Food grain storage and handling facilities in East Pakistan* (Kansas City: Econ. and Eng. Study).

1963-64 it had storage spaces for approximately 0.768 million tons of food grains in its 287 local storage depots, 10 big central storage depots, and some other rented private godowns (56: Chap. VI).

The whole range of marketing functions, namely, acquisition, storage, and distribution are done under the supervision of the Food Department, Government of East Pakistan, at an annual approximate expenditure of nearly 44 million rupees.[4]

Pricing and distribution by the public sector

Most of the imports through the Chittagong port are distributed through ration shops in Dacca, Narayanganj, Chittagong, and other areas east of the river Jamuna, while nearly 80% of the imports enter through the Chalna river port and are distributed to the area lying in the western region of the province. The price for government-distributed rice is the same in all locations, which shows that the pricing policy does not take

[4]Figures related to 1961-62. Excludes cost of grain and ocean freight. One rupee equals approximately 0.21 dollar.

Table 9. **Procurement, controlled, and market prices of medium quality rice** 1947-48 to 1967-68

Year	Procurement	Controlled	Wholesale			
			Dacca	Chittagong	Sylhet	Dinajpur
	rupees per maund					
1947-48 . . .	N.A.	20.50	N.A.	N.A.	N.A.	N.A.
1948-49 . . .	N.A.	21.04	N.A.	N.A.	N.A.	N.A.
1949-50 . . .	N.A.	20.50	N.A.	N.A.	N.A.	N.A.
1950-51 . . .	12.50	20.00	N.A.	N.A.	N.A.	N.A.
1951-52 . . .	12.50	20.00	25.25	22.25	N.A.	N.A.
1952-53 . . .	14.00	20.50	24.78	23.75	N.A.	N.A.
1953-54 . . .	14.00	21.20	17.98	20.44	N.A.	N.A.
1954-55 . . .	N.A.	21.25	13.27	14.81	N.A.	N.A.
1955-56 . .	N.A.	17.83	20.94	24.37	N.A.	N.A.
1956-57 . .	18.12	20.50	20.00	30.81	35.38	N.A.
1957-58 . . .	19.50	21.46	23.56	25.00	25.80	28.17
1958-59 . . .	19.69	22.50	30.50	24.14	23.90	24.90
1959-60 . . .	19.69	22.50	32.03	26.44	N.A.	26.74
1960-61 . . .	19.69	23.33	29.60	25.62	27.72	23.74
1961-62 .	19.69	23.75	30.58	23.63	26.16	26.58
1962-63 . .	21.19	23.75	31.46	26.97	24.16	27.75
1963-64 . .	22.55	23.75	27.89	26.99	28.61	25.19
1964-65 . . .	21.32	25.00	29.50	26.55	25.15	25.57
1965-66 . . .	22.10	26.40	33.53	31.36	25.80	20.15
1966-67 . . .	27.02	29.00	39.31	42.13	29.71	38.69
1967-68 . . .	28.00	30.80	41.29	36.12	N.A.	36.65

N.A. = Not available.

Source: Govt. Pakistan, *20 years of Pakistan statistics, 1947-48* (Karachi: Cent. Statis. Off., 1968). Govt. Pakistan, *Yearbook of agricultural statistics* (Rawalpindi: Min. Food and Agr., 1969).

Table 10. **Quantity of rice handled by the public sector, East Pakistan, 1955-56 to 1966-67**

Year	Opening balance	Local procurement	Imports	Total govt. supply	Distribution	Closing balance	Distrib. as % of govt. supply	Imports as % of govt. supply	Procurement as % of govt. supply	Carryover stocks as % of govt. supply
	million tons						percent			
1955-56	.100	.000	.081	.181	.117	.064	64.6	44.75	0	55.25
1956-57	.064	.033	.536	.633	.488	.145	77.1	84.7	5.2	10.00
1957-58	.145	.033	.590	.768	.361	.407	47.0	76.8	4.3	18.9
1958-59	.407	.197	.288	.892	.464	.428	52.0	32.3	22.1	45.6
1959-60	.428	.024	.379	.831	.596	.235	39 4	45.6	2.9	51.5
1960-61	.210	.027	.491	728	.308	.404	42.3	67.4	3.7	28.9
1961-62	.404	.010	.206	.620	.349	.229	56.3	33.2	1.6	65.2
1962-63	.229	.004	.542	.775	.597	.159	77.0	69.9	0.6	29.5
1963-64	.159	.123	.345	.627	.240	.322	38.3	55.0	19.6	25.4
1964-65	.322	.013	.095	.430	.234	.196	54.4	22.1	3.0	74.9
1965-66	.196	.093	.380	.669	.425	.244	63.5	56.8	13.9	29.3
1966-67	.244	.000	.431	.675	.567	.108	84.0	63.9	0	36.1
Average	.242	.045	.364	.652	.396		60.73	55.8	6.9	37.11

Source: Food Department, Government of East Pakistan.

into account the variation of transportation cost between different areas.

Table 9 shows the 3 prices of rice prevailing in the province: the procurement price, the controlled price, and the market price. The limited data make it difficult to estimate the effect of government procurement price and distribution price on the free market price of rice in the urban and producing areas. However, table 9 shows certain aspects of government price policy that deserve attention. The procurement prices are always lower than the average free-market price. Since most of the procurement zones are also areas in the districts producing surplus rice, the effect of this pricing policy on production and resource allocation may be quite significant. On the other hand, procurement from border zones at an inequitable price may fail as an anti-smuggling measure and may in reality be an incentive for smuggling and smugglers. Another important fact is that the market prices at Dacca are substantially higher than those prevailing in Chittagong. This leads one to ponder the effect that government-controlled price has on the prices in Dacca, where the largest distribution center of government food grains is still located.

Table 10 gives the total supply-distribution balance sheet of the public sector for the last decade. For this whole period, internal procurement constituted only about 7% of total government-held supplies of rice, while imports accounted for nearly 56% of each year's supply. The highest quantity of rice ever procured internally in 1 year was 0.197 million tons, which was nearly 22% of that year's government stocks (1958-59 crop season). The highest quantity of rice imported in 1 year was about 59 million tons and constituted nearly 77% of the total rice stocks with the govern-

Table 11. **Pattern of monthly off-take on rice from government stores East Pakistan, 1960-61 to 1963-64**

Month	1960-61		1961-62		1962-63		1963-64		Average	
	Quantity	Percent	Quantity	Percent	Quantity	Percent	Quantity	Percent	Quantity	Percent
	thousand tons									
July	81	26.3	37	10.6	49	8.2	46	19.2	53	14.2
August	40	13.0	31	8.9	40	6.7	34	14.2	36	9.6
September	22	7.2	38	10.9	50	8.4	32	13.3	35	9.4
October	14	4.9	45	12.9	62	10.4	38	15.8	40	10.7
November	10	3.25	23	6.6	54	9.1	23	9.6	27	7.2
December	6	1.94	8	2.3	28	4.7	9	3.8	13	3.5
January	6	1.94	7	2.0	32	5.4	9	3.8	13	3.5
February	2	.64	11	3.2	37	6.2	9	3.8	17	4.5
March	11	3.57	19	5.4	58	9.7	7	2.9	24	6.4
April	15	4.87	26	7.4	57	9.5	6	2.5	26	7.0
May	34	11.03	43	12.3	59	9.9	12	5.0	37	9.9
June	61	19.80	61	17.5	71	11.9	15	6.3	52	13.9
Total	308		349		597		240		374	

Source: Govt. E. Pakistan, Food Dept., *Food grain balance*. E. Pakistan Plan. Bd., Agr. Plan. Group. Mar. 1965. (Mimeo).

ment during the year 1956-57. However, that was the year of devastating floods in East Pakistan.

Table 11 shows the pattern of monthly offtake of rice from government-held stocks based on the data for the 4 years from 1960-61 to 1963-64. The average shows that distribution reaches its highest peak around the months of June and July and is at its lowest level during the months of December, January, and February. This pattern seems consistent with the rice crop seasons in the province.

Private Sector: Organization and Operation

In contrast to the structure of the public sector, the private sector is a decentralized conglomeration of a large number of institutions, each performing a variety of functions in the marketing process. It is a complex process with significant intra- and inter-regional variations, a factor nullifying efforts at broad generalizations.

Institutional classification of the rice-marketing system

A survey shows that the average distance between market place and farmyard is 1.8 mile (25, table 15). These markets, of course, vary in size and operation depending on the area in which they are situated. Most of the village markets are periodic, while some of the larger semiurban and urban markets are open 6 days a week.

The markets in the district of Barisal differ significantly from those in the northern districts in that they are river based. Transactions take place entirely on the boats where purchases are weighed and transferred to the purchasers' boats for shipment. In these markets, headloads and boats are the most common and often the only means of transportation. But in the markets of the northern districts, headloads and carts usually serve for arrivals, whereas trains, trucks, or carts are used for dispatches. The smaller rural markets have no storage facilities.

The markets in the northern districts mostly follow the standard measures of 80 tolas to a seer and 40 seers to a maund.[5] Lack of standardization of weights and measures increases as one moves further south in the Barisal region.

The first link in the marketing chain is, of course, the farmer who sells his commodities either in his home or at the nearest "hat." After the farmer–marketer, Beparis and Farias, essentially traders or itinerant merchants, are the basic institution in the marketing system. The intermediaries, called Dalals and Aratdars, are primarily brokers and charge a fixed brokerage fee and a commission from the transacting parties. The Dalals usually connote a petty broker, while the Aratdars are treated as large brokers offering a variety of services ranging from storage facilities to short-term financing. Aratdars and Dalals may operate in the same market and may even cooperate on sales. Aratdars are the more numerous in the big urban, semi-urban, and intermediate markets, while the Dalals are domi-

[5] One maund is approximately 82.286 pounds. One tola is approximately 0.0257 pound.

nant in the smaller interior markets and possibly in some medium-sized distribution centers.

Although the government requires licensing of all rice traders, the total number in government records is not an actual representation because a large number of unlicensed small traders also operate i. he various markets. A 1967-1968 survey indicated 90 Aratdars in 15 markets, 1075 Dalals and 3800 Beparis and Farias, the latter being the more frequent (table 12).

Almost all the rice that enters into the marketing channels is processed mechanically. The large millers usually buy paddy and sell the husked rice directly to the Aratdars or Beparies in the urban terminal markets. The smaller, village millers usually do custom husking and seldom engage in the same type of buying and selling practices as the large millers. The Kutials usually buy paddy and after having it processed at the small commercial huskers, sell it to the local Aratdars or Beparies.

Functional classification of the rice-marketing system

Functions involving the transfer of title

A survey shows that in East Pakistan an average 25% of the paddy and rice sales occur at the farmyard (25:51). The growers account for about 80% of the total assemblage in the small village "hats" and the Farias and Beparies, the rest. In such markets the "Bideshi" Bepari (trader from outside) makes purchases from the local traders and growers for shipment to the higher tier of markets. The Dalals play a key role here in establishing contact between the buyers and sellers. In most villages and some intermediate markets, the purchase and sale of paddy assumes a circular pattern. Some local Farias buy paddy on one market day, get it dehusked, and

Table 12. **Number of market functionaries classified by professional names**
15 markets, East Pakistan, 1967-68

Market	Professional name				Remarks
	Bepari	Faria	Dalal	Aratdar	
Badamtali	175	450	none	12	Large urban
Zinzira	175	450	none	8	wholesale markets
Narsingdhi	150	300	none	16	in Dacca district
Banaripara	250	N.A.	150	15	Secondary distri-
Patuakhali	145	N.A.	100	5	bution markets
Bogabandar	145	N.A.	100	5	(large) in Barisal
Lebukhali	125	N.A.	250	none	Small village
Maukaran	100	N.A.	200	none	markets in Barisal
Talora	80	140	N.A.	6	Secondary distri-
Phulbari	100	196	N.A.	5	bution markets
Birampur	150	190	N.A.	8	(large) in
Pirganj	50	75	N.A.	10	North Bengal
Dhap	20	70	120	none	Small village
Kaharole	7	90	85	none	markets in
Matajechat	7	50	70	none	North Bengal

Source: Data collected by field staff during 1967-68 survey.

sell it on the next market day, using the sales proceeds for the purchase of another supply of paddy.

Once the product moves to a larger distribution market, the buying and selling methods become substantially different from those prevailing in the village markets. The larger intermediate markets are dominated by Aratdars. The "Bideshi" Beparies come to the Aratdars' premises and place an order for the quantity of rice they want to purchase. The Aratdars then assume all responsibility for the supply purchase and also for the comfort of the Beparies. While the purchasers rest, the employees of the Aratdars shop for them. Unless there is a very heavy indent, most of the purchases are usually made on the premises of the Aratdars. The sellers, who are usually Farias, Beparies, or farmers, bring small samples of their products in wicker containers. The Aratdars display the samples of rice they are willing to buy. Usually the sellers shop different "arats" to appraise the market price. Once a deal has been settled, the sellers bring the produce inside the "arat" where it is weighed, sewed, and sacked by the staff of the Aratdars.

After the purchase, the Aratdars make arrangements for dispatch, which includes transport to the railway station or the boat pier, loading, and completing the paper work. The Aratdars will keep the purchase in their stores without charge if there is no transportation available. For these services the Aratdars usually charge a commission of 0.50 rupee per maund from the purchasers and 0.25 rupee from the sellers.

The wholesale terminal markets in the urban centers are more Aratdar-centered than the intermediate ones. In the intermediate markets it is possible that a small incoming trader will buy directly from another small trader who has an establishment on the market. However, there are no direct sales and purchases in the wholesale markets at Dacca, Madanganj, Narsingdhi, Chittagong, and Khulna. In these and other such terminal markets the Aratdars are the sales agents and stockmen of the Beparies. Retailers from the consuming centers make their purchases from the Aratdars, who charge a commission of 0.50 rupee per maund from the seller and 0.25 rupee from the purchaser (retailer).

The institution of the "Aratdari" seems to be an age-old one. Most of the Aratdars have been engaged in this business for decades, and at present are a vital link in the marketing chain. In recent times the Aratdars have diversified their business by also dealing in rice trading for themselves. They get supplies from interior markets by sending a request to fellow Aratdars there. Their own purchases and sales seem as important as those they make as commissioned agents.

There is no doubt that the working relationship between the traders and the Aratdars has shown remarkable stability over the decades and that it is deeply ingrained in the institutional framework of the marketing system. The belief that such functional intermediaries are superfluous and thrive at the cost of traders and consumers does not appear to be realistic.

The Beparies and Aratdars seem remarkably trustful of one another. Beparies believe that the Aratdars will always try to give them the best

deal; paradoxically, so do the other parties that deal through the Aratdar. Success lies in the intelligent manipulation of both and not in exploitation. This is due to several factors. First, the inadequacy of the primary and secondary market storage facilities would make it difficult for the Beparies to stockpile their purchases while preparing them for dispatch. The Aratdars provide a convenient place for this purpose and even assure that if transportation is delayed, the purchases will have shelter. Second, the Beparies feel that they could not move with security in the unfamiliar markets because they must carry large sums of money. Third, the Beparies feel that Aratdars know the local traders and market conditions better and thus can get them a better deal. Fourth, the Aratdars often finance their clients' purchases if required. Finally, the Beparies enjoy the hospitality offered by the Aratdars after traveling to the market. Since the traders depend upon the Aratdars so heavily, they are willing to pay anywhere between 1.5% to 2.5% of the gross value of their sales and (or) purchases in commission to the Aratdars.

Functions involving the physical handling and movement of the product

Processing. Kutials are possibly the most important functionaries of the 2 early stages of processing, namely, parboiling and drying. These landless laborers or small landholders buy paddy from the market and parboil and dry them in their own yards. Usually parboiling is done through the night (particularly during the peak of the season) or during the late daytime hours. The next day it is sundried and taken to the rice huskers. While some Kutials acquire ownership of the commodity and thus earn all profits accruing from the transaction, others contract with paddy-cum-rice merchants for fixed allowances.

The large rice mills integrate these 3 stages of rice processing (except for those in Sylhet and Chittagong where consumers prefer to skip the first two). Rice millers purchase paddy and after processing it they sell it to the wholesalers at the terminal markets. Recently the number who use small machines for custom-husking has grown rapidly. Many, however, do this, as well as purchase paddy and sell the processed rice. However, they do not have the same equipment for parboiling as the millers have.

Homepounding as a method of husking is becoming obsolete. The proportion of rice husked by homepounding that is on the market has become negligible. Possibly not more than 10% of all the rice consumed is homepounded; this process is limited to small farmers with subsistence landholdings or landless laborers.

Transportation. Internal movement of bulky agricultural commodities in East Pakistan is mostly accomplished by waterways, railways, and roads. During 1967-68 Pakistan Eastern Railways had a total of 1776 route miles and a cargo capacity of 1 million "ton miles" (23, table 4). About 560 miles of this are broad gauge, 1196 miles metre gauge, and 20 miles narrow gauge. This diversity in track size necessitates transshipment from one gauge to another and does not allow the pooling of rolling stock for optimum use. The total, estimated, all-weather, metalled road mileage in

1967-68 was about 2304 miles (23, table 4). Waterways are still the dominant and sometimes only means of traffic for a large section of the country, with an estimated mileage in 1965 of nearly 5000 miles (1:254). While nonmechanized country boats are by far the most common carrier on the waterways, mechanized boats or launches and some big steamers are also used. The Inland Water Transport Authority estimates the total number of boats to be around 300,000.

Some sources point out that nonmechanically propelled country boats carry about 12.5 million tons of freight annually, while the mechanically propelled crafts carry about 2.5 million tons (1:251). During 1963-64 Pakistan Eastern Railways carried a total of 7 million tons of freight (29, table 7.1). The waterways therefore handle more than double the freight carried by the railways. With the exception of country boats, which transport it in bulk, rice is carried in gunny bags that hold 2.25 maunds.

Transportation of rice and paddy from the farmyard to the village market is almost always by the most rudimentary methods: bullock or buffalo carts, horses or mules, headloads, and small boats. Transportation methods to the intermediate markets are the same, except that in some areas occasionally small dilapidated trucks operate. Dispatches to the terminal markets are usually made by railways. Although some interior markets have good metalled road links with the terminal markets, trucks are not yet in extensive use because freight charges are higher. A large part of the shipments to the terminal markets from Barisal and other riverine districts are by nonmechanical boats; though recently the use of mechanically propelled cargo boats has been increasing.

Railway costs consist of a basic charge for total miles transported. The rate of freight per mile progressively decreases as the distance increases. In addition there is a surcharge of 10% on the total freight, a refugee tax of 2%, and a wagon charge of Rs. 21.25 if a whole one is hired. Table 13 shows the basic structure of railway freight costs for different commodities. These do not include loading and unloading charges.

Table 13. **Railway freight rates for different commodities carried by the Pakistan Eastern Railway**

Commodities	Rates for distances traveled (miles)						
	50	100	150	200	250	300	350
	rupees per maund						
Rice, wheat, maize, and fertilizers	0.39	0.49	0.64	0.79	0.95	1.10	1.25
Sugar	0.47	0.64	0.88	1.11	1.34	1.57	1.79
Jute	0.54	0.80	1.11	1.42	1.73	2.04	2.33

Additional charges: 10% increased charge on total freight, 2% refugee tax, 21.25 rupees wagon charge per wagon of 305 maunds.

Source: Booking clerk, Dacca Railway Station.

For rivercraft (excluding the large steamer companies), transportation charges vary considerably with the time of year. This variation is more pronounced in the smaller markets in the rural areas than in the larger ones and reflects the effect of supply and demand for boats during different times of the year. In addition to the usual freight charges, as a fringe benefit, the boatmen are also entitled to have their ration of rice from the consigned quantity. The freight charges of the mechanically propelled boats are considerably lower than those of the country boats.

The traders' major complaint about transportation is the slow movement caused by rail transshipment and the weather. The other most common complaint was about the prevalence of corruption among railway officials. It was alleged that the traders must frequently pay illegal fees just to get the usual services. The boatmen also complain of robbery on the river, especially in the southern part of the Barisal district.

The traders at the terminal markets are not much concerned about the delay in transit time. They may base their sales and purchases on the expectation that supplies will come after certain anticipated intervals. Government regulations prohibit storing rice for more than 7 days, but this does not apply to consignments in transit. This rule removes the pressure to reduce transport time and thus indirectly introduces an additional source of delay. Especially after February and March, a transit delay will surely result in a higher sale price at destination.

Storage. While storage facilities and functions assume great importance, particularly for a subsistence crop, little is known about the various aspects of rice and paddy storage. It is probable that the government stores only about 16% of the foodgrain stocks. In aggregate terms, farmers and private dealers account for an estimated 84% of the "ton months" of foodgrain stocks in the province (56, Chap. VI). Further, anti-hoarding acts have resulted in such a highly distorted and clandestine storage pattern by the private dealers that it is difficult even to identify the institutions that perform this important marketing function.

The big rice millers have large storage godowns in their compounds. Possibly they perform a substantial part of this function in their own areas. The traders at the primary market have no storage facilities in the market. It seems likely that the small traders and Farias use their own houses for storage. In the secondary and distribution markets, the Aratdars possess by far the largest capacity to store rice and paddy as well as in the terminal markets. Moreover, most of the Aratdars also own or rent storage spaces outside the market place. It seems likely, then, that the Aratdars perform the major share of the storage function at the trader level. In the absence of warehouses in the markets, the traders have no option but to use the facilities offered by the Aratdars, an implication worth noting concerning the competitive position of the traders.

Functions that facilitate performance of title transfer and handling

Grading and standardization. These are important marketing functions because they affect the processes of buying, selling, and price formation.

However, there is no officially initiated and implemented standardization of the different grades of rice in East Pakistan. In the process of marketing it is the traders, Aratdars, Dalals, and Farias who grade rice. Apparently there are some concepts and variables adopted by these functionaries in structuring a system of grading across the country. The whole process is based on "direct" examination of the product.

Financing. Among the functionaries involved in the actual trade, the Aratdars seem to be the most important source of short-term financing to the other traders. In some cases, Beparies and Farias, who supply the Aratdars, take very short-term loans from them in the form of a cash advance in order to make purchases from the hat. Nearly always, the Beparies and Farias sell the produce to the same Aratdars from whom they borrowed the money. Secondly, the Aratdars also finance the purchases of their customers — the Beparies, who make purchases through them. Frequently, the Aratdar supplies the Beparies with their indent but realizes only about 15% to 20% of the total value at the time of dispatch; the rest is realized after about 2 weeks. The other variation in the method of financing involves actual cash loans to the purchasing Beparies if they need additional funds for a desired business operation.

The Aratdars at the terminal markets like Dacca, Khulna, Chittagong, and Narsingdhi will usually pay a discounted value of the stocks to their clients even before it has been sold. This resembles the practice of giving loans against warehouse receipts. Also, the Aratdars in the terminal markets often sell the produce to the retailers on credit.

Because these private traders operate within an institutional and environmental set-up, it is difficult to elicit information to quantify the actual volume of financing done on the different accounts as mentioned above. One Aratdar reported that on every hat day (twice a week) he advances nearly 25,000 rupees to the Beparies and Farias. Observations show that these practices of financing both customers and suppliers are widespread phenomena in the business of Aratdari.

It is difficult to learn the rate of interest they realize from their clientele because most of them do not agree that they are money lenders. They insist that this is a part of the service they provide and a basis for their competition among themselves. They also do not admit that they charge more than the market price, which would mean that their incomes are both a per unit commission and the difference in prices.

None of the Aratdars interviewed expressed a need for financing to run their business. Some larger Beparies in the intermediate markets occasionally advance money to Farias who supply them. From all these, it appears that Dalals and Farias are the only groups of functionaries who always play the role of debtors and never creditors as far as cash financing is concerned.

The large rice mills depend on Farias and traders for their supplies of paddy. They usually advance money to those suppliers shown by experience to be trustworthy and dependable. To a certain extent the millers

also finance the Aratdars and traders who purchase from them, using the Aratdar method. The millers will accept 15% to 25% of the total value of the consignment as advance and dispatch it to the destination. After the goods are delivered, the balance is paid in about 2 weeks.

The development of commercial banks in the major rice-trading areas has changed the financing pattern of the rice trade. In most of the sizable interior markets, all the 3 large commercial banks — the National Bank of Pakistan, the Habib Bank Ltd. and the United Bank Ltd. — have branches, and they actively finance the rice traders. The method varies between regions, depending mostly on the kind of transportation used. Where the purchased rice is shipped by rail, the operation involves the banker's purchase of the railway receipt, with an 8-9% interest charge. Almost all the major financing of purchases dispatched by railways is done by the commercial banks in this manner. Where rice is shipped by other means, banks simply allow a clean overdraft to the credit-worthy rice traders at the usual rate of interest.

In East Pakistan no specialized institutions exist for taking care of the unforeseen risks of the rice trade. The usual profit fluctuations caused by business uncertainties are borne by the Beparies, Farias, Kutials, and millers. Aratdars and Dalals earn a fixed amount of profit per unit of rice and paddy handled and do not bear the risks of the trade.

The institutional arrangement for the dissemination of market information in the private trade channels seems efficient. The most common medium, of course, is "word of the mouth." Telegrams and telephones, although frequently used, are not yet important for disseminating market information. Personal correspondence is used considerably. Functionaries use the radio and newspapers the least because they consider them incorrect and biased.

Market information is most lacking in the area of stocks held. Private stockholders never let their competitors know their stocks, nor do they know the overall stock position in the country. Even information on the stocks held by the government is not disseminated regularly among the traders. The private trade had no formal organization, as did the jute industry, for the collection and dissemination of market information.

Marketing Channels: A Total View

This is an overall pattern of marketing channels and by no means applicable in all the regions. Existing data do not make the computations of the proportions passing through the various channels a realistic possibility. The average East Pakistani rice grower retains 90% of his total output for his own consumption, seed needs, payments in-kind, and other such uses; 25% of his marketed surplus is sold on farms. Unless the region is in a government procurement zone, he has an option to sell to 3 market functionaries: the local Bepari, the Faria, or the Kutial.

In the village markets, Dalals or brokers are functionaries. Most of the assembly are dispatched to a market in the higher tier, and approximately

10% are sold for local consumption by the landless laborers and nonfarm workers.

Rice collected from the villages and village "hats" by Farias and Beparies and brought to the intermediate markets is usually sold to the local Beparies and Aratdars. Assembled paddy is usually sold to the rice millers or local Kutials. Aratdars make purchases for the traders from different consuming markets. Rice millers sell either to the local Aratdars or direct to the traders from the consuming centers.

Aratdars in the urban markets act as the sales agents and stockholders for the rice traders. Retailers, also known as Paikars, buy their supplies from the Aratdars and transport them to their respective retail shops. On the other hand, the government stocks are released from their godowns and retailed through ration shops run by commissioned agents.

Extent of Vertical Integration

There are no major instances of vertical integration among the different stages of the rice marketing system in East Pakistan. In each stage, there is at least one point of change in ownership and title. The operations between Beparies, Farias, and rice millers are not characteristic of a vertically integrated firm. At the level of small husking machines, however, there are some indications of integration. Usually in the semi-urban intermediate markets a large number of the husking machine owners are also the leading farmers in the areas. All of their marketed surplus of paddy are husked in their own facilities and sold to the local traders (and they even charge the usual Aratdari commission). Similarly, some internal coordination in the channels is noticeable when some traders in the distributive markets sell directly to traders in the urban centers. However, such instances of channel simplification through modest vertical integration and internal coordination are features present only at the micro-level.

Middlemen Oligopoly and Oligospony in the Present Structure

Nature of inter-firm and intra-firm relationship

The intermediate and terminal markets for rice distribution are dominated by small groups of Aratdars who handle from 75-80% of the supplies.[6] By contemporary theories on market structure analysis, this high level of concentration should be conducive to the forces that undercut the elements of competition. Yet it is observed that there is no solid evidence that supports collusive behavior among the few Aratdars operating in the intermediate and terminal markets. They compete mostly on the basis of

[6]Based on interviews with traders, Aratdars, and knowledgeable local people in the various markets.

services to their clients and since they, as brokers, stand between the buyers and sellers, there are strong pressures obstructing price competition. On the other hand, commission rates are sometimes reduced in order to increase net revenue through increasing the volume handled. They charge about 2% of the total value as commission – not an exorbitant fee, considering the services rendered. It is also doubtful whether a reduction or elimination of this margin would have a significant effect on consumer prices.

However, there are elements in the present-day Aratdari system that could degenerate the competitive forces. The business of Aratdari (and all other rice traders as well) requires a lot of skill, large capital, access to space in the market, family tradition, and above all an impeccable reputation. These appear to be very strong barriers to entry by new firms. In addition, the Aratdari wield much financial control through loans to traders with accompanying interest, price, and quantity agreements.

Nature of relationships between market intermediaries and producers

There is virtually no integration between the marketing intermediaries and the rice producers, nor is there evidence to support that these two groups are linked by financing and credit arrangements. The farmers' competitive position vis-a-vis the marketing institutions depends on their own capabilities to defer sales of their output (a function of physical storage facilities, cash needs, and consumption needs) and, more importantly, accessibility to different markets (a function of transport facilities and costs). An East Pakistan government survey shows that the farmyard price is 10–17% lower than the nearest market price (25:51). If correct, this indicates a marked degree of imperfection, and moreover, this figure seems high. Given the proximity of all farmers to a market it is unlikely that they would sell their produce on the farm at such an unfavorable price, since the transportation cost for them is frequently nothing more than the opportunity cost of their own labor. However, in areas where produce markets are far away or otherwise inaccessible there exists a potential for exploitation by the itinerant merchants. This, in turn, reveals the need for investments to develop feeder roads in the rural areas.

The problem of grading and standardization may also vitally affect the farmers' competitive position. Without standardized grading, the farmers may not understand the correct prices, particularly when the present grading is done with the skilled knowledge of the traders. The lack of standardized weights in the rural areas is generally considered another case of producers' exploitation. However, it was observed that in the rural locations where nonstandard systems of weight are used, both the buyers and sellers know the equivalents in standard measure and accordingly make price quantity adjustments. The fact that adjusted prices in areas that do not have standardized systems are not at great variance with those that do bears ample testimony to this contention. The more important cause of inconsistencies would be in using defective weighing tools and measuring quantity by volume. In many rural locations "one basketful" becomes the unit of measurement.

Chapter IV. Processing of Paddy: An Analysis of Alternative Methods and Costs

The object of paddy processing is to remove the outer shell or husk that covers the starchy rice kernel. It is rough and coarse in texture, does not have significant food value, and above all is unfit for human consumption. The methods used have a significant effect on the physical and qualitative characteristics of the processed grain as well as the total output of rice; the efficiency with which these functions are performed has some bearing on the optimum utilization of the product. An analysis of the present institutional and functional aspects of the processing sector in East Pakistan evaluates the present setup in terms of physical and economic efficiency and opportunities for improvement and change. On the basis of data collected from a few large and small establishments, estimates of the cost-structures of the alternative practices are made.

Stages of Paddy Processing

For several reasons parboiling before husking is desirable in the processing of paddy. Soaking and steaming gelatinize the starchy rice kernels and significantly improve the milling quality, as well as the total yield, by reducing the proportion of broken grains. Further, gelatinizing the grains improves storage quality by developing a higher resistance to the growth of microorganisms and metabolism of grain tissues. Furthermore, the important nutrients in the bran (the pericarp and aleurone layers) are properly diffused and absorbed into the rice kernels through parboiling. Finally, the parboiling process dissolves superfluous surface starch on the grains, which improves the cooking quality.

Parboiling equipment varies from earthen or metal containers holding ¼ maund of paddy (as for home consumption), to split oil barrels or cast iron bins holding 7 or 8 maunds of paddy (for small processors and Kutials), to the elaborate steaming plants in large rice mills. The methods range from boiling paddy for about 30 minutes on an open fire in open containers (as farmers and Kutials do), to temperature-controlled steaming and days of soaking as the large mills do. In the larger mills, paddy is first steamed in cylindrical bins for 3 to 5 minutes; it is then thrown into the soaking tanks, where it is left for about 2½ days. The saturated paddy is again steamed (or boiled) for 8 to 10 minutes. The simpler, small-scale method of parboiling is inferior to that used by the larger mills because there is less temperature control and the grains do not get the desirable uniform treatment.

Over- or under-steaming the paddy causes inferior milling quality and undesirable odors and colors in the kernels. The different varieties of rice also differ in the effects of the parboiling process. Mineral content of the water produces qualitative inferiority in the form of discoloration of the grains. Therefore, rice millers stress the importance of the operators' skill and experience with the parboiling process.

Experiments have shown that to maximize the milling outturn of paddy, the field crop should be harvested when the grains have a moisture content of between 20% and 25%, which is reduced about 12.5% before it is milled. Since moisture meters are not used in East Pakistan, the actual moisture content of the paddy at harvesting or milling is not known. Moreover, in many villages the matured paddy remains in the field for some time and is thus subjected to over-drying during the day and wetting at night.

The process of parboiling on the farm as well as in the commercial mills increases the moisture content to approximately 40%. Sun-drying is the only method used in East Pakistan to reduce the moisture to the level required for proper milling. In the large mills, the parboiled paddy is spread thinly in large exposed cement yards commonly known as "chatals." An average "chatal" of the rice mill can dry nearly 1500 maunds of wet paddy. The millers consider that the paddy is properly dried when it has been exposed to sunshine for three 8-hour days during November, December, January; two 8-hour days during January, February, and March, and two 6-hour days during the hot summer months. It is piled in small heaps and covered with tin or wicker at night to avoid wetting.

Proper moisture content means fewer broken kernels and less rotting and insect loss in storage. Table 14 shows the relationship between milling output and the method of drying and demonstrates the extent of grain loss caused by present drying practices (18:2). Beside the loss in milling, there is also the quantity lost by not working to milling capacity during the rainy season, an additional inefficiency.

The final stage in paddy processing is removal of the husk and a complete or partial removal of the pericarp layers. The mechanical hullers have a pair of adjustable shelling stones placed horizontally one above the other. Paddy is fed between the stones where the pressure cracks the top of the grains so that the hulls can be removed. The result is brown rice which still retains the bran layers. For white polished rice, this product is run through the same huller under a different setting of the stones or

Table 14. **Relationship between drying method and milling output**

Drying method	Recovery rate		
	Broken rice	Head rice	Total rice
		percent	
Open sun drying	24.4	21.3	45.7
Dried in huts without walls	21.2	41.4	62.6
Dried in closed rooms	18.6	52.7	71.3

Source: Faulkner, M.D. *Observations and recommendations on rice handling and milling in West Pakistan*

through a pearling cone to remove the bran.

The average rice mills in East Pakistan use powered hullers. The output from the first operation is a mixture of completely unhusked paddy, brown rice, broken rice, and husks. This then goes through a strainer to separate the husked and unhusked paddy. The husked rice is fed into another huller to remove the bran layers, while the unhusked rice is again fed into the first huller. The usual practice is to have a sequential use of the hullers that ensures the gradual abrasion so important in increasing the proportion of whole grains. The entire range of functions, from winnowing and straining to hulling and polishing, can be integrated in a mill and almost entirely automated. No data could be obtained on the number of such mills in East Pakistan. While two were observed – one at Pulhat in the Dinajpur district and the other at Khepupara in the Barisal district – neither was working well. No data on the extent of the use of the pearling cone as a polishing device exists, and none of the mills visited had such a facility. In all the cases, number 2 hullers were performing the dual function of removing both the outer shell and the inner bran layers. Possibly, polishing rice to whiteness is not a widespread milling practice in the industry.

Processing Sector

The processing sector can be classified into 2 broad categories: commercial and noncommercial. Homepounding in "Dhenki" is the only method of rice processing in the noncommercial sector and is of minimal importance. A rough survey of a typical village revealed that only about 5% of the people had a Dhenki, which they used to make rice flour or parched rice.

The commercial sector is composed of 2 distinct categories of establishments: the large rice mills and the small husking machines. The former are characterized by equipment several decades old. The industry is virtually stagnant in growth of new firms as well as modernization and expansion of existing ones. On the other hand, the husking machines, scattered throughout the countryside, have grown and expanded tremendously over the past years. In the following section the working of these two commercial sectors in the processing industry is analyzed.

Rice Mills

A typical rice mill is characterized by long, continuous, semi-permanent structures of cast-iron sheets, a number of steeping tanks that adjoin the steaming bins, and a large, cemented, drying yard. Inside the huller room are a few pairs of hullers and 1 or 2 strainers and fans. The milled rice is heaped on the floor in the huller room ready for sacking and weighing. The average capacity of a huller is 20 to 25 maunds of paddy per hour, depending on the efficiency of the stones. Table 15 indicates the physical facilities observed in the mills at Dinajpur and Bogra, which are representative of the whole industry. Table 16 shows the total number of rice mills in East Pakistan. In East Pakistan, this industry was in its early stages

Table 15. **Physical facilities at 11 rice mills**
East Pakistan, 1968

Mill	Mill area	Power generator	Power generation capacity	Storage capacity	Chatal capacity	Steeping tanks capacity	Hullers	Reported hulling capacity	Year of establishment
	acres		lbs P.S.I.	1000 mds	maunds	maunds	nos.	mds/hr	
Pulhat #1	1.0	steam	125	50	2,200	2,000	5	60	1930
Pulhat #2	9.3	steam	150	25	2,000	2,000	5	60	1937
Pulhat #3	2.6	steam	150	30	1,200	1,000	7	75	1927
Pulhat #4	9.8	steam	150	N.A.	1,200	2,000	5	60	1937
Pulhat #5	N.A.	steam	125	80	1,600	2,000	5	60	N.A.
Chirribander #6	6.3	steam	150	40	1,200	1,600	5	60	N.A.
Chorkai #7	4.5	steam	80	20	1,200	1,600	5	50	1925
Chorkai #8	5.0	steam	120	15	1,500	1,000	4	50	1923
Talora #9	9.0	steam & diesel	150 125 H.P.	20	1,500	2,000	5	75	1921
Talora #10	3.1	steam	150	N.A.	700	900	3	50	1946
Talora #11	N.A.	steam	120	7	400	800	3	50	1920

Notes: (a) Data from interview with millers in 1968; (b) Mills identified as #1 to #8 are in Dinajpur, the rest are in Bogra district; (c) All quantities are in terms of paddy.

Table 16. **Number of large- and medium-size rice mills**
East Pakistan, 1911-69

1911	1947	1955	1957	1962	1963	1964	1965	1966	1967	1968	1969
3	58	72	64	78	98	96	102	105	106	106	106

Notes: (a) 1911 and 1947 data: Ahmad, *op. cit.*, p. 223.
(b) 1955 to 1969: East Pakistan Bureau of Statistics and Census of Manufacturing Industries.
(c) Data up to 1962 refer to number of active mills.
(d) 1963-69 data refer to number of registered rice mills, i.e. includes those not active.

during the first quarter of the century, with the major growth occurring in the thirties. The relative stagnancy of growth in recent years is apparent. Table 17 gives a breakdown of the total number of mills by districts, showing that nearly 50% of the rice mills are located in the district of Dinajpur, while about 90% are in the northern districts of Rajshahi, Dinajpur, Rangpur, and Bogra.

Steam engines supply the motive power for nearly all the rice mills. Most of the engines were purchased old from the processing plants in the tea gardens and are fired by rice husks. Although some rice mills are powered by diesel engines and electricity, most parboiling plants are powered by steam engines.

The large rice mills integrate all of the functions involved in the 3 stages of processing. While the large mills do no custom milling for private traders, they occasionally process government paddy. The usual business practice involves purchasing paddy from farmers either directly or through Farias, depending on the location of the mills. For example, all 5 rice mills at Pulhat, in the urban city of Dinajpur, reported that 90% of their paddy purchases were made from traders and Farias who brought paddy into the mill premises. The rest were direct purchases from the farmers. On the other hand, the mills located in and around the producing areas like Talora, Chorkai, Phulbari, and Chirirbandar reported that 50% of their

Table 17. **Breakdown of number of medium and large rice mills in East Pakistan, by district 1963-64 to 1968-69**

District	1963-64		1964-65		1965-66		1966-67		1967-68		1968-69	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Dacca	8	1	8	1	7	2	7	2	6	2	6	1
Mymensingh	2	-	2	-	2	-	3	-	2	-	1	-
Faridpur	-	2	-	2	-	2	-	2	-	2	1	2
Chittagong	6	-	6	-	8	-	8	-	8	-	8	-
Noakhali	-	1	-	-	-	1	-	1	-	2	-	2
Sylhet		-	-	-	-	1	-	1	-	2	-	1
Rajshahi	7	-	7	-	7	-	7	-	7	-	7	-
Dinajpur	43	1	43	1	45	1	45	2	45	2	46	2
Rangpur	8	-	8	-	8	-	8	-	8	1	8	1
Bogra	11	-	10	-	10	-	10	-	10	-	10	-
Pabna	1	1	1	1	-	2	2	1	2	-	2	-
Khulna	1	1	1	1	2	-	2	-	2	-	2	-
Barisal	3	1	3	1	4	-	4	-	4	-	3	2
Comilla	-	-	-	-	-	-	-	-	-	-	-	-
Chittagong H.T.	-	-	-	-	-	-	-	-	-	-	-	-
Kushtia	-	-	-	-	-	-	-	-	-	-	-	-
Jessore	-	-	-	-	-	-	-	-	-	-	-	-
Total	90	8	89	7	93	9	96	9	94	12	94	12

Note: (a) Mills having 20 or more employees and using power.
(b) Mills having 10 or more employees but less than 20.

Source: Bureau of Statistics, East Pakistan.

paddy purchases came from traders and the other half were direct purchases from farmers. None of the millers reported preharvest or postharvest contracts with farmers regarding quantity or price. Purchases are strictly cash and occasionally very short-term advances are given to reliable traders.

The millers sell their rice mostly to the traders in the consuming markets in the different areas of East Pakistan. No rice appears in the local market for local consumption nor are sales to other market functionaries in the area where the mills operate common. Occasionally, however, they sell some quantities to the local Aratdars. The millers provide sacking-sewing-weighing, loading expenses, and other incidental charges as a part of their service to the customer. The purchasers, however, pay for the cost of the gunny bags.

Costs of Operating Large Rice Mills

It is difficult to obtain actual cost data from the millers. Many are unwilling to furnish records of itemized expenses or actual volume of operation. Where the fixed overhead costs are a larger component of the total cost function, the volume of operation becomes an important determinant of average costs. On the other hand, computation of variable costs becomes relatively easier where contractual arrangements regarding wages for performing specified jobs exist.

This analysis of the cost structure was computed by 2 alternative approaches: (a) on the basis of data obtained from a few mills concerning quantities milled in the different months and the expenses incurred in terms of wages paid and other expenditures, some estimates of average costs were derived; (b) for the same set of mills, alternative estimates of cost of milling per maund were derived from data on the rates of wages paid and the physical productivity of the labor. While the first estimate shows the average cost for milling adjusted for overhead costs as well as for the period of lower or no milling, the second estimate determines the actual per unit variable costs, although not taking into account the overhead expenses. However, the two estimates can be checked for consistency.

Components of total milling costs

The services that the millers provide are generally uniform. Any differences in per unit cost are chiefly the result of differences in overhead expenses, in processing technology (if any), in structure of wages, and above all in the rate of plant utilization. The following categories of costs in the milling operation can be identified:

a. Production workers' salaries and wages, which cover the expenses incurred for parboiling, handling on the mill premises, drying, and hulling. Except for the personnel in the machine room, most of the workers are either casually hired labor at a fixed wage rate or contract labor for specified amount of work. In the rice mills at Pulhat, Dinajpur district, the workers are predominantly contract labor who steam, dry, and move the rice between processes. Casual laborers operate the hullers. The mills at

Phulbari, Chorkai, and in the Bogra district, however, employ mostly casual labor for all these functions.

The permanent staff on the actual production line typically includes an engine driver, 2 boiler attendants, and 1 or 2 hullermen. On a working day, an average mill with 4 or 5 hullers employs 10 workers to feed the hullers with paddy and carry the husked rice into the packaging area, 3 workers for feeding husk into the boiler, and one worker to lubricate the equipment. Table 18 shows the expenses incurred through wages and salaries to production workers at 4 locations: Pulhat, Chorkai, Chirirbandar, and Talora. Since all mills operate for at least 8 hours on working days, the calculations have been based on the average milling capacity for an 8-hour day in a 5-huller mill. More than 90% of the total wages paid to production workers are variable costs; the rest are fixed costs.

b. Wages and salaries paid to the permanent staff such as clerks, night-watchmen, and custodians. Table 19 presents the reported annual payments for such expenses by 6 Dinajpur mills. It indicates a fairly consistent pattern of expenditure on such overhead among the various mills.

c. Plant operation expenses, such as utilities, repairs, and maintenance. Mills have an outlet for waste, since almost all are powered by steam

Table 18. **Wages paid to production workers for milling 1 maund of paddy in 4 locations** East Pakistan, 1967-68 season

Services performed workers employed	Wage paid in:			
	Pulhat	Chirirbandar	Chorkai	Talora
	rupees per maund			
(a) Steaming, boiling, and moving inside mill premises	.23*	.25*	.16†	.16†
(b) Drying	--	--	.05†	.05†
(c) 10 huller laborers	.04	.04	.03	.03
(d) 3 husk carriers	.01	.01	.01	.01
(e) 1 oilman	.01	.01	.01	.01
(f) 1 engine driver (g) 2 boiler attendants (h) 2 hullermen	.03	.03	.03	.03
Total	.32	.34	.29	.29

Notes: * Includes drying. Calculated at rate of 44 rupees and 45 rupees respectively for Pulhat and Chirirbandar per 200 maunds of paddy. Contract payment.

† Based on wage rate for casual labor and labor requirement for 100 maunds of paddy. Daily wage rate at Pulhat and Chirirbandar are 2.25 rupees and at Chorkai and Talora, 2 rupees.

Items (c), (d), and (e) calculated at daily wage rate and assuming 600 maunds of paddy-husking capacity per 8-hour day.

Items (f), (g), and (h) calculation based on monthly salaries paid and assuming 600 maunds of capacity. Related to permanent staff.

Source: Data supplied by 11 mills.

Table 19. **Wages and salaries paid to nonproduction staff, 6 mills**
Dinajpur, 1967-68 (up to October 1968)

Mill	Annual	Monthly average	Per maund	Avg. monthly milling
		rupees		maunds
Pulhat #1	29,756	1,353	.162	8,356
Pulhat #2	24,761	1,126	.346	3,254
Pulhat #3	19,232	875	.406	2,151
Pulhat #4	29,493	1,341	.213	6,298
Chirirbandar #6	29,686	1,349	.193	7,007
Chorkai #7	19,600	891	.351	2,469

Source: Data supplied by 6 mills in Dinajpur.

engines fired with rice husk. Where electricity is available, it is used for lighting only. Lubricants are required for the moving parts in the steam engine and in the hullers.

The rice husk has a market value of about 1.5 rupees per maund. Husk requirements during an 8-hour day vary in different establishments, depending on the steam pressure generated and the efficiency of the boiler and furnace. During the first hour of operation a steam engine requires about 5 maunds of husks and after that, 12 maunds per hour, giving a total husk consumption of about 90 maunds for an 8-hour day. The opportunity cost of this is about 135 rupees. In addition, about 3 gallons of lubricants, electricity for lighting, and other sundries cost about 25 rupees per day. Assuming a full capacity hulling of 600 maunds a day, the total cost for husk and other fuel comes to about 0.22 and 0.04 rupee per maund, respectively, of paddy processed.

After husking every 2000 maunds of paddy, the shelling stones have to be replaced. The cost of this, in addition to that of replacing the strainers, comes to about .01 rupee per maund. In some mills maintenance of the drying yards involves expense. Data for 6 mills in Dinajpur indicates an average repair and replacement cost of 0.065 rupee per maund of paddy. The data show wide variability among the annual repair costs for the mills. This is not unexpected since, while all the mills are quite old, some have deteriorated more than others. Moreover, some require major repairs and overhauling at certain intervals and those with high repair costs in the sample might have reached that condition during the year of survey.

d. Packaging expenses. These do not include the price of gunny bags for the millers, but as a service to the customers, they bear the expense of bagging, sewing, and weighing, which includes the costs of labor and materials. The millers use numerous gunny bags for storing paddy and also for carrying parboiled paddy to the drying yard. This is a major source of depreciation because the bags get wet and rotted, causing the millers an estimated 15% loss of gunny bags. Contract labor does the

bagging, sewing, and weighing at a usual rate of 6.25 rupees per 100 bags of rice, which is equivalent to 320 maunds of unhusked paddy. At this rate total packaging charges come to 0.02 rupee per maund of paddy. An estimated depreciation of 0.01 rupee per maund is added to this, based on the expenditure for gunny bags reported by different mills.

e. Customer services, traveling expenses, and other miscellaneous charges. These services are fairly standardized because they are obtained through contractual agreement with truckers and (or) porters. Detailed data on such expenses were obtained from one miller at Pulhat for the total volume of milling done by the mill during the year 1967 (table 20). The per unit miscellaneous expenses were about .145 rupee per maund.

The cost of storage has not been included in the analysis because determination of opportunity cost for the storage space owned by the millers is not feasible. While an evaluation can be made on the basis of market rates, it is doubtful whether such spaces would be in demand in the respective locations. Most of the millers own storage spaces that are vacant most of the time. Had there been a market demand for it, the millers would have rented their unused space. Depreciation on equipment and property have also not been included because there is a positive value appreciation of a substantial part of the plant, especially the steam engines and the land area.

The millers do not buy insurance for their properties or stocks. However, they pay local government taxes imposed by the Union Councils, which are flat charges varying from area to area. The millers pay license fees of about 25 rupees, rice trading license renewal fees of about 5 rupees, and boiler license fees of 70 rupees per annum. The weighted average of such expenses as reported by 6 mills is about 0.014 rupee per maund of paddy. These estimates give total milling costs of about 1.094 rupees per maund of paddy. Of this 53.9% are on account of wages and salaries, 23.8% are for fuels, 5.9% for repairs, 13.2% for customer services and miscellaneous expenses, 1.8% for packaging expenses, and about 1.3% for

Table 20. **Miscellaneous expenses incurred by a Pulhat miller**
1967 milling season

Expense items	Total cost
	rupees
Cartage to station	6,342.00
Loading charges	1,664.00
Messing of staff	3,206,00
Traveling	1,108.00
Bank interest	2,095.00
Sundries	1,671.00
Total	16,086.00

Source: Data supplied by 1 miller at Pulhat.

Table 21. **Average cost of milling 1 maund of paddy**
North Bengal, 1967-68 milling season

Item of cost	Rupees/maund	Percent of total cost
Salaries and wages to production workers	.31 (a)	28.33
All other wages and salaries	.28 (b)	25.59
Direct plant operating expenses	.26 (c)	23.76
Rice husk, lubricants, utilities, etc.	.065(b)	5.94
All repairs		
Packaging, depreciation on gunny bags, etc.	.02 (c)	1.82
Customer services, misc. expenses, bank interest, etc.	.145(d)	13.25
License fees, taxes, etc.	.014(b)	1.27
Total	1.094	100.00

Notes: (a) Average of cost estimates at 4 locations. See table 18. Weighted average for 8 mills amounts to about .29 rupee.
(b) Weighted average of data furnished by 7 mills. Weights are volume of paddy milled by each mill during 1967 and 1968.
(c) Estimates based on actual costs of operation.
(d) Based on data furnished by Mill #1, Pulhat, Dinajpur.

miscellaneous taxes (table 21). These percentages are consistent with the approximate estimates mentioned by the millers during interviews.

Capacity Utilization in Rice Mills

The capacity utilization of the rice mills are functions of 3 interrelated factors: the number of hullers in working condition and their actual efficiency, which largely depends on careful maintenance and service; the capacity of the mill to parboil and dry paddy; and the supply of paddy available to the mills.

Since the quality of huller servicing is not known, total hulling capacity cannot be based on the number of hullers. Also, the major constraint in the full use of the hullers is the lack of mechanical drying facilities. During the peak months of November, December, and January when paddy has to be dried for 3 full days, the existing number of hullers can barely be supplied with enough dry paddy to ensure 8-hour days of full use of the capacity. This problem becomes even more acute during the rainy season. The present technological backwardness of parboiling and drying makes maximum utilization of the hullers impossible. Figures 5 and 6 show the monthly volume of paddy husked by 6 mills during 1967 and 1968. While the information was supplied by the millers, some verification was made concerning its validity. Yet, even if the absolute figures on utilization are biased, the monthly patterns of capacity utilization are probably adequate-

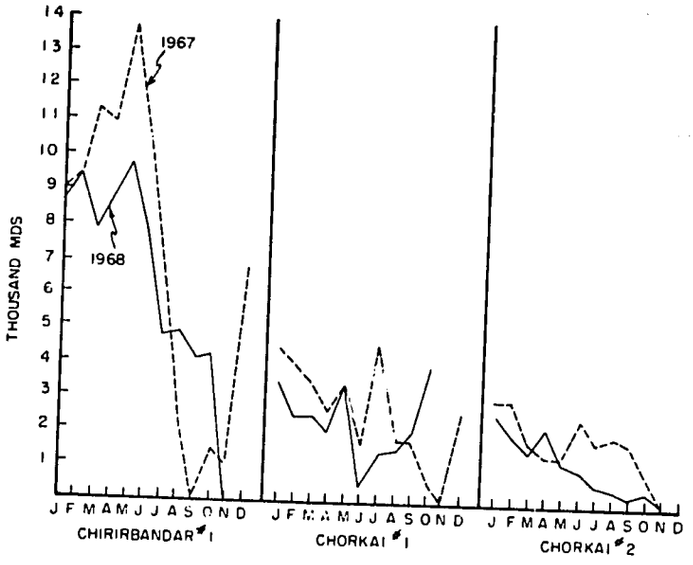


Figure 5. Monthly volume of milling reported by 3 mills in Dinajpur District, 1967 and 1968.

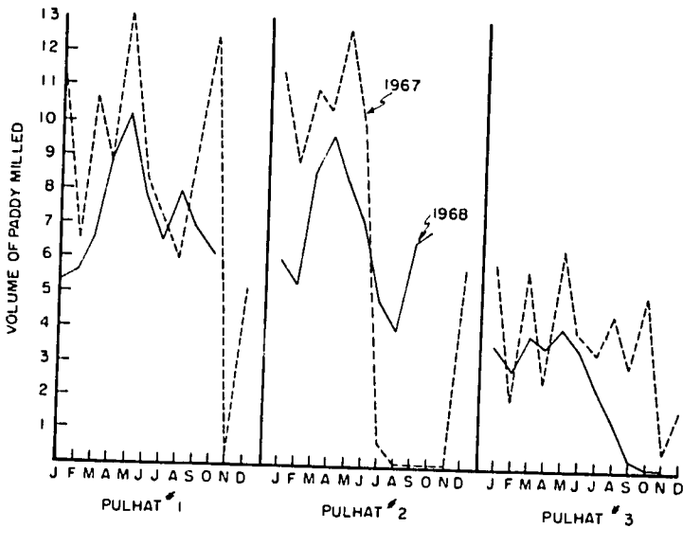


Figure 6. Monthly volume of milling reported by 3 mills at Pulhat, 1967 and 1968.

ly represented by these data. This assertion is based on the fact that the pattern demonstrated bears a close relationship to the seasonal pattern of production in the areas concerned.

The total number of working days in the 6 mills studied ranged from 63 to 226 eight-hour days. The low operation may be from the lack of initiative, aggressiveness, and efficiency in management. At the present technological level, full use with 3 shifts a day is out of question.

Most of the millers feel that the rapid growth of small husking businesses doing custom milling as well as their own has caused intense competition in the paddy market. Many traders who previously sold paddy to the big rice mills now process paddy and sell rice themselves. The small husking machines at Chorkai now have a combined capacity higher than that of the 3 rice mills. Unfortunately, we do not have more relevant and detailed data on this situation. Since the large mills are not operating at their peak, the milling sector displays significant excess capacities, if not throughout the year at least seasonally.

Small-Scale Milling Enterprises

In the past 2 decades, this sector of the rice milling industry has grown tremendously. In 1947 there were only 69 such establishments in East Pakistan, while in 1961 the total was 3583. Table 22 shows this increase. The total number may be still larger since the government survey probably under-enumerated. Table 23 presents the most recent data—a breakdown by districts in 1961. It shows the largest concentration (37.87%) of small husking machines to be in the district of Chittagong, while the northern rice producing districts of Rajshahi, Dinajpur, Rangpur, and Bogra combined had little more than 18% of the total industry. The average unit of these enterprises employs 5 persons, has a total investment of 16,628 rupees (6517 rupees in machinery), consumes 12,094 rupees worth of raw materials, and produces 18,504 rupees worth of goods and services per year (13:80).

The business practices of the husking machines are varied. Some of them in the larger markets such as Pulhat, Chorkai, and Bogra do custom

Table 22. **Growth in number of husking machines**
East Pakistan, selected years, 1950 to 1961

Year	No. of new enterprises
1950	98
1953	119
1955	148
1957	185
1958	352
1959	404
1960	985
1961	676

Source: *Survey of Small Industries in East Pakistan*, p. 26.

milling as well as perform the whole range of processing functions of parboiling, drying, and hulling on their own account. In many locations more than half of the total volume handled by such units in a year is their own processing. In the rural areas they do mostly custom milling at a charge ranging from 0.57 rupee to 0.75 rupee per maund of paddy.

The husking units that also function as "miniature millers" parboil by rudimentary methods and in a sense are large-scale versions of on-farm drying by small farmer-consumers. They do mostly open-flame parboiling on split-barrels or drums. In a desperate effort to compete with the larger mills, the small huskers sometimes construct ingenious but illegal equipment. But barring occasional variants, most of the miniature millers use the traditional methods of parboiling on open-flame. They have small drying yards that can handle from 200 to 300 maunds of wet paddy. They use the same size hullers as the large mills do, but have 1 or, at most, 2 machines powered by a 20- to 35-horsepower diesel or electric motor. Some units also have a mechanical fan-cum-strainer for cleaning paddy and husked rice. Those without this equipment clean manually by winnowing.

The husking units that do custom milling have the same hulling equipment as the miniature millers but no drying-parboiling facilities. The services include hulling and, if the customer desires, the husked rice is cleaned for an extra charge. Transportation to and from the mill is the responsibility of the customers. The customers take the rice husk and bran

Table 23. **Number of husking machines**
East Pakistan, 1961

Districts	No. husking machines	Percent of total
Dacca	106	3.0
Mymensingh	68	1.9
Faridpur	79	2.2
Chittagong	1,357	37.9
Noakhali	158	4.4
Sylhet	319	8.9
Rajshahi	267	7.5
Dinajpur	110	3.1
Rangpur	100	2.8
Bogra	171	4.8
Pabna	7	.2
Khulna	176	4.9
Barisal	310	8.7
Comilla	86	2.4
Chittagong Hill Tract	42	1.2
Kushtia	16	.4
Jessore	211	5.9
Total	3,583	

Coverage: Period covered by survey was calendar year 1961.
Source: *Survey of Small Industries in East Pakistan*, p. 80.

to use as fuel for on-farm parboiling. The per maund charges for hulling vary by location (lower in villages), and also by the different varieties of paddy, the moisture content, and foreign materials. The charges for hulling Aus paddy are higher than for the Aman paddy because, having a coarser husk and higher moisture content, the former requires 2 runs through the hullers.

Average Annual Volume of Husking, Capacity Utilized, and Costs of Operation

The huskers' suspicious attitude toward divulging business information to strangers made data collecting difficult. In addition, the firms do not have systematic bookkeeping. Also, it is not possible to determine the actual hours these machines work in a day or a month, since they are frequently shut down for part of a day.

Scattered data from hullers at important milling centers and certain village markets lend themselves to certain broad approximations. A village husking machine with 1 huller handles an average monthly volume of about 500 maunds of paddy. The husking machines in the large milling centers (the miniature mills) appear to operate at a higher level of plant utilization, and conservative estimates of the average monthly volume are 2000 maunds of paddy. December through March is the peak period, with 12- to 16-hour work days. However, all these estimates are based on discussion with some owners of husking machines and some quantitative data, and are therefore a rough approximation.

Costs of operating husking machines

Since the husking machines in East Pakistan do not provide uniform services, there are differences in the costs of operation between the two categories, with the miniature mills providing the full range of processing: namely parboiling, drying, and hulling; and the husking machines engaging primarily in custom milling.

Salaries and wages to production workers

Parboiling and drying: The miniature mills usually employ contract labor for parboiling and drying. At 50 rupees per 100 maunds of paddy, a group of laborers will perform the following services: carry paddy out of the storage godown; boil and/or steam and steep; dry it on the yard; and carry the dried paddy into the huller room. The larger mills pay much less for the same services because the miniature mills parboil mostly on open fire, which is a more time- and labor-consuming method.

Hulling: The usual hulling-room staff includes 1 hullerman, 1 assistant and, in miniature mills, 1 or 2 casual laborers. The salary and wage structure varies between locations. In the markets at Pulhat, Phulbari, Chorkai, and Talora, a hullerman earns between 100 and 120 rupees per month. In the village markets he gets from 60 to 80 rupees per month plus free

food. The assistant's salary is from 25 to 30 rupees, plus free food. The larger miniature mills occasionally have a cashier-cum-clerk, but in most cases it is the owner who acts as one.

Plant operation expenses such as fuel and other utilities, repairs, and maintenance

The hullers are attached to either a 25- or 30-horsepower electric motor or a diesel internal-combustion engine. About 30 maunds of paddy can be husked per 25 horsepower-hour, giving a per maund electricity cost of about 0.125 rupee.[7] Assuming a less efficient performance that yields 25 maunds per hour, the cost would be about 0.149 rupee per maund. At the prevailing market price of 1.5 and 6 rupees per gallon of fuel and lubricants, respectively, the per maund fuel cost for diesel engines comes to about .17 rupee.

The cost of burning rice husks is an additional expense in establishments that do parboiling. About ¾ of a maund of husks are required to parboil 100 maunds of paddy, which gives a per maund opportunity cost of about .01 rupee.

Maintenance expenses arise from the need to change the snelling stones. A pair of stones cost about 22 rupees (higher in the rural areas) giving a per maund expense of about .01 rupee. In the villages the cost is slightly higher — .015 rupee. An average estimate for all repairs is .02 rupee per maund of paddy hulled.

Packaging expenses, depreciation on sacks

These expenses are relevant for the miniature mills only. The amounts are the same as those of the larger mills because there is no difference in the technology or materials used or in the labor requirement. The custom hullers incur no expenses on these accounts.

Miscellaneous expenses: customer services, taxes, licensing fees, and other petty expenses

The miniature mills usually offer free transportation to the point of dispatch, loading, customer entertainment, and other such services, just as the large millers do. Since the services are identical, per unit cost should not vary significantly between the two categories of establishment. For local taxes, such as the Union Council tax and municipal tax, the miniature mills and husking units may be paying less than the large ones. The licensing fees are identical but these establishments do not have to pay the boiler fee. Such miscellaneous expenses average about .14 rupee per maund of paddy. But this amount is applicable only to the miniature mills. The smaller husking machines engaged in custom milling do not have to incur the expense of items such as customer services. However, they incur an estimated 0.02 rupee per maund for licensing and other petty expenses.

[7] I am grateful to my agricultural-engineer friend, Mr. Mainul Hussain, for these estimates.

Table 24. **Average cost of processing 1 maund of paddy**
Small milling units, 1967-68

Item of cost	Miniature mills	Percent of total cost	Custom hullers	Percent of total cost
	rupees per maund			
Salaries and wages to production workers				
Parboiling and drying	.50	56.8(55.6)	--	--
Hulling	.04	4.5(4.4)	.04	17.4(16.0)
Plant operating expenses				
Electricity	.15	17.0(88.9)	.15	65.2(68.0)
Diesel	.17		.17	
Rice husk	.01	1.1(1.0)	--	--
Repairs	.02	2.3(2.2)	.02	8.7(8.0)
Packaging, servicing, depreciation on sacks, etc.	.02	2.3(2.2)	--	
Miscellaneous expenses: taxes, fees, customer services, etc.	.14	15.9(15.6)	.02	8.7(8.0)
Total (a)	.88		.23	
(b)	.90		.25	

Notes: (a) Expenses for units using electricity.
(b) Expenses for units using diesel fuel.
Figures in parentheses show individual cost as proportion of total cost in units using diesel motors.

Source: Survey of husking machines.

Table 24 presents the estimated per unit cost for the miniature mills as well as the custom huskers. Costs for units run by diesel fuel are slightly higher than for those run by electricity. For a custom husker, total per maund processing costs come to about 0.23 and 0.25 rupee for electric- and diesel-run units, respectively.

Large Mills Versus Husking Machines

Comparisons between the cost structure of the large and miniature millers show that for identical processing and customer services, the former incur about 18.64% more expenses than the latter. Direct plant-operation expenses at the miniature mills are about 0.18 rupee (0.20 for diesel units) per maund of paddy as compared with about 0.53 rupee at the large mills. However, the cost estimate for the large mills has a major component of imputed value for the by-products used as fuel. The overall cost for the miniature mills would be much less if the costs were lower for parboiling and steaming, which, in fact, account for nearly 57% of the total cost at the miniature mills. The same expenses at the larger mills are only 20–23% of the total. Finally, the larger mills have heavier overhead expenses while the other units have very few expenses for fixed staff.

The quality of the products from the large rice mills is considered superior to that from the miniature mills or the husking units. Rice processed by the larger mills will be 2 to 3 rupees higher than that coming from miniature mills or the custom huskers. The quality differences seem to originate from the superior technology in the parboiling process at the larger mills, such as better temperature control.

Conventional Homepounding

Homepounding is exclusively a noncommercial operation with very little importance as a processing method. It is confined to either the lowest income group, mostly landless laborers, or to the areas where husking machines are not in adequate numbers or within reasonable distances.

Where the processing functions are performed by family labor, especially women, it is difficult to estimate the cost. In many cases, the hired women laborers engaged in parboiling, drying, and husking are paid part in cash and part in kind and often entirely in kind.

Observation showed that the total cost of processing in the home is higher than in the commercial milling facilities. Table 25 presents a summary of the different cost structures for alternative methods of processing, excluding variable costs such as customer services, taxes, and license fees.

Commercial Rice Milling Industry

This analysis of the milling industry has been a microlevel study of a few operations. However, it may be that the economic problems of the milling industry are amply described by the detailed observation of nearly 25 large and small establishments. Obviously, the industry is backward in technological progressiveness as well as in its efforts at product improvement. The major deficiencies and inadequacies are embodied in the use of an inefficient type of huller, the antiquated parboiling and drying methods, and the poor use of existing facilities. Modern mills with rubber roller-type

Table 25. **Cost of processing 1 maund of paddy under alternative methods**

Cost items	Large millers	Miniature mills	Custom huskers	Home processing
	rupees per maund			
Labor cost				
Parboiling and drying	.25	.50	--	1.00
Hulling	.06	.04*	.04*	1.00
Overheads	.28			--
Fuel cost, repairs, etc.	.33	.19	.17	.50
Total	.92	.73	.21	2.50

Notes: (a) * includes overheads.
(b) Variable costs only.

Source: Tables 21 and 24.

shellers increase the total milling output by 2-5% simply because bran removal is controlled for more uniformity. Proper temperature control and clean water achieve efficiency in the parboiling. Proper parboiling and mechanical drying would probably increase the milling outturn from 2 to 5% (5:88-90, 14:39) and definitely achieve marked qualitative improvement. The poor use of the existing plants and equipment is evidenced by the number of days they operate. It is important to study the extent of such excess capacities to determine if it is a question of inadequate supplies or a phenomenon related to the constraints imposed by the most primitive drying practices. Can the existing facilities bear the strain of a daily 3-shift operation?

The question of investment in the milling sector for modernization and expansion is linked with several other issues. First, to what extent will this increase the present level of milling efficiency in quantitative as well as qualitative terms? Secondly, to what extent will it contribute to the growth of export demand, and finally, to what extent is expansion necessary to handle future increases in total output of paddy?

An analysis of the present milling outturn is difficult since existing knowledge is inadequate. Millers gave diverging estimates; according to some the recovery rate is 66%, while according to others, it is between 70-73%. Without moisture meters, it is difficult to estimate the milling outturn. However, the hullers currently in use are surely not capable of an outturn as high as 73% or even 70%. This means that with improved shellers, better pre-cleaning of paddy, and improved drying and parboiling, the supply of processed rice would increase by at least 7%. For the mills in Pulhat, Dinajpur, some of which handle more than 100,000 maunds of paddy annually, this would mean an additional output of about 7000 maunds. At the average market price, the additional revenue would amount to 3½ to 4 lakh rupees.

The second question is related to the overall development of agriculture, particularly to generating an exportable surplus from local production. Past trends and the present rate of development do not suggest the emergence of the second situation in the immediate future. However, if at some time the province becomes a net exporter, the question of milling quality vis-a-vis international markets would arise. Knowledgeable sources conclude that the present quality of milled rice does not conform to the standards in free markets of the world. The fine rice grown in Dinajpur, Rajshahi, Bogra, and Barisal definitely has superior grain qualities, and with proper milling and grading, a good world market could be developed. With the expected future development of the IRRIPAK variety, an exportable surplus of superior quality rice such as Kataribhog, Birai, Kalam, Balam, and some others can be anticipated.

Any proposals and measures to expand or modernize the existing large-scale milling concerns must consider the effects on the other half of the industry, namely the small-scale hulling machines. The small capital required to establish a husking machine and the relative profitability even

in custom milling has resulted in a vast expansion of this sector. Excluding land and structure, a 1-huller, 25 horsepower, diesel-run unit costs about 10,000 rupees, while an electric-driven one costs about 5000 rupees. The total installed milling capacity of the country's small-scale units is probably significantly greater than that of the large-scale milling sector. At present, the smaller husking machines are a source of competition for the large-size mills, and the rice millers have voiced their displeasure. Important issues to consider are whether the smaller units should be squeezed by expanding the large modern mills and, if the husking machines are allowed to thrive and function, whether they perform their functions with the desired efficiency in parboiling, drying, and hulling.

Stagnation and Technological Backwardness in Large Milling Sector

Lack of motivation for innovation and technological progressiveness are symptoms of an imperfect and noncompetitive economic environment for operation. These aspects of the milling sector raise important questions about industrial performance.

Technologies are available for modernizing the mills. Innovations on drying facilities will drastically alter the situation in respect to excess capacity and under-utilization of facilities. However, lack of a competitive economic environment is demonstrated by the fact that the large mills exist side by side, operate at low efficiency, and do not attempt to compete through technological innovation, better management, and aggressive business strategies. There are no new entries; neither are there any cognizable exits.

The rice millers complain about cost competition from the smaller husking machines and about the so-called splitting of available paddy supplies; yet they make no perceptible effort to streamline management and business practices to cope with the new forces of competition.

Considered against the backdrop of these issues, one cannot but doubt the nature of the competition characteristic of the milling industry. Thorough study to determine the factors impeding modernization in this sector is needed. Is it capital or technological know-how that stands as barrier to innovation as well as to new entries? Is it institutional rigidity or asset fixity that acts as a barrier to exit by the inefficient firms? And finally, what should be the role of public policies for pulling the milling sector out of stagnation?

Chapter V. Pricing Efficiency in the Marketing System: Nature of Spatial Price Relationships

Theoretical Framework for Analyzing Pricing Efficiency

Marshallian and neo-marshallian economists derived theorems about the performance of an industry characterized by a large number of buyers and sellers, product homogeneity, perfect factor and product mobility, freedom of exit and entry, and perfect dissemination of knowledge at one

end of the scale, with a single firm monopoly at the other. Although these basic attributes of a competitive market model as enumerated by the classicists and neo-classicists cannot be found in their strictest forms in the real world situation, the basic hypothesis concerning the nature of price formation emanating from that model can be effectively adapted and used to interpret the pricing efficiency in a modified system as defined by the newer dimensions of competition enumerated by Fellner and others (19, 7, 55, 48). Within these dimensions of a competitive market model, the pricing efficiency of the distributive industries can be tested by the following efficiency criteria:

a. The index of market integration: In a competitive market structure, prices in geographically separated markets are expected to move in unison in response to stimuli from changing demand, supply, and other economic forces. The accuracy and speed with which prices react and adjust to such stimuli can be taken as an indication of the degree of interrelationship in the mechanism of price formation between various markets. A useful method for such an analysis is to compute correlation coefficients between prices prevailing at the different points in the marketing channels and interpret this as the index of market integration.

b. Spatial price differentials: In a competitive market structure satisfying the preconditions of perfect product mobility, intermarket price differentials shall result in arbitrage by the traders until price differentials in excess of the amount of transportation and other transfer costs are eliminated. Thus one could compute the transfer costs between the various points of transfer in the marketing channel and, calculating the actual price spread between those points, interpret it in terms of pricing efficiency.

c. Inter-temporal price differentials: By computing the actual costs incurred in the operation of storage, one could determine whether seasonal price variations are higher than the costs involved in carrying a stock through the storage period.

d. The price of a product derived or processed from another raw product shall not exceed the price of the latter by more than the actual processing cost.

Methodological Problems

In an analysis of pricing efficiency within the conceptual framework outlined above, there must be cognizance of 3 important sources of bias: (a) lack of specification and standardization of the grading system prevailing in the markets, (b) lack of grade-specific data on prices, and (c) lack of correct data on the various costs involved in intermarket transfer, storage, and processing of the commodity. In the absence of a proper and standardized grading system common to all the markets, prices prevailing at various geographical points of transfer as well as at different points in time may exhibit differences that are really due to quality differences.

These problems of grading and appropriate price data can be exemplified by the data situation in East Pakistan. Prices for rice are collected by government agencies at different markets. The usual grade specifications

are fine, medium, and coarse. However, there is no standard definition of these three categories. Since the concept and definitions of these categories vary widely between markets and regions, prices thus collected include large grade variations. Some agencies collect prices by the varietal name of the product. However, this is even more misleading because a varietal name may refer to completely dissimilar products in different markets. In addition, a given variety grown in unlike areas can yield noncomparable outputs because of variations in growing conditions. Again, the same variety and quality (as determined by grain size) of rice carried over from the old crop is regarded as superior to identical output from the new crop because the new crop has a higher moisture content and therefore less grain by weight. Apart from this, the same variety of paddy will yield diverse qualities of rice during different periods of the year. In East Pakistan the quality of winter-grown rice is superior to that of the rest of the year because a longer period of sun-drying is possible.

Nature of Data

To keep the biases in the price data to a minimum, the field survey in East Pakistan during the crop year 1967-68 was conducted with certain special efforts. The collectors of field data recorded prices by the varietal names used in the trade of a particular market. Usually each variety of rice is sold in 2 lots commonly designated as quality 1 and quality 2, which are determined by the percentages of broken kernels and foreign materials. Prices were collected for both these categories under each variety. In addition, the field staff member took a small sample of each category with a recorded price every fifth week or whenever he judged that the quality on a given market day differed significantly from the norm. The varieties and categories were graded for inter-market equivalency by several experienced rice traders.

Markets Selected for Collection of Price Data

Terminal markets

Of the 4 selected wholesale markets of the Dacca area, Badamtali and Zinzira supply most of the rice for metropolitan Dacca and those suburbs within a 15-mile radius. For all practical purposes these two markets can be considered a single unit because they are situated almost opposite each other on the banks of the Buriganga River. They also share a large number of the market functionaries. The third market, Madangonj, is located on the Shitalkhya River near the river port, Narayanganj. This market supplies the consumption needs for the industrial and commercial areas along the Shitalkhya River and to the north. The fourth terminal market studied was Narsingdhi, which is a large commercial center for jute, fish, and textiles located 35 miles northeast of the city of Dacca. Its demand area lies within a radius of 20 to 25 miles of concentrated population of entrepreneurs and industrial wage earners.

Major distribution centers in Dinajpur, Rajshahi, Pulhat, Phulbari, Birampur, Setabganj, Pirganj, Chirirbandar, Naogaon, and Talora

These markets are situated in the heartland of 3 of the surplus rice producing districts of East Pakistan, and represent a few of the major sources of supply for the 3 large urban centers: Dacca, Chittagong, and Khulna. Pulhat is a large milling center situated in an urban area. It does not have an open rice market; rather the bargaining, sales, and purchases are completed within the confines of the respective mills. Traders or their agents from different consuming markets in East Pakistan negotiate with the millers and make their purchases. Participation by farmers as marketeers of their produce is negligible.

The markets at Phulbari, Birampur, Setabganj, Pirganj, and Chirirbandar fall within the same category but are slightly different from Pulhat, since they are located in the center of paddy-growing villages. There are specified market days when rice and paddy are sold; at the same time there are a few millers who sell directly to incoming traders. More than 50% of the marketeers are the growers in the surrounding villages. These markets combine the functions of village market and direct source of supplies to urban markets.

Naogaon in the district of Rajshahi is a variation of both the above types. It is a secondary center of collection and dispatch to urban areas, but unlike Pulhat it does not have any large-scale milling facilities. Farmer participation is low, and the bulk of the supplies of rice come from several village markets in the surrounding area.

Rice markets in the southern district of Barisal: Banaripara, Betagi, Chamta, Neamati, Patuakhali, Boga, Botolbunia, Lebukhali, Maukaran, Galachipa, Ulania

Barisal's only connection with the rest of the province is through waterways and a recently developed minor road link. Characteristics of the markets here are distinctly different from those in the northern districts.

Banaripara is one of the largest rice and paddy markets in the province. It is another major source of supply to the urban markets in Dacca, Faridpur, Khulna, and Comilla. All the markets in Barisal are easily accessible by riverways, hence itinerant merchants come directly from urban centers for purchases. As a result, the supplies from the rural markets bypass the usual intermediate assembly and dispatch markets. The markets at Galachipa and Ulania are located on almost the southern tip of the delta, in an area made up of small islands. The markets are primary and rural in the strictest sense. They do not even have adequate paddy processing facilities, and therefore they are part of the supply hinterland of paddy for the northern Barisal markets with processing facilities.

Matajeehat, Kaharole, and Dhap: 3 village hats in North Bengal

Matajee hat is situated in the center of the major rice growing area of Rajshahi. It is about 19 miles from the big market at Naogaon, with which it is connected by a semi-pucca road that allows truck and bus transporta-

tion. Dhap and Kaharole are 2 village markets in the Bogra and Dinajpur districts, respectively. Since both have poor road communication with the nearby larger markets, bullock carts and horseback are the only modes of transportation. They represent a typical East Pakistan rural market.

Thus we can see that the markets selected for price analysis represent a cross-section of all of the different types of markets that exist in the marketing system in terms of size, location, and other relevant characteristics.

Wholesale Price Formation

In the previous sections we have indicated that the ideal situation of perfect correction at a given time between the prices in spatially separated markets is not possible, since many of the elements of perfection do not exist in as pure a form as is required to constitute a perfectly competitive market system (40). First, intermarket product mobility, which includes the transportation system, is not perfect. In a situation where slow and underdeveloped transportation facilities are coupled with imperfect knowledge about supply and demand situations in the various markets and consequent uncertainty regarding the length of the period during which prices in other markets will remain favorable, we have a set of most difficult barriers to intermarket product mobility. Secondly, there are transier costs for intermarket arbitrage. The magnitude of transportation costs sets the limit for intermarket price variation without arbitrage. The greater the cost of transportation, the lower will be the correlation between the two markets. Thirdly, institutional rigidities such as government restriction on free movement of commodities can be an additional barrier to perfect mobility and result in lower correlation between intermarket price formation. Fourthly, unless there is a highly standardized grading system, the conditions of perfect homogeneity of product are also not fulfilled. It is one of the most important factors and one that will almost always result in a low intermarket correlation of prices.

Price data coll ·ted during 1967-68 for comparable grades in the various markets studied were correlated. If any 2 markets did not have a common transaction day, then prices for the days nearest to each other during the same week were correlated. Since there are considerable differences in the basic characteristics between the markets in North Bengal and the district of Barisal, the results have been presented in 2 groups. Table 26 shows the matrix of correlation coefficients between the markets in North Bengal and the 3 terminal markets in Dacca. Table 27 presents the same information for the markets in Barisal and the 3 terminal markets in Dacca. Table 28 shows the frequency distribution of the regression coefficients. Although in the aggregate all the markets show significantly high correlation among their prices, certain important variations with respect to the individual markets are interesting and noteworthy.

a. Correlation among the 3 terminal markets is relatively lower than between them and the other intermediate and primary markets.

b. The secondary distribution markets have high correlation among themselves.

Table 26. **Correlation coefficient between prices of rice in 3 consuming markets in Dacca and 10 markets in Dinajpur, Rajshahi, and Bogra, 1967-68**

Markets	Phulbari	Birampur	Chirirbandar	Setabganj	Pirganj	Pulhat	Naogoan	Talora	Kaharole	Dhap	Matajee Hat	Terminal		
												Dacca	Madangonj	Narsingdhi
Phulbari	1.00	0.97	0.89	0.94	0.89	0.94	0.90	0.93	0.92	0.93	0.97	0.84	0.82	0.91
Birampur		1.00	0.90	0.94	0.90	0.94	0.93	0.93	0.92	0.94	0.95	0.88	0.85	0.86
Chirirbandar			1.00	0.71	0.93	0.96	0.94	0.94	0.94	0.85	0.91	0.89	0.89	0.86
Setabganj				1.00	0.90	0.86	0.78	0.84	0.86	0.83	0.96	0.78	0.80	0.74
Pirganj					1.00	0.93	0.93	0.92	0.93	0.87	0.93	0.92	0.92	0.92
Pulhat						1.00	0.74	0.94	0.92	0.83	0.96	0.77	0.81	0.87
Naogaon							1.00	0.85	0.90	0.81	0.90	0.74	0.82	0.82
Talora								1.00	0.92	0.91	0.93	0.90	0.93	0.85
Kaharole									1.00	0.87	0.88	0.70	0.81	0.86
Dhap										1.00	0.61	0.74	0.73	0.81
Matajee Hat											1.00	0.90	0.76	0.91
Dacca												1.00	0.81	0.86
Madangonj													1.00	0.74
Narsingdhi														1.00

Source: Correlation analysis based on data collected by field staff. Refers to prices for medium-grain rice.

Table 27. **Correlation coefficient between prices of rice in 3 consuming markets in Dacca and 9 markets in Barisal, 1967-68**

Markets	Banaripara	Betagi	Chamta	Neamati	Bogabandar	Botolbunia	Patuakhali	Lebukhali	Maukaran	Terminal		
										Dacca	Madangonj	Narsingdhi
Banaripara	1.00	0.76	0.90	0.93	0.95	0.85	0.94	0.92	0.93	0.87	0.78	0.80
Betagi		1.00	0.98	0.98	0.95	0.92	0.95	0.95	0.95	0.96	0.79	0.92
Chamta			1.00	0.95	0.93	0.91	0.96	0.91	0.91	0.93	0.77	0.86
Neamati				1.00	0.95	0.91	0.94	0.92	0.92	0.94	0.80	0.95
Bogabandar					1.00	0.89	0.96	0.88	0.87	0.91	0.83	0.91
Botolbunia						1.00	0.90	0.85	0.87	0.85	0.60	0.74
Patuakhali							1.00	0.92	0.92	0.91	0.83	0.91
Lebukhali								1.00	0.96	0.92	0.95	0.89
Maukaran									1.00	0.92	0.94	0.88
Dacca										1.00	0.81	0.86
Madangonj											1.00	0.74
Narsingdhi												1.00

Source: Correlation analysis based on data collected by field staff. Refers to prices for medium-grain rice.

Table 28. **Frequency distribution of correlation coefficients between rice markets in East Pakistan, 1967-68**

Range of "r"	Markets							
	Dacca & Barisal dists.	Dacca & N. Bengal dists.	Badamtali & Barisal	Badamtali & N. Bengal	Madangonj & Barisal	Madangonj & N. Bengal	Narsingdhi & Barisal	Narsingdhi & N. Bengal
	percent of "r" with indicated values							
.95+	24.0	5.5	11.11	0.00	10.0	0.0	9.1	0.0
.90-.94	40.9	4.4	66.66	27.3	10.0	16.7	27.3	23.07
.85-.89	18.18	20.9	22.20	18.18	0.0	16.66	36.4	46.15
.80-.84	7.57	15.38	0.0	9.1	40.0	50.1	9.1	15.4
.75-.79	4.54	4.39	0.0	18.18	30.0	8.3	0.0	0.0
.70-.74	3.03	8.79	0.0	27.27	0.0	8.3	18.2	15.4
.65-.69	0.00	0.00	0.0	0.00	0.0	0.0	00.0	0.0
.60-.64	1.50	1.09	0.0	0.00	10.0	0.0	0.0	0.0
.55-.59	0.00	0.00	0.0	0.00	0.0	0.0	0.0	0.0
Number of markets	12	14	10	12	11	13	12	14
Number of pairs	62	91	9	11	10	12	11	13

Source: Correlation analysis based on data collected by field staff. Refers to prices for medium-grain rice.

c. The terminal markets generally show lower correlation with the larger secondary markets than with the smaller ones. For example, nearly 78% of the time, the correlation between the Dacca market and the Barisal markets shows a coefficient above 0.9; 11% of that time, it is above 0.95. The coefficient is lower in only 2 markets, Banaripara and Botolbunia. The former is a large market while the latter is situated in a small out-of-the-way village. On the other hand, nearly 55% of the time the correlation with the markets in North Bengal is below 0.85, of which nearly 46% of the time the coefficient is below 0.80. The coefficient above 0.90 was for the relatively smaller markets.

Although one might argue about the statistical significance of such divergences between the coefficients, nevertheless the pattern has a noticeable uniformity and may not be just coincidences resulting from data problems. Moreover, these aspects show some variance from an earlier, similar work by Uma Lele in India (40:165). For example, she found that the correlation coefficient between rice prices in West Bengal was always higher than 0.95 and in some cases was as high as 0.99. She also found high correlation between the primary and the terminal markets. Her analysis of wheat prices in the Punjab shows similar results (40:53). On the other hand, her study of rice prices in Tamil Nadu shows lower correlation for all markets while the analysis for Jowar in Maharashtra displays a tendency of high correlation between the primary markets but a significantly lower correlation between the primary and terminal markets (40:114 & 23). Her justification for very high correlations between rice prices in West Bengal is that the prices used refer to the same variety in all the markets, giving more variety identity, whereas in Tamil Nadu the price refers to an aggregation of a number of varieties, resulting in poor grain identity. In conclusion, however, she said that "given the quality of data it will be stretching the point too far to claim that the lower correlations are due to varietal differences" (40:166).

The method by which different varieties were graded for comparability for this analysis has been stated. It is true that the price quotations used for this analysis do not refer to a particular variety but to a predefined set of grade standards and that prices were compared for identical grains belonging to any variety. If this nonspecification to variety is a factor in lowering the correlation coefficients, then all the coefficients between all the markets should have shown lower values.

It seems more logical to refer to the characteristics of the markets between which lower correlations are evident. A close look reveals that Dacca has lower correlations with the larger markets whether they are in Barisal or North Bengal. All these markets have 2 features in common: they are heavily dependent on large Aratdars and rice mills, and they have moderate to good storage facilities. On the other hand, the markets with which Dacca has high correlation represent a smaller set of markets in which large-scale processing facilities and (or) Aratdars are conspicuously absent. These factors could affect the correlation coefficient in 2 ways. First, the

presence of an Aratdar means slightly larger transfer costs because he has to be paid an additional commission. Second, in all the markets having this particular functionary, the distribution of market shares are significantly unbalanced. This might have some effect on the nature of the competition in these markets and consequently, prices may not always be the result of the forces of supply and demand.

Spatial Price Differentials

The price spread between costs and margins among the different markets in the system was analyzed. The procedure was to compute the parity price at the terminal markets at Dacca, Narsingdhi, and Madanganj by deducting it from the respective prices, the transportation, and other transfer costs involved in the movement of rice from different markets. Conceptually, whenever this parity price is higher than the price prevailing in the supply hinterland (markets), there should be arbitrage by traders. If we assume a competitive market model, the parity price in a receiving market is expected to be equal to the price in supplying markets.

Components of transfer costs

Under the existing institutional structure in the East Pakistan rice markets, we can envisage 3 distinct structures of transfer costs depending on the nature of the market functionary involved in arbitrage. The first situation is one in which the trader performing arbitrage has to depend on Aratdars both at the purchasing and selling centers for acquisition and disposal of his stock. The Aratdars, being commission agents, charge him commission at both ends, and the trader has a transfer cost function which is composed of the actual transportation charges, the actual handling charges, and 2 commissions.[8] The second variation is the case of a trader, who pays the same expenses but only one commission at the terminal market. This is true for most of the traders making direct purchases in the smaller markets where there is no Aratdar and where traders buy directly from the mills. The third variation is the Aratdar in the terminal market who purchases from other markets through his agents and then sells through his wholesale store in the terminal market. In this situation, transfer costs are lowest because the important elements of commission at the purchase and sales centers are not part of the cost function. Under the existing situation, the Aratdars at the terminal markets are the only market functionaries who can reap the benefits of this direct trading. However, although the Aratdar engaged in direct trading does not have to pay commissions, he incurs certain expenses for management and organization.

It is difficult to estimate the relative shares of these 3 types of arbitrage. However, to see the differences in market spread derived from differences in the type of functionary involved, 3 separate estimates were made in this analysis. Tables 29 and 30 give details of handling costs and commis-

[8]Handling charges here include weighing, packaging at purchasing center, cartage to carrier, and all other such incidentals involved in the receiving market.

Table 29. **Expenses involved in the purchase and sale in different markets, Dinajpur, Rajshahi, Bogra and Dacca districts**

Item of expense	Phul-bari	Chirir-bandar	Dhap	Kahar-ole	Matajee hat	Naogaon	Pulhat
Sewing, bagging & weighing			0.05*	0.06*	0.06*	0.06*	
Transport to carrier	0.20* (e)	0.20** (e)				0.10* (e)	0.20** (e)
Loading on carrier						0.05*	
Unloading from carrier	0.05	0.05				0.05	0.20
Transport to carrier	0.10	0.10				0.10	
Market charges	0.06*	0.05*	0.06	0.06*	0.10	0.05*	0.00
Depreciation on bags	0.05*	0.05*	0.05*	0.05*	0.05*	0.05*	0.05
a. Total handling charges:							
By buyer	0.15	0.15	0.06	0.00	0.10	0.15	0.20
By seller	0.31	0.30	0.10	0.16	0.11	0.31	0.25
b. General commission:							
By buyer	0.50	0.50	0.12	0.12	0.12	0.50	0.50
By seller	0.00	0.00	0.12	0.00	0.12	0.50	0.50
c. Total cost:							
By buyer	0.81	0.80	0.20	0.28	0.23	0.81	0.70
By seller	0.15	0.15	0.18	0.00	0.12	0.65	0.75

	Biram-pur	Pirganj	Setab-ganj	Talora	Badam-tali	Narsing-dhi	Madan-ganj
Sewing, bagging & weighing					0.06*	0.06*	0.06*
Transport to carrier	0.20** (e)	0.20** (e)	0.20** (e)	0.20** (e)	0.10*		
Loading on carrier					0.05*		
Unloading from carrier	0.05	0.05	0.05	0.05	0.05	0.05	
Transport to market	0.10	0.10	0.10	0.10	0.10	0.10	
Market charges	0.06*	0.06*	0.05*	0.06*		0.12*	0.05*
Depreciation on bags	0.05*	0.05*	0.06*	0.05*	0.05*	0.05*	0.05*
a. Total handling charges:							
By seller	0.15	0.15	0.15	0.15	0.15	0.15	0.00
By buyer	0.31	0.31	0.31	0.31	0.26	0.23	0.16
b. General commission:							
By buyer	0.50	0.25	0.25	0.50	0.25	0.50	0.25
By seller	0.00	0.25	0.25	0.25	0.50	0.50	0.50
c. Total cost:							
By buyer	0.81	0.56	0.56	0.81	0.51	0.73	0.41
By seller	0.15	0.40	0.40	0.40	0.65	0.65	0.50

Notes: (a) Does not include transportation charges to point of dispatch.
(b) Rupees per maund (82.286 lbs).
(c) * indicates expense incurred by buyer.
(d) ** may be incurred by either buyer or seller.
(e) Aggregate of first 3 items.

Source: Data collected during survey of rice markets.

Table 30. **Expenses involved in purchase and sale of rice in different Barisal markets**

Items of expense	Banar-ipara	Neamati, Betagi, Chamta	Boga, Botal-bunia	Galach-ipa, Ulania	Lebukhali & Maukaran	Patuak-hali
Sewing, bagging & weighing		0.06*	0.06*	0.05*	0.06*	0.06*
Transport to carrier	0.17* (e)					
Loading on carrier						
Unloading from carrier	0.10					
Transport to market						
Market charges	0.05*	0.05*	0.05*	0.06*	0.05*	0.05*
Depreciation on bags	0.05*	0.05*	0.05*	0.05	0.05*	0.05*
a. Total handling charges:						
By seller	0.10	0.00	0.00	0.00	0.00	0.00
By buyer	0.27	0.15	0.16	0.16	0.16	0.16
b. General commission:						
By buyer	0.25	0.12	0.12	0.12	0.12	0.12
By seller	0.25	0.12	0.12	0.12	0.12	0.12
c. Total cost:						
By buyer	0.52	0.28	0.28	0.28	0.28	0.28
By seller	0.35	0.12	0.12	0.12	0.12	0.12

Notes: (a) Does not include transportation charges to point of dispatch.
(b) Rupees per maund (82.286 lbs).
(c) * indicates expense incurred by buyer.
(d) ** may be incurred by either buyer or seller.
(e) Aggregate of first 3 items.

Source: Data collected during survey of rice markets.

sions as they prevail in the different markets. The functionary on whom the incidence of the cost falls is also given. This table shows the actual handling costs (including commission) a trader would incur in transferring 1 maund of rice from one market to another. For example, to transfer 1 maund from Banaripara to Dacca, the trader would have to pay all of the expenses as a buyer in the Banaripara market (0.52), and the expenses as a seller in Dacca (0.65), plus the actual transport costs.

Tables 31 and 32 give the matrix of transportation cost between the different markets.

Based on these cost figures the total cost of transfer between the different markets was computed. From that the parity price at different markets in relation to the others was computed as follows:

$$A_{ij} = P_i - (Hc_{ij} + Tc_{ji} + Gc_i + Gc_j)$$

where

A_{ij} = parity price of 1 maund of rice in the ith market in relation to the jth market.

P_i = wholesale price of 1 maund of rice at the ith market.

Hc_{ji} = all handling charges (except commission incurred in moving 1 maund of rice from the jth to the ith market.

Tc_{ji} = actual transportation cost for moving 1 maund of rice from the jth to the ith market.

Gc_i = general commission charged by Aratdar at the ith market.

Gc_j = general commission charged by Aratdar at the jth market.

The actual price spread between any 2 markets would be:

$$Sp_{ij} = A_{ij} - P_j$$

where

Sp_{ij} = price spread between the ith and the jth market.

P_j = price in j^{th} market.

In a competitive model A_{ij} shall always be equal to P_j. Tables 33, 34, 35, and 36 present the frequency distribution of the price spread between the 3 terminal markets in Dacca and the various interior markets in the North Bengal and Barisal districts.

Except for the market at Pirganj in the Dinajpur district, Dacca shows a positive margin more than 90% of the time with respect to the markets in the northern districts. Observing the specific markets, we find that the margin varied between 0% and 9% of the price at the milling center at Pulhat 78% of the time, under 2 assumptions: first, that the trader had to use commission agents at both ends and that a direct deal between the trader at Dacca and the millers at Pulhat existed. However, under the latter assumption, 15% of the time the margin was between 10-19%. On an average it appears that the margin as a percentage of wholesale price at the other larger markets like Phulbari, Birampur, Naogaon, Chirirbandar, Talora, and Setabganj lies between 0% and 14% about 70-75% of the time. The incidences of higher margin are insignificant. The patterns in the smaller markets, like Dhap and Matajee Hat are slightly different but not of great significance.

The price spreads between Dacca and the markets in Barisal show, on the aggregate, positive spreads for about 80% of the time. The negative spread ranges from a low of 9% (in Boga) to a high of 15.7% (in Betagi). The spread is positive 87% of the time between Banaripara and Patuakhali. From 75-80% of the time the price spread between Dacca and the markets at Banaripara, Bogabander, and Patuakhali was between 0% and 15%; 10-20% of the time it was between 15% and 30%. For 60-65% of the time the spread in the smaller markets such as Betagi, Botolbunia, and Lebukhali was in the range of 0% to 15%, and for 20-25% of the time the spread was between 15% and 30%. The market at Galachipa shows a higher marketing spread mainly because it is a distant, isolated area. As a matter of fact, it does not dispatch any significant quantity of rice outside its own consumption area. This is evidence of the positive relationship between transport facilities and market perfection.

Table 31. **Cost of transporting rice to Dacca, Madanganj, and Narsingdhi from 11 markets in North Bengal, 1967-68**

Terminal markets	Dinajpur							Bogra		Rajshahi	
	Biram-pur	Phul-bari	Chirir-bandar	Pulhat	Pir-ganj	Kaharole	Setab-ganj	Talora	Dhap	Naog-aon	Matajee Hat
	rupees per maund										
Dacca	1.10	1.13	1.15	1.20	1.30	1.70	1.29	0.83	1.05	1.20	1.60
Madanganj	1.25	1.28	1.25	1.40	1.45	1.90	1.40	0.90	1.15	1.25	1.75
Narsingdhi	1.10	1.10	1.10	1.29	1.35	1.80	1.27	0.85	1.15	1.10	1.60

Source: Data collected by field staff.

Table 32. **Cost of transporting rice to Dacca, Madanganj, and Narsingdhi from 8 markets in Barisal, 1967-68**

Terminal markets	Banar-ipara	Betagi	Boga	Botolbunia	Galachipal	Lebukhali	Patuakhali	Neamati
	rupees per maund							
Dacca	0.62	1.30	1.30	1.40	2.00	1.50	1.40	1.10
Madanganj	0.62	1.30	1.30	1.40	2.00	1.50	1.50	1.30
Narsingdhi	0.75	1.60	1.50	1.75	2.20	1.70	1.60	1.30

Source: Data collected by field staff.

Table 33. **Frequency distribution of price spread between Dacca and North Bengal markets, 1967-68**

Spread as % of price in N. Bengal markets	North Bengal markets																	
	Birampur			Chirirbandar			Dhap			Kaharole			Matajee Hat			Naogaon		
	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
	frequency expressed as percentage																	
-15 & -11										4.3	4.3	4.3						
-10 & -6				17.0	11.3	11.3				2.2	2.2		4.3	4.3	4.3	7.8	3.9	3.9
-5 & -1	5.7	3.8	3.8	30.2	32.1	26.4	12.5	12.5	10.4	19.6	19.6	21.7	4.3	4.3	2.1	13.7	15.7	13.7
0 & 4	17.0	15.1	11.3	30.2	28.3	32.1	18.8	18.8	18.8	19.6	17.4	15.2	31.9	23.4	19.1	23.5	17.6	15.7
5 & 9	28.3	28.3	26.4	11.3	17.0	18.9	31.3	27.1	25.0	37.0	39.1	34.8	31.9	36.2	36.2	39.2	47.1	49.0
10 & 14	26.4	30.2	32.1	7.5	7.5	6.5	27.1	29.2	25.0	110.9	10.9	17.4	19.1	23.4	25.5	3.9	3.9	3.9
15 & 19	13.2	13.2	11.3	3.8	3.8	3.8	8.3	8.3	16.7	4.3	4.3	4.3	4.3	4.3	8.5	2.0		2.0
20 & 24	5.7	5.7	11.3				2.1	4.2	2.1	2.2	2.2	2.2	4.3	4.3	4.3	3.9	5.9	3.9
25 & 29	1.9	1.9							2.1							3.9	2.0	3.9
30 & 34	1.9	1.9	3.8													2.0	3.9	3.9
35 & 39																		
40 & 44																		
45 & 50																		

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Table 33. (Continued)

Spread as % of price in N. Bengal markets	North Bengal markets														
	Phulbari			Pulhat			Talora			Pirganj			Setabanj		
	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
	frequency expressed as percentage														
-15 & -11										10.6	7.9	5.0			
-10 & -6										13.2	13.2	13.2			
- 5 & -1	15.1			13.5	5.8	5.8				23.7	23.7	18.4	14.9	12.8	10.6
0 & 4	9.4	11.3	7.5	53.8	59.6	50.0	15.4	13.5	11.5	23.7	26.3	34.2	48.9	46.8	44.7
5 & 9	41.5	9.4	13.2	25.0	25.0	28.8	26.9	25.0	25.0	15.8	13.2	7.9	21.3	25.5	27.7
10 & 14	18.9	35.8	34.0	7.7	7.7	13.5	26.9	28.8	28.8	10.5	13.2	15.8	10.6	8.5	10.6
15 & 19	8.4	24.5	24.5		1.9	1.9	25.0	26.9	26.9	0.0		2.6	2.1	4.3	4.3
20 & 24	1.9	13.2	13.2				3.8	3.8	5.8	2.6	2.6	2.6			
25 & 29	3.8	1.9	3.8				1.9	1.9	1.9						
30 & 34		1.9	1.9												
35 & 39		1.9	1.9												
40 & 44															
45 & 50										2.1			2.1	2.1	2.1

Notes: (a) Price spread estimated assuming commission at both ends.
(b) Price spread estimated assuming commission at one point only.
(c) Price spread estimated assuming no commission paid.

Source: Based on data collected by field staff.

Table 34. **Frequency distribution of price spread between Narsingdhi and North Bengal markets, 1967-68**

Spread as % of price in N. Bengal markets	North Bengal markets																	
	Birampur			Chirirbandar			Dhap			Kaharole			Matajee Hat			Naogaon		
	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
	frequency expressed as percentage																	
-15 & -11				7.7	5.8	3.8				6.6	6.6	6.7						
-10 & -6				19.2	17.3	11.5				2.2	2.2	2.2	6.4	6.4	2.1	6.0	6.0	
-5 & -1	7.7	5.8	3.8	34.6	34.6	32.7	18.8	18.8	8.3	20.0	17.8	11.1	19.1	17.0	14.9	24.4	22.0	20.0
0 & 4	34.6	28.8	21.2	19.2	21.2	30.8	39.6	37.5	35.4	37.8	40.0	37.8	25.5	27.7	27.7	36.0	38.0	34.0
5 & 9	32.7	36.5	42.3	15.4	15.4	15.4	31.3	31.3	39.6	17.8	17.8	26.7	31.9	31.9	25.5	18.0	12.0	16.0
10 & 14	19.2	23.1	25.0	3.8	5.8	1.9	4.2	6.3	8.3	8.9	6.7	6.7	14.9	14.9	27.7	12.0	18.0	22.0
15 & 19	3.8	3.8	3.8			3.8	4.2	4.2	6.3	6.7	8.9	8.9	2.1	2.1	0.0			4.0
20 & 24	1.9	1.9	3.8				2.1	2.1	2.1						2.1	4.0	4.0	4.0
25 & 29																		
30 & 34																		
35 & 39																		
40 & 44																		
45 & 50																		

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Table 34. (Continued)

Spread as % of price in N. Bengal markets	North Bengal markets														
	Phulbari			Pulhat			Talora			Pirganj			Setabanj		
	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
	frequency expressed as percentage														
-15 & -11				9.8	7.9	4.0				31.6	26.3	25.9	6.5	6.5	6.5
-10 & -6	3.8	1.9	1.9	31.4	33.3	31.4	1.9	1.9	1.9	10.5	13.2	13.2	21.7	21.7	15.2
-5 & -1	9.6	9.6	1.9	33.3	21.6	23.5	19.2	15.4	9.6	39.5	39.5	21.1	34.8	26.1	28.3
0 & 4	44.2	40.4	32.7	17.6	29.4	31.4	39.5	42.3	38.5	18.4	18.4	34.2	26.1	30.4	34.8
5 & 9	28.8	26.9	32.7	5.9	3.9	3.9	32.7	32.7	36.5		2.6	5.3	4.3	8.7	8.7
10 & 14	9.6	17.3	25.0	2.0	3.9	5.9	3.8	3.8	9.6				6.5	6.5	6.5
15 & 19	1.9	1.9	1.9				3.8	3.8	1.9						
20 & 24	1.9	1.9	3.8						1.9						
25 & 29															
30 & 34															
35 & 39															
40 & 44															
45 & 50															

Notes: (a) Price spread estimated assuming commission at both ends.
(b) Price spread estimated assuming commission at one point only.
(c) Price spread estimated assuming no commission paid.

Source: Based on data collected by field staff.

Table 35. **Frequency distribution of price spread between Dacca, Narsingdhi, and Madanganj and 7 markets in Barisal (assuming commission at both ends), 1967-68**

Spread as % of price in Barisal	Barisal markets																							
	Banaripara			Betagi			Boga			Botolbunia			Galachipa			Lebukhali			Patuakhali		
	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
	frequency expressed as percentage																							
-20 & 16																								
-15 & 11		1.9	5.7		4.0	5.9			4.6		6.0	4.0									4.4
-10 & -6		9.6	5.7		2.0	3.9		4.7	4.5		4.0	9.8						1.9		8.9	2.2
-5 & -1		26.9	3.8		14.0	3.9	4.5	25.6	15.9	2.0	16.0	0.0						5.8	4.4	22.2	0.0
0 & 4	13.2	25.0	7.5	15.7	34.0	5.9	4.5	34.9	20.5	9.8	14.0	7.8					9.6	9.6	8.9	31.1	8.9
5 & 9	35.8	17.3	24.5	19.6	26.0	15.7	38.6	25.6	43.2	21.6	38.0	19.6		4.1	4.0	19.0	21.2	17.3	37.8	28.9	40.0
10 & 14	22.6	7.7	32.1	21.6	14.0	23.5	22.7	2.3	6.8	25.5	16.0	27.5		4.1	10.0	23.1	38.5	19.2	26.7	8.9	33.3
15 & 19	17.0	5.8	7.5	15.7	20.0	27.5	18.2	7.0	2.3	19.6	2.0	15.7		8.2	4.0	21.2	17.3	21.2	17.8		11.1
20 & 24	3.8	1.9	11.3	23.5	4.0	11.8	6.8			9.8	2.0		4.0	22.4	2.0	25.0	9.6	11.5	4.4		
25 & 29	7.5	3.8	1.9	2.0		2.0	4.5			7.8	2.0		6.0	20.4	4.0	9.6	1.9	7.7			
30 & 34				2.0						2.0			20.0	10.2	10.0	1.9	1.9	1.9			
35 & 39													18.0	16.3	16.0		0.0	3.8			
40 & 44										2.0	2.0		38.0	10.2	30.0						
45 & 50													8.0	2.0	14.0						
													2.0	0.0	4.0						

Notes: (a) Dacca
(b) Narsingdhi
(c) Madanganj

Source: Based on data collected by field staff.

Table 36. **Frequency distribution of price spread between Dacca, Narsingdhi, and Madanganj and 7 markets in Barisal (assuming no commission paid), 1967-68**

Spread as % of price in Barisal	Barisal markets																				
	Banaripara			Betagi			Boga			Botolbunia			Galachipa			Lebukhali			Patuakhali		
	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
	frequency expressed as percentage																				
-20 & -16			1.9		4.0	5.9			4.6		6.0	4.0									
-15 & -11		7.7	9.4		4.0	3.9		2.3	2.3			7.8						1.9		2.2	1.9
-10 & -6		25.0	3.8		6.0	2.0	4.5	18.6	2.3		12.0	2.0					7.7	5.8	4.4	28.9	5.8
-5 & -1	9.4	15.4	5.7	11.8	40.0	3.9	4.5	27.9	11.4	7.8	16.0	7.8		2.0	4.0		13.5	3.8	2.2	20.0	3.8
0 & 4	30.2	23.1	17.0	19.6	20.0	17.6	36.4	32.6	25.0	17.6	36.0	17.6		6.1	8.0	17.3	44.2	15.4	40.0	37.8	15.4
5 & 9	26.4	15.4	34.0	17.6	18.0	19.6	15.9	9.3	38.6	25.5	18.0	21.6		8.2	6.0	23.1	17.3	25.0	22.2	8.9	25.0
10 & 14	18.9	3.8	11.3	19.6	8.0	29.4	25.0	4.7	11.4	19.6	6.0	23.5	4.0	8.2	0.0	23.1	7.7	15.4	22.2	2.2	15.4
15 & 19	7.5	5.8	13.2	23.5	4.0	11.8	9.1	4.7	4.5	17.6	2.0		6.0	32.7	2.0	21.2	5.8	15.4	8.9		15.4
20 & 24	3.8		3.8	3.9		5.9	4.5			7.8	4.0		16.0	6.1	8.0	9.6	3.8	11.5			11.5
25 & 29	3.8	3.8		3.9						2.0		7.8	12.0	16.3	18.0	5.8		1.9			1.9
30 & 34												5.9	38.0	14.3	24.0			1.9			1.9
35 & 39												2.0	16.0	4.1	20.0			1.9			1.9
40 & 44													4.0		6.0						
45 & 50													4.0	2.0	4.0						

Notes: (a) Dacca
(b) Narsingdhi
(c) Madanganj

Source: Based on data collected by field staff.

The price spreads between Narsingdhi and the markets in North Bengal show a situation different from the one in Dacca. In this case, we find that in a large number of instances there existed a negative price spread which was even greater in the case of the markets situated in North Dinajpur. For example, the spread with Pulhat was between −15% and −1%, 75% of the time, with Chirirbandar and Setabganj, 62% of the time and with Pirganj, nearly 81% of the time. Except for the markets at Phulbari (negative for 10% of the time) and Birampur (negative for 7% of the time), most of the markets provided an unfavorable margin for shipment to Narsingdhi. These figures are determined with the assumption that trading was done by traders through Aratdars at both ends. Narsingdhi displays this tendency in its relationship to the markets in Barisal also although to a much lesser degree.

For certain markets in North Bengal, Madanganj shows a negative spread for 3 to 7% of the time, only. These markets are Birampur (negative for 3.8% of the time), Matajee Hat (negative for 6.4% of the time), Naogaon (negative for 7.8% of the time) and Phulbari (negative for 7% of the time). On the other hand, there is another set of markets in North Bengal, for example, Pulhat (negative 43% of the time), Chirirbandar (negative 30% of the time), Pirganj (negative 46% of the time), and Setabganj (negative 30% of the time) where there are significant incidences of negative spread. When the spread was positive, 75% of the time it was below 15% of the wholesale price at Bhultari, 65% of the time below 15% of the wholesale price at Birampur, 65% of the time below 15% of the price at Chirirbandar and Pulhat, 76% of the time below 15% of the price at Naogaon and Matajee Hat. The incidences of spread higher than 20% were insignificantly low.

The pattern of price spread between Madanganj and the markets in Barisal also display the same characteristics: for a large number of times the price spread is negative, while the positive price spreads are mostly confined between 0% and 15% of the price at the intermediate/primary markets.

Interpretation of the Computed Price Differentials

This analysis of the price spreads between the 3 Dacca markets and the different markets in Barisal and North Bengal raises 3 important questions:

a. What is the significance of a negative price spread and how does it relate to the real situation in terms of traders' profit and intermarket movement of rice?

b. Given the hypothesis that competition is always less than perfect, price spreads between markets will always be higher than the transfer costs. However, the important policy issue in question is whether the positive price spreads are wide enough to indicate gross structural imperfections leading to inefficiencies in the pricing mechanism.

c. Finally, what are the policy implications vis-a-vis the wide spread and whether the efforts and costs are worth the end?

The first question raises the issue of whether the traders perform arbitrage during periods of negative margins and thereby incur losses. It seems that there is no practical way of giving a general answer to these problems and yet be consistent with economic rationale especially when the observer is not immune from biases in the data. The only realistic alternative is to analyze the specific instances with reference to the specific circumstances.

The intermarket price spread between Dacca and the North Bengal and Barisal markets is positive for a significant number of times and is of a moderate magnitude. It may be that a nonstandardized grading system caused random errors in the data.

The instances of negative spread in the case of Narsingdhi and North Bengal display 2 distinct patterns: the greater proportion of negative spread is in the markets of North Dinajpur, which are not the usual sources of supply to this market. On the other hand, in the markets that usually make significant supplies to Narsingdhi, like Phulbari, Birampur, Talora, and Naogaon, the negative spread is much less evident.

It should, however, be noted that the North Dinajpur markets show more negative spread, both with Dacca and Narsingdhi, as well as Madanganj. These are the more important markets in an area that has a demand all over East Pakistan.

It seems highly improbable that continuing negative margins between primary, intermediate, and terminal markets would continually encourage intermarket commodity transfer. To assume that a trader actually moves commodities during those periods and continually suffers losses is a negation of the basic concept of economic rationale. On the other hand, the rice traders are extremely competent and experienced business men with excellent province-wide market information. Therefore, the margin of error in their selection of markets for arbitrage is also very small. Hence we can assume that during the periods in which the negative spread between markets is excessive, there is no significant movement between them and therefore the question of traders incurring losses during those times does not arise. This observation is further strengthened by an analysis of the shipping patterns between these markets for the identical period, which shows that there was not much arbitrage between the markets that displayed negative margins.

The question of losses becomes more relevant in the markets where negative price spreads occur erratically. The negative price spreads between Dacca and some markets are examples of such instances. These are extremely short-term phenomena of very little magnitude. In such cases the prospect of loss by the trader is probably remote. It takes several weeks for a consignment from North Bengal to reach Dacca. If, at a particular time, a consignment is purchased at an unfavorable price, it does not necessarily represent a net loss because by the time the consignment reaches its destination the market there may have recovered its own level.

Whether the wide positive margins are adversely affecting pricing efficiency, particularly in terms of resource allocation and income distribution,

is a more important and broader policy issue. Detailed analysis of these aspects are outside the scope of this study. However, the small erratic spurs of positive margins probably do not affect signalling and income distribution in any significant way. The only real effect may be an increased profitability of a certain number of traders who happened to be arbitraging at those times. Secondly, negative margins between certain markets may be an indication of inefficiencies in handling, transportation, storage and other environmental weaknesses. These situations call for increased investments in developing the infrastructure for marketing services, thereby strengthening the competitive forces in the system.

The normative and ethical issues of whether the traders are exploiting the consumers and producers through monopolistic profiteering have to be judged in consideration of the methods by which such profits are estimated. For several reasons the customary methods for computing the intermarket price spread may not be the most desirable way to estimate the traders' profit-loss balance sheets. Price data used for intermarket comparisons represent an average of all transactions and have no reference to any particular consignment. This comparison provides certain information regarding the average tendencies of intermarket prices with reference to transfer costs, but this information is not adequate for constructing the profit-loss account for traders. More importantly, the analysis does not take into consideration the value and remuneration of the traders' skill and expertise. In a situation where we depart from the norms of perfect competition which clearly set the limit of intermarket price differentials, any judgment on the question of too wide and monopolistic intermarket price spreads has to be entirely arbitrary.

However, it seems that a marketing margin, which is about 15 to 20% of the price at the point of origin and on a transaction that is completed in a month, shows a gross rate of return that is significantly high to warrant further investigations.

Chapter VI. Pricing Efficiency in the Marketing System: The Nature of Temporal Price Relationships

The third measure of pricing efficiency used in the present analysis relates to the seasonality of rice prices and its relationship to storage costs. In the absence of structural or environmental imperfections, price differentials through time should not exceed the total costs involved in carrying a stock through the storage period. The usual procedure is to compare the prices at both ends of the assumed period of storage after discounting the end price by the estimated storage costs. The correct identification and quantification of the actual per unit costs of storage, as well as delineation of the storage period, are the crucial facets of this analysis. An examination of the extent of temporal price variations in the different rice markets of East Pakistan will follow an identification and quantification of the parameters of storage costs.

Description of a Storage Period[9]

In defining a storage season various factors must be considered. First, it is heavily dependent on the seasonal pattern of production and the relative importance of the different seasons in the total volume of production. For a commodity with a fairly stable and evenly distributed consumption demand throughout the year, the crop season that supplies the greatest proportion of the total annual output would be the most relevant determinant of the storage period. Secondly, the physical facilities of storage and the products' resistance to deterioration in quality over time are very important determinants of the storage season. The third factor is the stockers' expertise in anticipating the supply and demand variables at different points of time in the future. Linked with this ability to anticipate supply and demand are the questions of business risk, uncertainty, and profitability. The fourth and in some respects the most overriding factor is the institutional rigidity resulting from government policies toward storage practices.

In a previous chapter the seasonal pattern of rice production has been discussed. To recapitulate: the Aman crop, harvested from November to early January, is the major rice crop and is followed by a small crop harvested during March and April and a relatively larger crop of Aus harvested during the summer. Except for the Boro-growing districts of Sylhet and Mymensingh, the harvest of Aman has to be stored and marketed until the Aus variety comes on the market after 7 or 8 months. In such areas the logical storage period would be about 8 months. However, since Aus is not a major crop in quantitative terms, its appearance in the markets in July and August does not perceptibly affect prices. The traders have no business reason to unload their stocks of Aman rice (in addition to some Boro) to coincide with the Aus harvest. On the other hand, because of high prices during July and August and the impending Aman harvest, farmers usually sell their Aus crop immediately after the harvest. Thus the traders can carry their stock from post-Aman harvest through both the Boro and Aus harvest and unload it during the preharvest months of September, October, and November. A look at the price situation during those months reveals almost weekly fluctuations and a definite, although not strong, downward pressure on the price level.

The primitive way of storing rice in East Pakistan discourages a storage period of more than 8 to 10 months. Quality then diminishes because facilities are damp, lacking in proper aeration and fumigation, and are located in a warm, humid climate. This is further accentuated by the high moisture content of the grain caused by poor drying facilities. Studies on optimum storage conditions show that if stored rice has a moisture content

[9]Theoretically, however, the question of defining a storage period for rice traders in East Pakistan does not arise at all because the government restricts rice storage to just 7 days by any trader (15 days for paddy stored by a bona fide processor). However, this may not be fully operative to the extent of altering the length of storage season significantly, although it might have some effect on the modus operandi by the traders as to storage practices.

exceeding 14% (13% for paddy), the temperature is higher than 77° F., and relative humidity is above 74%, the metabolism of grain tissues and growth of microorganisms are inescapable.[10] The traders in East Pakistan, though unsophisticated, are fully aware of this potential source of the qualitative and quantitative loss of stored grain, and most of them said that they unload their stocks after no more than 8 or 9 months' storage. Finally, from past experiences the traders anticipate that prices in the postharvest months will be significantly lower than in September, October, and November.

These factors indicate little likelihood of carrying the stocks into the next crop season and that there is only one important storage period extending from December and January to October and November. For our analysis we shall study the seasonal price of rice under the assumptions of 4 alternative storage periods: 9, 10, 11, and 12 months.[11]

Monthly Production-Consumption Balance and Optimal Storage Pattern: An Analysis for the Period 1959-60 to 1967-68

In this section we attempt to construct a month-end inventory of rice supplies from domestic production and to relate it to a possible farmers' and private traders' storage pattern. Several assumptions were made in constructing this balance. First, the total production of Aus, Aman, and Boro were apportioned to the different months during which these crops are harvested. It was assumed that: 10% of the Aus crop is harvested in June, 20% in July, and 70% in August; 30% of the Aman crop is harvested during November, 60% in December, and 10% in January; and 10% of the Boro crop is harvested in March, 70% in April, and 20% in May. Secondly, it was assumed that one-ninth of the product is used on farm for nonhuman consumption, 89% of the population represents effective consumption units, and thirdly, 0.16 ton is consumed annually by each person.

Based on these assumptions the month-end inventories for the period under consideration were constructed and the results are presented in table 37. It shows that from the month of May, the production and consumption balance from current production begins to be negative, and except for the last 3 years of the period analyzed, October is the month when the deficit is largest. Conversely, December is the month with the highest net surplus from domestic production. Except for minor exceptions, December, January, February, March, and April are the 5 months when there is a positive production–consumption balance for the whole province.

This analysis leads to several conclusions. First, the most logical period for traders to begin storage operations is in December, January, February,

[10]Technically these measures are known as hygroscopic equilibrium.

[11]The 12-month period extends from December to November, the 11-month periods from December to October and January to November, the 10-month periods from January to October and February to November, and the 9-month period from February to October.

Table 37. **Monthly production consumption balance**
East Pakistan, 1959-60 to 1967-68

Month	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68
	million tons								
June	571	883	- 465	315	966	334	+ 197	+ 874	107
July	854	1 109	740	631	1 217	634	048	+ 567	968
August	196	213	+ 034	+ 043	273	+ 192	+ 1 791	+ 1 464	+ 752
September	855	889	661	669	1 003	558	+ 1 020	+ 676	062
October	1 514	1 565	1 355	1 381	1 733	1 408	+ 249	112	876
November	556	- 468	259	- 455	492	+ 086	+ 1 314	+ 693	+ 146
December	+ 2 018	+ 2 402	+ 2 629	+ 2 109	+ 2 720	+ 3 287	+ 4 215	+ 3 091	+ 3 001
January	+ 1 898	+ 2 317	+ 2 534	+ 1 942	+ 2 646	+ 3 192	+ 4 056	+ 2 836	+ 2 802
February	+ 1 239	+ 1 641	+ 1 840	+ 1 230	+ 1 916	+ 2 412	+ 3 285	+ 2 048	+ 1 988
March	+ 611	+ 1 006	+ 1 190	+ 561	+ 1 232	+ 1 743	+ 2 559	+ 1 335	+ 1 184
April	+ 166	+ 614	+ 805	+ 151	+ 823	+ 1 352	+ 2 103	+ 1 070	+ 1 069
May	432	+ 019	+ 199	475	+ 191	+ 705	+ 1 422	+ 431	+ 455

Notes: See text for method of derivation. It was assumed that a net deficit of .100 million tons was carried into June 1959-60.
+ = surplus
- = deficit

March, and April when the supplies from domestic production are plentiful and prices are low. Secondly, a good Aus crop has some effect on the overall supply, storage, and price situation, while Boro does not. And thirdly, the period from July to October is the optimum time for government operation of buffer stock to break the production–consumption deficit cycle and hence rising market prices.

Components of Storage Costs

Rent of facilities

Estimation of per unit rent is difficult for several reasons. First, most storage facilities are usually in the same structure as the trader's office and the living quarters of some employees. Secondly, the traders usually own the facilities. Consequently, such questions as opportunity cost, imputed value, and repair costs arise, and it is difficult to obtain correct assessment of these items. Thirdly, without information on the actual quantities stored, estimates of rent per unit is at best an approximation based on capacity. Fourth, it is difficult to take account of the expenses involved in the labor costs of supervision, handling, and protection because a number of the personnel who perform these functions are also engaged in other unrelated functions. And finally, for traders who use the same premises for storing a variety of produce and merchandise, estimates of rent incurred for individual products become complicated. As such the estimates of godown rents have been arrived at by some rough approximations and calculations based on discussions with a cross-section of traders. It comes to about .09 rupee per month per maund of rice. This figure is close to the

one estimated by the Pakistan Department of Marketing Intelligence and Agricultural Statistics, according to which an average 0.05 rupee is incurred as actual godown rent and 0.03 rupee as miscellaneous handling charges including loading and unloading (54:68).

Interest on capital

In ascertaining the rate of interest that should enter into storage cost the question of the type of storage functionary and the sources of the invested funds become relevant. Determining the cost of capital depends on this. Several alternatives are open: one could assume that the opportunity cost of such traders' capital is simply the rate of interest allowed by commercial banks on deposits (in Pakistan about 5%), or that the rate charged by the banks on short-term advances (in Pakistan about 8%) is the appropriate one. Others argue that it is the rate of interest prevailing in the private money-lending business that should be taken into account. However, as already mentioned, in the absence of more detailed information on the actual sources of finance for storage operation by traders, these estimates have very little practical value. Therefore, in this analysis a rate of interest of 9% per annum (slightly higher than the bank rate and lower than the private money-lending rate), has been used as a reasonable approximation of the opportunity cost of the traders' investable funds.

Depreciation of the bag

This is the most arbitrary of the estimates because no one knows the actual life span of gunny bags or how long the traders use them. Based on the price for a new gunny bag (which is between 1.4 and 1.6 rupees per bag), and the traders' estimates (approximation) of the resale value, and similar estimates made by other researchers, it was assumed that 0.06 rupee per month would be a reasonable rate of depreciation (54,40).

Losses in storage

The potential in-store losses are both qualitative and quantitative. Qualitative losses are strictly the result of deterioration in grain quality, such as discoloration and odor. Quantitative losses may occur from actual destruction of grains by rodents, insects, or weevils, as well as from actual loss in weight from dehydration of the grains.

Qualitative losses in private storage do not seem to be an important factor in storage operation, according to the consensus of East Pakistan traders. Most of the traders can determine how long the grain will retain its proper qualitative aspects just by examining the stock. The traders reported that they select only those lots of supplies for storage that pass their visual and sensory tests of storability. In general, rice that is processed (parboiled and dried) under less than optimum conditions, deteriorates faster. The rice from the larger mills usually has better storability. Secondly, the rice that is polished or has the bran removed is susceptible to faster quality deterioration.

A great number of reports and publications emphasize the large quantity loss of grains in storage in underdeveloped countries. The damage is usually attributed to insects, rats, rodents, and other such biological agents. However, interviews with traders show that they were not concerned about or even aware of any significant losses arising from insects and rodents. Most traders believe that they cannot be more than 2½% or 3% per annum. Without a specific study to determine the extent of such quantitative losses, it seems reasonable to accept the estimates offered by the majority of the traders. Quantity loss from dehydration is indeterminable, since the grain releases moisture during the dry season and absorbs moisture in the rainy season, therefore possibly balancing out in the end. It is assumed that an estimated 3% storage loss represents all forms of loss as mentioned above under normal circumstances.

The actual seasonal price increase in the various markets may be computed in the following manner:

$$E(P_{ti}) = Pt_o + t\,(R+I+L+D)$$

where

- P = price of 1 maund of rice stored.
- E(P) = expected price per maund of rice stored.
- t = time (in month; i = 0 to 12 months).
- R = godown rent per maund of rice stored (0.09 rupee).
- I = interest on capital needed for the purchase of 1 maund of rice for storage (9% per annum).
- L = quantity lost over time (3% per annum).
- D = depreciation on sacks (0.06 rupee).

and $SRP_{ti} = P_{ti} - E(P_{ti})$

where SRP_{ti} = net seasonal increase in price at period ti.

Under assumptions of perfect competition SRP_{ti} will be equal to O, which implies that the seasonal rises in price are just equal to the computed cost of storage.

The results of the analysis have been presented in a series of tables and graphs in the following pages. Table 38 shows the net increase in price at the end of the assumed storage periods in the different markets in Barisal. Table 39 presents the same information for some markets in North Bengal and the markets at Dacca, Narsingdhi, and Madanganj. Table 40 shows the extent of seasonal price increase in the Dacca market from 1966 to 1968. Under all 3 assumptions of the possible storage periods, seasonal price increases are significantly high. The period beginning with March offers highest per unit return if net return to investment in storage is defined as the net increase in price in period t_i in relation to t_o. November marks the lowest point in net seasonal price differences. Figures 7, 8, and 9 show the relationship between seasonal price increase and storage costs in 12 markets in East Pakistan during 1967-68.

Table 38. **Seasonal increase in price expressed as percentage of expected price under alternative assumptions of storage period**
Barisal markets, 1967-68

Market	t_0 = December			t_0 = January			t_0 = February			t_0 = March		
	Sept.	Oct.	Nov.	Sept.	Oct.	Nov.	Sept.	Oct.	Nov.	Sept.	Oct.	Nov.
	percent											
Banaripara	29.1	28.8	18.4	29.4	28.9	18.5	37.2	36.7	25.6	53.4	52.8	40.3
Betagi	30.4	34.0	23.0	34.6	37.5	26.3	27.7	44.0	32.1	44.0	47.1	34.9
Botolbunia	10.9	21.5	17.4	26.5	24.9	20.7	23.5	35.2	30.6	26.8	38.8	34.0
Bogabandar	23.3	23.9	1.95	35.9	36.6	12.3	36.5	37.1	12.7	18.8	44.3	18.6
Chamta	31.1	33.2	28.8	33.2	35.3	30.8	39.2	41.3	36.6	52.6	54.9	49.6
Galachipa	21.9	25.5	20.4	22.3	25.8	22.0	32.2	36.0	30.4	43.8	47.8	41.6
Lebukhalj	11.5	16.7	9.8	20.2	25.8	23.0	31.3	37.5	29.2	32.7	38.9	30.5
Neamati	29.0	32.6	25.4	30.8	34.4	27.1	28.1	46.0	33.1	0	47.8	34.8
Patuakhali	24.2	30.1	5.4	29.2	35.2	9.6	36.1	42.5	15.4	3	47.1	19.1
Maukaran	17.9	17.9	11.7	28.4	28.3	21.5	36.5	36.4	29.1	45.7	47.7	42.0
Ulania	22.5	25.4	20.4	31.4	31.1	18.4	31.8	34.9	18.7	42.2	45.5	28.0

Notes: t_0 refers to base period of assumed storage season. Sept., Oct., and Nov. are terminal months for assumed storage season. For example: first 3 columns show by what percent price in Sept., Oct., and Nov. is higher than that in Dec.

Table 39. **Seasonal increase in price expressed as percentage of expected price under alternative assumptions of storage period**
North Bengal markets, 1967-68

Markets	t_0 = December			t_0 = January			t_0 = February			t_0 = March		
	Sept.	Oct.	Nov.	Sept.	Oct.	Nov.	Sept.	Oct.	Nov.	Sept.	Oct.	Nov.
	percent											
Badamtali	14.9	8.7	6.4	21.6	14.8	12.4	25.6	18.6	16.2	29.1	22.0	19.4
Birampur	23.9	18.1	3.7	24.4	18.7	4.0	26.2	20.3	5.5	31.6	25.4	10.0
Chirirbandar	25.6	16.4	9.1	18.9	10.3	3.2	21.2	12.4	5.1	31.2	21.5	13 7
Dhap	16.7	16.9	3.2	20.8	21.1	6.7	28.1	28.4	13.1	29.2	29.8	14.1
Kaharole	--	--	--	27.9	24.7	11.9	29.7	26.7	13.4	31.5	28.4	14.0
Madanganj	36.0	5.3	.72	33.5	3.24	.85	36.9		1.6	45.6	12.6	7.9
Matajee Hat	16.6	19.1	11.5	13.5	15.9	8.7	20.0	22.6	14.8	23.5	26.1	18.1
Naogaon	19.9	9.0	6.4	20.4	9.8	-5.4	27.5	16.2	0.0	28.9	17.5	.92
Narsingdhi	23.0	22.4	11.4	28.6	27.9	11.5	29.4	28.7	12.1	22.3	21.7	6.0
Pulhat	15.6	16.5	10.1	16.8	17.7	10.9	17.6	18.5	11.7	28.1	29.1	21.6
Phulbari	21.3	23.5	6.8	19.8	21.8	5.3	23.2	25.3	8.4	29.4	31.5	13.7
Talora	14.6	12.3	2.1	22.1	19.5	8.3	30.5	27.6	15.9	31.4	28.5	16.7

Notes: t_0 refers to base period of assumed storage season. Sept., Oct., and Nov. are terminal months for assumed storage season. For example: first 3 columns show by what percent price in Sept., Oct., and Nov. is higher than that in Dec.

Table 40. **Seasonal increase in price expressed as percentage of expected price under alternative assumptions of storage period**
Dacca market, 1966-68

Market	t_0 = December			t_0 = January			t_0 = February			t_0 = March		
	Sept.	Oct.	Nov.	Sept.	Oct.	Nov.	Sept.	Oct.	Nov.	Sept.	Oct.	Nov.
						percent						
Badamtali ('66)	--	--	--	8.4	5.5	3.0	7.1	4.0	1.6	9.7	6.7	4.3
Badamtali ('66-'67)	-1.5	-3.9	-5.6	6.2	3.5	1.6	6.7	4.0	2.1	7.7	5.2	3.0
Badamtali ('67-'68)	14.9	8.7	6.4	21.6	14.8	12.4	25.6	18.6	16.2	29.1	22.0	19.4

Notes: t_0 refers to base period of assumed storage season. Sept., Oct., and Nov. are terminal months for assumed storage season. For example: first 3 columns show by what percent price in Sept., Oct., and Nov. is higher than that in Dec.

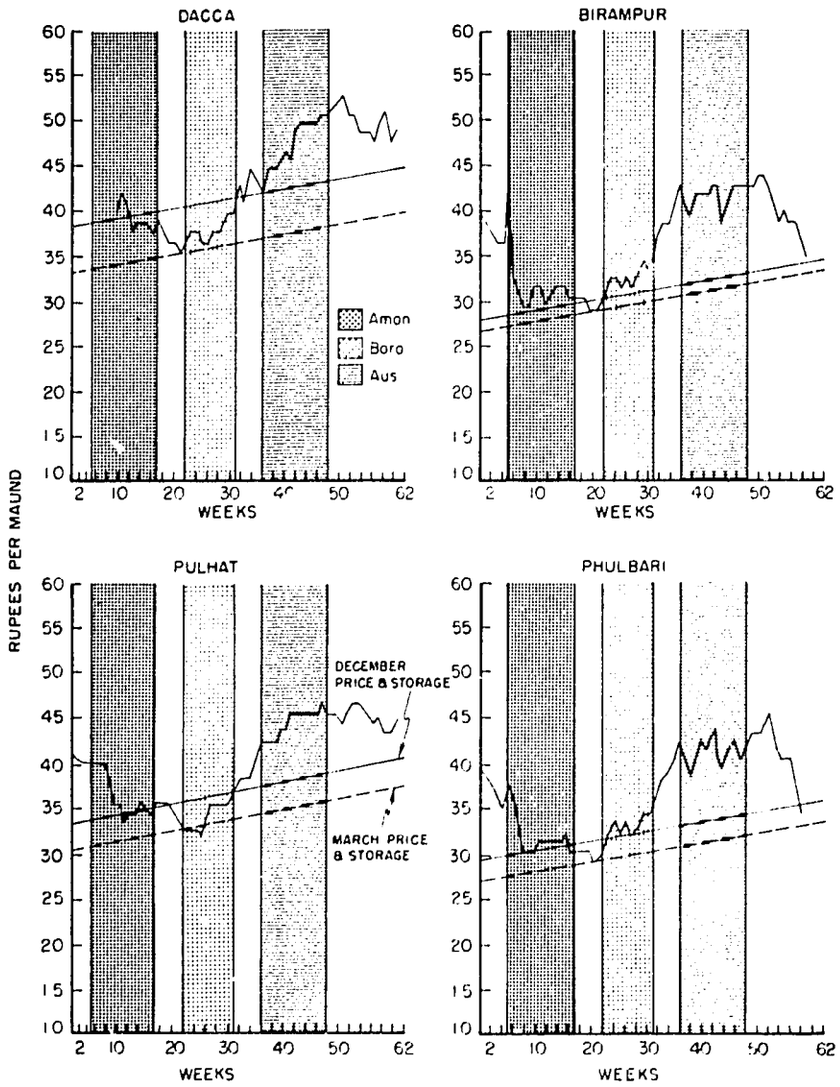

Figure 7. **Seasonal price increase in relation to storage costs in 4 of 12 markets, East Pakistan, 1967–68.**

On an average, the Barisal markets have a higher net seasonal price increase than the markets in North Bengal. There is also a difference in the time when peak seasonal increase occurs. The Barisal markets tend to reach the high point of seasonal difference during October, while the markets in North Bengal and Dacca reach that point in September. This could possibly be explained by the differences in the seasonal pattern of produc-

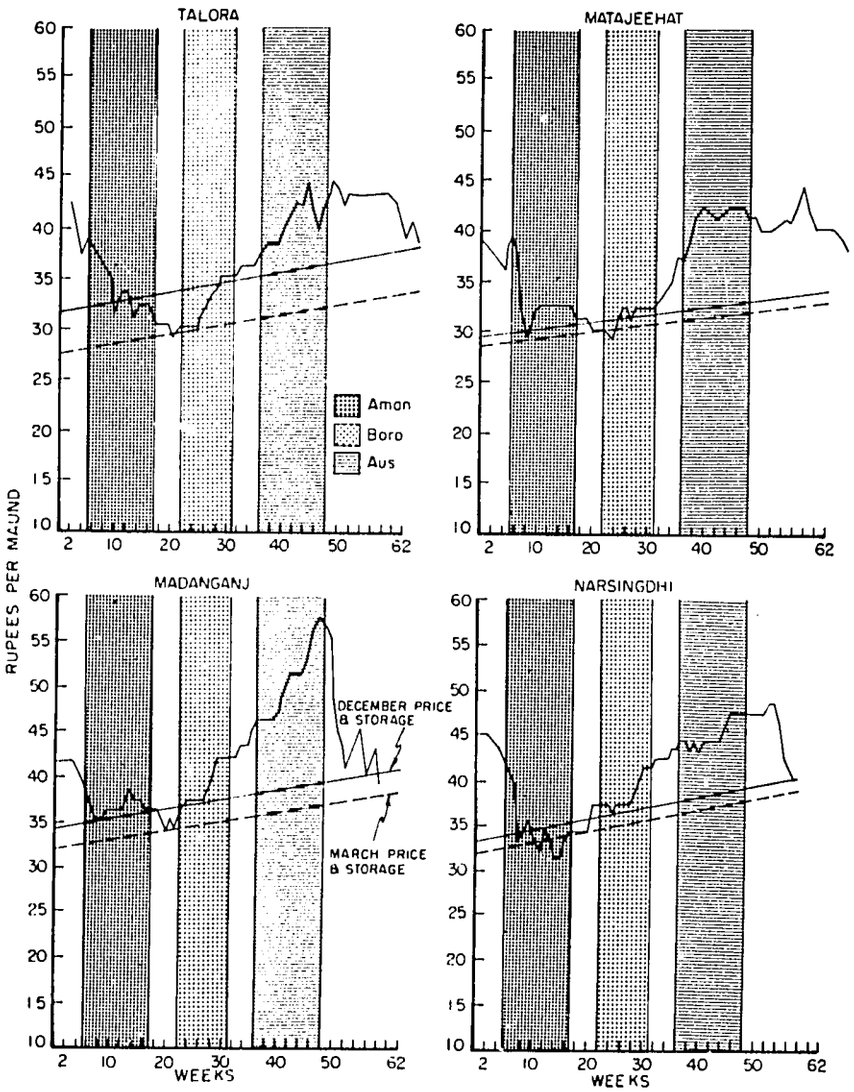

Figure 8. **Seasonal price increase in relation to storage costs in 4 of 12 markets, East Pakistan, 1967–68.**

tion between the two regions. Barisal's main crop is Aman rice, which accounts for more than 80% of the total production. Moreover, the small quantity of Aus rice is harvested during July and August -- a period when farmers' rice stocks are low. Therefore, it is likely that the Aus crop may not have a marketable surplus. This means that the market supply from the last Aman crop is not augmented by any other crop, which results in

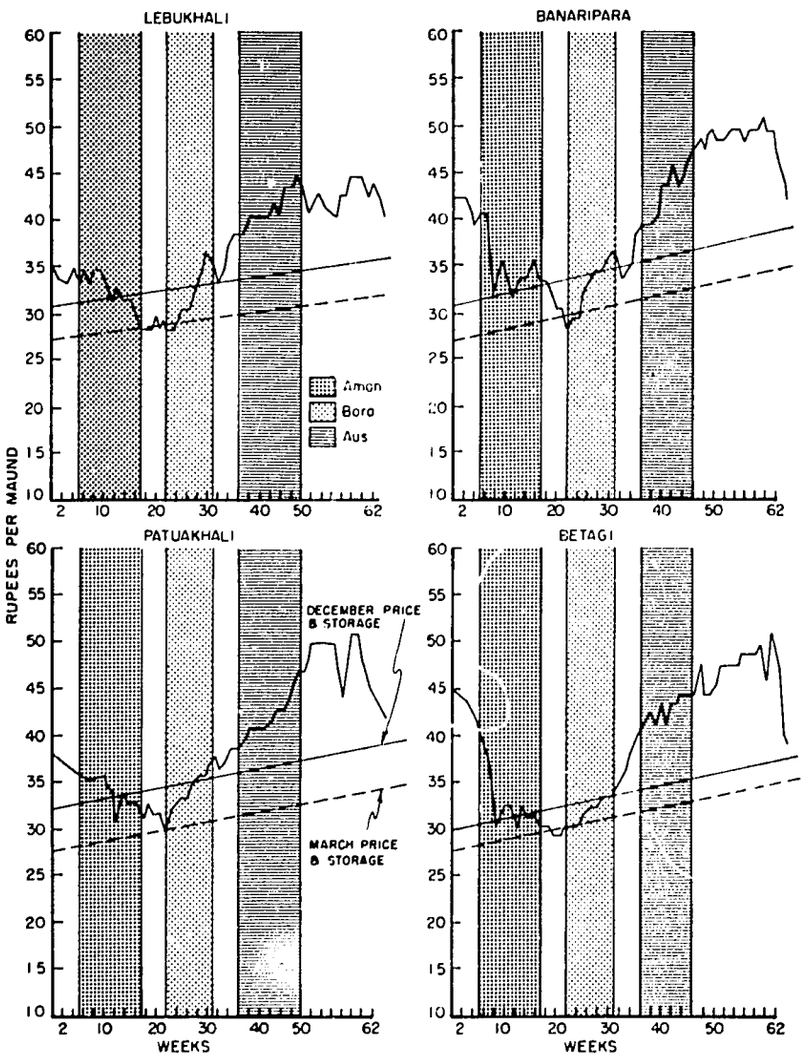

Figure 9. **Seasonal price increase in relation to storage costs in 4 of 12 markets, East Pakistan, 1967-68.**

a longer marketing season. The price continues to increase until the next Aman crop appears sometime during December.

However, the districts in North Bengal have a significantly important Aus crop, a part of which appears in the markets during July and August. This means that some additional supplies are pumped into the marketing channel at a time when prices are rising, which slows down the rate of increase. The storage operators know that the downswing in price precedes

the advent of Aman crop, so they begin unloading their stocks in September. This results in the highest seasonal price difference in September. In short, the Aus crop slows down the rate of growth in price as well as advances the time for highest seasonal price increase. Apart from this, the Aman crop in North Bengal is harvested and marketed slightly earlier than in the Barisal district.

Using price data from the East Pakistan Bureau of Statistics as a basis, the seasonal price variation for the period 1958-69 was also computed for the Dacca market (figs. 10 and 11). These data show that, except for 1962, seasonal prices have increased to a substantially higher level than the expected price. Secondly, there has been a steady trend toward a higher wholesale price of rice at Dacca, with sharp increases since 1966. On the whole, the price movements at the Dacca market over the last 10 years show a significantly high seasonal price increase, which is sufficient to warrant further investigation into this area. Since the hypothesis of significant interrelationship among the various markets has been established, it may also be concluded from the 10-year data for the Dacca market that all other markets also had similar seasonal price patterns in the past.

As in the case of excessive intermarket price spread, intertemporal price increases also raise the basic question regarding market imperfection: do the traders have monopoly power to influence price increases through time, and do high seasonal price increases present a prima facie case for concluding that traders earn abnormal profits from storage operation. Needless to say, the present status of knowledge as well as available data do not allow judgments on these issues. However, if the traders have a reasonably correct knowledge about the future, they would probably be induced to buy during the months of January, February, and March and sell during September, October, and November and thus make lucrative profits. On the other hand, our knowledge of the functionary performing the bulk of the storage is so limited that it is difficult to determine who are the actual beneficiaries of such seasonal price increases. The fact that seasonal price increases are as strong in the rural markets as in the larger ones, makes the theory that the monopoly power of the traders and stockists causes the acute seasonal price increase highly debatable. This doubt is further reinforced by the fact that as the harvest season approaches, prices start declining rapidly, and when the harvest enters the market, prices drop sharply, thus proving that the forces of supply and demand are indeed in operation.

One brief concluding note regarding the computation of costs. There is no way that the present analysis could include the costs of labor and management in the computations. Rice traders have decades of expertise and experience in the business. Without a correct valuation of their skills, any conclusions based on the customary methods of computation of temporal price variations may not reflect the real situation with respect to traders' profits. At best it gives us some indications regarding certain tendencies and more importantly points toward the complexity of the system and the need for caution in making generalizations.

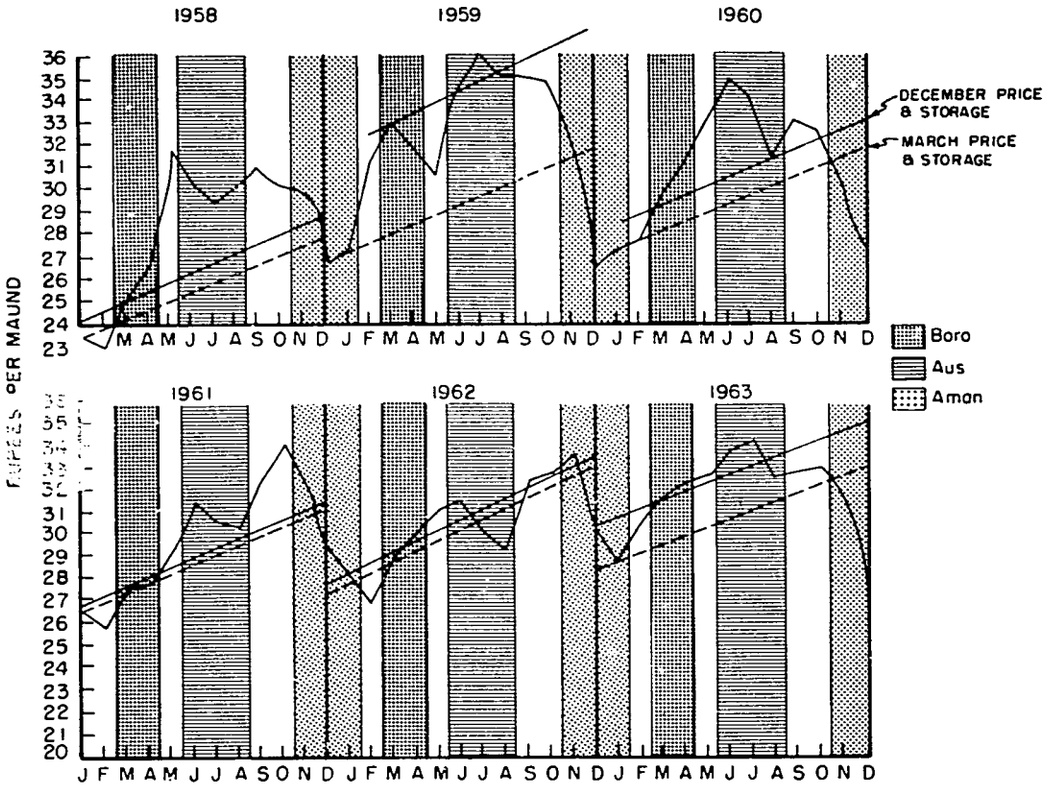

Figure 10. Seasonal price increase in the Dacca Market, 1958-1968.

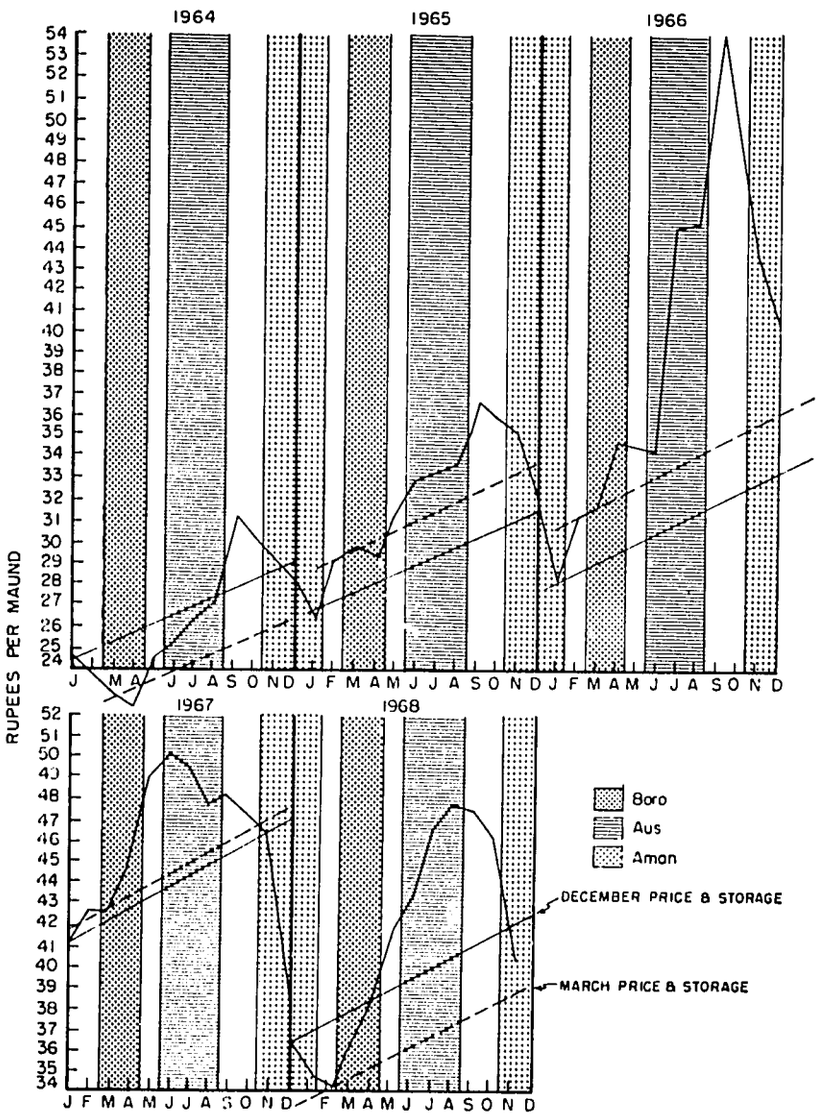

Figure 11. Seasonal price increase in the Dacca Market, 1958-1968. (continued)

Chapter VII. Summary and Conclusions

Since the early fifties, agricultural product and factor markets in underdeveloped countries have been the subject of substantial interest and analysis by development economists. This has been an outgrowth of the recognition of the positive relationships and interaction between the goals of development planning and the efficiency of the marketing system in traditional economies. The concern of many policy makers and development administrators in underdeveloped countries for an efficient marketing system is indicated by the amount of human and nonhuman resources that are devoted to marketing improvement programs. However, knowledge of the structure, conduct, and performance of the traditional marketing systems is scant, and a majority of the marketing improvement programs as well as the price policies are based on incorrect appraisals of the existing situation. This study on the rice marketing in East Pakistan was undertaken to bring out empirically the salient organizational, institutional, and functional features, to analyze the system in terms of efficiency and performance, and thus provide a basis for public policies in marketing.

Major Conclusions

Institutional aspects

Rice marketing in East Pakistan is carried on by a large number of processors, Beparies, Dalals, Farias, and Aratdars. In the large intermediate and terminal markets, Aratdars are the dominant market functionaries providing a variety of services such as financing, purchasing and(or) selling, storage, and other facilitative services to the buyers and the sellers.

The processing sector is composed of about 100 large rice mills and a rapidly growing small-scale industry of husking machines. While the former firms are characterized by virtual stagnation and nonprogressiveness, poor plant utilization, and antiquated technology, the latter have been growing in number significantly during the last decade. The large mills are heavily concentrated in the northern districts, particularly in the Dinajpur district.

The analysis of the internal shipping pattern clearly demonstrates that the rational development of the present system is commensurate with the available transportation facilities and the dictates of topography. Transfer of rice and paddy from the surplus-producing areas to the consuming areas is by the most direct and economic routes. Consequently, government actions to regulate interregional commodity transfer hardly seem economically reasonable. In the event of strong economic forces working to control a pattern of transfer, the government's limited enforcing staff would be virtually useless. In addition, arbitrage in response to spatial price differentials is a factor vitally important to achieving pricing efficiency. Any institutional rigidity that inhibits free commodity movements in effect introduces additional sources of market imperfection. Therefore, this represents one of the areas where a government's human and financial resources would be committed to the most unproductive uses.

Nature of competition in private trade

Three measures of pricing efficiency were used to test the hypotheses of competitive pricing in the system. Using the data collected during 1967-68, correlation coefficients for prices between pairs of markets on a particular day for a particular grade of rice were computed. Most of these markets showed quite high correlation, suggesting that prices in spatially separated markets move in unison. Some variations were observed, however, in the magnitude of the "r" between certain pairs of markets. For example: correlations between the 3 terminal markets and the smaller interior markets were always higher than those between the terminal markets and the larger intermediate markets. It was lower only in relative terms, since in absolute terms the correlations were still quite high.

On the basis of price data collected by the East Pakistan Bureau of Statistics, a similar analysis was done for 10 different markets for 1966 and 1967. The results failed to show any noteworthy correlation, which again emphasizes the need for utmost caution in using secondary data to analyze pricing efficiency.

Analysis of intermarket price differentials as well as intertemporal price increase shows that such variations during the year under consideration were higher than the cost of transfer and storage respectively. By the norms of a competitive market model, this suggests evidence of excess profit for the relevant market functionaries. However, in the absence of more detailed business and transaction data and, more importantly, a proper valuation of the skill and time of the trader, computation of profits in this manner may be a grossly imperfect method of measuring market imperfections.

The real issue is not whether the trader earns any supernormal profits; rather the crux of the problem is whether the price differentials are large enough to weaken and distort the proper role of price as an allocator of resources and a distributor of income. The other issues center on the questions related to policy implications for reducing wide seasonal and spatial price differentials because high price variations possibly increase social and consumer costs.

As far as the price differentials are concerned, the data failed to demonstrate that oligopolistic elements in the trade caused a chronic condition of excessively wide margins and costs. Since, in the long run, it is the stable and wide shifts in prices, margins, costs – and therefore the functional shares – that are the important forces jeopardizing the functional efficiency of price in a market economy, short-term and marginal changes in these variables should be of no great concern to the system.

If, however, from the viewpoint of consumers' and producers' welfare, any such price differentials are considered to be of undesirable magnitude, restrictive measures on private trade may not be the best way to reduce them. Rather, public policies toward building the infrastructure for changes in the marketing institutions, investments in transport development and storage, assistance in the adoption of cost-reducing and efficiency-increasing

technological changes, standardization of the products, and other such facilitative measures may well be the most powerful tools for achieving such objectives.

Market structure variables

The rice markets at the terminal as well as the intermediate dispatch centers are characterized by a small number of Aratdars, with a high degree of concentration in respect to size distribution. Although the lack of requisite data made detailed estimates of the concentration ratio impossible, discussion with traders and other people in a locality, as well as direct observation of the functioning of the markets, produced some approximate judgments on these aspects. It seems that in the markets where Aratdars are the dominant functionaries, about 80% of the total volume is handled by about one-third of the total number of Aratdars. This shows a significantly high level of oligopolistic as well as oligopsonistic concentration and, on the basis of existing theories of structure, conduct, and performance, it could be labeled as an aberration of a competitive situation. Yet, close observations of the functioning of this structure in the different markets do not indicate a prevailing lack of ethics in pricing and other aspects of market conduct. This view is supported by the intercorrelated price formations at the wholesale level among spatially separated markets. However, the validity of such deductions may be questioned because intermarket correlations can also be a result of collusion, not simply competition. In such cases one should examine the environmental conditions in which the sellers and buyers operate to determine which alternative is the more likely. Collusion among traders in a small market may be possible, but to have an intermarket network of collusion in an entire country is doubtful.

However, this kind of concentrated market structure contains certain potentials for the degeneration of the framework of competition. The barriers to entry seem to be one of the most important factors that might undercut competition. At the Aratdar level, knowledge of the trade, tradition, reputation, business contacts, and capital represent some of the most difficult barriers. The effectiveness of these barriers is possibly reflected in the static number of Aratdars in the different markets through the decades. Secondly, the extent to which the clients of the Aratdars provide them with a captive market is not known because they are heavily dependent on the Aratdars for credit, warehousing, and other such facilities. Another area for investigation is the extent of the unethical conduct of the Aratdar-cum-traders when they charge commissions even on sales of their own consignments.

As far as the small traders like Farias and Dalals are concerned, neither capital nor knowledge seems to be a barrier to entry. The particular and special relationship between them and the Aratdars apparently eases the usual barriers.

Most of the large rice mills fall in the same capacity category and hence the relative market shares for the individual mills are more a function of

the volume of paddy milled than of the facilities or resources owned. However, lack of capital and managerial ability may restrict adequate purchases of raw materials and therefore result in disproportionate market shares, in spite of equal plant capacities.

Efficacy of government policy towards private trade and government participation in the marketing system

Although the public sector handles only about 4-5% of the total net supply of rice during a year, its total effect on the marketing system is much more significant because it handles nearly 50% of all food grains entering the marketing channels. Therefore the impact of government pricing and distribution policies on production prices and other related variables must be studied carefully, especially the effect of procurement prices on the producing areas and of ration prices on urban areas.

Government restrictions on private trade have been based on considerations that cannot stand the rigor of economic reasoning. For example, the 7-day Antihoarding Act is an example of an extremely impractical measure. Some traders contend that its effect in the producing areas is a heavy post-harvest glut in market arrivals. Traders in the intermediate market cannot buy in large quantities since transportation bottlenecks may not allow them to dispatch the purchases within 7 days. This leads to a smaller "real or artificial" demand that gluts the market. The millers in North Bengal complain that this act prevents their buying paddy in large quantities during the dry winter months and storing it for milling at a later time. It affects their plant utilization level during the slack periods. These may well be the extreme cases; possibly the Act itself is inoperative. Enforcement through low-paid inspectors is a very difficult job. Usually the traders switch godowns before the inspectors come or else they buy them off.

Another food department regulation allows license holders to purchase rice and paddy from any place in East Pakistan but designates the selling areas. It is difficult to find the economic rationale for this, although the ill effects can be easily visualized. First, it imposes restrictions on the traders' freedom of arbitrage, which means that intermarket commodity transfer in response to changes in demand will either not take place or be slow. Understanding this, the traders have frankly complained that the temporary price rise in consuming centers, caused by supply-demand imbalance, cannot be halted quickly because the markets nearest to the crisis area are actually often the farthest because of the regulatory provisions. This means the consumers have to bear the cost of a prolonged price increase. Secondly, it is not known on what basis selling areas are designated and how the number of traders allowed to sell in that particular area is determined. Traders complain that either too many traders are designated for a particular area, which creates a glut, or too few, which results in an inadequate and inefficient operation. Thirdly, the arrival data for Dacca for the last 3 years show that year-to-year variations in the shipping pattern are justifiable, but that constant readjustments of the delineated shipping areas are necessary.

There are many small traders who work without a license possibly because of the bureaucratic problems involved in issuing such licenses. Without a license for trading in food grains, the smaller traders usually use the name of some license-holders in the selling or buying areas for their transactions. This may be a factor that puts this group of traders in a poor position for bargaining with their benefactors.

However, during the decades when the Directorate of Agricultural Marketing and the Department of Food have been functioning in the administrative setup of the East Pakistan government, few human and nonhuman resources have been devoted toward providing basic facilitative services to the marketing institutions. For example, no serious attempts were ever made to initiate, develop, and implement a grading system for rice. Although the grades evolved by the traders are fairly well understood by those engaged in the system, the establishment of such vague standards may bar entry to new traders, as yet unacquainted with these skills. Secondly, it might also make it difficult for the farmers to understand prices. In addition, in the absence of standardization it is difficult to achieve economies in processing, transportation, and storage through bulk handling.

The processing sector and its inherent economic problems have never been dealt with adequately. The government could give incentives as well as some leadership in the modernization of the milling sector.

To attain the overall objectives of providing efficient marketing services for producers as well as consumers, the public sector has to reorient its attitude toward the private trading sector. Provision of nonrestrictive and facilitative services to the existing marketing institutions, and investments in building the infrastructure for efficient marketing should be the cornerstone of marketing improvement programs. Currently, one such service that is provided involves the dissemination of market information. However, the market functionaries rarely use these services because the collection of market information is inefficient.

Modernization, expansion, and supply elasticities of marketing services

These questions assume great significance in a dynamic economy experiencing rapid technological breakthroughs in the production frontiers. The ability to modernize and expand depends on a host of interrelated factors such as the supply of capital and entrepreneurship, social infrastructure, and changes in the consumers' demand for marketing services. It is therefore difficult to generalize on the propensity of an existing structure to adjust itself to future changes.

The rudimentary and nonspecialized manner in which the present marketing services are provided makes their supplies fairly elastic. In spite of this, substantial increases in the net marketable surplus of rice in East Pakistan might be accompanied by a storage bottleneck particularly at the level of small- and medium-sized farmers. The fact that primary village markets have no storage facilities and that rural transportation is poor,

may present difficult marketing problems particularly during the post-harvest months. The storage facilities at the private traders' level are also inadequate for long-term storage requirements.

The supply of services by the market functionaries possibly has high elasticities at the lower trade level, involving Bepari, Faria, and Dalal, but at the Aratdar level, the need for large capital and other requirements make entry in the markets difficult. Consequently, one might expect to see a higher business concentration among Aratdars as well as a spatial integration of business by them as a result of changes in the volume of marketed surplus. Even in the existing structure, such spatial expansion and integration of business by Aratdars is noticeable.

The way the public sector performs its role as a marketer of food-grains leaves much to be desired. Apart from the inefficiencies observed in the physical handling of the product, the pricing and distribution policies of the public sector are also inconsistent. In spite of much better storage facilities, qualitative as well as quantitative losses from government storage operations are much higher than those in the private trade (56: table 51). Secondly, subsidized rice sales to all, not just the low, income groups are inconsistent with the accepted objectives of food subsidies to urban and semi-urban populations. Similarly, identical prices for government-sold rice in all locations show that the pricing decisions ignore the differences in cost of transportation and handling. In some locations, consumers are given larger subsidies while in others they are "taxed." Finally, procurement prices that are always substantially lower than the free market price in effect represent monopolistic exploitation of producers in the procurement zones, which leads to all forms of clandestine marketing practices on the part of the farmers as well as the traders. Since the compulsory procurement zones encompass nearly 4 million acres of land, much of which is in the major rice producing areas of the province, it is important to consider the economic effects of such pricing policies.

Bottlenecks in the social infrastructure, particularly transportation, may cause the most serious marketing problem. It is likely to be more acute in the northern and western rice surplus areas than it would be in the southern delta areas, where the large rice traders are investing in river transportation because this is the easiest means of transportation. Recently, the use of faster mechanized water vehicles for moving rice from the delta areas has increased, a trend that is likely to continue. However, the predominance of railways in the northern districts makes the private sector's efforts to improve the system unimportant. Trucking is still expensive for long-distance hauls, and unless this mode of transport grows rapidly or the rolling stock and the railway management improve markedly, transportation from northern surplus areas may be a very complex marketing problem in the future.

The stress on the processing sector may grow out of 2 phenomena: rapid increase in production and changes in consumer demands. The growth record of the small husking machines in rural areas demonstrates the

probability that this sector will expand fast enough to meet the needs of increased production. The relatively small capital requirements, as well as low operating expenses, make them ideal business enterprises for large rural landholders. However, the question of modernizing the present plant facilities, particularly at the large rice mills, is linked with the question of product improvement as well as industry performance. By using rubber-roller, sheller-type milling equipment and improved parboiling and drying facilities, the total outturn as well as the quality of rice can be expected to improve. However, the qualitative gains may be important only if there is a strong consumer demand in the domestic market for better processed rice or if there is an exportable surplus in the marketing system. It must be firmly established that either or both of these situations prevail sufficiently to warrant major modernization in the milling sector. Alternatively, it must be clearly demonstrated that such investments, a large number of which involve scarce foreign exchanges, will increase the total supply of processed rice enough to justify the resource commitment. As of now, the knowledge of the economies of modernizing rice mills is inadequate; research on rice marketing in underdeveloped areas would therefore be useful.

The Aratdars and the rice millers undoubtedly have command over substantial capital and investable funds. It is necessary to evolve an incentive program through which these untapped reserves of private capital could be drawn upon not only for modernizing the existing marketing institutions but also for the production sectors.

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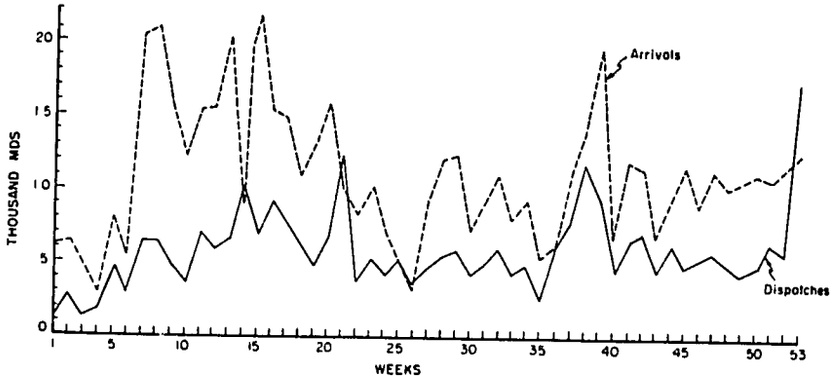
Appendix I.

Appendix table 1. **Arrivals of rice at the Zinzira market classified by sources**
December 1967 to November 1968

Sources Market and district	Quantity in 1000 maunds	Percentages
Kahaloo, Bogra	587	10.2
Naogaon, Rajshahi	748	12.9
Subtotal (North Bengal)	1,335	23.1
Patuakhali, Barisal	1,759	30.4
Banaripara, Barisal	875	15.1
Neamati, Barisal	50	0.9
Amua, Barisal	200	3.4
Subtotal (Barisal)	2,884	49.9
Mirkadim, Dacca	1,146	19.8
Kamalaghat, Dacca	57	1.0
Madanganj, Dacca	92	1.6
Subtotal (Dacca)	1,295	22.4
Comilla, Comilla	229	4.0
Other markets, other districts	35	.9
Subtotal (Comilla and others)	264	4.6
Total	5,778	

Source: Data collected by field staff.

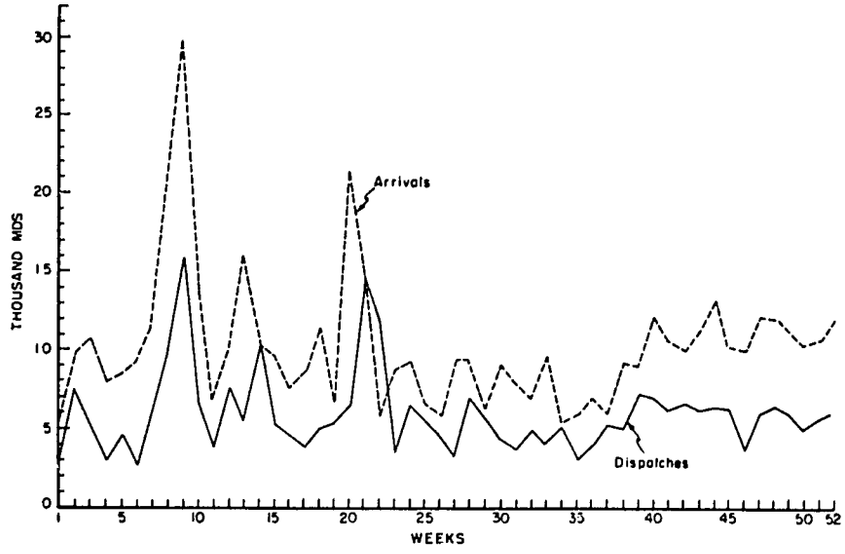


Appendix figure 1. **Weekly arrivals and dispatches at Zinzira Market, 1967–68.**

Appendix table 2. **Arrivals of rice at the Badamtali market classified by sources**
December 1967 to November 1968

Sources Market and district	Quantity in 1000 maunds	Percentage
Kahaloo, Bogra	765	14.1
Dinajpur, Dinajpur	1,142	21.0
Naogaon, Rajshahi	22	.4
Subtotal (North Bengal)	1,929	35.5
Banaripara, Barisal	1,233	22.7
Patuakhali, Barisal	1,846	34.0
Chamta-Neamati, Barisal	48	.9
Subtotal (Barisal)	3,127	57.6
Mirkadim, Dacca	56	1.0
Madanganj, Dacca	91	1.7
Subtotal (Dacca)	147	2.7
Comilla, Comilla	215	4.0
Ashuganj, Comilla	17	.3
Subtotal (Comilla)	232	4.3
Total	5,435	

Source: Data collected by field staff.



Appendix figure 2. **Weekly arrivals and dispatches at Badamtali Market, 1967-68.**

Appendix table 3. **Combined arrivals at the 2 Dacca wholesale markets, classified by districts**
December 1967 to November 1968

Source	Quantity in 100 maunds	Percentage of total
Bogra	1,352	12.05
Dinajpur	1,142	10.18
Rajshahi	770	6.86
Subtotal (North Bengal)	3,264	29.09
Barisal	6,011	53.60
Dacca (neighboring markets)	1,442	12.86
Comilla	496	4.42
Grand total	11,213	

Source: Data collected by field staff.

Appendix table 4. **Arrival data for 1 Aratdar-cum-trader in Badamtali market, classified by districts**
1966 and 1967

Year and source	Quantity in 100 maunds	Percentage
1966		
Barisal	845	42.8
Bogra	446	22.6
Dinajpur	636	32.3
Comilla	45	2.3
Total	1,972	100.0
1967		
Barisal	725	38.9
Bogra	433	23.2
Dinajpur	466	25.1
Comilla	239	12.8
Total	1,863	100.0

Source: Data supplied by 1 trader at Dacca.

Appendix table 5. **Dispatches from Badamtali and Zinzira markets classified by destinations**
December 1967 to November 1968

Destination	Quantity in 100 maunds	Percentage
Metropolitan Dacca and suburbs	5,742	91.14
Tongi	460	7.3
Joydevpur	28	.3
Chittagong	14	.3
Kaligonj	44	.7
Atti and Madangarj	12	.2
Total	6,300	

Source: Data collected by field staff.

Appendix table 6. **Sources of arrival of rice classified by markets and districts, Madanganj,**
December 1967 to November 1968

Sources Market and district	Quantity in 100 maunds	Percentage
Eliotganj, Barisal	566	5.5
Patuakhali, Barisal	1,401	13.7
Boga, Barisal	426	4.2
Banaripara, Barisal	1,191	11.6
Mirerhat, Barisal	836	8.2
Satla, Barisal	3,131	30.6
Other markets in Barisal, Barisal	358	3.5
Subtotal (Barisal)	7,909	77.3
Local mills, Dacca	1,408	13.7
Naogaon, Rajshahi	631	6.1
Alisarganj, Sylhet	331	3.2
Grand total	10,247	

Source: Data collected by field investigator.

Appendix table 7. **Rice dispatches from Madanganj**
December 1967 to November 1968

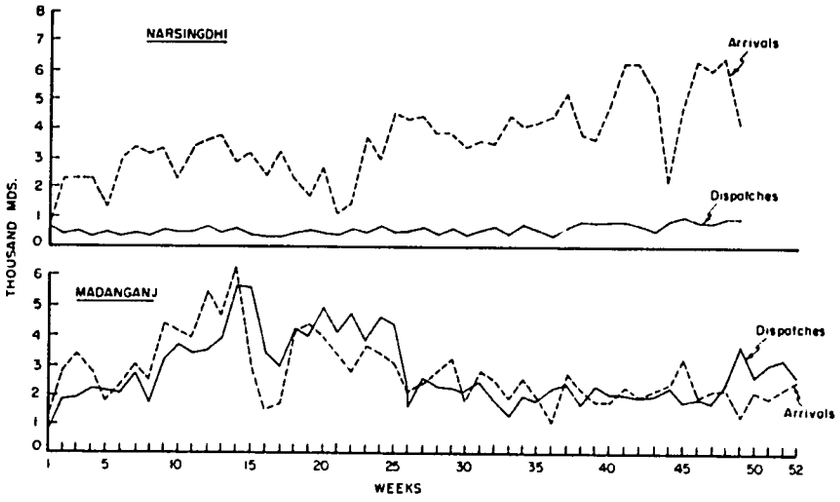
Destination	Quantity in 100 maunds	Percentage
Narayanganj	3,036	20.8
Adamjee Nagar	1,742	12.0
Ghorashal	1,490	10.2
Kapasia	1,385	9.6
Charsindur	839	5.8
Demra	1,652	11.3
Kaliganj	676	4.6
Lakpur	708	4.9
Monohardi	596	4.1
Baillapara	779	5.3
Other areas	1,662	11.4
Total	14,565	100.0

Source: Data collected by field investigator.

Appendix table 8. **Sources of supply for Narsingdhi classified by districts**
December 1967 to November 1968 (up to 3rd week)

Source district	Quantity in 100 maunds	Percentage
Dinajpur	629	8.5
Bogra	2,202	29.8
Mymensingh	1,404	19.0
Sylhet	1,100	14.8
Comilla	1,507	20.4
Barisal	557	7.5
Total	7,399	100.0

Source: Data collected by field staff. Arrivals recorded under Bogra also include arrivals from Naogaon.



Appendix figure 3. **Weekly arrivals and dispatches at Narsingdhi and Madanganj Markets, 1967-68.**

Appendix table 9. **Recorded dispatch to Khulna from certain markets studied**
December 1967 to November 1968

Source	Destination			
Market and district	Khulna	Daulatpur	Bagherhat	Total
	10 maunds			
Banaripara, Barisal	504(.6)	--	3,388(4.2)	3,892
Birampur, Dinajpur	1,520(4.0)	--	--	1,520
Chirirbandar, Dinajpur	440(8.2)	155(1.7)	--	495
Naogaon, Rajshahi	516(2.0)	--	--	516
Pulhat, Dinajpur	2,832(9.1)	1,417(5.0)	--	4,249
Phulbari, Dinajpur	294(1.1)	--	--	294

Notes: Data of dispatches to Khulna from Birampur, Chirirbandar, Pulhat, and Phulbari markets taken from dispatch records of respective railway stations. Same records from Pirganj and Setabganj did not show any dispatches to Khulna. Data for Banaripara and Naogaon based on estimates made by traders and field staff. Figures in parentheses refer to quantity dispatched as percent of total dispatches from supplying market.

Appendix table 10. **Recorded dispatch to Chittagong from 6 markets in North Bengal**
December 1967 to November 1968

Source Market and district	Dispatches to Chittagong 10 maunds
Birampur, Dinajpur	51 (0.1)
Phulbari, Dinajpur	328 (1.1)
Pulhat, Dinajpur	6,215(19.3)
Chirirbandar, Dinajpur	1,496(11.5)
Setabaganj, Dinajpur	720 (5.8)
Talora, Bogra	3,280(22.0)

Notes: From railway dispatch data of respective railway stations. Figures in parentheses refer to quantity dispatched to Chittagong as percentage of total dispatches from re-respective markets.

Appendix II.

We have mentioned that the government price data were not used in this analysis because of the problems of poor grade specification and collection bias. To test this hypothesis, correlations on prices of several markets were done on the basis of the data supplied by the East Pakistan Bureau of Statistics. The results show very poor correlation among these markets. The data relate to prices for medium grade of rice for 1966, 1967, and 1968.

Appendix table 11. **Disp. tches from 9 Barisal markets into different districts**
December 1967 to November 1968

Sources	Destinations					Total arrivals
	Dacca	Comilla	Barisal	Faridpur	Khulna	
	percent of dispatches					1000 maunds
Banaripara	69.1	8.6	11.1	8.0	3.2	903
Betagi	24.0	19.0	45.2	9.6	2.2	34
Botolbunia	56.0	36.6	7.4	--	--	40
Bogabandar	82.1	2.9	15.0	--	--	38
Lebukhali	51.7	9.2	39.1	--	--	72
Maukaran	51.2	13.0	35.8	--	--	71
Chamta	27.0	18.5	54.5	10.0	00	33
Neamati	38.0	20.5	41.5	8.4	--	35
Patuakhali	81.0	1.0	18.0	--	--	95

Source: Data collected by field staff.

Note: These markets do not dispatch to any other districts.

Appendix table 12. **Dispatches from 8 North Bengal markets into the different districts**
December 1967 to November 1968

Destination	Source markets							
	Birampur	Phul-bari	Chirrir-bandar	Pulhat	Setab-ganj	Pir-ganj	Talora	Nao-gaon
	percent of total dispatch							
Bogra		--	--	.4	--	--	7.5	1.5
Chittagong	.1	1.1	35.0	19.2	5.8	--	23.1	--
Comilla		--		.2	12.5	--	1.2	2.0
Dacca	7.4	10.0	28.0	30.4	10.5	32.0	31.2	54.9
Faridpur	12.8	2.7		5.4	2.3	14.2	--	11.1
Jessore		.5	.6	.7	1.1	--	--	--
Khulna	4.2	1.0	10.4	14.0	--	--	--	--
Kushita	12.1	8.4	14.0	12.2	29.0	18.0	--	4.0
Mymensingh	.4	2.4	.3	1.3	3.9	7.1	29.0	--
Noakhali		.5	1.0	1.6	20.1	2.0	--	--
Pabna	58.4	64.0	6.0	7.1	12.6	11.0	4.5	24.0
Rajshahi	1.7	--	--	.1	--	--	--	1.4
Rangpur	--	1.5	3.0	1.6	2.0	6.0	--	--
Others	2.8	7.9	1.7	6.2		9.7	3.5	1.1
Total dispatches 1000 maunds.	356	320	88	325	142	36	151	430

Source: Data from railway dispatch data of respective stations.

Appendix table 13. **Correlation coefficients between prices of medium grain rice in 10 markets**
East Pakistan, 1966-68

	1 Narayan-ganj	2 Mirk-adim	3 Nar-singdhi	4 Naogaon	5 Dinajpur	6 Thakur-gaon	7 Bogra	8 Patua-khali	9 Piroj-pur	10 Dacca
Narayanganj	1	-.268	.119	.010	-.059	-.032	-.134	-.038	.397	.276
Mirkadim		1	.336	-.187	.404	.087	.289	.173	-.053	-.044
Narsingdhi			1	.669	-.093	-.158	-.106	-.383	.595	.629
Naogaon				1	.016	.082	-.024	-.017	-.040	.005
Dinajpur					1	.119	.233	-.171	-.148	.326
Thakurgaon						1	.306	.049	.218	.174
Bogra							1	.365	-.174	.056
Patuakhali								1	.058	.009
Pirojpur									1	.494
Dacca										1

Source: Correlations based on price data supplied by East Pakistan Bureau of Statistics.

Other Publications Reporting Research on the Economics of South Asian Agriculture

This study is one of several studies of the South Asian rural economy carried on in the Department of Agricultural Economics at Cornell University.

The following studies have been published in this series:

1. Uma J. Lele and John W. Mellor, *Estimates of Change and Causes of Change in Foodgrains Production, India, 1949-50 to 1960-61*, Cornell International Agricultural Development Bulletin 2.
2. John W. Mellor and Bruno de Ponteves, *Estimates and Projections of Milk Production and Use of Concentrate Feeds: India, 1951-1976*, Cornell International Agricultural Development Bulletin 6.
3. Thomas F. Weaver, *Irrigation Evaluation under Monsoon Rainfall Patterns – A Case Study for Raipur District, Madhya Pradesh, India*, Cornell International Agricultural Development Bulletin 10.
4. Thambapillai Jogaratnam and Thomas T. Poleman, *Food in the Economy of Ceylon*, Cornell International Agricultural Development Bulletin 11.
5. Ashok K. Dar, *Domestic Terms of Trade and Economic Development of India, 1952-53 to 1964-65*, Cornell International Agricultural Development Bulletin 12.
6. Mark C. W. Schroeder and Daniel G. Sisler, *Impact of the Sonauli-Pokhara Highway on the Regional Income and Agricultural Production of Pokhara Valley, Nepal*, Cornell International Agricultural Bulletin 14.
7. Ray W. Nightingale, *The Modernization Decision in Indian Urban Fluid Milk Markets*, Cornell International Agricultural Development Bulletin 15.
8. Ujagar S. Bawa, *Agricultural Production and Industrial Capital Formation, India, 1951-52 to 1964-65*, Cornell International Agricultural Development Bulletin 17.
9. Gunvant M. Desai, *Growth of Fertilizer Use in Indian Agriculture – Past Trends and Future Demands*, Cornell International Agricultural Bulletin 18.
10. T. V. Moorti, *A Comparative Study of Well Irrigation in Aligarh District, India*, Cornell International Agricultural Bulletin 19.
11. Vishnoo Prasad Shukla, *Interaction of Technological Change and Irrigation in Determining Farm Resource Use, Jabalpur District, India, 1967-68*, Cornell International Agricultural Development Bulletin 20.
12. Brook A. Greene, *Rate of Adoption of New Farm Practices in the Central Plains, Thailand*, Cornell International Agricultural Bulletin (forthcoming).

Dedication

To the memory of my grandfather Alhaj Muhammad Darbari, the village farmer whose yearning for higher education was the best legacy a man can leave to posterity.