MAKING GREEN REVOLUTION

The Politics of Agricultural Development in China

Benedict Stavis

Research Associate
Rural Development Committee
Center for International Studies
Cornell University

and

China-Japan Program
Cornell University

RURAL DEVELOPMENT MONOGRAPH NO. 1

Published by the Rural Development Committee,
Cornell University, 1974

BEST AVAILABLE

Copyright 1974 and 1975, Cornell University,
Center for International Studies
Rural Development Committee

Copies may be obtained from the Rural Development Committee
Cornell University, 170 Uris Hall, Ithaca, New York 14853
for $4.50 each.

TABLE OF CONTENTS

Page

INTRODUCTION AND ACKNOWLEDGEMENTS

I. CHINA'S GREEN REVOLUTION..... 1

A. Grain Production in China 10
B. Adoption of Modern Agricultural Inputs... 22
C. Rural Income..... 54
D. Comparison With Other Places..... 60

II. PRECONDITIONS FOR THE GREEN REVOLUTION IN CHINA..... 76

A. Attitudes Towards Modern Agricultural Techniques..... 76
B. Economic Infrastructure..... 78
C. Trained Manpower..... 80
D. Previous Scientific Progress..... 83
E. Political and Organizational Preconditions..... 87

III. DECIDING TO MAKE A GREEN REVOLUTION..... 95

IV. ESTABLISHING A BALANCE OF POWER AND INCENTIVES..... 109

A. Patterns of Rural Administration - The Commune System..... 110
B. Matrix of Authority..... 118
C. Economic Incentives for Agricultural Development and Investment..... 139
D. Summary..... 155

V. STRENGTHENING AGRO-TECHNICAL SERVICES..... 156

A. The Role of Agricultural Science and Scientists..... 157

TABLE OF CONTENTS (continued)

V. STRENGTHENING AGRO-TECHNICAL SERVICES (cont.)

B. Agricultural Extension..... 172
C. Mechanical Power To The People..... 190
D. Summary..... 204

VI. RURALIZING THE ADMINISTRATIVE INFRASTRUCTURE. 207

A. Education..... 207
B. Commercial System..... 214
C. Banking..... 223

VII. POLITICAL LEADERSHIP FOR AGRO-TECHNICAL CHANGE..... 233

A. The Function of Political Leadership..... 233
B. Political Leadership After the Tenth Plenum..... 244

VIII. CONCLUSIONS AND EMERGING PROBLEMS..... 250

A. Emerging Problems of Regional Inequalities..... 252
B. Inequalities Within the Village..... 259
C. Problems Involving Bureaucratic Organization..... 263
D. Problems Involving Government Authority and Leadership..... 267
E. Conclusion..... 273

IX. UPDATING OF ANALYSIS, AS OF JANUARY, 1975... 275

LIST OF TABLES

Table		Page
1.1	Areas of Modernized Agriculture in China, Late 1960's (million Hectares)	3
1.2	Estimates for Area, Yield, and Production of Food Grains 1957, 1971	4
1.3	Estimates for Source of Growth in Grain Production	6
1.4	Grain Production in China	12
1.5	Major Mechanical Irrigation Systems, 1965	24
1.6	Recommended Planting Densities for New Rice Varieties	32
1.7	Extension of Specific Varieties of Very High Yield Rice.	33
1.8	Local Adaptations of High Yielding Rice Varieties	35
1.9	Domestic Production of Chemical Fertilizer (million tons)	41
1.10	Availability of Chemical Fertilizer and Plant Nutrients, 1972	43
1.11	Various Computations for Source of Crop Nutrients, 1972	43
1.12	Chinese Contracts for Chemical Fertilizer Factories, 1973	45
1.13	Indices of Food Production in Various Asian Places (1961 to 65=100)	61
1.14	Food Staple Production Per Capita, 1972	65
1.15	Yields of Various Food Grain Crops, 1971 (tons/hectare)	67

LIST OF TABLES (Continued)

Table		Page
1.16	Availability of Chemical Fertilizer (1970)...	71
1.17	Adoption of High Yielding Rice Varieties.....	71
1.18	Adoption of High Yielding Wheat Varieties....	71
1.19	Indicators for Agricultural Mechanization....	73
2.1	Agricultural College Graduates per Farm Workers.....	83
4.1	Sources of Agricultural Investments in Three Counties.....	128
4.2	Ratio of Index of Industrial Retail Price in Rural Area to Agricultural Purchase Price Index.....	144
5.1	Chinese Agricultural Specialist Participating in 1962 Meeting.....	159
5.2	Agricultural Demonstration Projects - 1963-65.....	166
5.3	Number of Agro-technical Extension Stations..	173
5.4	Number of Agricultural Machinery Stations....	196
8.1	Elements of China's Agricultural Development Policy.....	251
9.1	Summary of the Spread of Modern Grain Production in China, 1974.....	276
9.2	Regions of Modernizing Agriculture, 1965 - 1974 (million hectares).....	282
9.3	Estimates for Area, Yield and Production of Food Grains, 1957 - 1974.....	286

LIST OF FIGURES

Figure		Page
1.1	Regions of Modernized Agriculture in China (Late 1960's).....	X
1.2	Grain Production in China.....	15
1.3	Percent of Income from Private Plots.....	57
1.4	Rural Personal Income (Late 1960's).....	59
1.5	Comparison of FAO Estimates and Stavis Estimates of Food Grain Production in China, 1961-1973.....	63
4.1	Matrix of Authority.....	138
4.2	Production Expenses, According to Income...	146
4.3	Procurement of Grain (Tax and "Surplus") By the State.....	148
4.4	Investment Rate of Communes.....	153
4.5	Farm Mechanization and The Role of Private Plots.....	154
7.1	Suitability of Model Leadership Patterns Under Different Conditions.....	247
8.1	Distribution of Income, Liuling, 1961.....	260
9.1	Regions of Modernizing Agriculture, 1974...	277

INTRODUCTION AND ACKNOWLEDGEMENTS

This monograph deals with agricultural development and transformation in mainland China, focusing on the period after 1960. The first chapter concludes that China has succeeded in converting significant areas of land into modernized agriculture, using modern science and industrial inputs. Indeed, China has probably been more successful than many other populous Asian countries in increasing agricultural (primarily food grain) production. In Chapter 2 we examine some of the preconditions that made this rapid change in agricultural technology possible; Chapter 3 pinpoints the decisions by the Chinese leadership which led to a mobilization of energies to transform agriculture.

Once this decision was made a comprehensive program was undertaken, touching on many sectors of society, to achieve this change. Political and administrative restructuring were needed, industry had to be reoriented, scientific resources had to be mobilized, extension services had to be provided, commercial networks and banking practices had to be changed, education had to be redirected and local leadership had to be provided. The Chinese leadership never believed that agriculture could be transformed simply by doing scientific research and making new seeds and fertilizers available. They realized that broad, coordinated programs were necessary. In Chapters 4-7 we discuss these different programs.

Rapid change in agricultural techniques cannot but have important political consequences. The nature of authority changes, the tasks of government change, the relationship between regions and people change. In the concluding Chapter 8, we explore some of these consequences of agro-technical transformation in China.

The conclusion of this paper, namely that China has successfully initiated a major change in agricultural

technology, is controversial. This conclusion rests primarily on the sketchy reports and assertions which the Chinese have offered, and I am well aware of the risks involved in this. Thus, to be precise, my conclusions are essentially hypotheses which appear to make sense of the available data and suggest directions for future research. The hypotheses developed here will undoubtedly have to be modified (as any hypothesis must) as more data become available.

I am not fully satisfied to write a paper which has tentative, hypothetical conclusions; but I think it is far better to use the data that are available and see what they suggest, rather than simply to say nothing about agricultural development in China until more data are available. Even when more data are available, conclusions will still be tentative, because questions will naturally emerge about the accuracy of statistics. (Indeed, it seems that people studying agricultural development in other Asian countries for which statistics exist must be so cautious if they are honest about the reliability and validity of their data, that I studying China am not at such a severe disadvantage.) Are scholars to stand idly by while newspaper reporters and tourists discover starving beggars and skeleton-like corpses in many regions of Asia, and see healthy people in China? Are we simply to say that the different reports reflect the ability of the Chinese travel office to control the itinerary of all Western visitors? Are we to wait until the "mañana" when we have adequate data? I believe scholars, working with the scant data available, can develop useful, albeit tentative, hypotheses to explain the reported impressions.

This paper focuses on the dynamic elements of China's agricultural production. I am preparing a complementary monograph which is more static and discusses

in some detail the patterns of social organization and government administration in rural China. This monograph, tentatively titled People's Communes and Rural Development in China, will be published by Cornell's Rural Development Committee in the near future.

I am most thankful to the many people and institutions which have given me important assistance in preparing this study. Richard Sorich gave crucial bibliographic suggestions. Interviewing in Hong Kong (which confirmed the general conclusions) was supported financially by the National Science Foundation and logistically by the University Service Centre. The China-Japan Program and the Center for International Studies at Cornell have given me important encouragement and support to complete this work. Many friends and colleagues have read and criticized earlier drafts of this study, especially Michel Oksenberg, Carl Riskin, John Mellor, John Wong, and Kenneth Robinson. The first chapter of this monograph has been published separately by the China-Japan Program, Cornell University, under the title China's Green Revolution. Several revisions have been made since that publication to bring data more up to date, to correct typographical, arithmetical and other errors, to make comparisons with the most recent published FAO estimates, and to explain my arguments more precisely. I am indebted to John Blackton for his critical reading of the first chapter which inspired some of these revisions. A summary of this paper was presented at a conference on China's agriculture, sponsored by the Joint Committee on Contemporary China (of the Social Research Council and American Council of Learned Societies). I am thankful to participants in that conference (especially Jack Gurley, Dwight Perkins and John Despres) for helpful comments. David Mozingo and Norman Uphoff have made numerous invaluable editorial suggestions to help me express myself more

precisely. I also wish to thank Renee Pierce, Marie Fuerst, Mary Berens, Faith Forman, Debbie Van Galder, Debi Ostrander, and Elisabeth Thorn for patiently and carefully typing and proofreading this monograph.

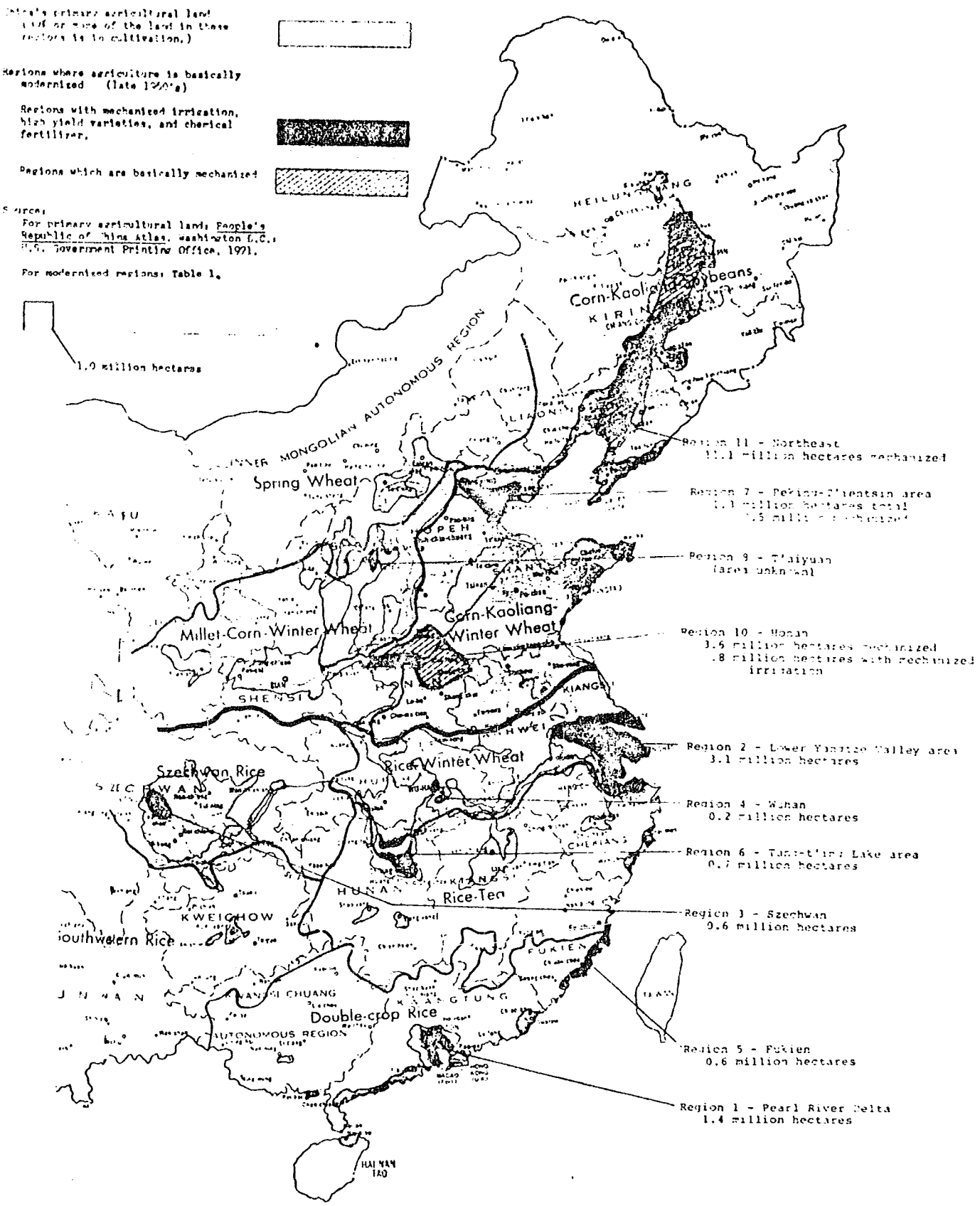
Of course the interpretations expressed herein are my own and are not meant to represent the position or views of other individuals or institutions. The errors remain my own as well.

For this, the second printing of this monograph, a supplement has been added, (pages 275-287) which updates (and strengthens) the conclusions from Chapter 1. Readers are encouraged to consult it simultaneously with reading Chapter 1. The supplement also includes newly discovered material on management of irrigation systems.

FIGURE 1.1

Regions of Modernized Agriculture in China

(Late 1960's)



BEST AVAILABLE

Chapter 1

CHINA'S GREEN REVOLUTION

During the 1960's China's agriculture underwent extensive technological changes, so that by the end of that decade roughly 20 percent of her cultivated area (i.e., about 25 million hectares) had modernized agriculture.[1] Of this, about 10 million hectares have mechanical irrigation, new seed technologies, probably chemical fertilizer, and some use of tractors for cultivation. On roughly another 15 million hectares cultivation is basically mechanized. Table 1.1 and the preceding map give rough estimates concerning the location and size of the various areas in China with a modernized agriculture.

In these areas, which the Chinese call "high and stable yield areas," food production is basically assured by mechanized irrigation. Neither flood nor drought will

---

[1] This analysis of China is limited to the mainland provinces of China and does not include the province of Taiwan because the timing and process of agricultural development has been quite different there. I have analyzed agricultural development in Taiwan in a monograph Rural Local Governance and Agricultural Development in Taiwan (Ithaca: Cornell, Center for International Studies, 1974).

influence production very much. Sufficient supplies of chemical fertilizer and careful seed selection result in high yields. Moreover, because water supply can be regulated carefully, because more crop nutrients are available, and because mechanization is available to deal with peak-season labor shortages (e.g., when harvesting the first crop and planting the second crop), cultivation can be greatly intensified. For example, in the Hangchow area of Chekiang province, communes plant two rice crops and one wheat crop annually instead of only one crop.[1] These regions have undergone what we will call a "green revolution," that is the adoption of a variety of new agricultural practices that are based on scientific research and industrial supplies. The term is used somewhat metaphorically, to be sure, as it is used when discussing "green revolution" in India or the Philippines.

The rest of China's cultivated area is in a transitional phase. Many of these areas have some modern inputs but not the full set of complements required by modern agriculture. They may have improved seeds (although not extremely high yielding), improved cultivation techniques, or some chemical fertilizer, mechanization and electrification. We know there are some smaller "high and stable yield areas," generally in the suburbs of cities, which are not included in our calculations of the area of modernized agriculture.

---

[1] Annette Rubinstein, "How China Got Rid of Opium," Monthly Review, October 1973, p. 60. Similar examples are numerous. In Wushih County, Kiangsu, an extra rice crop has been added to the traditional one rice crop and one wheat crop. ("A Double Approach to More Fertilizer," China Reconstructs, August 1973, p. 25.) In the Tungt'ing Lake area of Hunan, intensified cultivation at one commune increased average grain yields from 3.0 to 9.75 tons per hectare. ("Silted Land Transformed," China Reconstructs, October 1973, p. 10.)

TABLE 1.1

Areas of Modernized Agriculture in China, Late 1960's
(million hectares)

Area	Total Sown Area	Mechanical Irrigation	Very High Yielding Seeds	Area Plowed By Tractors
Rice Areas				
1 Kwangtung-Pearl River Delta	1.4	0.4	1.5	
2 Shanghai-Nanking area	3.1	3.1	0.71	
3 Szechwan	0.6	0.6	tested	
4 Wuhan	0.2	0.13	tested	
5 Fukien	0.6	0.6		
6 Hunan, Changsha, Tung-t'ing Lake	0.7	*	tested	
Rice Area Subtotal	6.6			
Wheat and Other Crop Areas				
7 Peking-Tientsin area	1.3	1.3	0.08 in Peking	0.5 in Peking
8 Shansi-Taiyuan	*	*		
9 Changchun, Kirin	0.2	*	reported	
10 Honan, Cheng chow Loyang	3.6	0.8#	tested	3.6
11 Northeast	11.1		reported	5.6
Total identified in these areas	22.8	6.9	2.3	9.7
Total estimated in 1971		9.0	7.7 (mid 60's)	21.0

* It is known that modernized agriculture exists in this location but the extent is not known.

\# Estimated, other figure reported.

Sources: This table is a summary of detailed data which are presented below in Section B. It does not include small pockets of modernized agriculture near cities outside of the major high and stable yield regions.

TABLE 1.2

Estimates for Area, Yield, and Production of Food Grains

1957, 1971

	1957[1]				1971[2]				
	Sown Area (million hectares)	Yield (Tons/ hectare)	Production (million tons)		Sown Area[3] (million hectares)		Yield (Tons/ hectare)		Production (million tons)	
Rice	32.2	2.69	87	regular	27.6	34.2	3.0	3.2	83	111
				high-stable	6.6		4.2		28	
Wheat	27.5	.86	24	regular	7.5	27.5	1.1	1.5	8.3	42
				mechanized	17		1.5		25.5	
				high-stable (and mechanized)	3.0		2.9		8.0	
Coarse Grains	50.6	1.04	53		58.6		1.2		70	
Potatoes	10.5	2.09*	22*		10.5		2.3*		24*	
TOTAL	120.8	1.54	186		130.8		1.89		247	

Sources

1. Figures for 1957 are official Chinese figures given in Ten Great Years.
2. Estimates for 1971 are based on figures contained throughout this paper. Increments in yields are based on field surveys conducted by Chinese agricultural scientists and economists, reported below in discussion of modern inputs and their impact on production.
3. We assume an expansion of sown area of 10 million HA. It is assumed that of this, expansion of rice planting (through expansion of areas of multiple cropping) account for 2 million HA. In 1971 alone, it was reported that early rice acreage expanded 1.8 million HA. (Steve Washenko "Agriculture in China: Priorities and Prospects," Current Scene Vol. IX No. 10 (October 7, 1971), p. 3. The remaining 8 million HA are presumed to be planted to coarse grains.

Note:

The estimates in table 1.2 are fairly close to FAO estimates for China. The main differences are that FAO does not agree concerning increase in wheat yields, and FAO presumes greater expansion of sown area than my figures show.

Estimates for 1971

	Area		Yield		Production	
	Stavis	FAO	Stavis	FAO	Stavis	FAO
rice	34.2	33.8	3.2	3.1	111	106
wheat	27.5	28.5	1.5	1.1	42	32
coarse grain	58.6	56.6	1.2	1.3	70	75
potatoes	10.5	15.7	2.3*	2.3*	24*	36*
TOTAL	130.8	134.6			247	249

* In all above computations potatoes have been converted to grain equivalent by multiplying actual yield and production by .25.

note: FAO figures are for harvested area, which should be somewhat smaller than sown area which I use.

Source: Production Yearbook, 1972. Because the figures for China in this source are for all of China, including the province of Taiwan, subtractions have been made (based on Production Yearbook, 1971) to get figures for the mainland provinces of China.

TABLE 1.3

Estimates for Source of Growth in Grain Production

Type of Region	Total Sown Area, 1957 (million HA)	1957 Land Converted to Modernized Agriculture (million HA)	Expansion of Cultivated Land (million HA)		Increase in Yield/Ha. (metric tons)		Increase in Total Grain Production (million tons)	
							modern sector	traditional sector
Rice								
Total area, over which we impute changes from traditional techniques	32.2			X	.31	=		10.0
Portion of rice land converted to high and stable yield areas		4.6		X	1.20	=	5.5	
Additional rice land made possible by new technologies			2.0	X	4.20	=	8.4	
Wheat								
Total area, over which we impute changes from traditional techniques	27.5			X	.24	=		6.6
Portion of wheat area with high and stable yields, plus mechanization		3.0		X	1.8	=	5.4	
Portion of wheat area which is mechanized		17.0		X	.4	=	6.8	
Other Crops								
Total area, over which we impute changes from traditional techniques	61.1			X	.16	=		9.8
Expanded area			8.0	X	1.20	=		9.6
TOTALS	120.8	24.6	10.0				26.1	36.0

Note: In constructing this table, I have minimized the role of the modern sector by two procedures. First, I have not attributed all of the growth in high and stable yield areas to modern techniques and inputs; rather I have assumed that a portion of the growth would have occurred anyway due to changes in traditional techniques. Secondly, I have presumed that all growth in areas not in the high and stable yield areas was due to improvements in traditional techniques. This is clearly not the case, as there were small pockets of modern agriculture, and much of the change in these areas came because of some modern inputs. Thus the 42 percent (26.1 million tons) of the grain increments from 1957 to 1971 is the minimum contribution of the modern sector.

Some of the most backward areas may as yet have few or no modern inputs.

From 1956 to 1971, Chinese grain production grew from roughly 190 million tons, a plateau for grain production under traditional technology, to almost 250 million tons. Of this increase of about 60 million tons, the major high and stable yield areas (with one-fifth of the cultivated area) accounted for about 42 percent.

From the point of view of overall percentage increase the annual growth of food grain production from 1956 to 1971 (both good years) has been about 1.9 percent, roughly equal to population growth. However, in high and stable yield areas, the growth rate in grain production has been well above 1.9 percent. Of course, in other areas the growth rate has been somewhat less, probably about 1 percent. Thus it would appear that China has not found a way of making backward areas develop their agricultural productivity at a high rate, in the absence of modern inputs.

This conclusion is somewhat striking, because the Chinese often attribute their success in development to unique forms of social organization and mass mobilization. I certainly would not argue that social organization and political mass mobilization are irrelevant to improved agriculture. Indeed, they have been very important in changing class relations in China and in developing patterns of distribution of food and other values that stress equality and security. Strictly in terms of production, organization and mobilization have also played a role, providing the labor inputs needed to level and terrace land and to build water conservancy projects. Social organization and mass mobilization have, then, been complements to modern inputs. They have not, however, been able to substitute for the modern inputs, which remain absolutely essential for continued growth of China's agriculture. Chinese leaders

recognize this, and in late 1973 contracted to buy chemical fertilizer factories which will come close to doubling their already large capacity.

Continued expansion of agriculture in the 1970's may be a greater challenge than it was in the 1960's. Much of the improvement in the 1960's was in areas which were already well developed and had good water supplies (e.g., the Pearl River Delta, Lower Yangtze valley, and the central lake areas). The scientific breakthroughs needed to increase rice production for such regions were relatively simple (and have been duplicated in most Asian countries). Moreover, the necessary improvements in irrigation were relatively inexpensive because water did not have to be lifted very high. For the 1970's there will be harder problems, which have not yet been solved adequately in other countries: controlling pests and diseases in high and stable yield areas; improving yields in the temperate latitudes, where the growing season is too short for multiple cropping and in upland areas where water resources are not good.

An indication of the problems China faces is suggested by the fact that food grain production appears to have grown very rapidly from 1964 to 1967 (at 6.0 percent annually), as the first generation of modern techniques were popularized. Since 1968, however, food grain production has probably grown at around 1.4 percent. We can expect to see increased mobilization of China's scientific and technological resources, as well as increased contact with agricultural scientists throughout the world, as China tackles the complex agro-technical problems of the 1970's.

One of the things China has been testing as a way of dealing with these problems has been new patterns of inter-cropping and multiple cropping. In Tangshan Special District, Hopeh province, an area about 100 miles east of Peking that does not receive special emphasis in industrial

supplies, methods of double harvesting can produce a grain yield of 6 tons per hectare and triple harvesting can bring 7.5 tons per hectare. Indeed, experiments were being carried out with quadruple planting and planting seven times in two years.[1] This pattern of agricultural development is distinctive in that it prevents mechanization of harvesting, complicates mechanization of plowing, and increases labor requirements. It naturally requires many complementary inputs--especially fertilizer and water, as well as machinery to process the harvest and release labor for intensified cultivation. The Chinese feel that this pattern of development is appropriate for areas that lack industrial supplies but have much labor power. It is not yet clear whether this pattern will emerge as an important way of raising productivity in the 1970's.

Compared with other countries in Asia, China's experiences in transforming agriculture can be considered successful. Food production has risen slightly more rapidly than in most other populous countries in Asia, and cereal production per capita and yields are quite high.[2] On an overall average basis, China's agriculture is the most advanced of populous countries in Asia, after that of Japan and Taiwan Province; and mainland China's high and stable yield areas are comparable to the modernized areas in Japan and Taiwan Province. In terms of future prospects, China's difficulties are real but certainly no greater than those of other populous Asian countries.

In this monograph the first chapter will specify quantitatively the extent of technical change in China's agriculture, looking at growth of grain production and at

---

[1] Discussion with Tangshan Special District, Agricultural Department, April 21, 1972.

[2] See below Tables 1.13-1.19.

changes in agricultural inputs. The first chapter will also suggest some of the income effects of increased grain production and will compare China's success with other Asian countries. The remaining chapters will specify the preconditions for China's advance and will examine in detail the policies which have been used to bring about the green revolution in China. The final chapter examines some of the political problems that may emerge as a result of agro-technical development.

A. Grain Production in China

The question of food production in China is subject to intense debate among analysts of China because there are serious problems regarding the availability, accuracy, and comparability of data. China released much data for the period before 1958 on a province-by-province basis, which Kang Chao has used to estimate total grain production.[1] His estimates for total production are higher than the official total figures offered by the Chinese government, but also imply a lower growth rate. Chao believes the discrepancy is due to incomplete compilation of sown land statistics before 1957. Chao's analysis seems convincing, and I have used his figures for the period before 1958. For 1958 and 1959, Chao's deflations of Chinese figures seem appropriate. For the period 1960 to 1965, I use the Chinese figures, which are generally accepted by Western observers, including official American "China-watchers." For the period after 1965, however, there is great debate on the accuracy and comparability of statistics offered by China. Some observers believe the Chinese claims for

---

[1] Kang Chao, Agricultural Production in Communist China, 1949-1965 (Madison: University of Wisconsin Press, 1970).

1970 and thereafter are too high.[1] Others consider that the recent figures are really too low because they do not include production on private plots, harvesting losses, and potatoes.[2]

My own view is that we can work with the official Chinese figures as accurate and comparable, at least until more information becomes available. For one thing, Chinese economists use these figures for comparison with earlier years in planning and evaluation of performance. For another, the size of potential error caused by exclusion of private plots is small, as very little grain is grown privately; harvesting losses are probably small. If potatoes

---

[1] I will not discuss here in detail the deficiencies of alternative estimates made by various U.S. government agencies, other agencies, and independent scholars. I believe that their downward biases can be explained in terms of their failure to note new seed technologies that became available in China by the mid-1960's, their presumption (erroneous, I believe) that chemical fertilizers were used primarily on cash crops and had little impact on grain production, their over-reliance on consumption data from refugees who come from poorer regions and emigrate in poor harvest years, and their presumption that food imports reflected overall shortages and were not related to domestic political and transportation considerations (see Audrey Donnithorne, China's Grain: Output, Procurement, Transfers and Trade, Hong Kong: Chinese University Economic Research Centre, 1970). In a broader sense, these errors stemmed from an assumption that continual political mobilizations in China disrupted production and prevented modern techniques from being adopted, from a presumption that collective agriculture could not be as efficient as a private ownership system, and from a general view that a communist political system must be unable to carry out technological reform effectively. In 1967, when China was reporting (through Anna Louise Strong) that production was 230 million tons, western observers were arguing whether production was 180-190 million tons, or whether it could have risen to 215-220 million tons. A convenient summary of many Western estimates is available in Yuan-li Wu, China, A Handbook (N.Y.: Praeger, 1973), p. 685.

[2] Curtis Ullerich, "China's GNP Revisited; Critical Comments on a Previous Estimate," Journal of Contemporary Asia Vol. 3 No. 1 (1973), p. 48.

TABLE 1.4

Grain Production in China

Year and Period	Grain-equivalent production, million metric tons	Index 1961-65=100	Increase %	Compound growth rate for period
Recovery from War				
1949	134			
1950	143		6.7	1949-52; 7.5%
1951	155		8.4	
1952	166		7.0	
First Five Year Plan				
1953	170		1.5	
1954	176		3.5	
1955	182		3.4	1952-57; 2.3%
1956	188		3.3	
1957	186		-1.1	
Great Leap, Crisis, and Recovery				
1958	205		10.2	
1959	170		-17.1	
1960	150		-11.8	1957-63; -0.3%
1961	160	88	6.7	
1962	170	94	6.2	
1963	182	100	7.1	
Period of Rapid Technological Change				
1964	195	108	7.1	
1965	200	110	2.6	1963-67; 6.0%
1966	220	121	10.0	
1967	230	126	4.5	
Period of Stagnation				
1968	(234)	128	1.7	
1969	(237)	130	1.3	
1970	240	132	1.3	1967-73; 1.4%
1971	246	135	2.5	
1972	240	132	-2.4	
1973	250	136	4.2	

Sources for Table 1.4

1949-58: Kang Chao, Agricultural Production in Communist China, 1949-1965 (Madison: University of Wisconsin Press, 1970), p. 227.

1959-65: Chinese unofficial claims are summarized and evaluated by Chao, op.cit., pp. 245-46.

1966: Han Suyin, China in the Year 2001 (New York: Basic Books, 1967), p. 54.

1967: Anna Louise Strong, "Letter from China," January 1, 1968.

These estimates for 1966 and 1967 are fairly consistent with estimates the Chinese made before the end of 1967. In October 1967, Hsieh Fu-chih estimated that the 1967 grain harvest would be 9 to 10.5 million tons higher than the previous year. "Vice Premier Hsieh on 'Fight Self, Repudiate Revisionism,' --Excerpts of his speech at the Standing Committee meeting of Peking Revolutionary Committee in the Afternoon of October 5," Canton Wen-ke T'ung-hsün (Cultural Revolution Bulletin) November 8, 1967. SCMP 4076 p. 1. Later in the year, Chou En-lai predicted that grain output would rise 5-6% in 1967. "Premier Chou's Speech to Canton Delegations to Peking on the Morning of November 14, "Canton, Tzu-liao Chuan-chi (Special Reference Material Supplement) , November 17, 1967. SCMP 4080, p. 4.

1968-69: These are arbitrary figures intermediate between 1967 and 1970.

1970: Edgar Snow, "Talks with Chou En-lai: The Open Door," New Republic, Vol.164, No. 13 (March 27, 1971), p. 20.

1971: First reports were 246 million tons. "New Leap in China's National Economy," Peking Review, No. 2 (January 14, 1972), p. 7. A revised figure of 250 million tons was reported in "China Reaps Good Harvest in 1972," Peking Review, No. 1 (January 5, 1973), p. 13. The change is probably due to rounding, because later a Chinese economist again used the figure

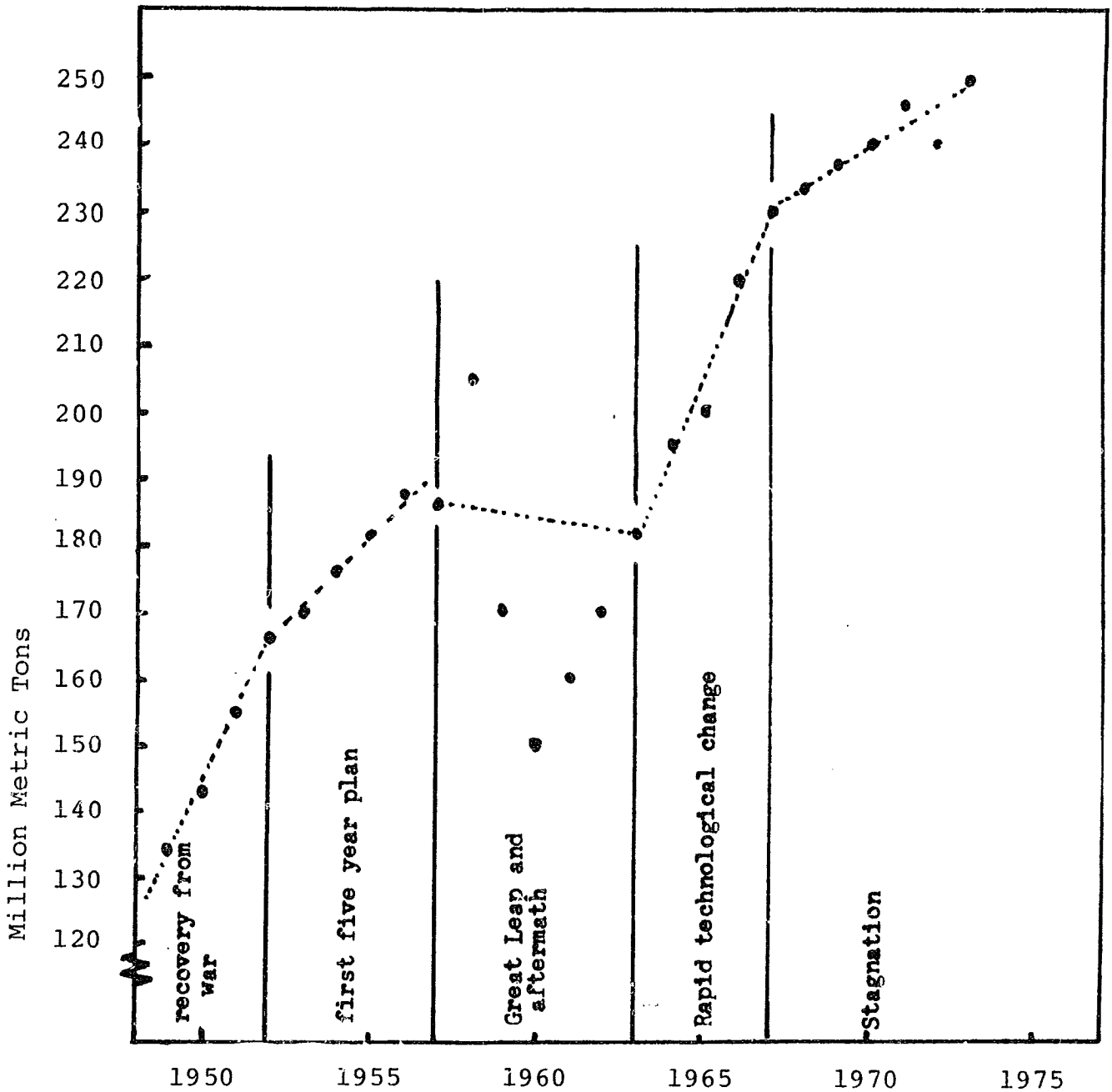
246 million tons. Chung Li-cheng, "China's General Principle of Developing the National Economy," Peking Review, No. 33 (August 17, 1973), p. 6.

1972: First estimates put the total grain output at 240 million tons. "China Reaps Good Harvest in 1972," Peking Review, No. 1 (January 5, 1973), p. 12. Before the end of the year, Chou En-lai told a visiting Scandinavian group that agricultural production for 1972 was about four percent lower than for 1971. "Economic Growth Declines in China," New York Times (December 5, 1972).

1973: The Chinese press reported: "Total grain output last year outstripped the 250 million tons of 1971, an increase higher than the average annual increase since the founding of the People's Republic of China." (By Chinese figures, the compound growth rate from 1949 to 1972 was 3.7 percent.) "All Round Rich Harvests in China," Peking Review, No. 1, January 4, 1974, p. 8.

FIGURE 1.2

Grain Production in China



Source: Table 1.4

are not included in current statistics in the manner they were in the 1950's (namely by counting 4 units of potatoes as 1 unit of grain equivalent), then the potential error is significant, for potatoes constituted roughly 12 percent of the grain equivalent in 1957.

A more general reason for working with Chinese figures where they are not unreasonable concerns the further development of scholarly work on China's development. As relations between the United States and China improve and the possibilities for scholarly exchange grow, it is appropriate that Chinese official data be used in analyses whenever they do not strain credulity, so that scholars here and there are working from similar bases. In this case, the Chinese figures seem reasonable, as the average compound growth rate of food production from 1956 to 1971 (both were years with good harvests) was 1.9 percent. This is virtually identical with population growth, so that per capita availability of food grains would be almost the same in 1971 as in 1956. Considering reports from recent visitors to China, it is not difficult to believe that food production has kept up with population growth, and this represents reasonable success compared with the situation in some other Asian countries; but it does not imply spectacular success. Moreover, admirers of China cannot say that the analysis underestimates China's success since my conclusions rest on Peking's own statistics. Hopefully China will release more data, and that may, of course, require revisions in the hypotheses developed here.

It is well to point out exactly to what the figures refer. Chinese grain production figures refer, in reality, to "grain equivalent" of several crops. Rice, wheat, and coarse grains are included at 100 percent of their production. Potatoes are included at 25 percent of actual production. (This makes sense, as potatoes have only about

25 percent of the caloric value per unit of weight as do the cereals.) Soya beans and other pulses are not included in the Chinese figures. The relative importance of different food crops is shown in Table 1.2.

It should also be pointed out that the Chinese figures refer to the total production of grain, before it is processed. To compute the amount available for human consumption, processing losses must be computed (about 30 percent for rice, about 15 percent for wheat and coarse grains), and subtractions must be made for other uses of grain, the most important being seed for the following year's crop. Some may be used for animal feed or for brewing. There is also a certain amount lost or damaged in transportation and storage. In addition, figures before 1960 are on the basis of biological yields, so harvesting losses must be subtracted. It is possible, but not certain, that some of the figures for the 1960's refer to grain that has been harvested, and for which no correction need be made for harvesting losses. (The note to Table 1.13 points out that FAO methods of aggregating production statistics are different from the Chinese methods.)

Close examination of the production statistics suggests that there are two broad periods of agricultural development. Before 1957 there was a period of growth through the mobilization of traditional inputs. This brought grain production to about 185 or 190 million metric tons, but production could not grow rapidly beyond that plateau without technological change. Short-term crash programs could not raise production without serious subsequent disruption. Only slow growth resulting from increased labor supply and traditional fertilizers was possible beyond this apparent plateau, barring new techniques and new inputs. After 1963, a technological

transformation of agriculture began, which permitted grain production to rise rapidly above what had been possible previously and to remain at higher levels.

Actually, a more complete analysis breaks these periods of traditional improvement and technical transformation themselves into two periods, and adds an additional transitional period when China experimented briefly with a "super-mobilization" policy. These five periods can be described as follows:

1. Mobilization of Traditional Resources

a. For the first years after the victory of the revolution, agricultural production grew very rapidly at an average annual rate of 7.5 percent. This reflected the termination of disruptions associated with over a decade of international and civil war.

b. From about 1952 to 1957, during China's first Five Year Plan, agricultural production increased slowly, at an average annual rate of growth of 2.3 percent, about the same rate as population increase. In general, this growth in agriculture was caused by increased utilization of traditional resources, especially labor. One important aspect of agricultural development during this period was the repairing of irrigation systems so that the pre-war system could be brought back into full use.[1] By 1957, the traditional resources were fully utilized,

---

[1] The data on irrigated area are not precise, but good enough for this sort of broad generalization. During the 1930's, the irrigated area in China was somewhere between 26 million hectares and 39 million hectares. The range of possible amounts of area is due to the fact that irrigated area is estimated by multiplying cultivated area by percent of land irrigated. For both values there is uncertainty. Estimates for cultivated area range from 94 million hectares (Dwight Perkins, Agricultural Development in China, 1368-1968, Chicago: Aldine, 1970, p. 236) to

and agriculture could not grow without a structural transformation in which agricultural inputs began to come from the industrial sector.[1]

2. Transition

c. From 1958 to 1963, China's agricultural production went up sharply the first of these years, then dropped into a deep depression and finally recovered to 1956-57 levels. The sharp decline had many causes, bad weather being one of them. But the crisis was also caused by the policy of the Great Leap Forward, which held that agricultural production could increase simply through intensification of cultivation. Labor inputs were considered the main restraint on production, so rural society was reorganized into communes in an attempt to increase the labor supplies for agricultural production.[2] For a year, yields went up, but the increase could not be maintained. Without chemical fertilizer, the close-planting depleted the soil. Without new energy sources, increased

---

111 million hectares (Kang Chao, op.cit., pp. 193-207). Estimates of irrigated percentage range from 31 percent to 42 percent. (John Lossing Buck, Land Utilization in China, New York: Paragon, 1968, pp. 188, 232, supplies figures which must be weighted to achieve proper geographic balance.) A detailed discussion of this can be found in Benedict Stavis, "Political Dimensions of the Technical Transformation of Agriculture in China," Columbia University Ph.D. dissertation, 1973. Appendix 1.

For the 1950's, the statistics on irrigated area are not precise either. For 1953, however, they range from 24.0 to 31.0 million hectares. By 1956, the irrigated area was somewhere between 32.0 and 37.6 million hectares. Owen Dawson, in Buck, Dawson and Wu, Food and Agriculture in Communist China (New York: Praeger, 1966, p. 156), conveniently sums up Chinese statistics published in a variety of sources.

[1] Dwight Perkins, op.cit., p. 16.

[2] When labor inputs are mobilized on a scale much greater than had been characteristic of the traditional economy, they can no longer be considered "traditional" inputs, but are transformed into something new.

irrigation eventually resulted in water shortages and increased soil salinity. The tremendous labor inputs tired the people. In short, modern inputs were needed to sustain production above this plateau. Unfortunately, because China's agriculture used traditional resources so efficiently and so delicately balanced, it was seriously disrupted as a result of the unsuitable policies. A sharp drop in food production followed the attempted Great Leap.[1] By 1963, China had recovered from those disruptions and was back on the plateau of food production at about 185 million tons.

3. Technical Transformation

d. From 1964 to 1967, China's grain production rose very rapidly, at an annual average rate of 6.0 percent each year.[2] This is the period that China began its green revolution. Because China had already reached its ecological limits for food production in the 1950's, the rapid growth during the mid-1960's is especially important. It reflects structural change in China's agriculture and indicates that China entered a new epoch in which agriculture is promoted by scientific techniques and inputs from the industrial sector.

e. Since 1968, China's grain production has grown at an average annual rate of only 1.4 percent. This is less than the growth in population, and can be

---

[1] While the Great Leap did not work well in 1958, many elements of its overall policy were sensible; when they were combined with suitable modern inputs and careful organization after the Cultural Revolution, they proved successful.

[2] This is an extremely high rate of growth to be sustained over several years. Often such a rapid growth rate in agricultural production might be related to bad weather in the first year of the series and good weather in the last year. In addition, some error may be introduced by the Chinese practice of rounding their estimates to two significant digits. Despite these potential sources of error, I believe the data are basically correct in suggesting that grain production grew very rapidly in this period.

considered stagnation.[1] The Chinese report that poor weather in 1972 and 1973 account for slow growth. (In fact, they regard the prevention of serious crop failures after two bad years of weather as a mark of accomplishment.) However, the stagnation after 1968 may have technological reasons. Advanced technologies for upland crops have not become available. Moreover, problems may have been encountered in the modernized sector. Modern agriculture is like a treadmill: new techniques must be constantly devised and extended as higher production is required, as inputs change and as new pests and diseases emerge. China definitely mounted this treadmill in the early and mid-1960's, but by the end of the 1960's China may have had difficulty keeping up on the treadmill. Another problem may be that increased military expenses to deal with the Soviet threat may have reduced investment in the agricultural sector. Whatever the cause of this apparent stagnation, the present intensity of family planning campaigns now suggests that the Chinese do not see a rapid, easy solution to the food question. China's green revolution is not yet completed; moreover, it has been slowing down.

It should be pointed out that possibly the lower growth rates in food production reflect a statistical problem. Perhaps during the 1960's the definition of "Unified Grain Equivalent" changed; moreover, perhaps

---

[1] The precise dating of the period of stagnation presents some difficulties. The adoption of 1968 as the beginning of this period is based on the acceptance of high production levels reported in 1967. This is, admittedly one of the weaker figures in the production series. However official statistics for 1970-73 clearly indicated that grain production was roughly constant in those years, hovering at 240-250 million tons, depending to some degree on weather. Despite the overall stagnation there were important advances in many regions and localities in this period.

after the Cultural Revolution it was more feasible for production units to fail to report, i.e., to hide, some of the grain they produce.

These data on grain production show very rapid growth in the early and mid-1960's. The following section describes the important improvements made in agricultural techniques at that time to make much of this growth in production possible.

B. Adoption of Modern Agricultural Inputs

In China there are two slogans which summarize the combination of technological changes that must be made for growth in agricultural production. One is the "Eight Character Charter," which lists (1) land construction and rearrangement, (2) water control and irrigation, (3) fertilizer, (4) improved varieties of seeds, (5) pest control, (6) improved field management, (7) better farm tools, and (8) suitable spacing of plants. A second slogan refers to the "Four Changes," namely, electrification, irrigation, chemicalization, and mechanization. These technological changes are not unique to China; they form the core of modern agriculture anywhere.

In the following section, Chinese reports on adoption of these modern agricultural inputs show that about one dozen areas ("high and stable yield areas"), covering roughly 20 percent of China's cultivated area (as summarized in Table 1.1), received a full complement of modern inputs and developed more modern agriculture in the early and mid-1960's. In some other regions of China, agriculture has advanced too, but not as comprehensively.

1. Mechanization of Irrigation

One dimension of technical change in China's agriculture was the mechanization of irrigation. From 1957 to 1965, mechanical irrigation equipment reportedly rose from 0.56 million horsepower to 8.6 million horsepower.[1] This equipment was used on about 6.6 million hectares of land in 1965.[2] (At that time China had about 32 million hectares of irrigated land, four-fifths of which was irrigated by gravity-fed systems or hand wells and pumps.[3]) Most of the mechanical irrigation equipment was used near urban concentrations to assure a high and steady yield of grains and vegetables. As seen from Table 1.5, regions around the major urban areas of Peking, Shanghai, Canton, and Szechwan had over 80 percent of the mechanically irrigated area in 1965.

Mechanical irrigation continued to increase after 1965, rising by extrapolation to about 12 million horsepower in 1971.[4] If each horsepower irrigated the same number of hectares in 1971 as in 1965 (0.8 hectares), then about 9 million hectares would be mechanically

---

[1] Chinese data are conveniently summarized by Kang Chao, op.cit., p. 141.

[2] "How China Achieves Good Harvest in 1965," New China News Agency, Peking, December 28, 1965. This source is the official news agency of China and is commonly abbreviated NCNA. It along with other Chinese news reports is reported regularly in a publication of the U.S. Consulate in Hong Kong, Survey of China Mainland Press, hereafter abbreviated as SCMP. The citation for this reference is SCMP 3609, p. 24.

[3] Chao, op.cit., p. 124. FAO reports a higher figure of 76 million.

[4] "Agricultural Development," Peking Review, No. 45 (November 10, 1972), p. 45 stated that from 1962 to 1971, irrigation and drainage machinery had trebled. A figure for 1962 is available in Chao, op.cit., p. 141.

TABLE 1.5

Major Mechanical Irrigation Systems, 1965

Region	Million Hectares
1. North China Plain, mechanical wells in the Peking-Tientsin area	1.3[a]
2. Lower Yangtze, near Shanghai	3.1[b]
3. Pearl River Delta, south of Canton	0.4[c]
4. Szechwan (1966)	0.6[d]

Source:

[a] "Medium and Small Factories Serve Agriculture in North China," NCNA Tientsin, September 7, 1964. SCMP 3316, p. 12.

[b] "More Electricity for People's Communes in China," NCNA Peking, April 24, 1964. SCMP 3208, p. 16. "Electric Pump Operators and Tractor Drivers Trained for China's Rural Areas," NCNA Peking, January 10, 1963. SCMP 2898, p. 13. "China Uses More Pumps for Irrigation and Drainage," NCNA Peking, April 3, 1963. SCMP 2955, p. 15.

[c] "Fifth Year of Construction on Pearl River Delta Pumping Stations," NCNA Canton, October 23, 1964. SCMP 3326, p. 19.

[d] "China's Leading Rice Producing Province Makes Headway in Technical Transformation of Agriculture," NCNA Chengtu, October 24, 1966. SCMP 3809, p. 27.

irrigated in 1971.[1] An additional 1.4 million hectares in north China were brought under irrigation in 1973, with deep and power-operated wells.[2]

Several other areas developed smaller mechanical power irrigation systems. An irrigation network was begun in the area around Wuhan in the early 1960's. The project was planned to provide irrigation and drainage for 0.13 million hectares.[3] A large network of pumps was planned around the Tungting Lake of Hunan.[4] Plans were also announced for large irrigation systems in the northeast province of Kirin, near Changchun.[5] Another area where machinery has increased irrigation is in Honan, particularly around the cities of Chengchow and Loyang. Between 1965 and 1971, mechanical wells in Honan increased from 10,000 to 260,000 and irrigated acreage rose from 1 million hectares to 2.66 million hectares.[6] In the early 1970's, deep wells greatly expanded water supplies on the North China Plains and stabilized production during 1972 and 1973, when rainfall was short. But for these pumps, North China would have faced a serious food problem.

---

[1] Most likely the same ratio has not been maintained. Pumps are probably used to lift water to increasing heights, thus reducing the area that could be irrigated per horsepower. Thus the estimate of 9 million hectares mechanically irrigated in 1971 is probably the upper limit.

[2] "All-Round Rich Harvests in China," Peking Review, No. 1 (January 4, 1974), p. 10.

[3] "New Electric Pumping Projects in Central China, Yangtze Province," NCNA Wuhan, January 9, 1963. SCMP 2897, p. 13. "Big Power Transmission Project for Central China Rural Area," NCNA Wuhan, July 26, 1964. SCMP 3269, p. 17.

[4] "Electric Pumps in Central-South China Province," NCNA Changsha, August 4, 1964. SCMP 3275, p. 21. "Tungting Lake Today," China Reconstructs, XXII (10) (October 1973), pp. 2-6.

[5] "New Pumping Stations in Northeast China," NCNA Changshun, August 26, 1964. SCMP 3290, p. 14.

[6] Rewi Alley, "A Glimpse at Today's Chengchow," Ta Kung Pao (Hong Kong) July 6, 1972, p. 13.

Mechanization of irrigation is a crucial step in improving agricultural production. Assuming the water source is adequate, mechanization guarantees production in time of drought. If there is flood, the same equipment can also be used for drainage. Mechanization of irrigation permits the precise regulation of water supplies required by high yielding varieties of rice. Finally, it makes multiple cropping possible in areas where supply of water at specific times was a bottleneck. A Chinese slogan summarizes the crucial role of irrigation and drainage: "Water conservancy is the lifeline of agriculture."

2. Seeds

Throughout Asia new seeds--"miracle rice" and "miracle wheat"--have become synonymous with agro-technical transformation. The great advantage of these varieties of seeds (especially of rice) is that their yields remain responsive to fertilizer at high rates of application. This is because their stalks are short and strong and do not fall over (lodge) when they grow a lot of grain. In China, similar varieties of rice and other crops have played an important role in agricultural development.

a. Rice

During the early 1960's, very high yielding varieties of rice and wheat were developed and popularized, especially in the "high and stable yield" areas which had good, mechanized irrigation. By 1965 almost 3.3 million hectares of high yielding rice and about 2.5 million hectares of high yielding wheat were planted.[1] By 1973, 6.7 million hectares were sown to improved rice varieties.[2]

---

[1] Sources for these figures are given later in the text.

[2] "New Achievements in Rice Research," Peking Review No. 6 (February 8, 1974), p. 22.

The high yielding rices were called nung-k'en 58, chen-chu-ai, ai-chiao-nan-t'e and kuang-ch'ang-ai. These new varieties of rice distributed in 1964 and 1965 were similar to the "miracle rice" distributed by the International Rice Research Institute, Philippines, in 1966. The Chinese varieties are short stalked and less likely to lodge in time of heavy winds or when heavily fertilized. Chinese agronomists described them in this way:

> The short stalk varieties, in general, are characterized by such features as short notches, powerful tillering, short and straight leaves, good light infiltration in clusters, and well-developed roots. The combination of these features constitute the high-yield characteristics of absorption of fertilizer, resistance to lodging, and greater numbers of earings.[1]

We should note that descriptions of IRRI seeds are quite similar:

> IR8 has excellent seedling vigor and produces moderately high number of productive tillers with short, sturdy stems . . . . It is resistant to lodging at high rates of nitrogen fertilization . . . . The variety is reasonably resistant to most common diseases of rice.
> IR5 . . . . has excellent seedling vigor, erect leaves, and high tillering ability. However, it is taller and is more prone to lodge at high fertility levels that IR8 . . . . It is

---

[1] Rice Scientific Technical Group of the Chinese Academy of Agricultural Sciences, "Preliminary Summary of the Cultivating Techniques in the 1965 Bumper Rice Harvest in the South," Chung-kuo Nung-yeh K'o-hsüeh (Chinese Agricultural Science), No. 2 (February 1966). This has been translated by the U.S. Joint Publications Research Service (JPRS), an agency of the U.S. federal government which provides translations for other government agencies. Its

somewhat susceptible to blast and bacterial leaf blight, however.[1]

As should be expected, the yield of the high yielding varieties depended on cultivation practices. Under ideal conditions, the new varieties could yield up to 7.5 tons per hectare,[2] about the same as IR8. When cultivated without necessary inputs the yield might be only 1.5 to 2.25 tons per hectare.[3] The average yield of traditional varieties under normal cultivation is also variable, around 2.7 tons per hectare. Thus the new varieties had the genetic potential for almost tripling yields.

In actual use, of course, the results were not that dramatic. Areas that adopted new varieties in 1965 showed increases in yields of roughly 0.37 to 0.75 tons per hectare; sometimes the increase was as high as 1.5 to 2.2 tons per hectare.[4]

Spotty reports from a variety of places in south China agree with the reports of the Chinese agronomists. In the early 1960's typical yields in Kwangtung were 1.9 to 2.3 tons per hectare per crop. In the late 1960's,

---

translations are cited here by JPRS series number. This article is JPRS 36, 217, p. 3.

[1] University of Philippines, College of Agriculture, Rice Production Manual (University of Philippines, 1970), p. 41.

[2] Rice Scientific Technical Group of the Chinese Academy of Agricultural Sciences, op.cit., p. 1.

[3] Ibid., p. 4.

[4] Rice Scientific Technical Group of the Chinese Academy of Agricultural Sciences, op.cit., p. 3.

after new varieties had been popularized there, typical yields were 2.3 to 3.0 tons per hectare.[1]

While the Chinese rice varieties could raise yields, they also had some shortcomings (similar to those of the IRRI varieties). First, the new Chinese varieties required complementary inputs, especially of fertilizer and water. If they were cultivated in less fertile farmland without complementary inputs, they might yield less than the traditional varieties under the same conditions. This was specifically reported for nung-k'en 58.[2] A second problem encountered was that some of the early high yield varieties (for example, ai-chiao-nan-t'e) could not be utilized in double cropping regions of Central China effectively because they took too long to mature and interfered with the planting of a second crop.[3] A final problem had to do with resistance to diseases. Chinese agronomists pointed out that the new varieties "showed an early weakening of stalks and leaves, as they were also vulnerable to banded sclerotial disease, bacterial leaf blight, and pestalotia leaf spot,"[4] (as is IR5).

As for taste and cooking qualities of the Chinese high yield varieties, it was reported that nung-k'en 58

---

[1] These figures come from interviews on file in the Contemporary China Reading Room, Columbia University.

[2] Rice Scientific Technical Group of the Chinese Academy of Agricultural Sciences, op.cit., p. 4.

[3] Ibid.

[4] Ibid. Yet one more problem is that the dwarf varieties of rice supply less stalks, which peasants use as fuel for cooking.

was "soft and good for cooking,"[1] but the same was not claimed for the other high yield varieties that were widely popularized. Some informants reported that the newer varieties were not preferred for consumption, and generally the production units sold the new varieties to the state, retaining more traditional varieties for local consumption.

The high yielding varieties required very precise field management to show improved yield. The Chinese developed many slogans to summarize the field management techniques of these seeds. For example, one management method was called the "three-early, one skillful" method. This required early application of fertilizer, early raking of the field, insect control, and skillful irrigating.[2] Another method was the "three-determination and four-observation method." This called for determining the amount of fertilizer, the kind of fertilizer, and the time of applying, and observing the weather, soil, sprout and strain of rice conditions.[3]

To get high yields (up to 6.4 tons per hectare)

---

[1] Agricultural Technology Promotion Station, Pao-shan hsien, Shanghai, "Our Experience in Planting Nung-k'en 58 Late Rice," Nung-yeh Chi-shu (Agricultural Technology) No. 10 (October 1964). JPRS 43, 378, p. 43.

[2] Scientific Experimental Group, Miao-erh-ch'iao Brigade, Kung-tung Commune, Huang-yen Hsien, Chekiang, "Manage Properly the Nung-k'en 58 Consecutive Late Rice Crop by 'Three-early and One'skillful' Method," Nung-yeh Chi-shu (Agricultural Technology), No. 8 (August 1966). JPRS 38, 826, p. 11.

[3] Li Shao-ch'iu, Nei-p'an Brigade, Tung-feng Commune, Ch'ao-an Hsien, Kwangtung, "The Technique of Applying Fertilizer by 'Three-determination and Four-observation' Adopted by Nei-p'an Brigade for Consecutive Late Rice Crop," Nung-yeh Chi-shu (Agricultural Technology), No. 8 (August 1966). JPRS 38, 826, p. 11.

Chinese agronomists recommended rather dense planting. The suggestions for areas with adequate water, fertilizer and labor power are summarized in Table 1.6.

The very high yielding varieties of rices were reported expanded by 2.3 million hectares in 1965.[1] If we assume arbitrarily that 1 million hectares were planted to very high yielding varieties in 1964 (we know at least 0.64 million hectares were planted to 3 varieties), then we can estimate the acreage planted as about 3.3 million hectares. This represents about 10 percent of the total area sown to rice (about 32 million hectares). Specific figures available for popularization of three of the varieties are given in Table 1.7.

Popularization of these varieties was especially rapid in the important rice grainary of Kwangtung province (latitude 23°). About 1.5 million hectares of new varieties of rice were sown in Kwangtung in 1965. This constituted two-thirds of the early crop there. The seeds used in Kwangtung were chen-chu-ai, kuang-ch'ang-ai, ai-chiao-nan-t'e, and chiang-nan-ai. Although these seeds were found successful on the early crop, they were not suitable for the late crop. Only two percent of the late crop was planted to these varieties.[2] Former residents report that the new varieties continued to be extensively used in the late 1960's.[3]

---

[1] Rice Scientific Technical Group of the Chinese Academy of Agricultural Sciences, op.cit., p. 3.

[2] Kwangtung Academy of Agricultural Science, "A Basic Summary of the Work of Breeding Seedlings of Low-Stalk Strains of Rice in Kwangtung," Kuang-tung Nung-yeh K'o-hsüeh (Kwangtung Agricultural Science), No. 1 (February 1966). JPRS 36, 710, p. 1.

[3] Interviews on file in Contemporary China Reading Room, Columbia University.

TABLE 1.6

Recommended Planting Densities for New Rice Varieties

Seed	Clusters per Ha.	Shoots per Ha.	Stalks per Ha.	Ears per Ha.
chen-chu-ai		1,500,000	5,250,000	3,750,000
		1,200,000-1,500,000	3,750,000-4,500,000	2,700,000-3,000,000
lao-lai-ching	300,000	1,500,000		2,250,000-2,400,000
nung-k'en 58		1,500,000--1,800,000		3,900,000-4,200,000

Source: Rice Scientific Technical Group of the Chinese Academy of Agricultural Sciences, "Preliminary Summary of the Cultivating Techniques in the 1965 Bumper Rice Harvest in the South," Chung-kuo Nung-yeh K'o-hsüeh (Chinese Agricultural Science), No. 2 (February 1966). JPRS 36, 217, p. 11.

TABLE 1.7

Extension of Specific Varieties of Very High Yield Rice

Variety	Area Planted (million hectares) 1964	1965	1973	Where Used
nung-k'en 58	0.27	1.13		Yangtze Valley
chen-chu'ai	0.04	0.73		Kwangtung
ai-chiao-nan-t'e	0.33	0.73		Kwangtung
Others	0.36*	0.67		
TOTAL	1.00	3.26	6.70	

*Estimated, based on figure that one million hectares were planted to new varieties in 1964.

Source:

For 1964, 1965: Rice Scientific Technical Group of the Chinese Academy of Agricultural Sciences, "Preliminary Summary of the Cultivating Techniques in the 1965 Bumper Rice Harvest in the South," Chung-kuo Nung-yeh K'o-hsüeh (Chinese Agricultural Science), No. 2 (February 1966). JPRS 36, 217, p. 3.

For 1973: "New Achievements in Rice Research," Peking Review No. 6 (February 8, 1974), p. 22.

In Kiangsu (latitude 32°) 0.63 million hectares were planted to nung k'en 58 in 1965,[1] and 0.08 million hectares were planted to other varieties in the nung k'en series, especially nung-k'en 57, 46, and 44.[2] These four varieties of nung-k'en seeds were planted on about 9 percent of the area sown to grain, and other new varieties were planted also.

In Fukien (latitude 26°) 0.33 million hectares were planted to new varieties in 1965.[3] This represented about 17 percent of the area sown to grains. In 1971 it was reported that 0.6 million hectares had "high and stable" yields.[4]

In Hunan (latitude 28°) by 1965, 45 percent of the early rice and about 60 percent of the late crop was planted with improved seeds which yielded 10 to 30 percent more.[5] A late-rice yielding 7.5 tons per hectare was

---

[1] "Some Problems of the Main Characteristics and the Planting of Nung-k'en 58 Strain of Late Rice," Chiang-su Nung-hsüeh-pao (Kiangsu Agricultural Journal), Vol. 5, No. 2 (April 1966). JPRS 38, 022, p. 1.

[2] "A Preliminary Summary of Planting Techniques for the High Yield of Nung-k'en 57, Nung-k'en 46 and Nung-k'en 44 of Middle Non-glutinous Rice," Chiang-su Nung-hsüeh-pao (Kiangsu Agricultural Journal), Vol. 5, No. 2 (April 1966). JPRS 38, 022, p. 3.

[3] "Archtype Paddies Boost General Early Rice Crop Yield in Fukien," Chung-kuo Hsin-wen (China News Bulletin), Canton, September 23, 1965. JPRS 32, 516, p.6.

[4] "China's 1971 Achievements in Water Conservancy," Economic Reporter (English Supplement), January-March 1972, p. 14.

[5] "Good Rice Strains Used Widely in Central South China," NCNA Changsha, August 2, 1965. SCMP 3512, p. 20.

developed and popularized in Hunan in 1971.[1]

In the important rice basket of Szechwan, new high yield varieties were successfully tested in 1964, but there are no reports that show widespread adoption after 1965.[2] However, given the extensive expansion of mechanized irrigation there, it can be presumed that high yielding varieties have been popularized.

Very high yielding dwarf-rice varieties were also reported under cultivation in Yunnan, Kiangsi, Kwangsi and Kueichow, but the amount planted was not reported.[3]

The Chinese seed development program encouraged local adaptation of seeds, so that new varieties would be developed for the needs of each locality. This was necessary in a country as large and diverse as China. Table 1.8 shows some of the major adaptations that were made to the high yielding varieties presumably around 1964.

TABLE 1.8

Local Adaptations of High Yielding Rice Varieties

Place	Basic Strain	New Strain
Kwangsi	nan-kao-kuang	kuang-hsuan 3
Chekiang	ai-chiao-nan-t'e	ai-nan-tsao 1
Fukien	ai-chiao-nan-t'e	mei-feng 3
Szechuan	kuang-chang-al-1	cheng-tu-ai 3
Shanghai	nung-k'en 58	hu-hsuan 17 chia-nung 08 chih-ma-tao
Kiangsu	nung-k'en 58	yeh-li-ching

Source: Rice Scientific Technical Group of the Chinese Academy of Agricultural Sciences, "Preliminary Summary of the Cultivating Techniques in the 1965 Bumper Rice Harvest in the South," Chung-kuo Nung-yeh K'o-hsüeh (Chinese Agricultural Science), No. 2 (February 1966). JPRS 36, 217, p. 4.

[1] "Peasant Technicians," Peking Review, No. 49 (December 8, 1972), p. 23.

b. wheat

With regard to high yielding wheat varieties, considerable progress was made during the 1960's. In 1965, 2.5 million hectares were planted to improved wheat strains[1] (out of a total area of 27.5 million hectares planted to wheat). The new strains were reported in use (or under experimentation) in Honan, Shensi, Hopei, Szechwan, Shantung and Shansi. Early and intensive experimentation with improved wheats was done in the Peking suburbs, where 87,000 hectares are planted to wheat.[2] It was reported that already by 1964, 90 percent of these lands were sown to good strains.[3] Production in 1964 was 50 percent higher than the previous year.[4] Use of high yielding varieties of wheat was expanded in 1973, but no figures are available.[5] This is undoubtedly associated with the rapid expansion of deep well irrigation on the north China plain in the early 1970's.

---

[2] Szechwan Agricultural Science Academy, "Experience on Bringing About High Yield in Rice Crop Cultivation," Chung-kuo Nung-yeh K'o-hsüeh (Chinese Agricultural Science), No. 2 (February 1965). JPRS 31, 556, pp. 8-20.

[3] Rice Scientific Technical Group of the Chinese Academy of Agricultural Sciences, op. cit., p. 2.

[1] "Mass Seed Selection Underway in China," NCNA, Peking, June 17, 1965. SCMP 3482, p. 15.

[2] Wheat Team of the Peking Municipal Crops Institute, "Analysis of the Technical Experiences of the Wheat Experimental Farms in Peking Suburbs in 1964," Chung-kuo Nung-yeh K'o-hsüeh (Chinese Agricultural Science), No. 9 (September 1964). JPRS 30, 055, p. 10.

[3] "Advanced Farming Technique Trebles Wheat Output Around Peking," NCNA Peking, January 20, 1964. SCMP 3145, p. 18. "Good Wheat Strains Widely Used on Outskirts of Peking," NCNA Peking, January 8, 1964. SCMP 3137, p. 15.

[4] Wheat Team of the Peking Municipal Crops Institute, op. cit., p. 10.

In addition to high yield, the Chinese varieties of improved wheat are disease resistant and adaptable to local cultivation requirements. For the Peking area, pei-ching 8 was recommended, which could yield 3.0 to 3.75 tons per hectare and was early maturing and rust resistant in the irrigated areas in that locality.[1] Other improved wheat seeds in the Peking area were nung-ta 3, 9, 183 and 90.[2]

For Shantung, chi-nan 2 was suggested. It yielded roughly 20 percent more than other widely used varieties.[3]

For the Yangtze valley area, hua-nan 6 was suggested. A test plot yielded 2.5 tons per hectares. Because of its resistance to rust and early maturing characteristics, it was suggested for intercropping with rice.[4]

For Szechwan and the Yangtze valley, shan-nung 205 was recommended. Yields on test plots were from 2.7 to 4.6 tons per hectare. This variety was resistant to rust, black mottle of the ears, drought and cold.[5]

---

[5] "All-Round Rich Harvests in China," Peking Review No. 1 (January 4, 1974), p. 10.

[1] Jen Hsiao-p'ing,"A Good Seed Planted Will Yield a Thousand Good Grains for Food," Hsüeh K'o-hsüeh (Study Science), No. 8 (1964), JPRS 29, 641, p. 63. Tai Sung-en, "Mass Efforts to Extend Improved Seed," China Reconstructs, April 1966, p. 19.

[2] Sung Ping-i, of Tung-pei-wang Commune, Peking, "Experiences of the Breeding of Better Wheat Strains of Tung-pei-wang Commune," Chung-kuo Nung-yeh K'o-hsüeh (Chinese Agricultural Science) No. 10 (October 1964). JPRS 44, 560, p. 11.

[3] Jen Hsiao-p'ing, op. cit. JPRS 29, 641, p. 62.

[4] Ibid., p. 61.

[5] Ibid., p. 62.

During 1972 another new variety of wheat, tung-fang-hung 3, was used in demonstration plots near Peking with yields up to 6 tons per hectare. A similar variety was in use in Chengchow.[1]

c. Other Crops

An important grain crop in some parts of northern China is kaoliang (sorghum). According to U.S. government estimates, in the late 1950's about 6 million hectares were planted.[2] The three provinces of the Northeast (Heilungkiang, Kirin, and Liaoning, at latitudes 41°-45°) account for about 35 percent of the area planted to sorghum.[3] Average yields ranged from 1.2 to 1.6 tons per hectare in this region during the 1950's.[4]

It is difficult to estimate how much progress has been made with regard to sorghum, but new seed varieties have been widely introduced. During the 1930's, the University of Nanking developed strains yielding 1.8 to 2.4 tons per hectare at latitudes roughly 35°-38°.[5] During the 1950's and 1960's, Chinese scientists continued efforts to improve sorghum. In Shansi (latitude 38°) experimental planting of a new type (i-tsa 10) increased yields from 5.4 tons per hectare to 8.6 tons

---

[1] These were observed by the author when he visited China in Spring 1972.

[2] Agricultural Acreage in Communist China, 1949-68: A Statistical Compilation (n.p.: n.p., 1969).

[3] Ibid.

[4] Nai-ruenn Chen, Chinese Economic Statistics (Chicago: Aldine, 1967), pp. 321-23.

[5] H. H. Love and John Reisner, The Cornell-Nanking Stor (Ithaca, New York: Cornell International Agricultural Development Bulletin 4, 1964), p. 36.

per hectare.[1] In 1972 there was a report of a new hybrid variety capable of yielding up to 15 tons per hectare.[2]

To what extent such high yielding varieties have been extensively planted is not known. It was reported that a new variety of sorghum was planted on about 53,000 hectares in Liaoning (latitude 42°) in 1966--this constituted about 10 percent of Liaoning's sorghum area. It was reported that yields were improved from 50 percent to 100 percent. The average yield on one large test area was 3.7 tons per hectare. This variety was developed through open pollination, and required large complementary inputs of water and fertilizer.[3] By way of comparison, it might be pointed out that a Canadian seed company offers a sorghum variety that will yield, under favorable conditions, 9 tons per hectare at roughly the same latitude as much of China's sorghum area.[4]

As for high yielding maize, only a few data are available. About 27,000 hectares in Shensi were planted to hybrid maize in 1964. It was also reportedly used in Shantung. In both provinces it seems that the hybrid maize was planted for experimental purposes, and was not

---

[1] Wang Hung-niu, "Listen to Chairman Mao's Words, Sow and Plant Carefully the 'I-tsa No. 10' Kaoliang," Nung-yeh Chi-shu (Agricultural Technology), No. 3 (March 1967).

[2] "Books on Science and Technology," Peking Review, No. 4 (January 28, 1972), p. 23.

[3] "Scientist Attributes His Success in Seed Breeding to Collaboration with Peasants," NCNA Shenyang, May 17, 1966, SCMP 3702, p. 18. "New Sorghum Strain for Northeast China Province," NCNA Shenyang, April 1, 1965. SCMP 3432, p. 17.

[4] Pride Cornett, Fall 1973, p. 12.

in general production.[1] (During the 1950's around 15 million hectares were planted to maize.)

The Chinese will probably show increased interest in these crops, now that the early gains in rice production have been made. Perhaps indicative of future trends is the report that planting of hybrid maize expanded five times from 1966 to 1973.[2]

3. Chemical Fertilizer

Before 1960, almost all of the crop nutrients in China came from traditional sources of fertilizer: manure, nightsoil, river and lake mud, and green manures. During the 1960's, there was a basic change in the fertilizer situation; by 1972 chemical fertilizer supplied between 23 and 37 percent of total crop nutrients. All indications are that chemical fertilizer will continue to grow in importance throughout the 1970's, because China has contracted for ammonia factories that will increase nitrogen capacity by two-thirds.

It is not simple to compute the availability of crop nutrients in China because the Chinese report production only in terms of gross output, and do not (as most other countries do) specify what chemicals are produced, or how much plant nutrients are produced. The Chinese do, however, report production according to the size of factory, and this can be used to estimate crop nutrient production. Table 1.9 summarizes the trends in production of nitrogen and phosphate in different size factories.

---

[1] Li Ching-hsiung, "Hybrid Maize Thrives on Commune Farms," China Reconstructs, No. 11 (1964).

[2] "All-Round Rich Harvests in China," Peking Review No. 1 (January 4, 1974), p. 10.

TABLE 1.9

Domestic Production of Chemical Fertilizer
(million tons)

Type of Factory	1964		1965	1971		1972		1972
Large Nitrogen	2.0			2.0		2.1		
Small Nitrogen	0.5	1.8	1.1	7.2	10.0	9.9	7.9	
Small Phosphate	1.3			2.8		3.0		
Large Phosphate	2.1			4.9		4.9		
TOTAL	5.9		8.9	16.9		19.9		25.4

Sources

The figures in the above table that are underlined were given in fairly direct terms by Chinese statements, as detailed below. Other figures in the table were computed or estimated.

Total Production:

1964, 1965: Kang Chao, Agricultural Production in Communist China, 1949-65 op. cit., p. 315.

1971: Chou En-lai told Edgar Snow that 1970 production was 14 million tons. Edgar Snow, "Talks with Chou En-lai: The Open Door," New Republic, Vol. 164, No. 13 (March 27, 1971), p. 20. It was reported that 1971 production went up 20.2 percent. "New Leap in China's National Economy," Peking Review, No. 2 (January 14, 1972), p. 7.

1972: Production grew 18 percent. "Industrial and Transport Achievements," Peking Review, No. 3 (January 19, 1973), p. 5.

1973: Production increased 25.8 percent. "Chemical Fertilizer Industry," Peking Review No. 6 (February 8, 1974), p. 22.

Small Factories, both nitrogenous and phosphate

1964: They produced 30 percent of the total fertilizer (1.8 million tons), Economic Background, March 14, 1965.

1971: They produced 60 percent of the total fertilizer (10.0 million tons), "New Leap in China's National Economy," Peking Review, No. 2 (January 14, 1972), p. 8.

Small nitrogenous factories

1965: They produced 12.4 percent of the total output (1.1 million tons), Ta Kung Pao, June 15, 1966.

1971: They produced 43 percent of national output (7.2 million tons), "Fertilizer Production Climbs Steadily," Peking Review, No. 44 (November 3, 1972), p. 29.

1972: They supplied over 50 percent in 1972 (over 9.9 million tons), "Industrial and Transport Achievements," Peking Review, No. 3 (January 19, 1973), p. 5.

Phosphate fertilizer, both large and small factories

1972: Phosphates made up about 40 percent of total output (7.9 million tons), "Industrial and Transport Achievements," Peking Review, No. 3 (January 19, 1973), p. 5.

To estimate the amount of plant nutrients supplied by chemical fertilizer, we made the following assumptions. First, we assume that the large chemical fertilizer factories produce some fertilizer with a high percentage of crop nutrients. This would include urea (52 percent N), ammonium nitrate (35 percent N) or concentrated superphosphates (47 to 65 percent P). The greater part of their production is fertilizers with a lower percentage of nutrients, such as ammonium sulfate (21 percent N) and superphosphates (16 to 20 percent P). We will presume that the average plant nutrient content of all fertilizers produced in big factories is 25 percent. It can be assumed that the small nitrogenous fertilizer factories produce ammonium bicarbonate (17 percent N) by a process developed in 1963.[1] Small phosphate plants can be assumed to produce fertilizer averaging 10 percent of plant nutrient. Imports (assumed to be at the 1970 level) are reported in terms of ammonium sulfate (20 percent nutrient) equivalent.

These assumptions are used in calculations shown in Table 1.10, which concludes that chemical fertilizers supplied about 4.52 million tons of plant nutrient in 1972 for China's 120 million hectares of cultivated land. This means 38 kilograms of plant nutrient per hectare of cultivated land in China.

In Table 1.11, computations are made to ascertain the significance of 4.52 million tons of nutrients compared to traditional sources of fertilizer in China which include animal and human excreta, green manure, and organic refuse. Various estimates show traditional fertilizers supplied from 6.07 to 14.80 million tons of crop nutrients. Thus chemicals supply somewhere between 23 and 37 percent of total crop nutrients.

---

[1] Leslie T. C. Kuo, The Technical Transformation of Agriculture in Communist China (New York: Praeger, 1972), p. 105.

TABLE 1.10

Availability of Chemical Fertilizer and Plant Nutrients (1972)

Source of fertilizer	Amount (million tons)	% Nutrient	Total plant nutrients (million tons)
Large nitrogen factories	2.1	25	0.52
Small nitrogen factories	9.9	17	1.68
Small phosphorous factories	3.0	10	0.30
Large phosphorous factories	4.9	25	1.22
Imports	(4.0)	20	0.80
TOTAL	23.9		4.52

TABLE 1.11

Various Computations for Source of Crop Nutrients (1972)

	Crop nutrients from traditional fertilizer (million tons)	Crop nutrients from chemical fertilizer	Total	Percent of crop nutrients from chemicals
High estimate[a]	14.80	4.52	19.32	23
Low estimate[b]	6.07	3.63	9.69	37

Sources:

[a]This is computed by using figures from Shigeru Ishikawa, Factors Affecting China's Agriculture in the Coming Decade (Tokyo: Institute of Asian Economic Affairs, mimeo, 1967), p. 59 for 1965, and then assuming an annual growth of 2 percent.

[b]This is computed according to the method of Kang Chao, Agricultural Production in Communist China, 1949-1965, op. cit., p. 150. Chao's figures have been modified to take into account growth in population and animal husbandry which directly affect supply of nightsoil and manures. These figures are lower than others because they consider plant nutrients which are actually absorbed by the plants, not the total supply of nutrients.

Including both traditional and chemical sources of fertilizer, China had perhaps as much as 160 kilograms of crop nutrients available per hectare of cultivated land in 1971, or around 110 kilograms per crop hectare (assuming that natural fertilizers were used at the same rate as in the 1950's). By way of comparison, in 1972 Japan utilized about 440 kilograms of crop nutrient per hectare of arable land, roughly three times what China used.[1] Since Japan's agricultural development has stressed increases in yields through high applications of chemical fertilizer, this figure represents something of a maximum utilization rate for chemical fertilizers under present technological conditions.[2] Thus, although China has made a great change in the source of fertilizers and the level of applications, there is room for continued improvement.

There are clear indications that there will be continued expansion of the chemical fertilizer industry and change in its structure. In December 1973, it was announced that China had contracted with the U.S. Kellogg Corporation, a Dutch firm, and a Japanese firm to purchase ten large ammonia factories which would go into production in the mid- and late 1970's. These factories will be able to produce 3.0 million tons of nitrogen per year, thereby raising China's supply of crop nutrients by about

---

[1] Computed from FAO Production Yearbook, 1972.

[2] Actually utilization of chemical fertilizer is probably excessive when put in terms of world price ratios. The market price of one in Japan is kept about three times the world market price, so it is profitable to use fertilizer in Japan at levels in excess of what would be profitable elsewhere.

TABLE 1.12

Chinese Contracts for Chemical Fertilizer Factories, 1973

Product	Number of factories	Capacity of each	Gross yearly capacity (million tons)	Percent nutrient	Total crop nutrient (million tons)
Ammonia	10	1,000 tons/day	3.65	82	3.00
Urea	8	1,620 tons/day	4.75	52	2.47

Source: New York Times, November 28, 1973.

65 percent over the already high 1972 level. In addition, China purchased eight urea factories (which will be the largest in the world), presumably to convert the ammonia of these factories into a fairly concentrated, easily transported solid fertilizer.

The purchase of these very large factories marks an important break in industrial development strategy for China. Since the mid-1960's, virtually all the growth in nitrogenous fertilizer had been in the production of small factories. These small-scale factories were undoubtedly linked with broad policies to develop local and regional self-sufficiency in case of war or natural disaster, to equalize distribution of fertilizer factories, and to reduce the transportation expenses that would have been incurred if production had been concentrated in a few urban centers. These small factories were generally presumed by western engineers to be sacrificing great economies of scale in nitrogen production, but no one could be certain as the technical details for the small nitrogenous fertilizer factories were unknown. The purchase of the large factories, however, suggests that the earlier small factories were substantially less economical

in producing fertilizer, and that the Chinese leadership is now more willing to promote some degree of centralization in this industry.

The utilization of chemical fertilizers is somewhat concentrated in the "high and stable yield areas." The overall availability of chemical fertilizer averages out to 18 catties per sown mou (135 kilograms per hectare gross weight of fertilizer), or 24 catties per cultivated mou for 1971. We know that some communes in the Peking and Canton suburbs reported using in excess of 100 catties per mou of chemical fertilizer (750 kilograms gross weight per hectare probably about 150 kilograms per hectare of crop nutrient).[1] Since we have estimated that China had about 9 million hectares with mechanized irrigation, if all of this area received this high level of fertilizer, then it would have utilized about one-third of the total consumption of China in 1971, 6.75 tons of fertilizer. The remaining two-thirds (14 million tons) would then have been distributed throughout the rest of the country at an average availability of 20 catties per mou (140 kilograms gross weight per hectare). Presumably there are significant variations in application of fertilizer in these areas.

---

[1] Data given to author in response to questions when he traveled in China, Spring 1972. It is interesting to note that maximum yields of rice in the U.S. are obtained with Nitrogen applications of approximately 150 kilograms per hectare. Robert Herdt and John Mellor, "The Contrasting Response of Rice to Nitrogen: India and the United States," Journal of Farm Economics Vol 46 (1964), p. 152. In Taiwan allocations of chemical fertilizer for the first rice crop, 1972 were N,126 kg/HA; P_2O_5, 54 kg/HA; K_2O, 42 kg/HA. Total of these three 222 kg/HA. Near Peking and Canton, unlike Taiwan, natural fertilizers are also used, so the grand total of crop nutrients in high and stable regions of the mainland and in Taiwan are roughly comparable. The yields are comparable too, as shown in Table 1.14.

One reason that a substantial portion of chemical fertilizer can be distributed broadly throughout the country is that a large percentage of chemical fertilizer is being supplied by small factories which are situated away from major urban centers. The most dramatic source of growth in China's fertilizer industry throughout the 1960's, as can be seen in Tables 1.9 and 1.10, is in the development of small nitrogenous fertilizer plants, but this policy appears to be reversed by the purchase of the large factories, as mentioned above. Perhaps one reason for the conversion of the ammonia into urea is to assure that transportation expenses to distant locations will not be very expensive.

4. Mechanization

Another dimension of technical change in China's agriculture is mechanization. By 1971 tractors were used to plow up to 20 million hectares, representing about 18 percent of the total cultivated area.[1]

---

[1] Computing the amount of land plowed by tractors is a complicated task, requiring certain assumptions and much extrapolation. The first step is to compute the number of tractors or horsepower in use, a complex task because the Chinese may have changed their reporting methods. In the 1950's and early 1960's, they reported in terms of "standard tractors" of 15 horsepower. (For example, a 30 HP tractor was rated as 2 standard tractors.) This was done to compensate for the obvious fact that tractors were of different capacities. By the early 1970's this system presented problems because of increased production of smaller garden tractors, for which the earlier methods of computation were inappropriate. In recent years, the Chinese have been referring to number of tractors and number of garden tractors, without clarifying whether they refer to "standard tractors."

In 1972 Peking Review reported: "Compared with 1962, the number of tractors in 1971 has more than doubled..." (No. 45, November 10, 1972, p. 18.) In 1962 Chao estimates that China had 103,400 standard tractors. (op. cit., p. 107.) If the report for 1971 is for standard tractors

---

then there were 207,000 standard tractors in China in 1971, and the total horsepower available for cultivation has doubled. (This assumption is in line with FAO estimates that China had 112,000 physical tractors in 1971. Production Yearbook 1972, p. 236). If the report is for the number of physical tractors, then the total horsepower available for cultivation would not have doubled, because the expansion in production in garden tractors has reduced the average horsepower per tractor.

The next step is to extrapolate on the basis of horsepower available for cultivation the amount of land that could be plowed. In 1964, the last year for which statistics are available, 123,000 standard tractors cultivated 10.8 million hectares (Chao, op. cit., p. 107, 115), so that each standard tractors cultivated 88 hectares. This is close to estimates of Chinese economists that each standard tractor should be able to service 100 hectares. Hsiang Nan, "Certain Problems of Agricultural Mechanization," Jen-min Jih-pao (hereafter abbreviated JMJP) (People's Daily), December 22, 1962; also Liu Jih-hsin, "Exploration of a Few Problems Concerning Mechanization of Our Agriculture," JMJP, June 20, 1963. SCMP 3021 p. 3. In 1956 each standard tractor at a state mechanized farm serviced 95 hectares (Chao op.cit., p. 109, 112) and each standard tractor in a Machine Tractor Station serviced 147 hectares ("325 Tractor Stations in China," NCNA Peking, February 26, 1957, SCMP 1480 p. 10).

Of course it is imprecise to presume constant ratios plowed per standard tractor, but it is not known in which direction the ratio is moving. As garden tractors are increasingly used in paddy cultivation, the amount of land plowed per horsepower would decline. At the same time, there are improvements in efficiency coming from more experience, better arrangement of fields, better farm roads, and better tractor maintenance.

If we interpret the Peking Review article to mean that in 1971 the number of standard tractors available for cultivation had doubled, then, according to the ratios suggested above, tractors could have plowed from 18 to 21 million hectares. If, however, the article means that the number of physical tractors doubled, then most likely the number of horsepower has not doubled, and the land plowed by tractor is not this high. Thus the figure used in the text above, 20 million hectares, is a maximum amount for land plowed by machinery. The minimum could be around 15 million hectares.

More recent data confirm this computation. The tractor plowed area nearly doubled from 1965 to 1974 ("China Records Sharp Rise in Farm Machinery Production," NCNA Peking, December 26, 1974). In 1964 it was reported that tractors cultivated about 10.7 million hectares (Kang Chao, op. cit., p. 115). Presumably tractors cultivated a bit more in 1965, so the area plowed by tractors in 1974 would be about 20 million hectares.

Tractors are, in general, concentrated in the northeast sections of China (former Manchuria) and the North China plain. By 1965, about one-third of the land in the Northeast was machine cultivated.[1] The Peking suburbs were also mechanized during the 1960's; by 1966, 60 percent of the suitable land around Peking was machine plowed.[2] Other areas on the North China Plain also developed mechanization. Many tractors were reported in Shantung, Shansi, and Hopei.[3] Mechanization speeded up in the late 1960's, and by 1970, 60 percent of the farm land was cultivated by machine in a number of provinces.[4] In 1971, 40 percent of the land in Honan was mechanically tilled.[5]

In the Southern rice paddy areas, mechanization based on small garden tractors began in the mid-1960's. The exact extent of use of garden tractors is not known, but they are in widespread use in suburban communes in Southern China, according to many visitors.

---

[1] "China Extends Range of Tractors," NCNA Peking, January 31, 1966. SCMP 3631, p. 19.

[2] "Peking and Surrounding Country Districts Develop New Relationship," NCNA Peking, February 7, 1966. SCMP 3635, p. 22.

[3] "East China Province Mechanizing Farming," NCNA Tsinan, October 22, 1963. SCMP 3088, p. 10. "North China Province to Step up Agricultural Mechanization," NCNA Taiyuan, February 16, 1961. SCMP 2442, p. 12. "More Tractors Used in Northern Part of China for Autumn Plowing," NCNA Peking, October 12, 1961. SCMP 2601, p. 6.

[4] Nung Chi-ping, "China is Mechanizing her Agriculture," China Reconstructs, January 1970, p. 11.

[5] Yu Wen, "How Honan Achieves Self-Sufficiency in Grain," Peking Review, No. 40 (October 6, 1972), p. 27.

Mechanization of harvesting in China is almost unknown, with the exception of harvesting of wheat on mechanized state farms, mostly in the northeast. Mechanization of grain processing--threshing and milling, for example--is widespread, but again statistics are lacking. In the Pearl River Delta, foot-operated threshing machines are quite widespread.[1] In 1972, China vaguely reported: "In many places more than half the rice harvested is machine-threshed."[2] In Hunan, 80 percent of the rice threshing was mechanized or semi-mechanized by 1973.[3]

For over fifteen years, China has been trying to develop machinery that could transplant rice shoots. Engine driven rice transplanters are used in the Peking suburbs, but it is not known whether they are used for all the rice or only experimentally.[4] In Hunan around 1970, over 13,000 mechanical transplanters were used. (Chuchou County of Hunan had 3,700 for 4,300 hectares.)[5] In Kwangsi, 30,000 transplanters served on 53,000 hectares.[6] In the Pearl River Delta, rice is still transplanted

---

[1] Interviews available at Contemporary China Reading Room, Columbia University.

[2] "Mechanizing Paddy-Rice Cultivation," Peking Review, No. 42 (October 20, 1972), p. 23.

[3] "Machine-Building Industry," Peking Review, No. 44 (November 2, 1973), p. 22.

[4] Observed by author when he visited China in Spring 1972.

[5] Radio Hunan, July 24, 1970. Also, "Central South China Hsien Makes New Rice Transplanter," NCNA Changsha, October 21, 1968. SCMP 4286, p. 22.

[6] "National Conference on Rice Transplanter Held in Nanning," NCNA Nanning, April 27, 1969. SCMP 4407, p. 21.

by the traditional hand method.[1]

Generally speaking, mechanization does not have much effect on yields in a densely populated country such as China, because enough labor is available to assure intensive cultivation and maximum utilization of available resources. However, mechanization in China (and other Asian countries) can help improve yields in certain regions. During the 1950's, surveys of mechanized areas of Heilungkiang, a northeastern province, showed increases in yields of roughly 0.4 tons per hectare due to deeper plowing and more careful cultivation.[2] In addition, mechanization has permitted expansion of cultivation in underpopulated sections of China's vast northeast and northwest regions. Finally, mechanization of both cultivation and grain processing can contribute to increase in production in the densely-populated southern and central regions by saving time and thus permitting increases in multiple cropping.[3] (Of course adequate water control, fertilizer, and suitable seeds are also needed to do this.) Aside from its contribution to production, mechanization has been encouraged as a way of expanding the scale of profitable operations, to make the collective system more sensible and as a way of encouraging rural industrial development.[4]

---

[1] Interviews available at Contemporary China Reading Room, Columbia University.

[2] Wang Kuang-wei, "On the Modernization of China's Agriculture," Hsüeh-hsi (Study) No. 1 (January 1958). ECMM, p. 34.

[3] For example if rice takes 100 days to mature, and if the growing season is 210-220 days, mechanization may alleviate the otherwise extreme time pressures in planting the second crop.

[4] This theme is explored in detail in Benedict Stavis, "Political Dimensions of the Technical Transformation..."

5. Rural Electrification

Another crude indicator of rural transformation is rural electrification. As late as 1958, rural China consumed virtually no electricity. In 1971, rural consumption of electricity was approximately 9.3 billion kilowatt hours.[1] My estimate is that about one-third of the villages now have electricity.

This estimate is based on a variety of reports indicating the extent of rural electrification. In 1963 about 1,000 counties (out of China's 2,100) had some electric power.[2] This rose to 1,300 by 1965.[3] Overall figures for 1972 are not available but it is reported that in Kansu, a relatively backward province in the northwest, 41 counties and cities out of 74 had electricity in 1972.[4] Naturally, some provinces are more advanced than others in this respect. In the Southwestern province of Kwangsi, where hydroelectric stations can be set up in many places, it was reported that as early as 1965 all counties had electricity.[5] When electricity is

---

[1] Rural electrical consumption in 1971 was three times that for 1962. "Agricultural Development," Peking Review, No. 45 (November 10, 1972), p. 18. The base for 1962 is from Chao, op. cit., p. 141.

[2] "Technical Transformation of China's Agriculture," NCNA Peking, September 30, 1963. SCMP 3074, p. 7.

[3] "The Fine Practice of Operating the Electricity Service in Rural Areas on a Part-Work and Part-Farming Basis," JMJP editorial, September 7, 1965. SCMP 3544, p. 12.

[4] "Northwest China Villages Develop Hydro-Electric Power Generation," NCNA Lanchow, March 6, 1972. SCMP 5091-95, p. 147.

[5] "South China Minority Region Gets More Electricity," NCNA Nanning, October 23, 1965. SCMP 3566, p. 23.

available in the county, however, it is first available only in the county seat (generally a city with a population of 10,000 to 20,000) and perhaps the adjacent rural areas. In these cases, no doubt most of the electricity is used for governmental communications and small scale industry in the county capitals.

A better indicator of the availability of electrification for agriculture is the number of communes and brigades which have electricity. (A commune might be 100 villages; a brigade is either a village or a group of villages.) At this level, data are sparse but suggestive. In Hopei, a northern province, it was reported that over one-half of the rural communes had electricity in 1963.[1] In 1965, about half the communes throughout the northeast had electricity.[2] In Shansi, also a northern province with a significant industrial base, and where work began on rural electrification in 1958,[3] 63 percent of the communes and 41 percent of the brigades (which are co-terminous with villages in that province) had electricity by 1971.[4]

If about 40 percent of brigades have electricity in a moderately industrialized province, it is a reasonable guess that by 1970, roughly one-third of the villages had electricity. When electricity first comes to a village it

---

[1] "More Electricity for Rural Areas in China's Major Cotton and Wheat Province," op. cit.

[2] "Northeast China Undertakes Electric Pumping Projects on Unprecedented Scale," NCNA Shenyang, April 8, 1965. SCMP 3437, p. 25.

[3] T'ao Lu-chia, "On T'aiku Hsien's Agro-technical Reform," Hung Ch'i (Red Flag), No. 5 (March 1963). US Consulate, Hong Kong, Survey of China Mainland Magazines (hereafter abbreviated SCMM) 359, p. 28.

[4] "More Electrification for North China Province Countryside," NCNA Taiyuan, January 20, 1972. SCMP 5065-69, p. 27.

is used for agricultural production, that is, for irrigation and food processing. Electricity would also be used in small factories and workshops. Use of electricity for household illumination is a lower priority, but is not ignored. In the electrified areas of the Pearl River Delta and suburbs of large cities, for example, most houses have electric lights.[1] There is no reasonable way to make an estimate of the total number of rural households with electric lights, but it might be one-fifth to one-fourth.

C. Rural Income

While food grain production is one crucial dimension of rural development, it is not the only one. Another important factor is the income of people in rural areas. The level and trend of income is somewhat different from that of food grain production. From the early 1950's to the late 1960's, rural income has roughly doubled, from ¥70 to about ¥150 per capita, on the average.

Two factors make the trends in rural income different from the trends in food grain production. Most important is agricultural diversification. Government policy has been to keep the price of food grains very low. (roughly ¥10 per 100 catties. At official exchange rates this is about $0.05 per pound. Rice at the supermarket in the U.S. today is about $0.50, or ten times as much.) The agricultural planning system in China strongly encourages the communes to emphasize food production until self-sufficiency is reached. Once a locality produces enough or surplus grain, it can divert resources (land and labor) to higher-priced subsidiary crops such as fruits, vegetables, oil and fiber crops, animal husbandry, sericulture, beekeeping, or local handicrafts and industry. As a result, once a

---

[1] Interviews available at the Contemporary China Reading Room, Columbia University.

locality succeeds in raising grain production, it has the opportunity to raise fairly rapidly the cash income of the farmers.

The significance of diversification can be shown with available data from a few locations. In Lienchiang County, Fukien, income in 1962 was low, averaging ¥66 per capita from collective sources. In this area, agriculture was not very diversified. Food grains supplied from 60 percent to 75 percent of the income of the production teams. Differences in income between teams were explained largely (over 75 percent) by differences in food grain productivity.[1]

In contrast, in Liuling brigade, Shensi, where agricultural techniques had begun to change by 1961 (there was mechanical irrigation for a collective vegetable plot and there was machine plowing), average collective income was ¥127; food grains supplied only about 36 percent of the total collective income. Other plant products (fruits, vegetables, and tobacco) supplied 32 percent and animal husbandry supplied 9 percent.[2]

In one commune in Tungkuan County, Kwangtung, where there was extensive mechanization of irrigation and other processes, diversified activities provided the key to rapid growth. From 1957 to 1964, total collective income went up 2.2 times, with three-quarters of this accounted for by increases in diversified activities. These activities included animal husbandry (pigs, beekeeping, sericulture, fish farming), increased cultivation of non-grain crops (such as peanuts, sugar cane, jute, soya, sesame, bamboo, medicinal herbs, and

---

[1] "Statistical Tables Relating to the Hu-Li Brigade of the P'u-k'ou Commune," C.S. Chen and C.P. Ridley, Rural People's Communes in Lien-chiang (Stanford: Hoover Institution Press, 1969), pp. 70, 78, 79.

[2] Jan Myrdal, Report from a Chinese Village (New York: Pantheon, 1965), p. 198.

fruits), some manufacturing (of bamboo farm implements, charcoal, bricks, and tile), and increase in local food processing. In 1957, grain supplied 55 percent of the commune income; by 1964 grain supplied only 38 percent of commune income.[1] In Tachai, the national model for agriculture, economic diversification (fresh and dried fruit, fish ponds, pig raising, and small factories) contributed only 18 percent to total collective income in 1968. This grew to 40 percent by 1972.[2] In a rapidly developing area near Tungting Lake a team's grain production doubled from 1962 to 1972. In 1972, its income from diversified products doubled compared to 1971.[3]

No national data are available to prove conclusively that agriculture has diversified during the period that grain production went up, or to demonstrate that diversification occurred in localities where grain production reached "high and steady" yields. Thus the preceding analysis is somewhat speculative but such a transformation is clearly the intent of Chinese policy. It means that the benefits of China's green revolution are greater than the simple increases of grain production described above.

Another factor influencing rural income is income from private plots and family handicrafts for which very few statistics are available. The private sector generally contributes around 20 percent of total rural income, and the scant data available (in Figure 1.3) suggests that the

---

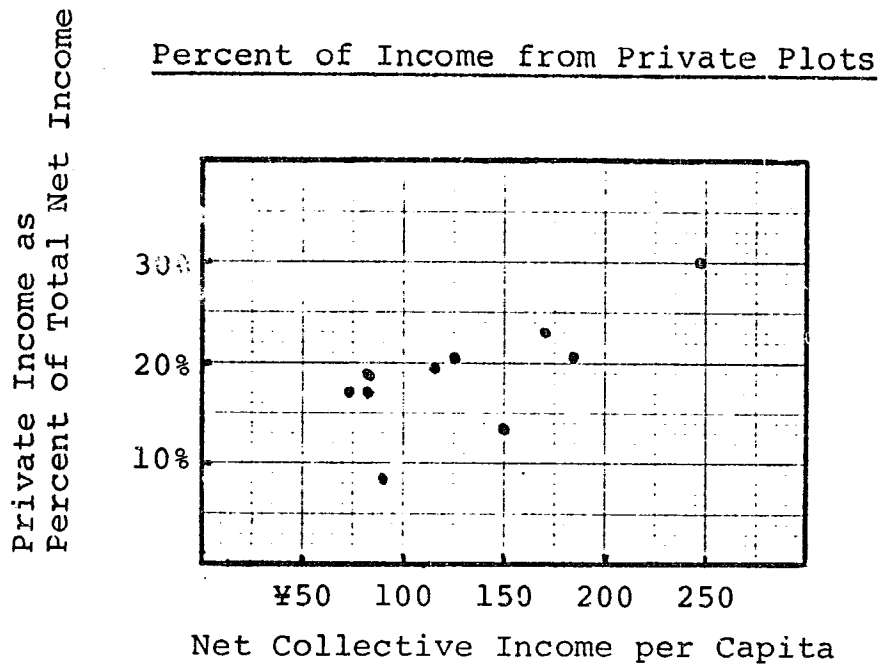
[1] Wang Chen-hua, "Divisified Undertakings Promote Development of Grain Production," JMJP October 21, 1965. SCMP 3577, p. 15.

[2] "Tachai Year-end Report, Yields High Despite Drought," Peking Review No. 52 (December 29, 1972), p. 14.

[3] "A Visit to the Tungting People's Commune (IV)," Peking Review No. 16 (April 20, 1973), p. 27.

private sector may be more important in wealthier localities.

FIGURE 1.3



Source:
Shahid Javed Burki, A Study of Chinese Communes, 1965 (Cambridge: Harvard University Press, 1969), p. 40-41.

Despite these problems we will attempt to ascertain rural income in the 1950's and the 1960's, both to impute the level of income and to characterize the changes over time. For the 1952-55 period, average peasant (per capita) consumption has been estimated at ¥68. (This was ¥49 worth of crops and ¥19 in cash.)[1] Unfortunately the surveys that were done in the 1950's have not been published in a manner that would permit analysis of the distribution of income in different localities. However, the median income was a little lower than the average.

For a comparison I have examined data from 21 localities in China generally from the mid to late 1960's (In some cases the data refer to communes, in others brigades or teams.) Although the data are few, it is possible to draw some conclusions. The median income (personal, disposable income, including cash and rations) from collective sources is about ¥110 per capita. The most frequently encountered level of income was ¥80-100 per capita. A few wealthy localities brought the average up to ¥ 126. We would infer from Figure 1.3 that income from the private sector would be about 20 percent of total income, so that the median total net income in rural areas would be about ¥137 and the average would be ¥158.[2]

These data indicate that rural income roughly doubled in fifteen years. This is an average compound growth rate of 5 percent. Prices of consumer goods have been roughly constant or have declined somewhat, so no correction need be made for inflation. In fact, it is possible that a correction should be made for deflation.[3]

---

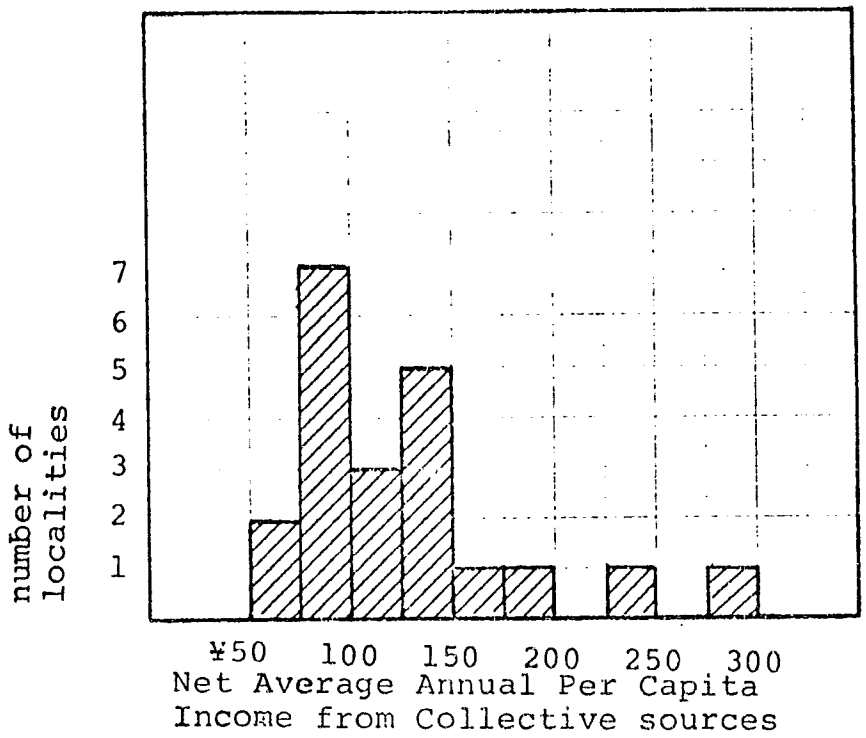
[1] This is the conclusion of Peter Schran after intricate manipulations of a variety of data. Peter Schran, The Development of Chinese Agriculture, 1950-1959 (Urbana: University of Illinois Press, 1969), p. 134.

[2] Alexander Eckstein has estimated that the Chinese gross national product per capita was ¥189 in 1966 and ¥228 in 1970. If we assume that 30 percent of the GNP is used in investment and depreciation, then ¥133 in 1966 and ¥160 in 1970 would be available for consumption. Rural incomes should be expected to be lower than urban incomes so these aggregate computations are very close to the results from the analysis of our sample. This suggests that the sample is reasonably representative. See Alexander Eckstein, "Economic Growth and Change in China: A Twenty-Year Perspective," China Quarterly No. 54 (April/June 1973), p. 232.

[3] The meaning of this growth is not clear because of price ratios in China. The first things people buy -- food and clothing -- are priced very low, but other commodities (e.g. radios, bicycles) are priced high, so even with a growth in cash income the amount of non-essential goods that can be purchased does not go up very much.

FIGURE 1.4

Rural Personal Income, Late 1960's



Sources:

(The number in parentheses after the source indicates the number of locations noted in the source.)

Shahid Javed Burki, A Study of Chinese Communes, 1965 (Cambridge: Harvard University Press, 1969), p. 20, 41. (13)

"In a Production Team" Peking Review No. 13 (March 25, 1966) p. 15-16. (1)

Jan Myrdal, Report from a Chinese Village (New York: Pantheon, 1965), p. 199. (1)

"A Visit to the Tungting People's Commune (IV)," Peking Review No. 16 (April 20, 1973), p. 27. (1)

Huatung Commune, 1972. Notes courtesy of Ward Morehouse.

C.S. Chen and C.P. Ridley, Rural People's Communes in Lien-chiang (Stanford: Hoover Institution Press, 1969), p. 37. (data for 1962) (1)

Shashiyü, 1971 (1)

Stavis Diary; data for 1971. (2)

There is no adequate way of giving a dollar value for this level of income because the price ratios between different commodities in China and in the U.S. are so different. In terms of the official exchange rate of ¥2.0= U.S. $1.00, the average per capita income is about $75. But the cereal consumption of the average peasant (roughly 400 pounds) would cost over $100 at a U.S. supermarket at current prices. More complicated problems in comparison arise quickly. Is there any way of imputing shadow values for the physical security provided the Chinese peasant by social organization, and so expensive for many Americans? Likewise, are meetings and discussions which are free (and virtually inescapable) in China in any way analagous to psychiatric and social services, for which a shadow value must be computed for strict comparability? Or should a deduction be made for psychic discomfort caused by lack of free mobility? The mind boggles at such questions. Attempting to put a dollar value on the life style in rural China is clearly impossible.

D. Comparison with Other Places

China's growth rate in food grain production and level of agricultural technology compare favorably with developments in other Asian countries. In an overall sense, agriculture in China's mainland is not as advanced as in Japan or in the province of Taiwan.[1] Compared to the rest of Asia, however, China is doing quite well. In terms of food production growth, during the 1960's, China's food production has gone up more than food production in many Asian countries. This is shown in Table 1.13.

---

[1] Reference to Taiwan throughout this section in the context of other Asian countries does not, of course imply that Taiwan is an independent country. Leaders of mainland China and Taiwan all agree that from the standpoint of international law, Taiwan is a province of China.

TABLE 1.13

Indices of Food Production in Various Asian Places

(1961 to 65=100)

Year	China (Table 1.4)	China (FAO)	India	Indonesia	Bangladesh	Taiwan Province	Pakistan	Sri Lanka	South Korea
1961	88	92	100	96	95	93	91	93	94
1962	94	96	99	102	91	93	96	98	86
1963	100	99	101	96	104	95	101	102	96
1964	108	104	104	104	104	105	103	107	112
1965	110	108	96	103	106	114	109	101	112
1966	121	109	97	107	102	118	109	102	121
1967	126	113	105	102	118	124	117	107	113
1968	128	113	111	111	117	128	130	114	114
1969	130	116	116	112	122	126	131	112	132
1970	132	122	123	127	118	131	145	118	128
1971	135	126	123	131	109	137	144	115	129
1972	132	124	118	129	105		147	114	128
1973	136								

Source of Table 1.13:
Table 1.4 and FAO Production Yearbook, 1972, p. 28. For Taiwan Province, FAO Production Yearbook, 1971.

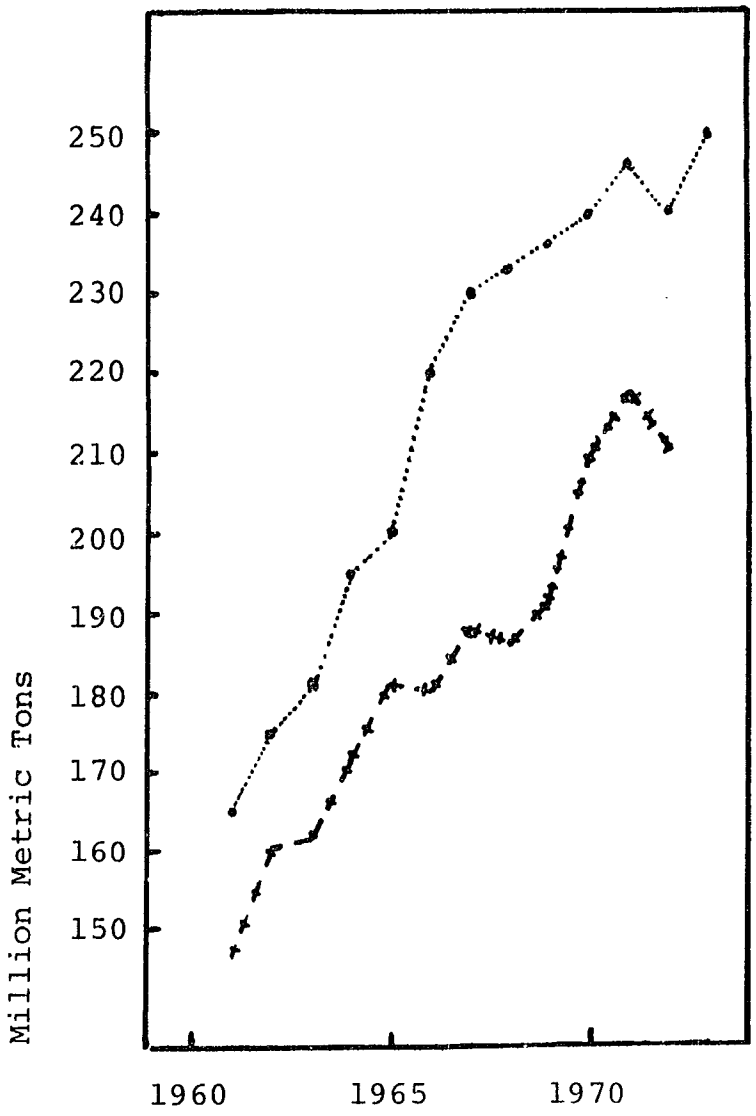
Notes:
There are several reasons why the index for grain production developed in Table 1.4 is different from the FAO index. Because of the manner in which FAO statistics are calculated for China, they cannot be sensitive to the changes in inputs made within a few years. The FAO estimates China's food production basically by estimating a population (they presume a 2.1 percent growth each year, and use the 1953 census as a base year) and by estimating per capita food consumption. (FAO Production Yearbook, 1972, p. 433) The latter estimate is highly subjective and probably influenced by political factors. For the early and particularly mid-1960's, FAO stayed fairly close to U.S. estimates for consumption, which strike me as low. (See page 11, fn. 1.) It appears, however, that as Peking and not Taipei was being recognized by more and more countries in the United Nations as the government of China, FAO presumptions on food consumption in China went up, so that by the time Peking representatives were seated in New York the FAO estimates were based on the same Chinese reports that I use. (See note to Table 1.2.) For these reasons, I believe the FAO index understates the growth rate in China's food production in the early and mid 1960's. However, it is probably reasonably accurate with regard to the total growth over this period. A comparison of FAO estimates and mine for food grains is shown in Figure 1.5.

Differences in techniques for aggregating data account for some of the differences between the FAO index and the index based on Table 1.4. First, in constructing its index of food production, the FAO weights cereal crops in a manner that (compared to the Chinese accounting system) undervalues wheat and coarse grains and overvalues potatoes. Moreover, the FAO index includes food crops other than cereals and tubers, such as pulses, sugar, edible oils, fruits, vegetables, livestock, cocoa, nuts, and wine. (I am unaware of any data that would enable the FAO to make informed estimates concerning these subsidiary food products.)

This type of index is strongly influenced by the selection of base years. I do not know about 1961 to 1965 for South Asia and East Asia, but for China this has the effect of selecting for a base the highest level of production attainable under traditional agriculture. For gauging China's changes, it is a good base line.

FIGURE 1.5

Comparison of FAO Estimates and Stavis Estimates for Food Grain Production in China, 1961-73



..... Stavis estimates (Table 1.4) for mainland China, cereals plus one-fourth potatoes.

+ + + + + + FAO estimates, All China (including Taiwan Province), cereals only.

The actual level of food production per capita is surprisingly high in China. Table 1.14 compares production of staple foods, including cereals, tubers, and pulses per capita in China and other populous Asian countries. According to FAO statistics, mainland China shows up substantially higher than other populous Asian countries. This number does not reflect total food production; it does not include fruits, vegetables, dairy, livestock, etc. Nor does it include oil seeds, such as soy beans and groundnuts. Of course the number is not equivalent to overall agricultural productivity, especially for places (such as Sri Lanka or Taiwan Province) which have chosen to specialize in producing commercial crops for exports. Nor is the food production necessarily related to food consumption, which is influenced by imports (which are very important in several countries) and exports. However, for the large populous Asian countries food production per capita must have some relationship with food consumption and welfare, especially for rural people who rely principally on local production.[1] With all these caveats, China's food production is very high. Even if one assumed China's population to be 10 percent larger than FAO estimates, and production to be 10 percent lower than claims, food staple production per capita would still be 212 kg. per capita per year, well above the level of many other Asian countries.

In terms of absolute yield levels, China's agriculture is at an intermediate level. Yields are well above the base line of traditional agriculture, but below the potential of fully modern agriculture. Table 1.15 shows yields in different food crops in China and a few other countries.

---

[1] Of course, if one wanted to compute the suitability of any level of consumption, one would have to make adjustments for different body sizes and climatic conditions which affect caloric needs.

TABLE 1.14

Food Staple Production Per Capita, 1972

	Food Staple Equivalent (thousand metric tons)	Total Population (million)	Food Staple per capita per year (kg)
Bangladesh	10,733	80.339	134
China (mainland)	201,887	785.815	255
India	96,533	562.995	172
Indonesia	18,937	129.752	146
Korea, Republic of	6,404	33.686	190
Pakistan	10,396	66.220	157
Sri Lanka	1,063	13.227	80
Taiwan Province	3,448	14.995	231
Thailand	10,792	38.612	279

Notes and Sources:

This table has been constructed with data published in the FAO Production Yearbook, 1972. (Data for Taiwan comes from Production Yearbook, 1971.)

Because the FAO data for China in 1972 include figures for the province of Taiwan, I have made subtractions to derive figures for mainland China.

It might be noted that the FAO estimate of China's population is among the lowest made for China, and represents a drastic downward revision from the FAO's previous estimates. The Production Yearbook 1971 estimated China's population in 1970 at 850 million. This could be assumed to grow to about 885 million in 1972, or 100 million more than given in the source cited above. If we use this higher population estimate, then food staple production per capita would be 228 kg.

There is also the problem of selecting any year, because it may have been a good season for one country and a bad year elsewhere. I have chosen 1972 because it is the most recent for which data are available. For most countries, it was not an especially good year. For example, the food staple per capita in India for 1970 was 190 kg., 10 percent higher than the figure for 1972.

Any attempt to make such a list, which quite literally tries to compare and equate apples and oranges, requires arbitrary assumptions about the value of different food products. For this table I have reduced cereals to processed cereals, have taken tubers at about one-fourth their weight (as Chinese statisticians do) and have taken pulses at their full weight (as Indian statisticians do). This is summarized below.

crops, gross weight	processing factor (percent)	food staple equivalent (percent)
cereals:		
rice	70	100
all others (wheat, barley, maize, oats, millet, sorghum)	85	100
tubers:		
potatoes		25
sweet potatoes		25
cassava		29
pulses (beans, lentils, peas, etc.)		100

TABLE 1.13

Yields of Various Food Grain Crops, 1971
(tons/hectare)

	Rice	Wheat	Barley	Maize	Millet
China (mainland)					
high stable yield areas	4.2	2.9			
mechanized		1.5			
regular	3.0	1.1			
average	3.2	1.5	1.5	2.8	0.8
Japan	5.3	1.8			
Taiwan Province	3.4	2.3			
India	1.7	1.3	1.1	0.9	0.5
US	5.3	2.1	2.5	5.5	
Mexico		2.9		1.3	
Turkey					1.2
Egypt	5.3				
Canada			2.3		

Source:
Mainland China, wheat and rice: see Table 1.2.
Taiwan: FAO Production Yearbook, 1971.
All other: FAO Production Yearbook, 1972.

Note: Taiwan Statistical Data Book, 1972 (Taipei, Executive Yuan), p. 49 shows Taiwan's rice yields as 3.0. The Chinese figures are yields per sown area, while FAO are yields per harvested area, to correct for this difference, Chinese yields should be inflated slightly.

In a narrow technical sense, China has made no surprising breakthrough in terms of the theory or practice of agricultural development. The summary of China's agricultural development theory -- the "Eight Character Charter" -- contains no agricultural input that is unknown in other countries. China has, however, been rather successful in the rate of adopting new inputs. Table 1.16 shows the amount of chemical fertilizer used in China and different Asian countries (in terms of plant nutrients) and the area planted to cereals. China is by far the largest user of chemical fertilizer in Asia. Japan and India each use, overall, about one-half of what China uses. However, because China has so much land, the amount of chemical fertilizer available per hectare sown to cereals is in the low to intermediate range.

The rate of adoption of high yielding varieties of cereals has been an important aspect of agricultural development in other countries. While our data on China are rather spotty in this regard, the following tables show that through the mid-1960's, China was adopting new seeds (particularly rice) fairly rapidly compared to other countries. By the early 1970's, China's early advantage in rice had been lost. It is doubtful that China has been as successful as South Asian countries in the early 1970's in expanding cultivation of very high yielding wheat strains, and wheat is an important crop in North China, contributing roughly 15 percent of China's food. Perhaps lack of reliable water supplies on the North China Plain has slowed popularization of high-yielding wheat. The expansion of deep well irrigation there should be conducive to expansion of high yield wheats now in the 1970's.

A water supply that is reliable and accurately controlled is essential to utilize high yielding seeds

and chemical fertilizers. In China, we have estimated that by 1971 approximately 9 million hectares were mechanically irrigated and therefore had very precise and reliable control of water. This represented about 20 percent to 25 percent of total irrigated area. Precisely comparable figures are not available for other countries.

As for rural electrification, China's progress has been quite rapid, at least compared to India. We estimated that one-third of China's villages had electricity in 1970. By way of comparison, In India, 12 percent of the villages had electricity in 1968. (It might be pointed out that there was a great difference between different states in India with regard to rural electrification. In some states 60 to 70 percent of the villages had electricity; in others, only 1 percent had electricity.)[1]

As for mechanization, China is progressing quite well compared to other places in Asia. Japan and Taiwan Province are certainly more mechanized than China; in both places mechanization is a relatively recent development, beginning in the late 1950's in Japan[2] and in the mid-1960's in Taiwan.[3] In Taiwan, in the early 1970's only cultivation was mechanized; transplanting and harvesting were done by hand. This suggests how rapidly mechanization can proceed.

While mainland China used less tractor power per hectare sown to cereals in 1965 than Japan, Taiwan Province, Sri Lanka, and the Philippines, she was ahead of some other Asian countries with regard to mechanization. In West Pakistan, only about

---

[1] Usha Dar, "Some Economic Factors in the Expansion of Electricity in the Rural Areas," Indian Journal of Agricultural Economics, Volume 124 (1969), p. 156.

[2] H.F. McColly, "Agricultural Mechanization in East Asia," in Mechanization of Agriculture (Michigan State University, International Programs, 1967).

[3] Ibid.

TABLE 1.16

Availability of Chemical Fertilizer (1970)

	Cereal area, harvested, 1970 (1,000 HA)	Plant Nutrients from Chemical Fertilizer (100 tons) 1970	Plant Nutrients from Chemical Fertilizer Harvested From Cereals (Kg/HA)
Japan	3,447	21,685	630
Taiwan Province	1,016	2,566	254
South Korea	2,420	5,631	230
Sri Lanka (Ceylon)	655	937	143
North Korea	2,566	3,335	130
Philippines	5,508	2,566	47
Pakistan	9,835	4,239	43
China (mainland)	115,000	45,200	39 (1972)
India	100,378	21,773	21
Indonesia	11,074	2,372	21
Bengladesh	10,071	830	8

Source: All places except China: FAO Production Yearbook, 1971 and 1972.

China: Based on Table 1.2 above (with deductions of land planted to potatoes, and deductions to change sown to harvested area) and Table 1.10.

Note: In this table, the comparison is to cereal area harvested, not to total cultivated area, because the former figure gives a better indication of how much land is actually used for basic human survival.

Of course the figures in the last column do not represent the amount of chemical fertilizer actually applied to cereal lands. In many countries much (or most) of the fertilizer is applied to commercial crops (eg. tea in Sri Lanka). This figure is also not the same as total fertilizer per cropped or sown hectare, because it excludes area planted to crops other than cereals. In many countries, the majority of arable land is used for crops other than cereals. This column is meant only to give a crude indication of the availability of chemical fertilizer compared to the amount of land needed for human survival.

TABLE 1.17

Adoption of High Yielding Rice Varieties

	Area Harvested of Rice, 1971 (1,000 HA)	Area Sown to HYV Rice, 1967/68 (1,000 HA)	Area Sown to HYV Rice, 1970/71 (1,000 HA)
India	37,334	1,780 (5%)	5,500 (15%)
Bangladesh	9,776	67 (1%)	460 (5%)
W. Pakistan	1,456	4 (-)	625 (43%)
Indonesia	8,324	--	945 (11%)
Philippines	3,246	693 (21%)	1,570 (48%)
China	34,200	3,260 (10%) (1965)	6,700 (20%) (1973)

Source: Areas harvested, all countries except China: FAO Production Yearbook, 1972; China: See above Table 1.2. (Note that the figure for China is sown area, not harvested.)

Areas sown to HYV wheat and rice, all countries except China: D. Dalrymple, Imports and Plantings of High Yield Varieties of Wheat and Rice in the Less Developed Nations (Washington: U.S. Department of Agriculture, 1972).

Areas sown to HYV rice in China: Table 1.7.

TABLE 1.18

Adoption of High Yielding Wheat Varieties

	Area Harvested of Wheat, 1971 (1,000 HA)	Area Sown to HYV Wheat, 1967/68 (1,000 HA)	Area Sown To HYV Wheat, 1970/71 (1,000 HA)
India	18,241	2,940 (20%)	5,900 (32%)
Pakistan	5,978	955 (16%)	2,940 (49%)
China	27,500	2,500 (9%) (1965)	NA

Sources: Same as for Table 1.17, except that area sown to HYV wheat in China is given in text, p. 36.

0.1 percent of the cultivated area was plowed by machine in 1965.[1] In that year, about 10 percent of mainland China's cultivated land was machine plowed.[2] Table 1.19 summarizes data on mechanization. Unfortunately, the only comparative data in terms of horsepower are for 1965. The last column in Table 1.19 showing the ratio of this mechanical horsepower to area sown to cereals in 1970 is not entirely satisfactory but it gives some idea of the ranges of difference among Asian countries.

Chinese policy toward mechanization, especially in recent years, has been somewhat like Japan's early policy, in which various operations were mechanized one at a time (for example, threshing or irrigation). Moreover, there was a gradual, incremental improvement of hand and animal-drawn implements over many decades. Field operations were not mechanized in Japan until the late 1950's.[3]

Mechanization of agriculture will be able to proceed rapidly in China for several reasons. First, the fact that agriculture has been collectivized vastly simplifies both management of field operations--as there are no small, scattered plots--and financing of machines.

In some countries mechanization is delayed from fear that it will encourage a bimodal pattern of development, with large farms developing to use big machinery. These large farms will have lower costs and will push the price of grain down, with disastrous effects on small farmers, resulting in further polarization.[4] In China, there is

---

[1] The Third Five Year Plan (1965-70), (Karachi: Government of Pakistan Press, 1967), pp. 402-403.

[2] Kang Chao, op.cit., p. 115.

[3] Hiromitsu Kaneda, "Economic Impl[illegible] the 'Green Revolution' and the Strategy of Ag[illegible]ural Development in West Pakistan," The Pakistan Development Review, Vol. IX, No. 2 (Summer 1969), p. 121.

[4] Hiromitsu Kaneda, "Economic Implications of the 'Green Revolution' and the Strategy of Agricultural Development in West Pakistan," loc.cit., pp. 132-33.

TABLE 1.19

Indicators for Agricultural Mechanization

	Number of Tractors[a] (1970)	Number of Garden Tractors[a] (1970)	Tractor Power (1965) (1,000 HP)[b]	HP in 1965/ 1,000 Hectares of Area Sown to Cereals in 1970[c]
Japan	278,000	3,197,000	29,431	8,500
Sri Lanka	8,000	253	51	78
Taiwan Province	410	9,400 (1965)	61	60
Philippines	5,400		163	29
China (mainland)	108,000		1,950	16
India	63,000		1,587	15
Pakistan	10,000		50	.5
North Korea	20,000			
South Korea	120	5,000		

Sources: a. Production Yearbook, 1971 and 1972. The estimate of 108,000 physical tractors in service in China in 1970 is entirely consistant with our estimate above that China had 207,000 standard (15 HP) tractors in 1971.

b. All places except China: Yujiro Hayami and Vernon Ruttan, Agricultural Development: An International Perspective (Baltimore: Johns Hopkins Press, 1971), p. 324.

China: Chao, op.cit., p. 109, estimates China had 130,500 standard (15 HP) tractors in 1965.

c. Data on area sown to cereals from Production Yearbook, 1971.

to some extent such a bimodal pattern, with state farms being the large scale producers. However, because they are owned and operated directly by the state, they do not upset marketing patterns or result in concentration of political power in the hands of large landlords as has been observed elsewhere, e.g., in Pakistan.

What do changes in agricultural productivity mean in the day-to-day life of the Chinese (or other) farmer?[1] The changes we have been discussing are not necessarily related directly to the standard of living of the peasants. Many other factors are important. The level of extraction determines the extent to which peasants can benefit from gains in agricultural productivity; in China, extraction has been quite low so that much of the benefits of increased productivity have remained with the peasants.[2] Of course, standard of living includes much more than economic factors. Some of the most important gains for the Chinese peasants have come from a system of distribution of food, which assures that food will be available regardless of floods or droughts. For Chinese peasants who previously experienced periodic famines and general uncertainty of survival, guaranteed food is extremely important.[3] Moreover, the

---

[1] I discuss living standard more thoroughly in my monograph: People's Communes and Rural Development in China (Ithaca: Rural Development Committee, 1975), Chapter 1.

[2] In Chapter 4, Section C, I present data indicating that peasants retain about 65 percent of the increments in production resulting from modern techniques.

[3] One clear indication that nutrition and health have improved is that the body size of children has increased significantly over the past years. One-month-old infants now average 3.25 kg., compared with less than 3.0 before Liberation. In Wuhan, surveys revealed that 10-year-old children averaged 5 cm. taller in 1973 than in 1956; boys averaged 2.5 kg. heavier. In one locality populated by national minorities, seven-year-olds averaged 3 to 5 kg. heavier and 10 cm. taller than before Liberation. "Healthy Children," Peking Review No. 24, June 14, 1974, p. 22.

elimination of a wealthy, powerful, and often brutal class of landlords has increased the dignity of the average peasant. Availability of health services and education in rural China have also improved the standard of living. New marriage laws and social customs have vastly improved the position of women in rural China. Another element in standard of living is simply the ability to satisfy curiosity about the outside world--whether by radio, television, cinima, or travel. Extensive communications in China have done much to break down what Marx called the "idiocy of rural life." For some Chinese, another part of the standard of living is personal freedom--freedom to move, to have personal relations, to have unorthodox political views or to pursue private economic activities. In these dimensions the Chinese system is lacking. The dictatorship of the proletariat and economic planning necessarily restrict certain dimensions of individual freedom. (The significance of this is difficult to evaluate because in the traditional Chinese culture, such freedoms were available only to a small minority and not relevant to most peasants.)

A great many factors affect the standard of living of peasants, and I do not want to attempt here to balance the positive and negative fators. But obviously food production is a sina qua non for a decent life, and the evidence shows that China's agriculture has been transformed as rapidly as, or more rapidly than, most other Asian countries into a modern agriculture that reliably produces adequate food. For the future, China faces great challenges along with all other Asian countries.

Chapter 2

PRECONDITIONS FOR THE GREEN REVOLUTION IN CHINA

The rapid expansion of modern agricultural techniques in China during the 1960's did not take place in a vacuum. It took place in a particular environment--political, economic and cultural--and cannot be extracted from this context. Some elements of this environment had been established centuries before the 1960's; others were not created until the first years of the 1960's. They were all necessary for the success of the policies adopted.

A. Attitudes Towards Modern Agricultural Techniques

In some parts of the world, peasants are thought to be conservative and uninterested in modern agricultural techniques. In such a situation, a major element in a strategy for agricultural development must be aimed at breaking down traditional attitudes towards change. In China, fortunately, this was not much of a problem. Chinese farmers have for centuries been progressive in adopting new agricultural techniques. A Chinese agricultural encyclopedia of the sixth century, for example, discussed in some detail questions of timing of planting, crop rotation (including nitrogen fixing legumes), seed selection, grafting fruit trees, and plant protection.[1] By the 13th or 14th century, Chinese farmers knew that night soil, lime, and mud could be used as fertilizers.[2] A fairly sophisticated agricultural economics, in which the cost of cultivating

---

[1] Shih Sheng-han, A Preliminary Survey of the Book Ch'i Min Yao Shu (Peking: Science Press, 1962).

[2] Dwight Perkins, Agricultural Development in China, 1368-1968 (Chicago: Aldine, 1969), p. 70.

different crops was compared with the market situation for them was well developed by the 15th century.[1]

Thus, Chinese peasants were well aware that fertilizers can improve yields and that different seeds have different productive characteristics. This was not new scientific information for them, but rather was part of their traditional culture.

Another element in traditional Chinese peasant culture also plays an important role. The Chinese peasant has always known about the importance of savings and investment. In the traditional culture, the individual was a link between the past and the future. He worshipped his ancestors, and would in turn be worshipped by his descendents. With such a strong continuity between the past and the future, it was natural to think about making investments (in the traditional economy, generally the purchase of land) which would benefit future generations. With but a small change, this value is highly conducive to rapid economic development. If the individual perceives himself as a link between the past and future of the entire nation, instead of a single clan, the notion of sacrifice, savings, and investment for economic development comes quite easily. Documenting this type of hypothesis is difficult, but there is one interesting statement suggesting the importance of traditional values of future orientation by a leader of Tachai Brigade, a national agricultural model which will be described in Chapter 7. In referring to massive construction projects, the leader stated:

> If we can't finish the job in three years, we will finish it in five. If we can't do it in five years,

---

[1] Evelyn Sakakida Rawski, Agricultural Change and the Peasant Economy of South China (Cambridge: Harvard University Press, 1972), pp. 46-51.

we will do it in ten. If we can't finish it in our lifetime, our sons and grandsons will carry on.[1]

B. Economic Infrastructure

Modern agriculture requires industrial supplies; the most obvious are chemical fertilizers and mechanical equipment to regulate water supplies. The Chinese policies of the 1960's were based on the presumption that these supplies would not be imported. There were several reasons for this basic decision: First, China's agricultural sector is so huge that it would be almost impossible to acquire sufficient quantities on the international market. The international market would hardly have been able to supply the quantities needed or to absorb the exports China would have had to make to earn the necessary foreign exchange. Second, for political and military reasons, Chinese leaders had agreed that the national economy could not be made dependent on the willingness of other countries to continue to provide supplies and equipment. Given the decision not to import industrial supplies, it was essential for China to build an industrial base that could supply industrial equipment.

Such an industrial base is rather complex even if it is limited to agricultural inputs. Chemical fertilizer factories require steel, high-pressure valves and piping, etc. Mechanical irrigation requires the manufacture of pumps and pipes and the supply of energy, either electrical

---

[1] The Red Sun Lights the Road Forward for Tachai (Peking: Foreign Languages Press, 1969), p. 57.

(with generating capacity and transmission lines) or petroleum (with drilling and refining capacity). Tractors need steel and precision machinery fabrication. All these items require geological surveys to locate natural resources. mines to extract them, and a transportation network. In short, manufacturing industrial supplies for agriculture requires broad industrial capacity.

The base for China's industrial system was substantially laid during the 1950's during the First Five-Year Plan, with aid from the Soviet Union. The First Tractor Factory at Loyang, for example, was supplied by the Soviet Union. With Soviet assistance, the productive capacity for chemical fertilizers was roughly quadrupled during the First Five-Year Plan, although it was still quite low in 1957.[1] More important, but more difficult to quantify, the broad industrial base created during the 1950's provided the potential for further expansion of agricultural supplies during the 1960's.

Another aspect of infrastructure is transportation and communication. Efficient transportation is essential to supply industrial products to farmers, to enable farmers to market their products, and to move people and ideas. Communication permits integration of regions and dissemination of ideas. During the 1950's, China expanded its domestic transportation and communication system. The railroad system was extended by 40 percent during the 1950's, from 22,000 kilometers in 1949 to 31,000 kilometers,[2] and it carried 10 times more ton-miles of freight in 1959

---

[1] Jung-chao Liu, China's Fertilizer Economy (Chicago: Aldine, 1970), pp. 11-13.

[2] Nai-ruenn Chen, Chinese Economic Statistics (Chicago: Aldine, 1967), p. 372.

than in 1949.[1] The highway system was expanded sixfold during the 1950's, from 81,000 kilometers to 490,000 kilometers,[2] carrying almost 30 times more ton-miles in 1959 than in 1949.[3] Water transportation grew in similar fashion.

Likewise, during the 1950's, the communication system was vastly improved. The postal system was extended from 1.0 million kilometers of postal routes in rural areas serving 59 percent of the towns and townships in 1952 to 2.6 million kilometers with virtually complete coverage of rural areas in 1958.[4] The telephone system was also expanded to the rural areas in the mid 1950's. Whereas in 1952, only 9 percent of towns and townships had telephone service, by 1958, 98 percent were served.[5] The telephone permitted rapid transfer of information--such as new government policy or information about changes in weather or pest conditions that would affect agriculture; it was not for personal or private use.

C. Trained Manpower

The expansion of agricultural production in the 1960's required many people with special knowledge and skills for research, extension, and overall management. Policies during the 1950's and in previous decades provided the base of this trained manpower.

---

[1] Ibid., p. 374.

[2] Ibid., p. 372.

[3] Ibid., p. 375.

[4] Ibid., p. 384. These statistics may overstate somewhat the growth of the postal system because the 1958 figures refer to communes, which were made by amalgamating several townships.

[5] Ibid.

(1) Mass Literacy and Primary Education

Communist education policies have always stressed primary education and other forms of education to assure widespread literacy. It is reported that during the 1950's, almost 90 million youths graduated from primary school.[1] This statistic may include children in the rural areas who had only 3 or 4 years of primary school, instead of the specified 6; it may also include some double counting. Possibly only 30 to 40 million youths graduated from the full six-year primary education.[2] Perhaps as important, during the 1950's there were continual mass adult literacy campaigns.[3] The precise number of graduates and the precise years of education are not in themselves too important. What is important is that by 1960 there was a vast number of young people and adults in rural China who were literate, who were competent in the simple arithmetic needed for accounting, and who had some familiarity with modern scientific ideas.

(2) Senior Scientists

By the 1960's, China had a substantial group of highly trained (doctoral level) agricultural scientists. The creation of this group began before liberation of 1949. A core of Chinese agricultural scientists were trained abroad during the previous decades. Precise figures are lacking, but this group probably numbered about 1,000.[4]

---

[1] Leo Orleans, Professional Manpower and Education in Communist China (Washington D.C.: Government Printing Office, 1961), p. 32.

[2] Ibid.

[3] Ibid. pp. 49-52.

[4] The estimate of 1,000 is based on the guess that 15,000 Chinese received degrees in the sciences, engineering, (cont'd.)

There is no way of estimating--other than crudely guessing--how many of these scientists stayed in China after liberation, but over 130 are known to have been active scientists in China after 1949.[1] We will see in Chapter 5 that these scientists trained abroad before 1949 played an important role in planning and launching China's green revolution in the 1960's.

(3) College-Trained Manpower

It has been estimated that roughly 13,000 people received college-level education in agricultural studies in China before 1949.[2] Of these, about 8,000 were probably working in China around 1960.[3] During the 1950's education in agricultural sciences expanded greatly in China and roughly 30,000 people completed higher education in some facet of agricultural studies.[4] Then in the years of 1961 and 1962, a total of 30,000 more were graduated from colleges in agriculture.

In comparative terms, this is a very substantial number. As shown below, elsewhere in Asia in 1960, only Japan and Taiwan Province had more agricultural college graduates per farm laborer than mainland China. Indeed,

---

4 (cont'd.) or medicine abroad (Cheng Chu-yuan, Scientific and Engineering Manpower in Communist China, 1949-1963, Washington D.C.: Government Printing Office, 1965, p. 223), and that 6.8 percent of these were in agricultural sciences, that being the percentage of Chinese students who studied in the United States and who specialized in biological sciences (Cheng, op.cit., p. 226.).

1 This was compiled from Cheng, op.cit., Appendix 4.

2 Orleans, op.cit., p. 129.

3 Ibid., pp. 128-129.

4 Ibid. See also, Leslie T.C. Kuo, The Technical Transformation of Agriculture in China (New York: Praeger, 1972), p. 19.

the graduation of 30,000 more in 1961 and 1962 would almost double China's ratio, but these graduates are not included in Table 2.1.

TABLE 2.1

Agricultural College Graduates per Farm Workers

	Number of graduates from Agricultural Colleges per 10,000 Farm Workers (1960)
Sri Lanka	0.03
India	0.41
Japan	14.24
Pakistan	0.26
Philippines	1.60
Taiwan Province	6.18
China (mainland)	3.60

Source: All places except China: Yujiro Hayami and Vernon Ruttan, Agricultural Development: An International Perspective (Baltimore: Johns Hopkins Press, 1971), p. 325.

China: Figure based on assumptions that there were 35,000 graduates in agricultural sciences, and that there were 110 million agricultural laborers. Feng Chih-kuo, "How to Solve the Problem of Labor Shortage on the Agricultural Front," Ching-chi Yen-chiu (Economic Research) No. 3, March 1959. ECMM 167 p. 18. (This figure may not be precisely comparable, as for other countries it is "graduates from agricultural colleges," while for China it includes people who "completed higher education in some facet of agricultural studies.") Of course, the question of whether higher education in China and elsewhere in Asia is qualitatively comparable may also be raised.

D. Previous Scientific Progress

China's green revolution of the 1960's was based on agro-scientific and technological work that had been going on for decades, and the scientific foundation for this had been established with assistance from abroad.

From the mid-1920's to the mid-1940's, China received significant assistance in agricultural development from the United States. One important element of the aid was the cooperative Crop Improvement Program between Cornell University and the University of Nanking College of Agriculture and Forestry. This program was begun in 1924 and lasted until 1931. The program focused on selecting crop varieties with good qualities--high yielding, drought and disease resistance, etc. Good strains of wheat, barley, rice, and sorghum were selected that showed an increase in yield of 20 to 30 percent over the commonly used varieties. A higher quality cotton was also developed.[1]

Another element in this program was the establishment of experimental stations which would work closely with the University of Nanking. These stations were used to test various crops, develop experimental procedures, and train personnel. By 1929, there were 13 experimental stations cooperating with the University of Nanking's crop breeding program. A large number of Chinese agronomists were trained in conjunction with this program. This program continued independently (without direct assistance) in the 1930's and developed many crop strains.[2]

Reports from China in the 1960's did not say specifically that the very high-yielding varieties of the 1960's were related to previous programs of seed breeding. Nevertheless, it would seem a safe assumption that the selection and breeding work in the 1960's was based on the foundations established in the 1920's. One hint that this was indeed the case is the fact that an

---

[1] H.H. Love and John H. Reisner, "The Cornell-Nanking Story," Cornell International Agricultural Development Bulletin 4 (April 1964), p. 36.

[2] Ibid., pp. 37-41.

exhibit of Chinese products in India in 1960 included a display of an improved wheat variety--"Nanking 2905"--which had in fact been developed in the 1930's at the University of Nanking.[1] At the same time, it must be pointed out that the progress of the 1960's was not a simple extension of work in earlier decades. New scientific breakthroughs and new patterns of organization were involved.

Another potential source of foreign aid was from UNRRA in 1946 and 1947, but its impact does not seem to have been long term.[2] Seeds of various crops (especially vegetables and cotton) were brought in to help China recover from wartime destruction. Some hybrid corn was brought in, but in the absence of a corn breeding program to maintain the strain, this could have no long-term impact; no other seeds for food grains were brought in under the program. The UNRRA program also brought in some breeding livestock and supplies of agricultural chemicals, including fertilizers and pesticides; it also helped put existing chemical fertilizer factories and pesticide plants back in operation, but the quantities produced were so small as to have very little impact on China's agriculture. With regard to agricultural mechanization, UNRRA supplied tractors to China. Some UNRRA projects eventually became one of the bases of China's agricultural mechanization program. (One of the first state mechanized farms set up by the Communist government

---

[1] Ibid., p. 37.

[2] United Nations Relief and Rehabilitation Administration, Agricultural Rehabilitation in China. Operational Analysis Papers No. 52 (Washington D.C.: UNRRA, April 1948), pp. 13-15.

in 1950 was at a site that had previously been an UNRRA project and utilized former UNRRA technicians as leaders.[1]) UNRRA also set up a network of small factories to produce farm tools; their long-term effect cannot be gauged. In general, the UNRRA programs were designed to grow food immediately to prevent famine and were not incorporated into on-going institutions or programs. Thus their long-term effect (that is, into the 1960's) was probably minimal.

During the 1950's China continued to make progress in agricultural sciences.[2] Agricultural research was carried out within the Chinese Academy of Science and within the Chinese Academy of Agricultural Sciences (CAAS). By 1959, the CAAS controlled 31 institutes and laboratories and had 107 rural research bases. In addition, it collaborated with 27 agricultural colleges and more than 200 other organizations involved in agricultural research or experimentation.[3]

One of the important projects for agro-technical development in the 1960's was the partial completion of a national soil survey between 1958 and 1960. The survey was especially detailed in Kwangtung, Suburban Peking, and the valleys of the Yangtze, Yellow, Huai, Heilung, and Liao Rivers. Detailed work was also done for the subtropical areas of South China.[4] It was precisely in

---

[1] William Hinton, Iron Oxen (New York: Monthly Review Press, 1970).

[2] Sidney Gould, Sciences in Communist China (Washington: American Association for The Advancement of Science, 1961).

[3] Cheng Chu-yuan, op.cit., p. 31.

[4] Leslie Kuo, op.cit., p. 122.

these areas that the agro-technical change was concentrated in the 1960's.

During the 1950's, Chinese agricultural scientists received assistance from Soviet specialists. Soviet aid seems to have been helpful in conducting soil surveys of China's flora and fauna.[1] The Chinese were selective in what they accepted from the Soviet Union. They did not, for example, accept Lysenko's erroneous theories of genetics that had become doctrine in the Soviet Union.

E. Political and Organizational Preconditions

Compared to many countries in the developing world, China entered the 1960's with a very strong government. Not only could it make policies; it could carry them out. It even had the ability to re-distribute resources. At the same time, Chinese peasants were mobilized to expect change and insist on suitable policies. Finally, stable institutions linked the farmers to state powers.

(1) Strong government

The strength of the Chinese government came from several sources. First was the cultural heritage. For more than 2,000 years there had been the ideal of a unified Chinese state which had been realized periodically in many dynasties. Central government during the various empires had imposed cultural and linguistic unity throughout China. The Chinese government did not face the problem of "nation building" in the same way that other Third World governments today do. This is not to imply that regional pressures are unimportant in China. The regional

---

[1] V. A. Kovda, Soils and Natural Environment of China (Moscow: Soviet Academy of Sciences Press, 1959). JPRS 5967.

disintegration of the country during the first part of the 20th century (during the period of warlordism) demonstrates that the authority of the central government cannot be taken for granted. However, regional diversity has never threatened the idea of a central Chinese state--as it has in India, Nigeria, and Pakistan before it divided. The situation with regard to Taiwan only confirms this point. Despite tremendous political differences between the Nationalists on Taiwan and the Communists on the mainland, and despite 25 years of separation, both still adhere strongly to the view that there is only one China, and that Taiwan is a province of China. The question is: which government can represent China, not how many Chinas are there.

Second, the strength of China's government was built on the fact that the Communist leadership had already achieved much for the Chinese people. By waging guerrilla warfare against the Japanese, The Communist Party had successfully identified itself with Chinese nationalism. By leading land form and collectivizing agriculture, it had improved the livelihood of millions of poor farmers. In a fundamental sense the leadership was strong because it effectively represented the desires of most peasants.

Third, the Communist government had the strength of organization. This was manifested in effective local administration in rural areas by the 1950's. At the level of the county (hsien) , which might include a thousand natural villages and a population of several hundred thousand, there were offices for agriculture, water conservancy, finance, and commerce. By 1960, the government knew how much land of different qualities was cultivated; the government had the capacity to buy

up surplus grain and to tax the land.[1] Government power existed at the sub-county level also. By the mid-1950's, effective government was also operating at the township (hsiang) level. (There were roughly one hundred hsiang to a county in the early 1950's.[2])

Much of the strength of the government was based on the existence of the Communist Party of China. Constant ideological training gave Party members--20 million in 1960--a shared perspective and firm discipline. By November 1955, 90 percent of China's roughly 210,000 townships had organized Party branches. These branches might have 10 to 30 members and would assist in carrying out policies (for example, land reform and collectivization) in the villages.[3] There were, of course, also Party branches at the county level of administration and above.[4] The well-disciplined People's Liberation Army effectively monopolized tools of coercion in China.

These factors gave the Chinese political system enormous strength. By 1960, China had carried out land reform and had established collective agriculture. These changes were probably among the most extensive changes in human relations the world has ever seen. In addition, industry and commerce were nationalized. A rationing

---

[1] A. Doak Barnett, Cadres, Bureaucracy, and Political Power in Communist China (New York: Columbia University Press, 1967), pp. 205-310.

[2] Ibid., p. 320.

[3] Ta-Kung Pao (Impartial Newspaper) (Tientsin), November 25, 1955. Cited in Thomas P. Bernstein, "Leadership and Mass Mobilisation in the Soviet and Chinese Collectivisation Campaigns of 1929-1930 and 1955-1956: A Comparison," China Quarterly No. 31 (July-September 1967), p. 11.

[4] Barnett, op.cit., pp. 123-204.

system for certain staples had been put into effect. Many important political issues remained--the Cultural Revolution brought them out--but the basic structure of Chinese society and economy was set during the 1950's.

(2) Popular Demands

While the Chinese communist government had great strength and legitimacy, it had certain limitations. For a decade it had assured the peasants that the living standard would improve and that rural local governance would basically be democratic, voluntary, and participatory. During 1958 and 1959, the leadership sponsored the Great Leap Forward and a program of establishing large-scale communes. These policies included an irrational distribution system (which eliminated material incentives) and an over-zealous popularization of certain agricultural techniques (such as close planting and deep plowing) in areas where they were not suited. Many peasants felt that these policies were undesirable. They expressed their resentment by going on virtual sit-down strikes to disrupt production, by refusing to serve as local leaders and thus complicating government administration, and by supplying false economic data to confuse the government planners.[1] A very deep agricultural crisis resulted, in which food production plummeted below the minimum required to keep China functioning as a country.

In the wake of the Great Leap Forward and peasant resistance to inappropriate institutional and policy changes, there was a determination to pursue more rational and acceptable policies. By 1960-62, the central political

---

[1] Pao-an Bulletin No. 71 (November 14, 1961) and No. 74 (November 22, 1961). Available in Union Research Service Vol. 27, p. 144 and p. 156.

system was relatively in balance with the rest of the system, powerful but with an understanding of the limitations on its power. The farmers had expressed their desires and had the power to influence the basic patterns of economic and social development.

(3) Consolidation of Collective Ownership

China's green revolution of the 1960's was carried out in the context of collective ownership of the means of agricultural production.[1] The collective system was established during the 1950's in a step-by-step fashion. First there was land reform, at which time land was taken from the landlords and rich peasants and given to the landless and poor peasants. Land was distributed basically on a per-capita basis, regardless of age.[2] This meant that if a family had many young and old members who could not labor effectively, it might end up with more land than it could manage. Conversely, if a family had few children and old people, it might be able to farm more land than it had.

There had been traditional patterns of labor-sharing to deal with these types of problems, and these were expanded and institutionalized into Mutual Aid Teams (involving up to about 10 families) during 1952.[3]

---

[1] A detailed analysis of the formation of communes and management of them is available in a monograph I am preparing, People's Communes and Rural Development in China. (Ithaca NY: Center for International Studies, 1975).

[2] An extraordinary report of how land reform was carried out is William Hinton, Fanshen (New York: Monthly Review Press, 1966).

[3] An excellent analysis of the relationship between the traditional patterns of labor sharing and the Mutual Aid Team is John Wong, "Peasant Economic Behaviour: The Case of Traditional Agricultural Co-operation in China," The Developing Economies IX(3) (September 1971), pp. 332-349.

The pooling of land became more permanent and on a larger basis when Lower-level Agricultural Producer Cooperatives were developed in 1954 and 1955. In this system people retained title to their land and were paid both according to their labor and according to how much land they had put into the cooperative. In the following years, Higher Agricultural Producer Cooperatives were established in which people were paid only according to labor.[1]

In 1958 the cooperatives were amalgamated into communes. At first there were about 24,000 communes (averaging 20,000 people); later they were divided into 74,000 communes, with roughly 8,000 people residing in roughly 20 to 30 villages. The commune is subdivided into brigades (perhaps 10) and teams (perhaps 100-200). The brigade is generally a large village or a few small ones. The production team is often about 20 families.

When communes were first introduced, serious problems arose, as we have suggested above. There were problems encountered in establishing principles for payment to the farmer (i.e., shaping labor incentives) and in doing the complicating bookkeeping required by the system, as well as in improving field management. Cooperative leaders were not used to managing land on a large scale; indeed, many of them had political or military backgrounds and knew little about farming. Conversely, those who knew about farming, the well-to-do peasants, were isolated from leadership of cooperatives.

---

[1] Since this essay focuses on technological change, it will not examine in detail the complex social transformation of the rural sector. Excellent introductions are available in Jack Chen, The New Earth (Carbondale: South Illinois Press, 1972) and Kenneth Walker, "Collectivisation in Retrospect: The 'Socialist High Tide' of Autumn 1955 - Spring 1956," China Quarterly No. 26 (April-June 1966), pp. 1-43.

By the early 1960's these two broad problems had been resolved. A work point system was developed that had rational economic incentives. Bookkeepers were trained. Field management improved as cooperative leaders had more experience.[1]

In Chapter 4 we will examine in some detail the advantages and problems for agricultural production due to collective ownership. Here, however, it is important to note simply that in the early 1960's, when China was commencing her green revolution, the countryside had a high degree of organization. There were numerous channels of communication, multiple ways that the leadership could reach the peasants and the peasants could in turn reach the leadership. Moreover, it was not a new, untested organization by 1962. There was over a decade of experience in dealing with problems which had emerged in the 1950's. The green revolution could proceed in a tested and reasonably stable institutional environment, which already had developed procedures, organizational principles, and manpower for resolving difficulties of agricultural change.

In short, by 1960, many very important foundations for agricultural development had been established in China. There was a traditional peasant culture that was reasonably progressive with regard to agro-technical change. Scientific and technical personnel had been trained for several decades, and important scientific research had been conducted in China for at least 30 years. Finally, a political and economic

---

[1] John C. Pelzel, "Economic Management of a Production Brigade in Post-Leap China," in W. E. Willmott, ed., Economic Organization in Chinese Society (Stanford: Stanford University Press, 1972), p. 392-404.

structure had been established and consolidated that could mobilize the country for agro-technical change and could supply the resources needed. All these factors were necessary for China to improve its agriculture during the 1960's.

Chapter 3

DECIDING TO MAKE A GREEN REVOLUTION

A crucial step in China's green revolution was making a conscious, firm decision to change fundamentally the agricultural technology of the country. This step was finalized in September 1962 at the Tenth Plenary Session of the Eighth Central Committee of the Chinese Communist Party. The decision had two dimensions. First, it was decided to place priority on the agricultural sector. Second, it was decided that agriculture would undergo a technical transformation. The communique of the Tenth Plenum summarized the decision:

> It is necessary to mobilize and concentrate the strength of the whole Party and the whole nation in an active way to give agriculture and the collective economy of the people's communes every possible material, technical and financial aid as well as aid in the field of leadership and personnel, and to bring about the technical transformation of agriculture, stage by stage in a manner suited to local conditions.[1] (emphasis added).

The new policy was summed up in the slogan "take agriculture as the foundation, and industry as the leading factor," which appeared for the first time in the communique of the Tenth Plenum:

> ...the urgent task facing the people of our country at present is to carry through the general policy of developing the national economy with agriculture as the foundation and industry the leading factor...[2] (emphasis added)

---

[1] "Communique of the 10th Plenary Session of the 8th Central Committee of the Chinese Communist Party," NCNA Peking, September 28, 1962. U.S. Consulate, Hong Kong, Current Background (Hereafter abbreviated CB) 691, p. 4.

[2] Ibid.

This decision at the Tenth Plenum was a watershed in the history of agricultural development in China. Before this time, the basic thrust of policies in the rural sector in China was to change the pattern of social relations, to change from a private property system to a suitable system of collective ownership. A Chinese economist pointed out the shift in priorities to technical transformation:

> The Tenth Plenary Session of the Eighth Party Central Committee has decided to place the technical transformation of agriculture on the main agenda of economic construction...The decision of the Tenth Plenum means that in the field of agriculture the main emphasis has been shifted from social transformation to technical transformation.[1]

The precise process by which this policy decision was made in 1962 is not clear. There were both ideological and political threads leading up to the decision. These can be traced, but exactly how they were woven into a decision is something that outsiders cannot know. First, the Chinese Communist leadership had always expressed the belief that technical transformation of agriculture was very important but would have to come after the social transformation had been substantially achieved and after an industrial base had been established. The clearest statement of this was given by Mao Tse-tung in his report of July 31, 1955, "The Question of Agricultural Cooperation:"

---

[1] Wang Kuang-wei, "Actively and Steadily Carry Out Technical Transformation of Agriculture," Ching-chi Yen-chiu (Economics Research) No. 3 (March 17, 1963). SCMM 361 p. 34. There is, of course, a danger of over dramatizing the sharpness of the break in policy in 1962. There had been important efforts to change agricultural techniques before 1962. And there were important campaigns to reform social relations in the countryside after 1962. The Tenth Plenum also decided "never forget class struggle," and the Socialist Education Movement

> During the First and Second Five-Year Plans, the main feature of reform in the countryside will still be social reform. Technical reform will take second place. The amount of sizable farm machinery will certainly have increased, but not to any great extent. During the Third Five-Year Plan, social and technical reform will advance side by side in the rural areas. More and more large farm machinery will be employed year by year. As for social reform, cooperatives after 1960 will gradually change, group by group and at different times from co-operatives of a semi-socialist nature to fully socialist ones. Only when socialist transformation of the social-economic system is complete and when, in the technical field, all branches of production and places wherein work can be done by machinery are using it, will the social and economic appearance of China be radically changed. The economic conditions of our country being what they are, technical reform will take longer than social reform. It is estimated that it will take roughly four or five five year plans, to accomplish, in the main, the technical reform of agriculture on a national scale. The whole Party must work to carry out this great task.[1]

Mao's analysis and prediction of technical transformation of agriculture over-stressed agricultural mecharization and did not put enough emphasis on chemicals and scientific techniques, but in the main it did indicate the stages through which Chinese agriculture would pass. However, the social transformation proceeded much more rapidly than Mao had implied in this speech.

A second element in this decision was the combined economic-political crisis of 1959-61. We have pointed out

---

came soon after. There was not a total change in policy from social reform to technical transformation in 1962. There was, however, a definite shift in main emphasis of national policy.

[1] Mao Tse-tung, The Question of Agricultural Cooperation (Peking: Foreign Languages Press, 1956). Available in Robert Bowie and John Fairbank, ed., Communist China, 1955-59 (Cambridge: Harvard University Press, 1962), p. 104.

in Chapter 2 that unpopular policies in 1958 led to large-scale peasant dissatisfaction which resulted in a very serious economic crisis. In 1960 and 1961, grain production fell below the minimum required for survival of the country as a whole. The crisis was temporarily met by using reserves, by strict rationing, and by importing food grains, but some new policy was required to assure sufficient food in the future. Mao Tse-tung pointed out in a deliberately low-keyed manner in November 1959, as the dimensions of the crisis began to unfold: "... ours is a big country with a population of 650 million people, and feeding them is an important matter."[1] The food crisis was, of course, at heart a political crisis. In Chinese communist vocabulary, there were "contradictions in the worker-peasant alliance," and the implications for political stability were ominous.

Thus, by early 1960, the top leadership had accepted the idea that the agricultural sector had to receive priority for both economic and political reasons. Giving priority to the agricultural sector was implied by the slogan "agriculture is the foundation," which was first used in the title of an article by Teng To, an important communist intellectual, published in February 1960. (Teng was editor of People's Daily and one of the first people to be purged in the Cultural Revolution). In "Agriculture is the Foundation for the Development of China's National Economy,"[2] Teng developed a detailed argument based on quotations from Marx, Lenin, and Mao proving that agriculture must receive high priority in development. When a Central Working Conference

---

[1] "A Letter to Production Team Leaders," November 29, 1959. CB 891 p. 34.

[2] Teng To, "Agriculture is the Foundation for the Development of China's National Economy," Hsin Chien-she (New Construction) No. 2, February 1960. ECMM 206. p. 8. The phrase was used around the same time by Minister of Agriculture Liao Lu-yen in an article "The Whole Party and the Whole People Go In for Agriculture in a Big Way," (Peking: Foreign Languages Press, 1960), p. 1.

was meeting at Peitaiho, during the summer of 1960, a People's Daily editorial appeared incorporating the slogan "Agriculture is the foundation" in its title: "Industrial Enterprises Should Adopt the Idea of Taking Agriculture as the Foundation."[1]

Although the top leadership of the Chinese Communist Party had come to a consensus by mid-1960 that agriculture had to receive priority, there was not yet agreement on what the new policies should be. Some thought that the peasant discontent was caused by simple economic exploitation. One economist argued:

> If, in disregard of the conditions of agricultural production, consideration was given only to the one-sided need to absorb funds from the communes by the use of price differentials, it would definitely affect the worker-peasant alliance.[2]

Many members of the top leadership, however, thought that low production and peasant discontent were caused by ill-suited social organization, i.e., the collective economy. They advocated steps to dissolve substantially the collective system. The first serious effort in this direction was taken by P'eng Te-huai, Minister of Defense, at the Lushan Conference of July 1959, just before the Eighth Plenum.[3] Although P'eng was dismissed, his ideas still had support. From 1959 to 1961, there were

---

[1] "Industrial Enterprises Should Adopt the Idea of Taking Agriculture as the Foundation," JMJP editorial, July 17, 1960. SCMP 2304 p. 6-10.

[2] Ti Wen, "Discussions on Equivalent Exchange of Industrial and Agricultural Products among Economists in Recent Years," Kuang-ming Jih-pao (Bright Daily), hereafter abbreviated KMJP, March 19, 1962. SCMP 2714 p. 1.

[3] Kang Chao, Agricultural Production in Communist China, 1949-65 (Madison: University of Wisconsin Press, 1970), p. 28.

several directives emanating from the Center designed to decentralize the People's Communes. These directives, the most important of which were the Sixty Articles Concerning the People's Communes of March 1961, reduced the power of the commune and established the brigade as the basic accounting unit.[1]

Even these changes were not satisfactory to some in the top leadership. In the second half of 1961, these people, by now united by Liu Shao-ch'i, chairman of the government of the People's Republic of China, advocated a system called "three private and one guarantee." Under this proposal, the private sector in the countryside would be enlarged in three ways. First, the private plots of land would be increased. Second, markets for selling privately produced goods would be enlarged. Third, private production of handicraft goods would be enlarged. The "one guarantee" part of the slogan meant that a specific plot of land would be assigned to a household, and the household would guarantee to produce a certain quota. The household was entitled to receive whatever was produced above the quota.[2] This aspect of the proposed program meant that field management and incentives would be fairly similar to private farming, although families would not be able to buy, sell or rent land as in the past. The "three private and one guarantee" system was adopted experimentally in some locations.[3] How widely spread it became is not

---

[1] Chao, op. cit., p. 29.

[2] Ibid., p. 30.

[3] One fairly careful experiment was carried out near Canton under the supervision of T'ao Chu in early 1962. Ten-thousand Li of East Wind of Red Flag of Sun Yat-sen University, Red Headquarters of Canton Combined Committee for Criticism of T'ao Chu, "T'ao Chu is the Vanguard in Promoting 'Production Quotas Set at Household Level,' of China's Khrushchev," Nan-fang Jih-pao (Southern Daily). Hereafter abbreviated NFJP. July 26, 1967. SCMP 4011 p. 14.

known.[1] Mao feared this approach to the agricultural crisis would lead to the "restoration of capitalism."

An alternative approach to the agricultural crisis was to increase state investments in rural areas. It was presumed that such a shift in investment priorities would help reduce rural discontent by improving the standard of living. One Chinese writer explained:

> In order to consolidate the worker-peasant alliance, we are now resolutely putting into effect the policy of going in for agriculture and production of grain in a big way, and calling on industry to help agriculture on a large scale.[2]

Another reason for investing in agriculture was the belief of some leaders that the technological transformation of agriculture would justify and strengthen the collective features of agriculture. It was assumed that modern agriculture requires a larger scale than traditional agriculture, and thus the Chinese peasants would lose their interest in individual farming as agriculture modernized.

This interaction of political and economic goals was displayed in an important People's Daily editorial published about six weeks after the Tenth Plenum. The editorial stated:

---

[1] Agricultural cadres with whom I discussed this question in Tangshan, Hopei in April 1972 said that the "three private and one guarantee" system had not been adopted at all in that district because both the broad masses and cadres saw it would lead to the restoration of capitalism.

[2] Wang Yu, "Questions and Answers on the Worker-Peasant Alliance," NFJP, January 31, 1962. SCMP 2715 p. 1.

> ...the modern technical equipment used in agriculture provides a material basis of uniting the peasants and consolidating the collective economy. Agriculture production using machinery in a big way cannot be operated in a disorganized manner; it is beyond the power and scope for a small peasant economy consisting of individual farming households to operate modern technical equipment.[1]

The editorial made it clear that the "small producer way of thinking" (i.e., peasant individualism) was still a serious problem, that much time and work would be necessary to eradicate this ideology, and that technical transformation of agriculture could provide the material basis for the ideological development.

The idea of sharply increasing investment in agriculture brought opposition from some Chinese leaders whose main concern was industrialization. They looked at investment as a "zero-sum game," and naturally thought that if more investments were made in agriculture, there would be less available for industry. This view dominated Chinese economic planning in the 1950's, when the Soviet Union was a model.[2] A clear indication of this tendency was given in an article in Red Flag in the spring of 1960.

---

[1] "Actively Realize Technical Transformation of Our Country's Agriculture Step by Step," JMJP editorial, November 9, 1962. SCMP 2864 p. 1.

[2] Throughout the 1950's China's basic policy was to focus investments on heavy industry. During the First Five-Year Plan, only 8.6 percent of basic construction sponsored by the state budget went for agriculture or water conservation. Direct investment in industry amounted to 51 percent of the total construction budget, and much of the remainder was for transportation, communication and training of specialized personnel. (Nai-ruenn Chen, Chinese Economic Statistics, Chicago: Aldine, 1967, p. 159.) This pattern of development was, of course, essentially the pattern that had been used in the Soviet Union since the late 1920's and was widely considered to be the only socialist way of development.

> Some [comrades in industrial departments] even fear that any support given to agricultural mechanization would weaken their own strength, and hamstring the successful operation of the departments to which they are attached. Swayed by this thinking, they are not enthusiastic as they ought to be with the result that questions which could have been straightened out are not solved.[1]

Mao Tse-tung, however, argued that economic development is not a zero-sum game. On the contrary, agricultural development can help industrial development. In 1957 in On the Correct Handling of Contradictions Among the People, Mao explained the relationship between industry and agriculture in a manner somewhat different from (and more sophisticated than) orthodox Soviet economic theory.

> In discussing our path to industrialization, I am here concerned principally with the relationship between the growth of heavy industry, light industry and agriculture. Heavy industry is the core of China's economic construction. This must be affirmed. But, at the same time, full attention must be paid to the development of agriculture and industry.
>
> As China is a great agricultural country, with over eighty percent of its population in the villages, its industry and agriculture must be developed simultaneously. Only then will industry have raw materials and a market, and only so will it be possible to accumulate fairly large funds for the building up of a powerful heavy industry. Everyone knows that light industry is closely related to

---

[1] Ouyang Chiu, "Overall Planning and 'Walking on Two Legs' Essential to Agricultural Mechanization," Hung-ch'i No. 7 (April 1, 1960). ECMM 209 p. 11. Further indication of this tendency to avoid expenditures for agriculture was offered by Yang Chien-pai and Hsu Ping-wen, "On the Basic Way for the Balanced Development of Industry and Agriculture," Peking Ta-kung Pao (Impartial) hereafter abbreviated TKP, May 22, 1961. SCMP 2523 p. 1.

> agriculture. Without agriculture there can be no light industry. But it is not so clearly understood that agriculture provides heavy industry with an important market. This fact, however, will be more readily appreciated as the gradual progress of technological improvement and modernization of agriculture calls for more and more machinery, fertilizers, water conservancy and electric power projects, and transport facilities for the farms, as well as fuel and building materials for the rural consumers. The entire national economy will benefit if we can achieve an even greater growth in our agriculture and thus induce a correspondingly greater development of light industry during the period of the Second and Third Five-Year Plans. With the development of agriculture and light industry, heavy industry will be assured of its market and funds, and thus grow faster. Hence what may seem to be a slower pace of industrialization tion is actually not so, and indeed the tempo may even be speeded up. In three five-year plans or perhaps a little longer, China's annual steel output can be raised to 20,000,000 tons or more from the peak pre-liberation output of something over 900,000 tons in 1943. This will gladden people both in town and countryside.[1]

Further development of this theory was offered by Liu Jih-hsin in an article in February 1961. Liu pointed out that agriculture supplies 70 percent of China's exports, which are in turn used to purchase industrial equipment.[2]

There would appear to be a confluence of interests between those who thought that agricultural development required only social reorganization--i.e., more private,

---

[1] Mao Tse-tung, On the Correct Handling of Contradictions Among the People (Peking: Foreign Language Press, 1957). Available in Robert Bowie and John Fairbank, Communist China 1955-1959 (Cambridge: Harvard University Press, 1965), p. 294.

[2] Liu Jih-hsin, "On the Relationship Between Agriculture and Heavy Industry," Peking TKP, February 2, 1961. SCMP 2466 p. 1.

monetary incentives and more flexibility for the individual farmer--and those who desired that investments continue to be funneled into heavy industry. There is not enough information about the precise process of decision-making during 1960-1962 to know whether or not this confluence of interests was consumated in a political alliance or how those favoring collective agriculture and its technological modernization came into alliance.

The decision to stress agro-technical reform which was made in 1962 and announced at the Tenth Plenum had broad support from most elements of the Chinese leadership. It benefited the rural sector by promising new investments and industrial supplies. It did not hurt the industrial sector too much because industry would grow to assist agriculture. (A large reorientation of industry was, however, required.)[1] Only those favoring a withdrawal from the principles of collective economy were dissatisfied, because the principles of collective activity were reinforced. However, the production team (the smallest unit of collective agriculture, composed of about 20 families) was made the accounting unit so that the most irrational features of the incentive system set up during the late 1950's were eliminated. There is no information on how China's military strategists felt about these decisions. On the one hand, they may have been reluctant to see the rural sector become the focal point of state investments, because this could hamper

---

[1] Hang Chien-pai, "To Shift Industry Onto the Line that has Agriculture as the Foundation," TKP, January 30, 1963. SCMP 2922 p. 1. See also, "Industrial Work Gradually Brought into Line with Agriculture as the Foundation," Kuang-ming Jih-pao (Bright Daily), hereafter abbreviated KMJP, January 21, 1963. SCMP 2925 p. 1.

development of sophisticated technology and the buildup of heavy industry capable of supporting advanced weapons systems. On the other hand, they must have been concerned about the military dangers brought by widespread dissatisfaction; and they must have appreciated the strategic advantages of self sufficiency in food. Many military strategists must have applauded the idea of applying science and technology to China's problems.

The decision announced at the Tenth Plenum was not the victory of one faction over another. It was not the victory the followers of Liu Shao-ch'i over Mao Tse-Tung or of the "experts" over the "reds." Both technology and collectivization were affirmed. The decision was a careful attempt to satisfy many diverse interests in China. All indications are that the policy adopted by the Tenth Plenum to change fundamentally China's agricultural technology and to do so on the basis of a collective economy (with a small accounting unit) was widely supported in China.

However, precisely because the policy appealed to so many interests in China, important contradictions in the policy were somewhat overlooked in 1962. An important one involved the types of modern agricultural techniques that would receive priority. Mao and other Chinese leaders who were especially concerned with the socialistic, collective features of life in the Chinese countryside wanted agro-technical transformation to emphasize <u>mechanization</u> of agriculture. Mechanization was especially important because it would consolidate the collective economy and wipe out forever the "small producer way of thinking." Many of China's economists and agricultural scientists, on the other hand, emphasized the expansion of agricultural <u>chemicals</u> (fertilizer and pesticide) as well as the development of new, improved <u>seed strains</u> to increase yields. These

technical changes are generally unrelated to scale, and could be adopted by individual farmers as well as collective units. Thus these types of changes would not have the same political consequences as mechanization. These differences in perspective surfaced a year later in an article by Liang Hsiu-feng:

> Some comrades are of the opinion that since the central aim of agro-technical reform is increase in farm output and since chemical fertilizers can increase the output with the most striking results, introduction of chemical products should be the center of agro-technical reform. Others take the view that water conservancy "is the life-line of agriculture" and should be the center of agro-technical reform. Still others regard mechanization and electrification as the center of agro-technical reform because mechanization and electrification will not only raise the productivity of agricultural labor with the most notable results but also serve as an important material and technical basis for changing the rural outlook and consolidating the collective economy of the people's commune. Finally, there are comrades who take the view that mechanization, electrification, water conservancy and introduction of chemical products are of equal importance and are all centers of agro-technical reform.[1] (emphasis added)

Making the decision to change agricultural techniques took almost two years, during which time all interests in the country could express their views. The decision that was finally reached satisfied most interests. When it was announced at the Tenth Plenum, the decision was clearly the authoritative judgement of the entire political system. For the following years, virtually every organ was aware of what central policy was and

---

[1] Liang Hsiu-feng, "Preliminary Enquiry into the Center, Step and Keypoint of Agro-technical Reform in our Country," Ching-chi Yen-chiu (Economic Research) No. 9, September 17, 1963. SCMM 389 p. 36.

could not avoid carrying it out.

There were, of course, many uncertainties in the program adopted in 1962. The precise balance between industry and agriculture, the type of collective action in the rural sector, and the types of agricultural techniques which should be adopted were still subject to substantial debate. Indeed, as the first elements of the program to change agricultural technology were achieved, the more difficult choices came up and could not be avoided. The consensus broke by 1966 at the start of the Cultural Revolution, largely over the importance of mechanization. For the four years after 1962, however, there was widespread consensus in China on the need for agro-technical reform, and on the broad patterns of this change. This agreement was necessary before the development could occur during that period.

Chapter 4

ESTABLISHING A BALANCE OF POWER AND INCENTIVES

Once the decision was made to change agricultural techniques, the Chinese leadership moved quickly and comprehensively to carry it out. The next four chapters examine different aspects of policies and organization that were adopted to effect agro-technical change. In this chapter we will examine the political balance between center and local areas that was established after the Tenth Plenum. We will examine the general administrative system in rural areas, the extent of decentralization, and the pattern of incentives which distributed economic benefits to the rural sector. Chapter 5 examines steps the center took to strengthen leadership over technical services. Chapter 6 focuses on efforts to make various other services relate more closely to the needs of the rural sector. In Chapter 7 we examine patterns of leadership that were adopted in communes to encourage agro-technical change.

The necessity to establish a distribution of authority in China that was in accordance with peoples' desires and that fit the agro-technical requirements became painfully apparent after 1958. Until then, the central political authorities had too much power and had successfully advocated inappropriate technological reforms and unpopular social reorganizations.[1] After 1960 and especially after 1962, a new balance was established which had three distinctive features which we shall examine in this chapter. First, the general administrative system was modified so

---

[1] These problems are discussed in Benedict Stavis, "Political Dimensions of the Technical Transformation of China's Agriculture," Columbia University Ph.D. dissertation, 1973.

that it was more consistent with the traditional scale of social organization. Second, power over day-to-day management of the economy and over investment and consumption questions was decentralized to lower levels. The center retained power to make broad political policies. Third, an economic incentive system was developed so that localities could retain the bulk of the benefits generated by modern agricultural techniques.

A. Patterns of Rural Administration - The Commune System

In Chapter 2 we briefly noted that changes were made in the commune administrative system after 1960. Three changes in particular were of crucial importance in establishing an administrative system that could manage and encourage the technical transformation of agriculture. First, the size of the commune was reduced so that after about 1962 the commune frequently coincided with the traditional marketing area, i.e. the commune was made up of those villages which traditionally were related to a particular market town. Not only did this mean that the commune was more closely related to pre-existing patterns of economic coordination; equally important, the traditional marketing unit formed a social community, in which people knew each other and could more easily establish the working relations required for modernizing the collective economy.[1] For example, they could more easily agree on water conservancy projects or other investments.

The second change was the adoption of the production team as the basic accounting unit. (This change was publicized at the time of the Tenth Plenum.) This meant that an individual's income would be based on the profitability

---

[1] William Skinner, "Marketing and Social Structure in Rural China," Journal of Asian Studies Vol 24 No. 1-3 (1965). I discuss this in more detail in People's Communes and Rural Development in China (Ithaca: Center for International Studies, 1975), Chapter 2.

of a small piece of land farmed collectively by about 20 families. Invariably the families in the team would be old friends or relatives and would put strong social pressure on everyone to do his share of work. Thus labor incentives were rationalized compared to those in the period 1958-1960, when the entire commune was an accounting unit and individual effort would be less directly rewarded.

A third change was to give support and encouragement to the small private sector in China's agriculture. Production teams were asked to set aside up to 7 percent of the cultivated area for allocation to families as private garden plots (tzu liu ti). On these plots, families would grow fruits, vegetables, tobacco, and similar crops. They could also use the land and its produce for animal husbandry (especially pigs and poultry). In addition, families were encouraged to produce certain handicrafts at home, such as baskets. Rural markets (similar to the traditional ones) were sponsored to give families an opportunity to exchange or sell their privately produced products. While the private sector has been encouraged, it has been strictly regulated. Families are discouraged from spending so much effort in private production that it interferes with collective production. Moreover, if a particular product is in great demand and can be produced collectively, it generally is confined to the collective sector. Nevertheless, expansion of the private sector was important in enlarging production of fruits, vegetables, and animals, products which require more careful tending than do grains.

While the commune system was modified in these important ways, the basic concept of collective ownership of the means of production was retained. Indeed, the policy of transforming China's agricultural technology was, we have argued in Chapter 3, devised partly to assure the profitability and continuation of collective ownership.

Elsewhere I have argued that the principal effect of collective ownership is on distribution of wealth and not on production.[1] However, because collective agriculture has not been very successful in the Soviet Union and Eastern Europe, observers sometimes assume that the collective agricultural system adopted in China must have been a great impediment to agricultural production. I believe this is not the case. On the contrary, the collective ownership system in China, once it was established on the appropriate scale, has demonstrated many advantages for production. One of the most important is the relative ease in organizing and mobilizing labor for rural construction projects. Because there are several levels of rural institutions (team, brigade, commune), interests can be identified, expressed and articulated for projects of almost any scale and there is the capacity to organize projects of any scale. Virtually no project is too small to be worthwhile to some level of organization; nor is any project too large for mobilization of sufficient funds and labor. A peculiar feature of the collective ownership system is that it has built-in incentives for labor-intensive construction projects. The production team has a fundamental obligation to provide work, food, and income to all members. A team leader cannot dismiss the members of the team when labor begins to have a declining marginal profit; it still must be utilized. In fact, as long as increments in labor have positive productivity, no matter how small, it makes sense to use that labor. Thus the collective system of ownership makes it profitable to utilize more labor than would be used under private ownership, where workers could be dismissed and would have to seek new employment.[2] Some economists might

---

[1] Ibid., Chapter 6.

[2] This aspect of the labor market in China is discussed by Kang Chao, Agricultural Production in Communist China, 1949-1965 (Madison: University of Wisconsin Press, 1970), p. 37, 47. The argument is drawn from Georgescu-Roegen.

argue that this feature is a disadvantage, and that it would be more efficient for surplus labor to seek out employment with higher marginal productivity. However, experience in many other countries suggests that such an approach leads to massive urban slums and poverty. The incentives inherent in collective ownership result in greater efforts towards rural construction.

Another reason collective ownership encourages rural construction activity is the fact that everyone receives some of the benefits of increased productivity. If a construction project is sensible, it will improve the income of almost everyone and everyone's descendents. No one has the feeling of working on a project which will benefit only a few people. This feeling of shared interests is reinforced when leaders of the managing organizations participate in physical labor with the other farmers, as will be discussed in our description of leadership in Chapter 7

In certain places, these projects can provide the crucial spark to start agriculture moving. In Tachai and Shashihyü (two model villages which will be discussed later) tremendous labor was mobilized to carve terraced fields into rough mountains and to carry soil up to the new fields. Once the fields were constructed, it became possible to grow sufficient food grains and to diversify into cash crops. In Lin County, the construction of a massive canal to bring water into a formerly parched area played a major role in agricultural development.[1]

In other places, these types of labor intensive construction projects are complementary to other, modern agricultural inputs. On the North China Plain and in south

---

[1] "Carved in the Cliffs--The Red Flag Canal," Peking Review No. 48 (December 1, 1972), p. 12-15; No. 49 (December 8, 1972), p. 13-17.

China, massive earth leveling has been undertaken (mostly by manual labor) to make for full utilization of modern irrigation equipment and tractors. Irrigation and drainage canals are also needed, as is road construction to permit increased marketing of products and purchase of inputs.[1]

Another advantage of collective agriculture in China is that certain socio-political impediments to efficient economic allocation of resources are removed. Two examples will explain this. Under private farming, peasants all have a strong tendency to grow enough food grains to ensure family survival, even though their land might be optimal for growing some other crop. Few farmers are willing to trust family survival to market conditions and specialize in cash crops. In collective agriculture the production unit can use land in a more optimal fashion, inasmuch as no family's survival is dependent on the food grain production of any particular piece of land.

This advantage of collective agriculture also shows up in allocation of water especially in rice growing areas. Studies in the Philippines have shown that good irrigation is crucial to the adoption of high yielding rice production techniques. In rainfed regions, rice yields are only about 1.8 tons per hectare, while in effectively irrigated localties yields are 2.8 tons per hectare.[2] In many localities the constraint for expansion of irrigated area is <u>not</u> lack of water, but rather institutional factors. Water at the head of an irrigation system is wasted so that water is insufficient at the lower reaches. It is wasted because

---

[1] By 1973, 77 percent of the communes were open to motor vehicles. <u>Peking Review</u> No. 7 (February 15, 1974), p. 23. Skinner has collected much data on the spread of roads. Skinner, <u>op.cit</u>., p. 378.

[2] Randolph Barker, "The Evolutionary Nature of the New Rice Technology," <u>Food Research Institute Studies in Agricultural Economics, Trade, and Development</u> (Stanford), Vol. X, No. 2 (1971), p. 118

the people who own land at the head of the irrigation system have social and political power, and can block changes in irrigation practices which would result in more sharing of water with people lower down in the system. It has been demonstrated in Taiwan Province and elsewhere that careful management of an irrigation system, coupled with improved technology for regulating the height of water in different parts of the system, can spread out the water (sometimes in rotation) and effectively irrigate much greater areas, leading to increased total production.[1] The collective system in the mainland provinces of China is able to gain these advantages through careful planning and management as well as having interests for maximizing production over a large area.

Another advantage of the commune system is that it can enforce a fairly high degree of savings and a commensurate high level of investment. We will analyze this in our discussion of incentives below.

The commune system can also spread out the risks of agricultural innovation. In capitalist agriculture poor peasants are reluctant to risk innovation because if it fails, their families might starve. Collective ownership in China, however, presents the opportunity for local testing without risking a family's survival. Such local testing has not always been done, and inappropriate agricultural techniques have been popularized, but when I visited China in 1972, I was very much impressed by the careful local testing of seeds, fertilizers, and cultivation techniques.

Another advantage of the collective system is that transfer of technology can be very rapid. All agricultural techniques are public information; there are no secrets. In our discussion of agricultural extension we will note this.

---

[1] Rotational Irrigation Development in Taiwan (Taipei: Joint Commission on Rural Reconstruction, 1968), p. 4.

Other advantages of the collective system include an enlargement of the size of plots and reduction in parcelization. This simplifies mechanization of cultivation and reduces time wasted by private farmers in going from plot to plot, often quite far apart. Collective ownership reduces the expenditures needed to prevent thievery, of both crops and water. It eliminates the waste of land used for boundaries. It also simplifies the staggering of peak labor times by rationalizing the planting time, so as to reduce peak labor requirements. Moreover, it can allow more efficient and concentrated use of resources without bringing about increased polarization between rich and poor. One of the most elusive but perhaps most important features of collective agriculture is its ability to generate a cultural climate conducive to technological change. Because everyone benefits from agricultural development, there are no people in a village who need to oppose development to protect their livelihoods. There are no tenants who fear losing their lands if mechanization comes. There are no small farmers who get pushed out of the rice market when new seeds increase productivity and push prices down. Thus agricultural modernization is more popular under this system of organization.[1]

The commune system has some features which, under certain circumstances, turn out to be serious disadvantages for production. We have pointed out how a system with highly unsuited labor incentives was proposed and implemented

---

[1] I do not wish to argue that all or any of these advantages of agricultural modernization are unique to the collective system in China and unobtainable in private agriculture, but merely that there are distinct strengths in the collective system.

around 1958 which resulted in a virtual sit-down strike by many of China's peasants. We have also mentioned how at certain times rural local leaders felt obligated to adopt quite inappropriate techniques of cultivation including deep plowing and close planting. The system of collective agriculture permitted such top-down interventions in production.

Another problem with collective agriculture (as practiced in China) is that it requires extensive and careful management. When it was first introduced, there was a serious shortage of qualified agricultural managers to assist at all levels and in all areas. No one knew how to assign labor on the scale of the whole village. Nor were there adequate personnel to do the accounting. Several years were required before rural China had the management skills needed to make the collective system work efficiently.

Yet another potential problem with collective agriculture is the problem of entrepreneurship. Since there is no individual who will make a lot of money by inventing or adopting a new technique, what alternative incentive system can get people interested in taking risks and in making changes? There are, in fact, many alternative reasons for people to desire change other than profit; these include patriotism, ideology, social pressure, and desire to help everyone.[1] The transition from one pattern of incentives and entrepreneurship to another is not, however, a simple matter.

For these reasons, the commune system can disrupt agricultural production severely. When this happened in

---

[1] Robert Merton has shown that ideological factors were important in motivating 17th Century scientists. Many wanted to demonstrate in their scientific work the power of God to structure the universe rationally, and were not interested in personal profit.

China, the results were quite serious because China's agricultural system is so delicately balanced and had so little slack. These dangers still exist, but since 1962 the Chinese have been very careful to see that they do not again disrupt agriculture.

B. Matrix of Authority

In making decisions concerning agricultural development, China has developed a complex blend of central direction and local initiative after the Tenth Plenum. (In this section we will discuss central and local authority without making a distinction between government and Communist Party. In broad terms, the Party makes overall plans for any particular local level, while government organs administer policy. The special role of the Party will be discussed in Chapter 7 on leadership.)

In many cases, the center has made a conscious decision to decentralize decision-making power. This may be done for a variety of reasons. The central leadership realizes that because of the extreme variability of local conditions, agricultural production requires many rapid, highly localized decisions which could not be made by a central bureaucracy. Moreover, the central leadership believes that by localizing decision making, more people can participate in the decision-making process and thus will feel more willing to make economic and other contributions. Finally, some members of the central leadership fear that if decision making were very centralized, a large, specialized, highly-trained bureaucracy would be necessary to make efficient allocations, and such a bureaucracy could become a self-perpetuating ruling class. Of course not all decentralization is a matter of choice. On some issues localities have insisted, in one fashion or another, on local power; and the central political system has been wise

enough to accept the inevitable in such a crisis.

Not all powers have been decentralized, however. China is a socialist country and has national economic planning. Many programs for agro-technical development are worked out at the center and executed directly. The center can directly administer agro-technical change by controlling distribution of many industrial supplies and credit for agricultural development and by controlling certain services, including research, extension, and mechanization, which can strongly shape agricultural development.

To understand the complexity of relations between center and localities, it might be best to imagine a continuum. For some issues, the center has great power, and for other issues the localities are virtually autonomous. For still other issues, there are negotiations, sometimes involved, between the levels, or suggestions are made back and forth. The following pages specify some of these relationships.

1. Central Direction of Investments, Construction, and Supplies

In the first chapter, regions with rapidly modernizing agriculture in China were specified. Exactly how these regions are chosen is not known; presumably there is a complex combination of political and technological factors that lead to the decisions. Once certain areas are chosen, however, the center uses its material and financial resources to stimulate agro-technical reform in the region.

Allocation of Material

In China, the output of a factory belongs to the organization or unit which owns the factory.[1] The central

---

[1] The source for this discussion on principles of distribution are interviews the author conducted in Hong Kong, spring 1972, supplemented by discussions in China.

government (and other levels of government) can accordingly influence the distribution of many modern agricultural supplies. Generally, ownership is determined according to the provision of investment funds. Thus, if the central government builds a fertilizer factory, it controls the distribution from that factory. Analogously, if a provincial government uses its own funds to establish a tractor factory, it controls the distribution of those tractors. Likewise, if a county government or commune establishes factories to make pumps or other tools, that unit controls the sales of those pumps or tools.[1]

In practice, during the early and mid 1960's, most of the crucial supplies for agro-technical development, including most of the chemical fertilizer and much of the pumps, motors, electric generating equipment, electric wire, and tractors were manufactured in factories of the central government, and hence were distributed by the central government.[2] (After the Cultural Revolution, many more factories

---

[1] Actually, the distribution of goods is handled by a commercial unit (mao-yi tan-wei) of the government at the level of the factory. This unit will receive the goods from the factory and will distribute them in accordance with instructions from the government at that level. A factory as such is a unit of production (sheng-ch'an tan-wei) and is not permitted to distribute its products.

[2] Right after the Tenth Plenum, the center took steps to redirect the industrial sector to serve the needs of agriculture more directly. On January 30, 1963, Ta-kung pao (an important Chinese newspaper for industrial and financial cadres) carried an article that emphasized that the entire industrial system would be modified. The article called particular attention to the machine building, chemical, electrical power, and metals industries as having to shift to meet the needs of rural production. Light industry would have to change to produce consumer goods especially needed in rural areas. The article noted, however, that some industrial resources would still have to be directed to the needs of national defense. Hang Chien-pai, "To Shift Industry onto the Line that has Agriculture as the Foundation,"TKP (January 30, 1963. SCMP 2922 p. 1. See also, "Industrial Work Gradually Brought into Line with Agriculture as the Foundation," KMJP January 21, 1963. SCMP 2925 p. 1.

were established by provincial, county, and commune levels, so the relative power of these levels of government increased after that time.)

In the distribution of industrial supplies a market system is used when supplies are adequate to meet demand. Whenever there are shortages, however, the political system consciously allocates the supplies according to its own priorities, which include encouragement of production, reduction of inequalities, balancing of political demands, and sometimes desire to establish a strategic presence in a region.

In practice, there are frequently shortages because prices are kept low,[1] and demand far exceeds supply. In a capitalist market system, the purchasers who have a greater need for and ability to pay for the manufactured goods would be able to bid up the prices until demand was reduced to the available supply. China has deliberately rejected such a distribution system for scarce commodities and chosen to ration such goods instead.

The allocation of goods in short supply (at a given price) is handled by the central and provincial planning commissions. The production units submit plans to the planning commission. The plan must show that the locality can supply locally certain aspects of the project (eg, that it can build structures needed for electrification, that it has the technical personnel for installing and servicing the equipment.) Working on the basis of these proposed plans and on the basis of a regional plan for agricultural development, the provincial planning department makes a plan and then orders the factories over which it has jurisdiction to deliver the products to specified county commercial units. If the product is supplied to both urban and rural users,

---

[1] The pricing system is discussed in more detail in Section C, below.

it will be distributed through the department store (pai-huo kung-sze). If it is used only in rural areas, it will be distributed by the Supply and Marketing Cooperatives in the countryside. The province also gives the commercial units certain principles to apply when they sell goods to the production units.

The department store then sells equipment to selected production units which have applied, according to the principles set down by the planning commission. Generally, the department store will select production units which can use the new input to assist production. Consumer uses are second priority. With regard to electrical supplies, this would normally imply that the densely populated areas near generating sources with level land that can be irrigated with minimal supplies of wire and pumps would receive priority. Because sparsely populated hilly regions distant from generating facilities would require very large supplies of equipment and would have less impact on production, the tendency is for the department store not to provide them with equipment. The department store could have difficulty deciding whether to sell a small amount of wire to a densely populated area where it would provide a lot of illumination (a consumer use) or supplying it to a small, distant village where it would be used for irrigation (a production use). (The decision would be simple if there just was not enough wire available to reach the distant village.)

In making these kinds of decisions to allocate wire and equipment, the department store is under the supervision of the county committee of the Communist Party. The Party Committee establishes the criteria for allocation and directs the department store in difficult choices. As far as can be ascertained, the decisions are based on a crude notion of "justice," which, however reluctantly, recognizes that differences in income due to differences in environment will

not be eliminated immediately; people in poor regions will remain poor for a while, but they should receive some help. There is no indication that a sophisticated analytical technique for optimizing allocations exists in China that would measure the anticipated increments in agricultural productivity coming from each unit of input. Such a mathematical technique would severely undercut the role of the county party in specifying a "just" allocation.

A similar system is utilized to distribute chemical fertilizer. In this case, chemical fertilizer is distributed to production units by the county Supply and Marketing Cooperative, in consultation with the county agricultural office, under the direction of the county Party Committee. The precise principles for allocation differ from region to region, county to county, and commune to commune. On a national basis, the principle of equality is not utilized. Production units in the high and stable yield areas have more fertilizer than others, so clearly there is a national plan for allocation of chemical fertilizer. Within these regions, however, there seems to be great flexibility as to how chemical fertilizer is distributed. Perhaps each county can select its own method.

Generally most chemical fertilizer is distributed on the basis of cultivated area of each production team. Supplementary supplies of fertilizer are occasionally allocated on the basis of sale of commodity grain by the production unit. (In one place about half the fertilizer used was distributed on the basis of sales of grain.) In some cases, fertilizer supplies are related to production of specialized agricultural products (for example, bananas) which are used for export. In such a case, the supplementary fertilizer may be supplied by the relevant export company. (Very fragmentary information suggests that pegging fertilizer to production of commodity grain or specialized

commercial crops was more common before the Cultural Revolution of 1968 than after.)

Regardless of the criteria used to allocate fertilizer, the production team decides for itself how to utilize the fertilizer. Thus it is common for fertilizer which has been allocated on the basis of banana production or dry farmland to be actually applied to paddy areas. In practice, almost all chemical fertilizer in the Pearl River Delta is used on paddy rice. It is used on the best land.

Generally, only collective units, such as the production team, can legally purchase chemical fertilizer. However, there are some instances in which private households can purchase chemical fertilizer for use on private plots. Such purchases are usually on the basis of selling something important to the state, such as poultry, nightsoil, vegetable oil, or grain. Such a system is obviously used to stimulate the production of some particular commodity which the collective economy cannot supply adequately.

Whatever the precise principle of allocation, the fertilizer which is allocated is actually purchased with cash. The fertilizer is priced quite low compared with grain so that the use of chemical fertilizer is almost always profitable.[1]

---

[1] In the Pearl River Delta area in the late 1960's, a catty (0.5 kilograms) of pure nitrogen cost roughly ¥1.0

PRICE OF CHEMICAL FERTILIZER

Fertilizer	Price per 100 catties	% Nitrogen	Price per Catty N
Ammonium sulfate	16.5	20	.82
Ammonium nitrate	16.5	35	.48
Ammonium chloride	16.5	40	.41
Urea	30.0	52	.58
Ammonium water	6.6	5	1.30

Note: In the above computation, the percentage of Nitrogen is based on the pure chemical. Fertilizers actually used

The county Party Committee bears the final responsibility for devising a distribution system that both encourages production and is thought fair and just or at least a suitable combination of these principles. Distribution of fertilizer geared to area or population would presumably be the simplest "fair" method. Distribution according to commodity grain production would be emphasizing the principle of encouraging production. In making these decisions, it appears that the county Party Committee does not have detailed agro-technical data. The marginal response ratios of various grain varieties to a variety of crop nutrients at various levels of applications are not, as far as can be determined, utilized by county, commune, or production team leaders in allocation of chemical fertilizer. They all believe that the question of response ratio is too complicated for a simple method of analysis. It depends on availability of water, weather, cultivation practices, timing of use of fertilizer, and many such factors. Thus, while the central political authorities make major decisions regarding regional allocation of fertilizer, local officials can determine principles of allocation within the county. Production team leaders decide on actual utilization of the fertilizer.

In general, distribution of agricultural machinery for which demand exceeds supply (especially pumps and tractors) follows the same principles; namely the production

---

by the production units have been mixed to some extent, so that the percentage of nitrogen is actually lower, and the price is higher than indicated above.

During this time, production teams sold commodity rice (third grade, unhusked) to the state at ¥9.80 per 100 catties (¥8.90 before 1966). Better quality rice was ¥11.00 per 100 catties. Application of chemical fertilizer would be profitable if the marginal increment of grain production was only ten units per unit of nitrogen. (This is probably lower than it really is) and if a catty of nitrogen cost ¥1.0.

unit draws up a plan for production which includes the input of machines. Planning departments work out with marketing agencies how to distribute the machines. All this is under Party supervision.

The system the Chinese use would appear to be conducive to corruption. One might expect production teams to use family connections, friends, and political allies to get a higher allocation of agricultural supplies. Moreover, one might expect there to be a black market in fertilizer, based on fertilizer stolen from factories and stores, and on fertilizer sold by production units which have a low marginal return for fertilizer. Both forms of corruption exist, but seem to be uncommon. There has been from time to time and place to place a black market of fertilizer, which has been used by individuals on private plots. However, the strict organization of the Communist Party appears to have kept remarkably infrequent the occurrence of nepotism or political influence in allocation of agricultural inputs.

Perhaps to reduce temptations of corruption, the prices of goods in short supply is sometimes allowed to go up somewhat; in practice the system is not as rigid as described above. (Probably there is variation from place to place and from time to time on this question.) In one locality in the early and mid 1960's it was reported, "the supply of rationed producer goods remained very short, and units had often to look for unrationed sources, while the prices of both were driven upward by the short supply so that only the wealthier units could afford to buy them."[1]

It is important to restate that in principle the allocation system is used only when demand for agricultural supplies outstrips their supply. When the supply is adequate, then the allocation system is not used. Instead, the production

---

[1] John Pelzel, "Economic Management of a Production Brigade," in W. E. Wilmott, Economic Organization in Chinese Society (Stanford: Stanford University Press, 1972), p. 395.

units are free to purchase at will what they want (sui pien mai). They will send a person to the department store or Supply and Marketing Cooperative with cash to purchase the object. This will be possible for various circumstances. If the modern input is produced locally or supplied in adequate quantites, allocation is not required. This appears to be the case with regard to many grain processing machines and pesticides. Sometimes the new input may not be effective so that the production units are not especially eager to purchase them. Then there is no need for allocation. This appears to be the case with regard to rice transplanters in Kwangtung. Finally, there are some cases in which the central authorities have assigned very large quantities of a particular input to a certain county, so that in that county the commodity may be purchased, even though it is allocated in other counties.[1]

Distribution of Credit

Credit is distributed in a manner similar to modern agricultural inputs in short supply; that is, it is distributed first according to national and provincial plans to selected regions. Then it is allocated under the supervision of the county Party Committee, in accordance with plans for agricultural development.

Examples of large scale credit to entire counties can be found, in which loans were closely integrated with programs for rural electrification. In the Pearl River Delta, construction of a 400,000 hectare irrigation project began in about 1960. Two large dams were built with hydro-

---

[1] Electric wire appears to be in this category; there is some evidence that electric wire is purchased freely on China's border counties (Paoan and Ch'ühai counties) but not in other counties. Perhaps this reflects a political decision to improve the living conditions more rapidly in those counties whose population knows more about conditions in Hong Kong and Macao.

electric generating capabilities. A Kwangtung Provincial Electric Company was formed to integrate the power system of Canton with that of the large dams, and to assure distribution of electricity to the countryside. Crucial initial installations of this system were financed by the central government, but the local contributions eventually financed about 80 percent of the project. Communes built small canals and provided bricks for pump houses and material

TABLE 4.1

Sources of Agricultural Investments in Three Counties

Tung-kuan County, Kwangtung

Year	% from Local Sources	% from State	Total
1960	33	67	
1961	46	54	
1962	72	28	
1963	84	16	
Total	¥11,690,000 (70%)	¥5,000,000 (30%)	¥16,690,000

Hsin-chou County, Hupeh

Year	% from Local Sources	% from State	Total
1957	47	53	
1958	73	27	
1959	44.5	55.5	
1960	36.5	63.5	
1961	35.5	64.5	
1962	53.5	46.5	
1963	77	23	
Total	¥507,500,000 (60%)	¥333,350,000 (40%)	¥840,850,000

E-ch'eng County, Hupeh

Year	% from Local Sources	% from State	Total
1958	15	85	
1959	11.8	88.2	
1960	6.5	93.5	
1961	38.4	61.6	
1962	64.3	35.7	
1963	52.2	47.8	
Total	¥54,300,000 (53%)	¥49,040,000 (47%)	¥103,000,000

Source: Hsiang Nan, "An Inspection Report of Our Agriculture," Chung-kuo Nung-yeh Chi-hsieh (Chinese Agricultural Machinery), May 1965. JPRS 33,691 p. 21-22.

for electric poles.[1] This appears to be the normal pattern of investment.

In three counties for which detailed data are available, the locality supplied from 53 percent to 70 percent of the total investment funds, but state funds were dominant at the initial stages in each.

Exactly how the local investments were raised is not known; communes sometimes put an assessment on production teams (often on the basis of cultivated area). Also, credit from the central banking system may have been available to some production units.

Long-term credit (for two or more years) to purchase machinery, is sometimes offered to communes and teams, but my impression is that it is rather uncommon. Peasants seem reluctant to assume long-term debts; perhaps this is based on memories of traditional China, in which going into debt was the first step to ruin. It is also possible that as a

---

[1] "Fifth Year of Construction on Pearl River Delta Pumping Stations," NCNA October 23, 1964. SCMP 3326 p. 19.

practical matter long-term credit is quite scarce. One example for which credit was used was when a commune near Peking purchased very modern imported machinery for making powdered milk, half the purchase price of the machinery was financed for two years.[1] A loan of ¥4,000 (at 2.5 percent per year interest rate) was available to the brigade of Liu Ling for installing electricity. More discussion of the administration of rural credit is offered in Chapter 6, Section C, but provision of credit to individual households for personal expenses will not be considered here.

This analysis of distribution of agricultural inputs is, admittedly, incomplete, but it is important to note that the average Chinese peasant does not know more about it than this; only the Party secretaries know exactly how and why agricultural inputs are distributed.

The implications of this type of distribution system are manifold. Because the crucial supplies for agro-technical development and credit are allocated by the political system, there must be conscious decisions by the political system concerning the pattern and distribution of agricultural modernization. The location of irrigation systems, the increases in use of chemical fertilizer, the coordination of these changes with diversification of agriculture --all these types of decisions pass through the political system. In China, agro-technical development is thus very much a political question.

As production of agricultural supplies increases, more and more of them will be available for purchase at the discretion of the production unit. The trend, therefore, is towards a marketing system in which the purchasers are collective production units. This change will have to

---

[1]Stavis diary, April 17, 1972.

involve a redefinition of the role of the Communist Party Committees at commune and county levels, as they will no longer be responsible for so many crucial decisions concerning allocation of agricultural inputs.

2. Central and Local Negotiations for Agricultural Production Plans

The basic plan of what to plant is worked out by negotiation between the central authorities and the localities. The central authorities work out a national plan for production of various crops and also for sales of crops to the state. It then establishes quotas for each province. The province then sets quotas for the counties, and counties pass on targets to the communes. The commune then consults brigades and teams to make the final plan.

A Chinese report describes the basic system:

> Every year, in accord with the national economic plan, the county hands down to the commune a plan covering agricultural production, collection of agricultural tax, and purchase of grain and farm and sideline products...In allotting tasks to the brigades, the commune considered the quality of the latter's soil, its actual output over some years and its established custom of growing grain and industrial crops. Then it proposed a quota for the brigade in implementing state plans for sowing and output of grain and industrial crops. The brigade passed the proposal further down for discussion by its teams, which made some amendments. The commune studied and analysed these suggestions, incorporated the rational ones and fixed the final plan.[1]

At each level there are complex negotiations concerning both the quota for the specific level and how it will be distributed to subordinate units. In these negotiations

---

[1] "People's Commune--Government and Cooperative in One," China Reconstructs, December 1973, p. 43.

the state has very great power for two reasons. First, the state has a total monopoly over trade of grains, cotton, oil seeds, peanuts, and beans. The state also strongly influences the marketing of subsidiary products, especially fruits and vegetables. A production unit cannot unilaterally decide to specialize in a high-profit crop, because it may end up with no way to market it if the production is not coordinated with the state plan. Another reason for the power of the state is its control over crucial inputs. It can relate allocations of fertilizer, electric wire, pumps etc. to changes in a commune's production plans.

The net result of this system is that the state has very substantial power over the planning of agricultural production, but in the final analysis a production unit must agree voluntarily to the plan. The precise balance of power in these situations undoubtedly changes over time, according to economic and geographic factors, and personalities involved. Often the government changes prices of certain agricultural products to get agreement to the plan by the production units.

Some fascinating data are available concerning how production plans were made in a commune in Peking's suburbs. A deputy vice-mayor of Peking concerned about vegetable supplies for the city wanted the commune to specialize in vegetables, but the commune leader felt the commune lacked sufficient labor power to make such a change. When the commune leader refused to switch to specializing in vegetables, he was dismissed from his job. The farmers in his village, however, elected him as production brigade leader and still refused to specialize in vegetables. Agricultural scientists from Peking came out to the commune and helped it adopt new labor-saving techniques so that vegetable production was raised somewhat.[1] This took place in the

---

[1] A.Z.M Obaidullah Khan, "Class Struggle in Yellow Sandhill Commune," China Quarterly No. 51 (July-September 1972), pp. 537-538.

very early 1960's, when the power of the central government vis-a-vis localities was somewhat reduced.

The Chinese system is impressive in its directness. The government does not rely on complex, indirect techniques of market manipulation, buying food on an open market, taxes, price differentials, etc. that characterize the policies of other governments in Asia in efforts to influence production. The government simply makes production a political weight directly. One of the problems with this system has been that the state frequently has too much power and convinces a production unit to grow a crop that is not suited for the locality. To guard against this, the government must be restrained in its exercise of power.

Central Guidelines and Local Management

For a great number of important aspects of rural development, the central authorities specify a general policy direction, but grant local leaders broad autonomy in actually carrying out policy. For example, there is a national guideline that investment funds should come from profits made by sales of cash crops and subsidiary agricultural products (including animal products). This is summed up in the slogan "Take grain as the base, and have all-round development." But how much money can be made this way is closely related to the state's agricultural plan. The state can assist a locality in raising investment funds by assuring that the apples, dates or hogs raised in a particular place will be purchased at a remunerative price.

Handling distribution of food and money within each production unit is also decided at the local level in accordance with the socialist principle (to each according to his work), and various production units will have the freedom to decide whether the work accomplished will be measured by time or by fixed quantity. In fact, many production

units often chose the latter and set up quotas for different jobs. When the central authorities decided that this kind of quota had a tendency to lead back to capitalism and issued directives that work points should be based on other criteria, most teams switched immediately. They had no choice.

Mechanization of agriculture and the development of small-scale industry is another example of a policy in which the broad guidelines are centrally established, but the execution of the policy is left to the locality. The center picks a model area (in the case of rural industrialization, Ts'unhua county is a model) and it may sponsor a conference so that officials from all over China can come and examine the experience. The government encourages popularization of the experience through various media, including printed word and cinema. Some technical assistance -- for example, blueprints of machinery and some highly trained specialists -- may be assigned to an area, and some amount of critical inputs (for example, tool steel) may be supplied. The center suggests that capital be raised for small-scale heavy industry by producing profitable consumer goods -- textiles and household goods. Each locality is free, however, to select the precise type of consumer good best suited to raise capital and to select the type of product produced locally to meet local needs. Most manpower and inputs are developed locally.

With regard to the distribution of chemical fertilizer within each county, the county political leadership has the discretionary authority to set up different principles for allocation so that certain goals are achieved. For example, allocation of fertilizer may be geared to production of commodity grain or certain cash crops.

Local Autonomy

In planning the production process itself, there is almost total autonomy. The Revised Sixty Points, issued in September 1962 in conjunction with the Tenth Plenum, defined the pattern of rural organization and specified that production teams would have the final say with regard to utilization of agricultural techniques:

> The means of production should be under free selective purchase by the production teams. Assigning them is not permitted. The production teams have the right to refuse any which are assigned.

Especially in seed selection and field management, local experience is the crucial factor. In Shashihyü (a model brigade which I visited), for example, each of the four production teams have technical groups which perform experiments with different seeds and different crop rotation patterns. Experiments have also been done to determine optimum planting densities and proper fertilization usage. A production team technician explained how chemical fertilizer is used at Shashihyü and the type of experimentation that had been done:

> There are two principles in using chemical fertilizer. First, certain crops, such as maize, millet, and sorghum can use chemical fertilizer. Secondly, we use chemical fertilizer on irrigated lands. We have never tried to compute the increment in output for increments in fertilizer use, but we do not apply fertilizer equally. Maize gets about 30-35 catties per mou; wheat gets about 40 catties per mou; and sorghum and millet get 20 catties per mou.
>
> We figured this out through our own experience. For maize the growth is vigorous, so we figured it needs a lot of fertilizer. For millet, if you use too much, it falls down. Our method is

> through experience, not theory. We don't know about theory. We think the stalk of maize is thick and the roots are well developed, so just using a little fertilizer won't do too much good. As for millet, we tried using 30 catties. At first the plant grew quickly and very high, but then a wind blew it down. So we know it doesn't make sense to use too much. So we have been using 10-15 catties per mou over the years. It is just like a person eating meals. You try to feed the stomach. If he is hungry, you give him more. But it is not good to feed him too much either.[1]

When much of the planning and execution is done locally, there is a strong tendency for extensive participation in the decision making process. Shashihyü decided to dig a tunnel under a mountain to provide access to the other side and to facilitate the transport of soil, virtually everyone in the village was involved:

> In deciding how to build the tunnel, there were some suggestions from the leaders above us, and some suggestions from the masses below. We took the suggestions from both above and below and handed them over to the masses for discussion. The final decision is made by the brigade leadership. For example, we have a ten-year plan for the development of our agriculture. We want to make the soil on the terraces deeper, so we can use small garden tractors. However, we had to get soil from two miles away, and we computed it would take twenty years to add a foot or a foot and a half of soil. So there was the problem of how to accelerate development.
>
> We handed the problem to the masses for discussion to see if they could figure out a solution. They came up with the idea of digging a tunnel. At first only one or two people made the suggestion. Then this was discussed by the masses in one production team and agreed upon. Then the leaders

---

[1] This and other material on Shashihyü came from my Diary, April 22,23, 1972.

> of the brigade handed this suggestion to the other teams for discussion. When all teams agreed, then the brigade leadership made the decision to go ahead and set a date to begin.
>
> When the teams discussed the question of how to thicken the soil, everyone gave his views. There were many suggestions. After all the suggestions were put forth, the team chose the best one. The team leader sums up the sense of the discussion, and presents a suggestion. Then the whole team votes on it. The minority must accept the choice of the majority. After the teams had discussions, the brigade leaders asked all leaders to report on how the discussions were progressing. At a meeting of all team leaders, we agreed on one way of solving the problem, namely digging the tunnel. This decision was handed back to the teams for discussion. Only through this kind of repeated discussion can the brigade make a decision.
>
> Every once in a while the masses do not want to do something that the leaders think should be done. In that situation, we leaders wait, delay and try to convince the masses. For example, the brigade leadership thinks we have to expand the capacity of water wells, so that we will have enough water to irrigate more land. At first, the masses opposed this project, so we delayed it. The masses thought it would be better to increase water storage capacity so that we could more efficiently use the existing water supplies. So we did that. We enlarged the storage area. We could increase irrigation somewhat but not enough. The masses were convinced with these facts, and now the great majority of commune members think that an additional well is necessary. We will sink it this fall.
>
> All decisions are adopted through this process: first active leadership; then patient waiting. There is broad democracy and reasonable centralism.[1]

A similar decision-making process would be involved for a commune or brigade to build a small hydro-electric

---

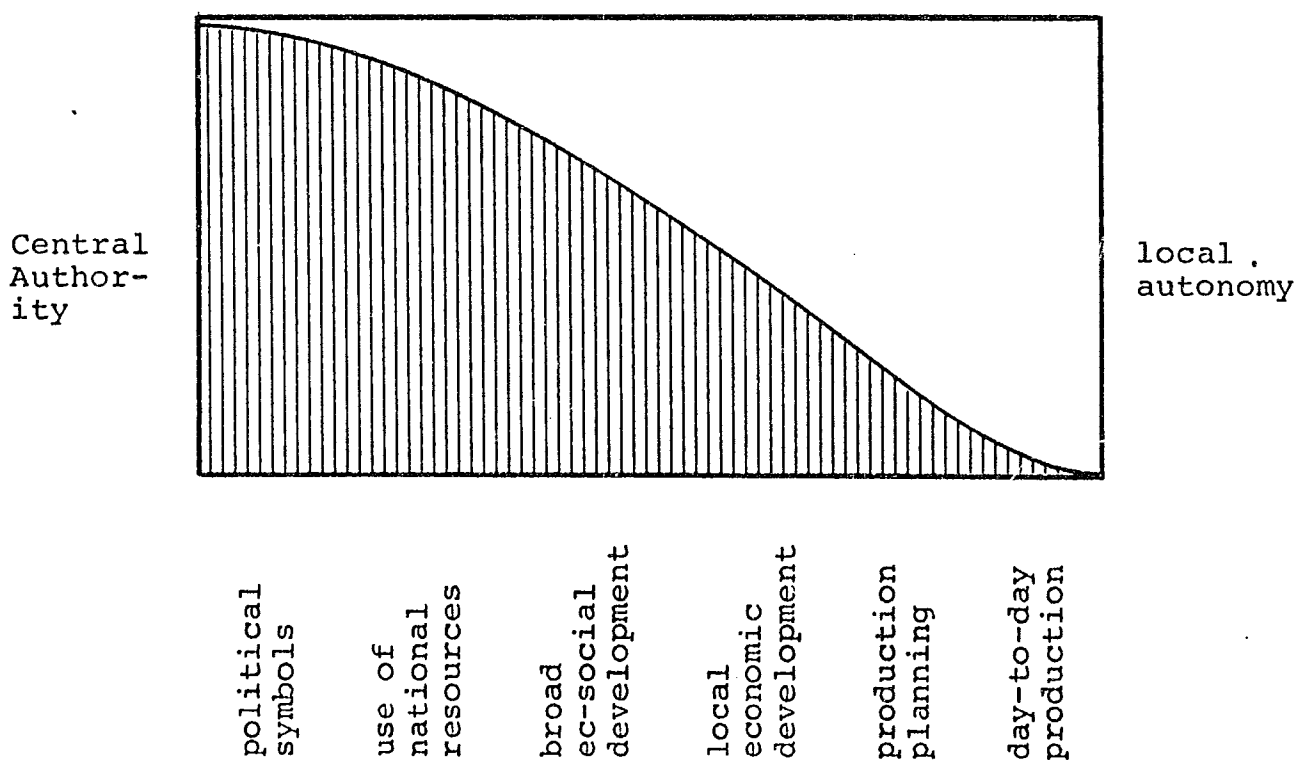
[1] Stavis diary April 22, 1972.

generating plant, or a grain mill or a small irrigation network. When the village of Liu Ling (visited by Myrdal) decided to purchase an electric pump, the decision was finalized at a public meeting.[1]

Two generalizations about these relationships are possible. First, the balance of power between center and locality varies with the type of question. For questions involving broad patterns of development, the center has rigid plans. Local economic development is worked out by negotiation; agricultural production decisions are made locally. (It might be noted that the symbolic aspects of politics, including the political vocabulary, the types of arguments, and the proclaimed objectives are very rigidly controlled by the center.) Chart 4.1 presents this type of relationship schematically.

FIGURE 4.1

Matrix of Authority



Second, there appears to be a relationship between the distribution of authority between center and localities and the pattern of decision making within the local unit. For those aspects of agricultural development for which the center has no specific policy, there tends to be both local autonomy and extensive individual participation in making local decisions. When, however, the center decides on a specific policy, the local leaders have less flexibility and must lead in a more firm, direct manner to carry out specified policy.

C. Economic Incentives for Agricultural Development and Investment

The Chinese do not talk directly about the economic incentive system. Rather they generally stress the importance of non-material incentives, the fact that people voluntarily want to serve the Chinese and the world revolution. I do not wish to denigrate or under-rate these factors, and will discuss them in Chapter 7 on leadership. However here we will emphasize that in Chinese official communications, no commune or production team that followed the road pointed out by Chairman Mao has ever been seen to lose money over the long term. Although temporary hardship and sacrifice may be required, the revolutionary road seems always to result in increased profit for the accounting unit, and because household income is based primarily on the profitability of the collective accounting unit, most families have a personal stake in increasing the profits of the unit.[1]

It must be remembered that the rural economy remains substantially monetized, and if a family has a higher cash

---

[1] I discuss the wage system in detail in People's Communes and Rural Development in China, 3B, 3C.

In this chapter we will examine in detail only those incentives effective in the collective economy. This

income, it can more easily purchase bicycles, sewing machines, thermos bottles, home improvements, clothing, and high-priced specialty food items including meat, fruits, sauces, etc. (Food grains, cooking oils, stove fuel, and cotton are rationed so consumption of these commodities is not affected much by income.)

Especially since the early 1960's the Chinese have adopted an incentive system that encourages localities to adopt modern, more profitable agriculture by assuring that the localities will be able to retain the great bulk (about 65 percent) of the increments in productivity. People in these localities can consume more and can also invest more so they will have even higher incomes in the future. It is clear that the Chinese leadership has deliberately structured incentives in this way because they have at their disposal all the mechanisms which might otherwise be used to extract funds from the countryside, namely: 1) the agricultural tax, 2) purchases of supplies for production (such as pumps, fertilizer, etc.), and 3) forced deliveries of agricultural products at sub-market prices. All three methods are used so that urban residents, bureaucrats, and military personnel have food, but the bulk of increments in productivity will remain in rural areas.

1. Agricultural Tax

The agricultural tax in China was established in the early 1950's. Land was graded according to its quality, and a tax was set that would be about ten percent of its yield. The tax was a fixed amount, however, rather than

---

is because this study is focusing on technical transformation and it is the collective production units which make the major decisions concerning new agricultural techniques. The individual incentives are important in influencing the labor supply (both in terms of quantity and quality of labor inputs), but do not affect technological change directly.

a rate. When agriculture was collectivized in the mid 1950's, the taxes were consolidated into a single tax bill for the accounting unit. As yields rose or as land was improved, the tax was not changed. (When uncultivated land is reclaimed, it is added to the tax rolls after a few years' grace period.) The result of this system is that the agricultural tax has in general become a declining percentage of a production unit's operating costs, often less than five percent. (Inflation would make the tax an even lower percentage of production, but prices have been quite stable in China since 1950, so this factor is not relevant.) The agricultural tax is clearly not a method for extracting the benefits of agricultural development because it does not extract any part of increments to production.[1]

2. Terms of Trade

A second mechanism which could extract the profit from agricultural innovations would be manipulating the terms of exchange between the agricultural and industrial sectors. In many areas, growth in income is closely related to increases in agricultural inputs. These inputs must be purchased with cash. If the price of these agricultural inputs is very high, then most of the increment of agricultural development will be siphoned off in purchasing supplies.

The sparse data which are available, however, indicate that this does not happen. Prices of agricultural inputs are set the same way that other prices are set in China. The provincial price commissions instruct factories

---

[1] Shahid Javed Burki, A Study of Chinese Communes 1965 (Cambridge: Harvard University Press, 1969).

to set the prices according to the following criteria:[1]

The ex factory price includes:

1. Manufacturing costs, including raw materials, transportation of raw materials to the factory, breakage and damage to raw materials, insurance on the transportation of raw materials, and processing costs, i.e., labor costs.

2. Factory profit, which is only 1 percent.

3. Management costs, including paper, office space, salaries of accountants and managers; this might be only 1.5 percent to 2 percent.

4. An ad valorem tax of 30 percent, which provides funds to the state.

The prices computed in this manner may be modified by the price commission. For example, if production of a product has just begun and the production processes are not yet efficient, the price may be set below production costs, near the estimated eventual price. Secondly, if various factories can produce the same item at different costs (because the factories have different capital equipment), the price commission may suggest an averaging technique to establish price. There may also be reductions in prices due to inferior quality.

The 30 percent ad valorem tax is an important means whereby agricultural regions that use many modern inputs indirectly pay extra tax to the State. However, this element of the

---

[1]This is based on interviews conducted in Hong Kong Spring 1972, about the system used in the mid 1960's. Joan Robinson describes a slightly different system in use in the early 1970's, in which profit and tax level are quite flexible and are manipulated to achieve socially desirable goals and to adjust demand to supply. Joan Robinson, Economic Management China 1972, (London: Anglo-Chinese Educational Institute, 1973), p. 21-23.

price is not exploitative because the pricing mechanism does not include interest charges on state loans for construction of the factory which produced the products. The tax is used to finance factory construction, so it does not place much special burden on areas using modern inputs. Besides, it is the same tax as on all manufactured goods, and therefore does not fall excessively on areas with progressive agriculture.

Furthermore, Chinese policy is to pass on to the rural sector whatever savings are achieved through the more efficient production of farm inputs. We lack data to give a precise picture of changes in prices of farm produce, of industrial supplies, and of the terms of trade between the prices for these two types of commodities, but we do have enough data to justify this generalization. Data on price levels show that industrial goods were priced rather highly in the early 1950's (relative to their prices in the 1930's) but that throughout this period, the terms of trade moved in favor of the rural sector. These reports are summarized in Table 4.2. For years after 1957, we have even less data, but one careful specialist on the Chinese economy has estimated:

> Between 1956-1963, the state's purchasing price of grain rose by about 27 percent; most of this rise probably occurred in the 1960's. Between 1958-59 and 1963 the scissors relationship fell 10 percent in favour of the country dwellers.[1]

For the period of the 1960's, the same trend seems to have continued. Prices of industrial goods have been reduced when efficiency reduces the cost of production. In Liuling, prices for processed consumer goods dropped roughly

---

[1] Audrey-Donnithorne, China's Grain Output, Procurement, Transfers and Trade (Hong Kong: Chinese University, 1970), p. 10.

10 percent to 60 percent from 1962 to 1969.[1] Prices of farm machinery were dropped 30 percent to 50 percent in Fukien because of more efficient production processes.[2] In the late 1960's the purchase price of grain was raised approximately 10 percent from ¥8.90/100 catties to ¥9.80/100 catties (for rice). The system of allocations, as we have explained, prevents the prices from going up on these commodities when supply falls short of demand.

TABLE 4.2

Ratio of Index of Industrial Retail Price in Rural Area to Agricultural Purchase Price Index

	1930-36 = 100
1950	131.8
1951	124.4
1952	121.8
1953	109.6
1954	109.2
1955	111.3
1956	107.0
1957	103.2

Source: Data Office, Tung-chi Kung-tso (Statistical Work) and Chang Yi-fei, "Problems Concerning Price Ratios between Industrial and Agricultural Products," Hsin Chien She (New Construction) No. 11, 1958, p. 25. Cited in Nai-ruenn Chen, Chinese Economic Statistics (Chicago: Aldine, 1967), p. 424.

Note: I am not certain precisely which agricultural and industrial commodities are included in these price indeces, or how the different items are weighted.

---

[1] Jan Myrdal and Gun Kessle, China the Revolution Continued (New York: Pantheon, 1970), p. 7-8.

[2] "Cheaper and Better Farm Tools in Fukien Province," NCNA Foochow, December 16, 1965.

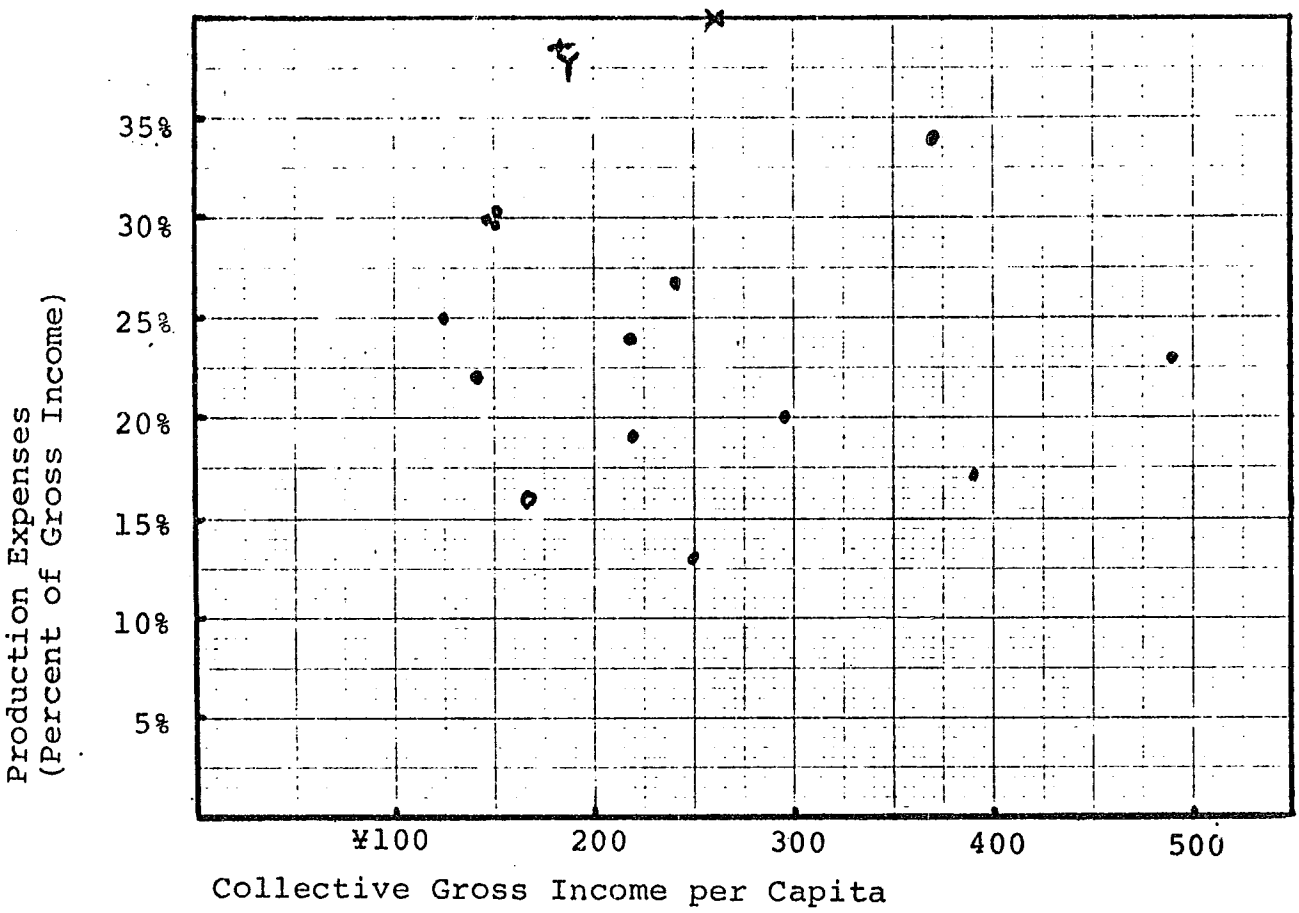
Despite policies to keep the price of agricultural inputs low relative to agricultural produce, it is likely that the rural sectors will have to purchase more and more industrial commodities as agricultural inputs. This is unavoidable as agriculture modernizes and achieves yields higher than possible under traditional practices. Data from several communes plotted in Figure 4.2 shows there is no rigid relationship between production expenses and income levels; production expenses were generally between 15 and 30 percent of gross income depending on environmental factors. However, in communes highly dependent on modern technology, production expenses can be over 40 percent of gross income. Undoubtedly more and more communes will face this problem of rising production costs. Data are not available which would indicate to what extent the rising costs of production might be eating up the rises in productivity. While rising production costs are not extraction or exploitation, they will increasingly limit the extent to which rural people benefit from modern agricultural technology.

3. Grain Procurement Policy

The third possible method of extracting wealth from rural areas, and thereby shaping incentives, is the manner in which the state procures grain. After local grain needs are met (including use for food, seed, fodder, etc.), the surplus grain is sold to the state for cash. In reality, however, the surplus is not simply what is left over. The amount of "surplus" is included in the production plan developed through negotiations between the production unit and the government. The amount which the state purchases varies both with the level of production and the trends in production. For one commune in 1962, detailed data are available which show clearly that

FIGURE 4.2

Production Expenses, According to Income



Sources:

● : Shahid Javed Burki, A Study of Chinese Communes, 1965 (Cambridge: Harvard University Press, 1969), pp. 18, 20.

o : Jan Myrdal, Report from a Chinese Village (New York: Pantheon, 1965), p. 199.

+ : "In a Production Team," Peking Review No. 13 (March 25, 1966), pp. 15-16.

x : "A Visit to the Tungting People's Commune (IV)," Peking Review No. 16 (April 20, 1973), p. 27.

Y : Huatung Commune, 1972. Notes from Ward Morehouse.

after a certain amount of food was allocated for seed and food, (probably about 200 kg. per capita) the state received about 85 percent of the increments of production, through both taxes and purchases. In localities where production was relatively low, the state received about 40 percent of the total; in more productive localities, the state received almost 60 percent. (These data are shown by the "o" in Figure 4.3.) Probably around 1962 (but perhaps varying from place to place) the amount of "surplus" grain purchased by the government was fixed for a specified time so that the production unit could retain all increments beyond a certain level. In some localities, the extraction was fixed in 1961 for ten years;[1] in other places the targets for "surplus" grain were fixed on a three-year and later a five-year basis.[2] This level is, of course, renegotiated after three or five years. More recent data, coming mostly from regions with modernizing agriculture, (shown with "x" or "y" on Figure 4.3) suggest that the rates of procurement by the state have not remained as high as earlier, at least in relative terms. They seem to be around 20 percent. I suspect that this difference represents a policy of the 1960's that permits localities to retain most of the increments resulting from agricultural modernization and serves as an incentive for rural localities to use surplus grain as a way of moving into profitable animal husbandry and fish farming.[3] It is also related to the policy of sharply limiting (by a variety of means) the growth of urban population.[4]

---

[1] Pelzel, op.cit., pp. 392-93.

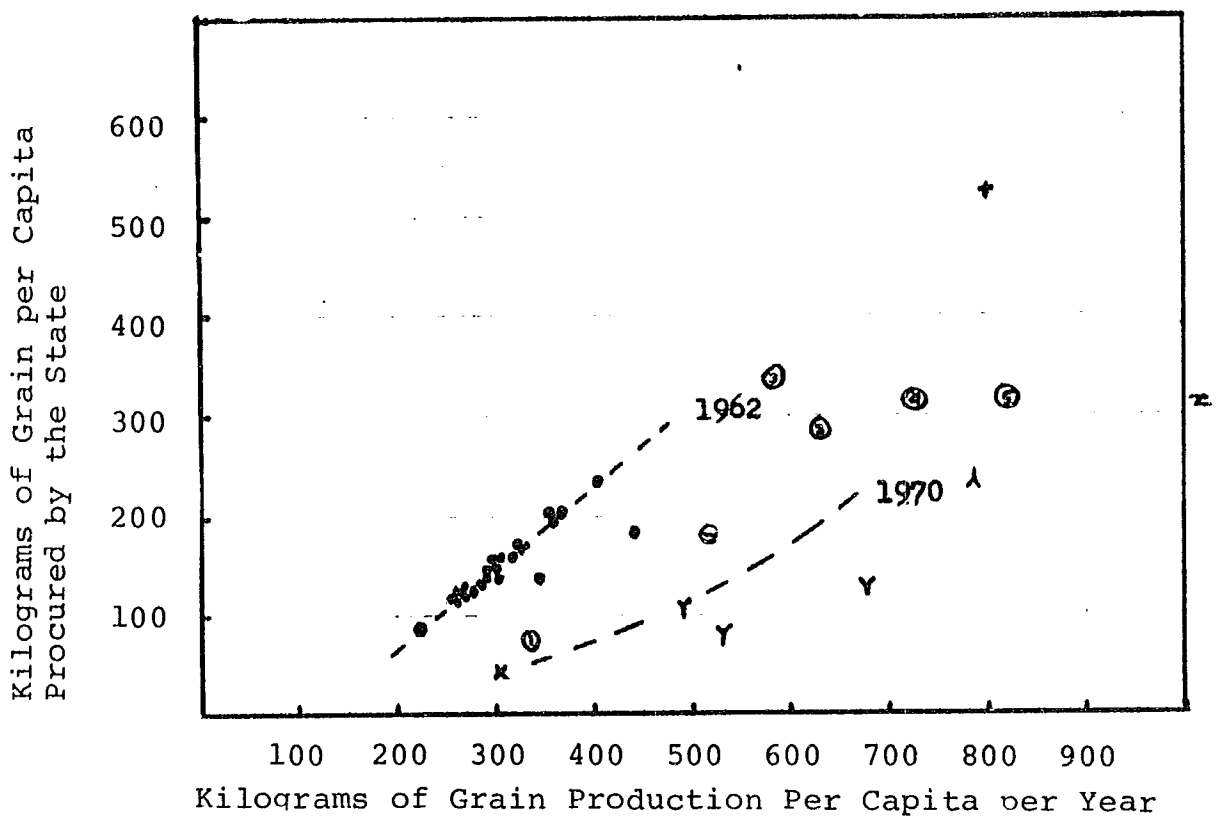
[2] Stavis Diary, May 2, 1972.

[3] Profits from these industries would be used to pay increasing production costs.

[4] The apparent decline in procurement rates may,

FIGURE 4.3

Procurement of Grain (Tax and "Surplus") by the State



SOURCES:

●: C.S. Chen and Charles Price Ridley, Rural People's Communes in Lienchiang (Stanford: Hoover Institution Press, 1969), p. 60, 63, 74.

x: Jan Myrdal, Report from a Chinese Village (New York: Pantheon, 1965), p. 198.

Y: Stavis Diary, April 28, May 2, May 4, 1972.

+: Stavis interview L.

⊖: Notes from Ward Morehouse.

λ: Ian Davies, "The Chinese Communes, An Australian Student's View," Eastern Horizon Vol. VIII No. 1 (1969) p. 37.

z: Jack Chen, A Year in Upper Felicity (New York: Macmillan, 1973), p. 380.

o 1,2,3,4,5: Kuo Feng-lien "The Tachai Road," Peking Review No. 40 (October 4, 1974), p. 23. Data are for, respectively, 1953, 1958, 1963, 1965, 1973.

The purchase of "surplus" grain is an important way in which the state obtains grain for redistribution to poorer areas, to cities, and for military personnel, but it is difficult to call this exploitation because the production units receive cash for it. The cash is then used to pay for both production expenses and consumer goods. Whether this constitutes exploitation depends on the ratios of prices of agricultural and manufactured goods. Some scholars have argued that because state grain prices are below open market grain prices in China, the state purchases of grain constitute exploitation. However, the prices of manufactured goods are also often kept below the prices on the free (or black) market by the rationing system described above. This makes it virtually impossible to specify the extent to which sale of "surplus" grain constitutes exploitation. However, if a locality is required to sell a great deal of "surplus" grain, it may be deprived of developing a highly profitable livestock and fish farming industry.

Both in terms of the quantity of grain extracted and the price received for it, the sale of "surplus" grain to the state does not seem to constitute a disincentive to the production unit, especially since the procurement system now appears to permit the production unit to keep the bulk of increments in food grain production.

---

of course, simply reflect the fact that our data come from different locations, and not an overall policy shift. It is possible that the decline in procurement rates reflect reduced political strength of the center vis-a-vis the rural localities, and not a policy the central leadership actually desires. This situation in the procurement situation may explain, at least in part, why China continues to import good grains despite apparently adequate levels of production. Imports may be necessary to supply food to urban areas. See Audrey Donnithorne, China's Grain Output, Procurement, Transfers and Trade (Hong Kong: Chinese University Press, 1970).

Of course the assurance that increments in production will have a guaranteed market serves as a positive incentive.

4. Collective Expenditure Patterns

In very crude terms, this analysis of economic incentives operating on production units suggests that the members of a production unit can utilize locally roughly 65 percent of the increments in productivity. (Roughly 35 percent of increments are required to purchase agricultural supplies; none of the increment is taxed.) Much of cash crops and about 30 percent of the increments of grain production will be sold to the state to provide cash income for purchases of means of production and consumer goods.

What do production units do with increased productivity? We will try to sort out changes in propensities to consume, invest, and make different types of investments as income increases.

First, as income rises, food consumption invariably rises, but slowly and at a diminishing rate. In around 1970, it seemed that food rations rose quite slowly after they reached the rate of about 250 kilograms per capita (all ages included) per year of unhusked grain. This is the equivalent of about 2,040 calories per day. There was, however, substantial variation in rations among communes that cannot be accounted for by simple differences

in production. The reason for this variation is not known, but probably some areas historically had enjoyed higher levels of food consumption and the government felt unable to change this.

When production of grain rises above minimum needs, localities are expected to establish and increase grain reserves, up to a modest level (perhaps 40 to 50 kilograms per capita per year so that in 5 years, a one-year cushion could be established). Once this is reached, the reserves would level off.

While consumption rises, investments rise. After adequate grain reserves have been built up, it is likely that an increasing increment of grain production goes for animal food so that animal husbandry can play a broader role in the local economy. I estimate that a production unit can begin to increase grain supplies for animals when its grain productivity reaches 500 kilograms per capita. This is quite high and not many production units are at this level. It is estimated that above this level about one-third of the increment in production is used to develop animal husbandry.

As income rises further, more funds are used for collective investment. Figure 4.4 shows how the investment rate of communes tends to rise when the average net collective income increases. Below ¥600 the investment rate is roughly 8 to 12 percent of net income. As net income rises, the investment rate may go over 20 percent. The chart suggests that while there is a general tendency for investment rates to rise, there is no rigid percentage for communes to adopt. The communes have a certain degree of autonomy to set an investment rate within broad guidelines.

Typically, investment will be used first to guarantee grain production, perhaps by improvements in

irrigation to improve yields. As grain yields go up, less land will be required to supply adequate grain, so more land can be planted to higher-priced crops. Moreover, the irrigation system can assure that higher priced fruits and vegetables will flourish. These effects will result in a further increase in collective income.

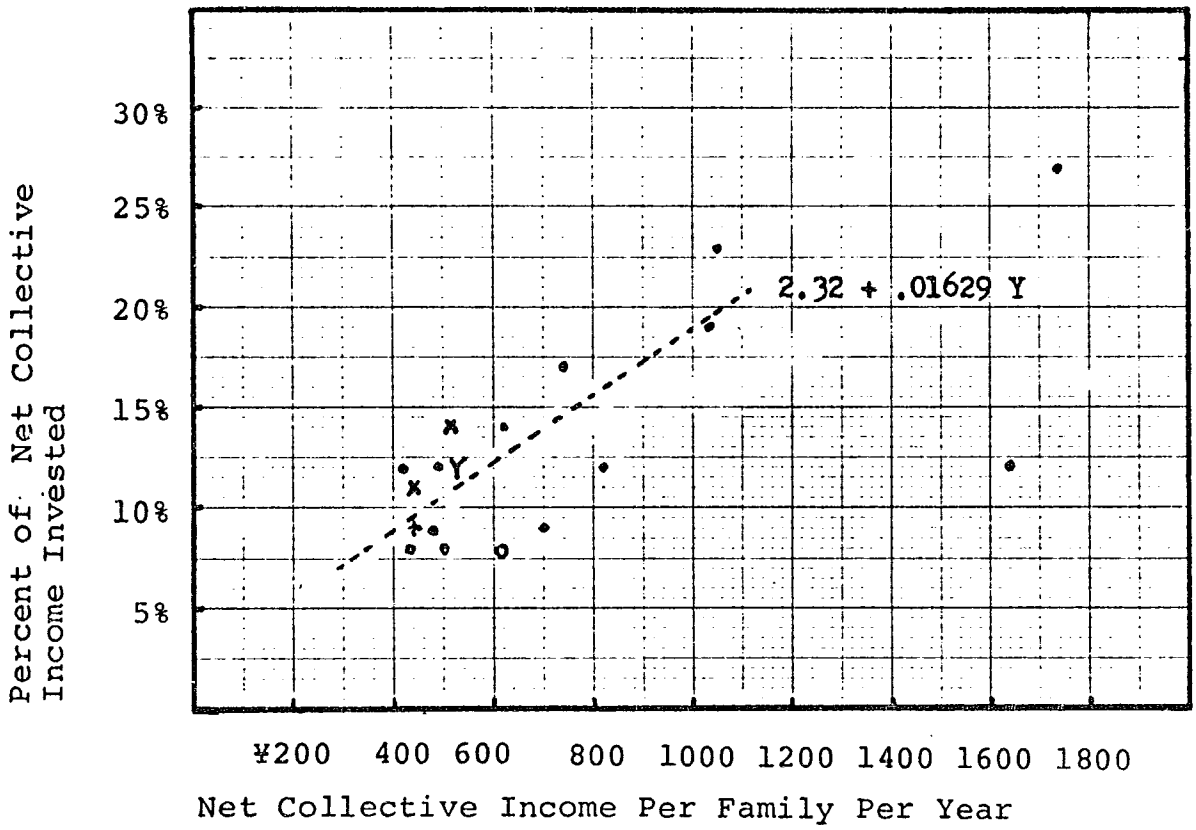
At the same time, increased investment is often used for mechanization. Tractors, pumps, threshers and milling machines reduce the amount of labor required by the collective economy. I explored at Figure 4.5 the possibility that when mechanization reaches a high level the Chinese peasants may have more time to put into cultivating their private plots (constituting 5 to 7 percent of cultivated area) or other forms of private economy (pig or chicken raising, basket making, etc.) so that income from private sources may rise. However, this does not appear to be the case.

One inevitable result of this system of collective economic incentives is that the level of income is different in every accounting unit. The differences can be very significant; a rich commune may have an average income of double or triple that of a poor commune. Within the commune, the production teams will have different levels of income. In the concluding chapter we will examine in more depth this problem of differences in income between accounting units, and look at the steps the government is taking to reduce these differences.

For this incentive system to be effective, it is essential that consumer products be available for cash purchase. If they are not, the peasants as individuals and as collectivities will have no use for cash and therefore will have no incentive to sell food and other agricultural products to the state. Since the early 1960's, the central leadership has been very sensitive about the

FIGURE 4.4

Investment Rate of Communes



Sources:

● : Shahid Javed Burki, A Study of Chinese Communes, 1965 (Cambridge: Harvard University Press, 1969), pp. 18, 20.

o : Jan Myrdal, Report from a Chinese Village (New York: Pantheon, 1969), p. 199.

x : "A Visit to the Tungting People's Commune (IV)," Peking Review No. 16 (April 20, 1973), p. 28. The two notations are for 1971 and 1972.

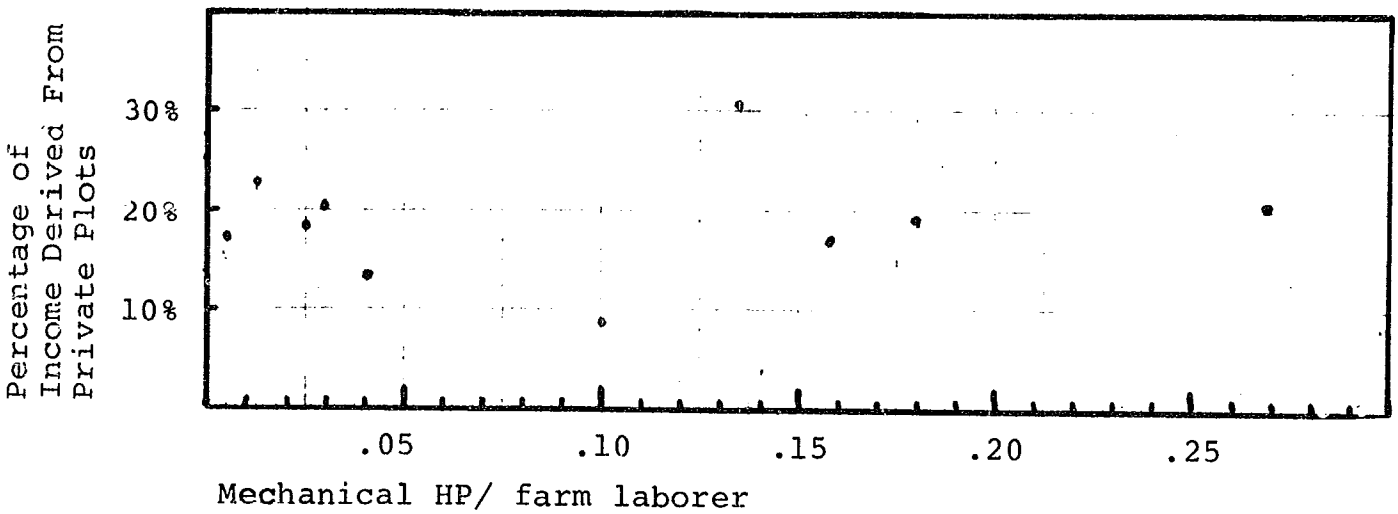
+ : "In a Production Team," Peking Review No. 13 (March 25, 1966), p. 16.

Y : Huatung Communes, notes from Ward Morehouse.

Note: Net Income computed by deducting taxes and production expenses from gross collective income.

FIGURE 4.5

Farm Mechanization and the Role of Private Plots



Source: Shahid Javed Burki, A Study of Chinese Communes, 1965 (Cambridge: Harvard University Press, 1969), pp. 18, 40, 48.

need to produce varied and attractive consumer goods for rural people. They have also pushed the Supply and Marketing Cooperatives, which sell consumer goods in rural areas, to be more attentative to tastes and demands of rural customers. We will discuss the Supply and Marketing Cooperatives in Chapter 6, Section B.

D. Summary

When the Chinese leadership decided in 1960-62 to emphasize the technical transformation of agriculture, they believed that it was not enough to mobilize scientists, to provide services and to offer leadership. These activities would be necessary of course (and are described in the following chapters), but they also believed that the establishment of a suitable distribution of political power was needed as well. This had, as we have seen, several dimensions. The basic administrative system had to be rectified to the existing patterns of social organization. This meant that the commune had to be reduced in scale so that it became roughly coincident with the traditional marketing unit incorporating a market town and about 20 villages. The basic accounting unit had to be reduced in size until it was based on a small group of intimate friends, and relatives. The entire managerial system had to be revised to permit greater participation by peasants and basic-level managers in the day-to-day decisions concerning agricultural production and in some of the planning for production and investments. The farmers, individually and collectively, had to be given a financial stake in agricultural modernization by the adoption of an incentive system that would assure that they would retain the bulk of the increments. These political steps, the Chinese leadership believed, were critical elements in launching the green revolution.

Chapter 5

STRENGTHENING AGRO-TECHNICAL SERVICES

In conjunction with the decisions of the Tenth Plenum, China embarked on a program to strengthen government services available to the rural sector. This was to be done in two ways. For services in which technical expertise was crucial, such as research, extension, and mechanization, the policy was to improve these services through a variety of methods including better utilization of scientists, increased scientific research, and increased collection of scientific ideas from other countries. These services were to be centralized, so that technical standards could be improved and maintained. For the few years after the Tenth Plenum, this policy was carried out successfully, but by about 1965-66, many Chinese leaders (especially Mao) believed that the new pattern of organization was tending to create a new elite, with its power in the state bureaucracy. The new elite was considered potentially corrupt and was obstructing local mobilization and participation in development. Moreover, because these technical services were concentrated in the "high and stable" yield areas, they were helping directly only a minority of the peasants.

For other government services, the method adopted for improvement was the reverse, namely to decentralize the services, to make them more available to the peasants, to "ruralize" them. In the fields of education, commerce, and banking, the services and expertise tended to be concentrated in urban areas, making them inaccessible to peasants. Attempts to push these services into the rural areas appear to have had only marginal success after the Tenth Plenum. The bureaucrats in these sectors apparently preferred their urban locations and felt little compulsion to direct their services to the rural areas. In education,

it seemed so difficult to "ruralize" that China began to establish (though it later abandoned) a second, parallel school system for the rural sector.

The problems of elitism and urbanism in government services were among the targets of the Cultural Revolution. In a broad sense, the solution to both problems was to increase the power of the communes in supervising all government services.

In this chapter we will examine those technical services which were strengthened and centralized in the early 1960's to increase technical capacity. The following chapter will discuss those services for which the main problem seems to have been "ruralization."

A. The Role of Agricultural Science and Scientists

When China's leaders agreed to change China's agricultural technology, they realized that they were placing two tremendous demands on China's agricultural scientists. First, the scientists had to develop suitable agricultural techniques to expand agricultural production. Second, they had to assist the government in popularizing the new techniques. Both of these points were mentioned in the communique of the Tenth Plenum:

> In the fields of science, culture and education, it is necessary to strengthen scientific and technological research, and particularly to pay attention to the scientific and technological research in agriculture, vigorously train personnel in these fields, and at the same time strengthen the work of uniting with and educating the intellectuals so that they may fully play their role as they should.[1]

---

[1] "Communique of the 10th Plenary Session of the 8th Central Committee of the Chinese Communist Party," NCNA Peking, September 28, 1962. CB 691 p. 5.

A month after the Tenth Plenum, a small conference was held in Peking, presumably to give top political leaders and agricultural scientists a chance to discuss the new policy.[1] The government was represented by the highest level officials responsible for agriculture and science, including:

Chou En-lai, Premier

T'an Chen-lin, Vice Premier and Politbureau specialist on Agriculture

Nieh Jung-chen, Vice Premier, Chairman of the Science and Technology Commission of the State Council

Liao Lu-yen, Minister of Agriculture

Han Kuang, Vice Chairman of the State Science and Technology Commission.

The agricultural scientists at the meeting included specialists in all fields. Of the twenty-six specialists, thirteen had received doctoral degrees in American or European universities. Five had received PhD degrees at Cornell.[2]

The content of this meeting was suggested in a People's Daily editorial published at the time of the meeting.

> The importance of agricultural science to agricultural production is very clear. Party committees at various levels and agricultural administrative departments must give stronger leadership over this work. It is necessary to respect agricultural scientists, respect the technical workers in the agricultural fields, and give full play to their enthusiasm for scientific research and technical popularization, so that their research work may be combined with the practice of the broad masses of peasants. Their rational suggestions must be seriously considered and accepted, and any idea which belittles agricultural science and technology must be overcome.

---

[1] "Conference of Agricultural Scientists Held in Peking," NCNA Peking, October 10, 1962. SCMP 2842 p. 5.

[2] Data on education is from Cheng Chu-yuan, Scientific and Engineering Manpower in Communist China, 1949-1963 (Washington: Government Printing Office, 1965), appendix IV.

TABLE 5.1

Chinese Agricultural Specialist Participating in 1962 Meeting

Field	Specialist	Education
Rice	Ting Ying	Tokyo Imperial University
Wheat	Chin Shan Pao Liu Chu'uan-kuang	Studied in United States PhD, Cornell
Cotton	Hu Ching-liang Yu Ch'i-pao	
Horticulture	Shen Chun Li P'ei-wen	PhD, Cornell PhD, University of London
Soil Science	Li Ch'ing-k'uei Shen Tzu-p'ei Hsu Shu-hua	PhD, University of Illinois
Plant Physiology	Lou Ch'eng-hou	PhD, University of Minnesota
Genetics	Tsu Te-ming Li Ching-hsiung Pao Wen-k'uei	 PhD, Cornell PhD, California Institute of Technology
Seed Cultivation	Tai Sung-en Chung Ch'iao-sheng	PhD, Cornell
Insects	Chou Ming-tsang Chiu Shih-pang	PhD, Cornell
Microorganisms	Ch'en Hua-k'uei	PhD, University of London
Fertilizer	Ch'en Shang-chin	
Irrigation	Su Tsung-sung	
Agricultural Machinery	T'ao Ting-lai	
Livestock Breeding	Cheng P'i- liu T'ang Yi-jen	 PhD, Edinburgh
Veterinary Science	Ch'eng Shao-hui	PhD, Johns' Hopkins University

> At the same time, it is imperative to carry out correctly the technical policies in agricultural fields; strengthen the work of organs of agricultural scientific research and technical popularization, and improve as far as possible the working conditions of agricultural scientists and technicians. For instance, specialists should be provided with assistants, and must be given the necessary funds and experimental facilities. Furthermore, in the light of the needs of agricultural development, we should recommend them subjects for research, set up systems of evaluating and popularizing achievements of scientific research and popularize the existing scientific and technological achievements.[1]

After this small, high-level meeting, a major conference on agricultural science and technology was convened in early spring 1963. It lasted for two months, from February 8 to April 5, and was attended by about 1,200

---

[1] "Intensify Scientific and Technological Research in Agriculture," JMJP editorial, October 12, 1962. SCMP 2852 p. 8.

It should be pointed out that this heightened interests in science and technology for agriculture was part of a broad policy to mobilize science and technology for national development. In an interview with scientists in spring 1963, Liu Shao-ch'i explained this policy:

> The progress of our country and the modernization of agriculture, industry, national defense, sciences and technology in our country depend on the vigorous efforts exerted by the people of the whole country and by the scientists and especially require the leadership of old scientists.

Chou En-lai, at a conference for scientific and technical work held in Shanghai took a similar position:

> The key to our realizing modernization of agriculture, industry, national defense, and sciences and technology and to our building the motherland into a socialist, strong power lies in the realization of modernization of sciences and technology.

"Apply the 'Triple Combination' Method of Leadership More Properly," JMJP editorial, February 9, 1963. SCMP 2926 p. 4.

scientists, experts and leading members of government departments. This conference was a major planning session for agricultural science and technology as well as for overall agricultural development in the 1960's.[1]

After these meetings, a variety of steps were taken to give scientists more responsibility and power. In their own laboratories, they became somewhat autonomous, selecting topics for research roughly as they saw fit. C.G. Oldham, a British scientist who visited branches of the Chinese Academy of Agricultural Sciences in Nanking in 1965, reported that the system of planning permitted the scientists to define their own tasks:

> ...the overall objectives of each [of the three] institutes [he visited] were determined according to a "united plan" worked out by the state. Their terms of reference were, however, quite broad. For example, the main task of the Kiangsu Branch of the Chinese Academy of Agricultural Science is to "solve the problems of agricultural production encountered in this province." The Mechanization Research Institute had as its objectives "to do research to find the types of machinery most suitable for paddy rice production," and the Chinese Academy of Science's Soil Science Research Institute was directed to carry out "basic studies related to improving the fertility of poor soils, especially saline, alkaline and red soils."
>
> The scientists work out their research projects according to these terms of reference. In the case of the Kiangsu Branch of the Chinese Academy of Agricultural Science the working out of research priorities involves close liaison with branch institutes scattered throughout the province and with the peasant scientists in the communes. The

---

[1] "National Work Conference on Agricultural Science and Technology Called by the CCP Central Committee and the State Council -- To Discuss Major Problems on the Agricultural Science and Technology of Our Country and Study the Long-term Plans for our Agricultural Science and Technology," JMJP, February 9, 1963. SCMP 2929 p. 11.

> Soil Science laboratory, however, does more basic research, and the scientists seemed to have considerable say in their research program. In all instances the program has to be sent to Peking for approval.[1]

These very broad instructions gave the scientists substantial autonomy to make their own choices for research, quite independently of either centralized government direction or local political pressures.

During the years after 1962, China did not make any startling breakthroughs in agricultural sciences, but the research conducted was, in general, sound and closely related to immediate practical needs of improving crop yields.[2]

Outside the laboratories, scientists also took on broad authority. Although it can be assumed that the scientists did not make by themselves the basic plans for China's green revolution that came in the following years, they worked in close consultation with various departments of the Central Committee of the CCP and the highest level of leadership. The Chinese slogan to describe the role of scientists in the political process was "Triple Combination" or "Three-in-one Combination" method of leadership. People's Daily editorial explained:

> The "triple-combination" method of leadership combining leading cadres, experts, and the masses as advocated by the Party Central Committee is a leadership method in which the leadership personnel, scientists and technicians, and the masses of workers and peasants are closely coordinated with one another.

---

[1] C.H.G. Oldham, "Science in Mainland China: A Tourist's Impressions," Science CXLVII (February 12, 1965), p. 711-712.

[2] A very useful survey of Chinese achievements in agricultural sciences after 1962 is by Ralph Nash and Tien-hsi Cheng, "Research and Development of Food Resources in Communist China," BioScience October 1965, pp. 643-656, and November 1965, pp. 703-710.

> In order to guide [the agro-technical] revolution and bring about this great transformation from the use of manual labor and draft animals to mechanical operation in agriculture in our country we must adopt a leadership method which conforms to this revolution. The "triple combination" method of leadership combining leading cadres, experts and the masses is exactly the method which we need.[1]

One of the most important ways in which scientists participated in a "triple combination" was in demonstration fields. (yang pan t'ien). Major demonstration projects were planned by agricultural scientists at their meetings in spring of 1963 (undoubtedly with consultation with political leaders) for ten regions, namely:

1. The Peking area
2. Northeast China (not more specifically identified)
3. The Szechwan basin
4. The Taihu Lake area near Shanghai
5. The Pearl River delta area near Canton
6. Hainan Island
7. Northwest China.[2]

(It is not clear whether there were three more regions or whether some of the regions listed above included more than one major area.) In these regions, demonstration projects were set up at both commune and brigade level.[3]

---

[1] "Apply the 'Triple-Combination' Method of leadership More Properly," JMJP editorial, February 11, 1963. SCMP 2926 p. 1,2.

[2] "'Demonstration Farms' Are Main Centers Through Which Agricultural Science May Serve Production," JMJP editorial, October 25, 1964. SCMP 3338 p. 14.

[3] Ibid. (The importance of this editorial is underscored by the fact that it was also published in Chung-kuo Nung-yeh K'o-hsüeh, no. 11-12, 1964.)

The demonstration plots were large, ranging up to thousands of hectares.[1] They were not experimental fields with controlled experiments, but rather large fields using modern techniques to assure that modern techniques could be applied on a large scale. In the demonstration fields, scientists participated directly in management. The fields were "jointly run by the cadres, agricultural scientists and technicians, and the peasants," in a "three-in-one combination."

The demonstration farms were expected to fulfill several functions in addition to simple demonstration of new technology.[2] First, they would boost production in areas that needed more commodity grain, such as areas near major cities. Second, they would educate the scientists both to the needs of agricultural production and to the problems of large-scale production (which are necessarily different from cultivation on small experimental plots) and to the social, political, and economic conditions in rural China. Third, the demonstration farms were considered a way of educating cadres in techniques of modern, scientific farming and farm management. Fourth, the demonstration farms were to become locations where the energies and ambitions of educated young people and demobilized soldiers could be enlisted on behalf or rural transformation.

Demonstration farms were set up in 1963 and 1964. They were judged successful and at a conference in March

---

[1] Chia Pei-hua, "Farm Scientists Run Rural Demonstration Fields," Peking Review, July 2, 1965, p. 15-17.

[2] Chiang I-chen, Vice Minister of Agriculture, "Actively Develop Movement for Agricultural Scientific Experiment with Demonstration Farms as the Center," JMJP April 5, 1965. SCMP 3446 p. 2-5.

1965, plans were made to expand their role. The demonstration farms were to become one of the most important methods of encouraging the development of modern agriculture. Demonstration farms were called the "backbone in developing the current movement for scientific experimentation in the countryside."[1] A People's Daily editorial gave the movement full support:

> Operating three-combination demonstration farms represents realization of Comrade Mao Tse-tung's brilliant ideas concerning the origin of man's correct ideas and regarding working people as the heroes on the front of agricultural production and agricultural science.[2]

The scope envisaged for the demonstration farms was quite large. The importance of the plan is suggested by the fact that agricultural science institutions were expected to devote one-half of their manpower to managing the farms. It was planned that agro-science research institutions would develop over 1,000 demonstration farms on three million hectares, representing about 3 percent of the cultivated area. (In addition extension stations, to be described below, set up over 4,400 demonstration areas.) The goal of the farms, based on experience in 1964, was to show yields of 20-30 percent above the average in high yield areas and 30-100 percent above the average in low yield areas.[3]

---

[1] "China Holds Conference on Agricultural Experimentation," NCNA Peking, March 27, 1965. SCMP 3428 p. 26.

[2] "Operate 'Three-Combination' Demonstration Farms Well, Promote the Movement for Conducting Experiments in Agronomy," JMJP editorial, March 28, 1965. SCMP 3440 p. 1.

[3] Chiang I-chen, op. cit., SCMP 3446 p. 2.

TABLE 5.2

Agricultural Demonstration Projects - 1963-65

Location	Project Area and Year
Hopei	1964: 44 demonstration projects[b] Paoting (cotton)[a] Chin Hsien (fruit trees)[a]
Peking	1964: 73 experimental farms,[c] 220 experimental wheat plots[m] Ch'enkochuang (hogs)[a] 1965: 2,000 hectares in demonstration plots[j]
Kiangsu	Hsu chou (Soochow) Special District 1964: 10,000 hectares of demonstration fields in three communes[d] 1965: 59,000 hectares of demonstration fields[a] Tai Hu area, Wangt'ing (rice)[a] Liyang (silk)[a]
Shanghai	Ma chiao Commune[a]
Szechwan	Pi Hsien 313 hectares model field[e] Hsip'u (rice and wheat)[a]
Kwangtung	1963: Tungchiang hills[f] 1964: Tashih production team, Po-lu hsien[f] Huiyang Special District: 23,400 hectares[f] Hu shan plain[f] Chienchiang plain[f] Pearl River Delta[f] Kaoho (tobacco)[a] Yangshou (rape seed)[a]
Shansi	1964: 63 experimental centers, 6,700 hectares[g] 1965: 443,000 hectares[g]

Location	Project Area and Year
Chekiang	1965: 48,700 hectares total[g] Ningpo administrative district[h] Sheng Hsien (tea)[a]
Shangtung	1965: 1,000,000 hectares[i] Liaoch'eng (cotton)[a]
Fukien	1965: 133,000 hectares[k.o.]
Kiangsi	Ningtu[a]
Hunan	Ch'iyang (rice)[a]
Honan	Hsinhsiang[a]
Kansu	Chingy (fruit trees)[a]
Ninghsia	Yench'ih (pasture)[a]
Northeast	1964: 88,000 hectares[l] -- 127,000 hectares for three provinces[m] 1965: 500,000 hectares for three provinces[m] Liaoning Liaoho (kaoliang)[a] Suicheng[a] Fengch'eng (silk)[a] Fouhsin[l] Chinchou[l] Ch'aoyang[l]
Singkiang	1965: 10% of cultivated area[m]

Total planned for 1965: 3,000,000 hectares

Total accounted for in above list: 2,210,000 hectares

SOURCES ON AGRICULTURAL DEMONSTRATION PROJECTS 1963-65

a. Chiang I-chen, Vice Minister of Agriculture, "Actively Develop Movement for Agricultural Scientific Experiment With Demonstration Farms as the Center," JMJP April 5, 1965. SCMP 3446 pp. 1-14.

b. Hopei Academy of Agricultural Sciences, "A Report on the Large Scale Demonstrative Programs in Rural Villages," Chung-kuo Nung-yeh K'o-hsüeh, January 1965, No. 1, pp. 25-30. JPRS 43, 698 p. 18.

c. Ts'ai Hsu, Tseng Tao-hsiao, Chu Ts-hui, Wang Heng-li, Wang Shih-chih,Wang Chao-t'ien, and Liu Chung-hsuan, "Analysis of the Technical Experiences of the Wheat Experimental Farms in Peking Suburbs in 1964," Chung-kuo Nung-yeh K'o-hsüeh No. 9, September 15, 1964, pp. 8-17. JPRS 30,055 pp. 10-32.

d. Agricultural Science Institute, Hsu-chou Special District, "Achievements and Experiences of Model Field Work in 1964 in Ta-wu Ta-miao, and Ta-huang-shan communes," K'o-hsüeh T'ung-pao No. 7, July 20, 1965, pp. 568-574. JPRS 32, 171 pp. 1-10. A summary report is available in Chung-kuo Nung-yeh K'o-hsüeh No. 3, 1965. SCMM 467 p. 17.

e. Kuo Li-hsiao, "Szechwan Provincial Academy of Agricultural Sciences Studies First Line Agricultural Production," Kuang-ming Jih-pao, January 16, 1965. JPRS 29,641 p. 64-67.

f. Chang Ta-wei, deputy head of the Kwangtung Provincial Academy of Agricultural Sciences, "New Achievements in Scientific Research in Kwangtung," Canton Chung-kuo Hsin-wen, September 25, 1965, pp. 13-14. JPRS 32,912 pp. 3-6.

g. "Agricultural Scientists Promoting Crop Yields in Shansi and Chekiang," Canton Chung-kuo Hsin-wen, March 19, 1965, p. 6. JPRS 30,311 pp. 5-6.

h. Wang Fu-ch'ing and Yeh Shao-fang, "1,595 Catties of Grain per mou: How this High Yield is Achieved -- Report of Demonstration team of the Agricultural Institute of Ningpo Administrative District," Chekiang Nung-yeh K'o-hsüeh, No. 3, 1965. SCMM 481 p. 42.

i. "Success of Demonstration Farms in East China Province," SCMP 3586 p. 20.

j. Chin Shan-pao, Vice President of the CAAS, "Demonstration Fields -- Bases for Agricultural Research," China Reconstructs, No. 6, 1965. SCMM 479 p. 32.

k. "Southeast China Local Science Groups Help Raise Rice Yield," NCNA Foochow, November 11, 1965. SCMP 3579 p. 24.

l. "Crop Increases Being Tried Out in the Northeast," Canton Chung-kuo Hsin-wen, March 19, 1965, p. 4. JPRS 30, 311 p. 3.

m. "China Sets up More Demonstration Farms," NCNA Peking, May 16, 1965. SCMP 3461 p. 14.

n. "Chinese Scientists and Peasants Cooperate in Agricultural Research Projects," NCNA Peking, October 24, 1964. SCMP 3329 p. 8.

o. "Establishment of Demonstration Fields in Fukien to Promote Production," Chung-kuo Nung-yeh K'o-hsüeh, July, 1965, p. 56. JPRS 42,695 p. 23, gives details about the demonstrations of the following:

133,000 hectares	early rice
100,000 hectares	late rice
67,000 hectares	sweet potatoes
12,000 hectares	sugar
13,000 hectares	peanuts
3,000 hectares	tea
1,000 hectares	oranges

This is not inconsistant with the other figure, which refers to cultivated area, not sown area.

Taking one-half the agricultural scientists out of their research institutes seems drastic, and this part of the plan may have been somewhat controversial in scientific circles. One reason many scientists may have supported the plan is that it offered an opportunity to educate party cadres to the scientific method; moreover, there seems to have been no indication that the transfer to the countryside would be permanent. A possible indication of some opposition from scientists is suggested by a report that only one-fourth of the agricultural scientists were reported working in demonstration fields although early plans had called for one-half.[1]

Table 5.2 records reports of demonstration fields in different provinces in 1963-1965. Although the table is not complete, it accounts for almost three-fourths of the demonstration fields planned.

The policies of giving power to scientists and distributing them in the countryside in the early and mid 1960's was a very effective way of popularizing in selected regions the discoveries that they had made in the previous decade. However, several problems emerged. First the reduction of personnel at research centers may have slowed down the development of new scientific advances. Second, the highly developed demonstration areas remained somewhat isolated and were not especially useful in spreading modern agriculture to other regions. Finally, the scientists were not always successful at farming, as they lacked practical experience. [illegible]nese official explained these problems to me.

---

[1] Chin Shan-pao, [illegible] CAAS, "Demonstration Fields--Bases [illegible]cultural Research," China Reconstructs, No. 6, [illegible] SCMM 479 p. 32.

> Before the Cultural Revolution, we had twists and turns in our research methods. We trusted too much on specialists and technicians. We concentrated specialists in high-yield places such as Soochow and Chengtu and the Pearl River Delta--twelve places altogether. We attempted to have high yield demonstration and assumed that other places would learn. But we failed. We found that the specialists were not good at cultivating, not as good as peasants. The peasants have more ways. In the past we gathered all specialists in seeds, soil, plant protection, dense planting, water, etc. in several areas, and tried to perfect one area. But this failed because the peasants could not learn.[1]

Perhaps this judgment on policies of 1962-66 is too harsh. While the policies adopted then did have certain shortcomings, they also had important strengths. They gave agricultural scientists an opportunity to develop techniques suitable for large scale cultivation, and at the same time enabled the scientists to demonstrate to themselves and the political leadership the potential contribution of agricultural science to production. The demonstration areas were, then, an important transitional phase in China's agro-technical development.

After the Cultural Revolution the organization of agricultural scientists changed somewhat. Many of the agro-scientific research institutes were probably shifted from the supervision of the Chinese Academy of Agricultural Sciences in Peking to the supervision of provincial level scientific organs and departments of agriculture.[2] In at least one province (but presumably elsewhere) agricultural scientists spend one-third of their time in specialized research institutes, one-third of their time doing field

---

[1] Stavis Diary, April 27, 1972.

[2] Ross Terrill, 800,000,000: The Real China (New York: Dell, 1971), p. 91.

research at communes, and one-third of their time touring and investigating techniques and problems in communes.[1] The specialized research institutes were often at the special district level (i.e., a level that would include about a dozen counties). This system would seem to be designed to maintain advanced research, to assure that the research would be integrated into production, and to facilitate the extension of scientific ideas widely throughout China. Not enough data are available yet to evaluate its success, but the apparent stagnation of food grain production (described in Chapter 1) may suggest that the pattern of organization for agricultural scientists adopted after the Cultural Revolution is not conducive to continuous, rapid scientific development in agriculture.

B. Agricultural Extension

After the Tenth Plenum, the agricultural extension stations were revitalized. Agro-technical extension stations had been set up originally during the early 1950's. Before 1953 some stations had been set up in Heilungkiang Province.[2] Perhaps using experience gained with these first stations, the Ministry of Agriculture issued a directive concerning the work of agricultural technical extension stations in April 1955. The number of agro-technical extension stations grew rapidly after 1954, as shown in Table 5.3.

During the time of the Great Leap (1958-1961), the extension stations seem to have been transferred from county to commune leadership. In a report to the Second

---

[1] Stavis Diary, May 2, 1972.

[2] Kuo-min Ching-chi Shih-yung Tz'u-tien (Dictionary of Commonly Used Economic Terms) (Shanghai: Chun-min publishers, 1953), p. 3073.

TABLE 5.3

Number of Agro-technical Extension Stations

Year	Number of Stations
1950	10
1951	43
1952	232
1953	3,632
1954	4,549
1955	7,997
1956	14,230
1957	13,669

Source: Nai-ruenn Chen, Chinese Economic Statistics (Chicago: Aldine, 1967), p. 369.

Session of the Second NPC in April, 1960, T'an Chen-lin stated:

> According to incomplete statistics from 12 provinces there are at present 7,690 experimentation and research organizations for agricultural science run by people's communes, with over 38,000 people taking part. A nation-wide research network with the people's commune as the basis has basically taken shape. [1]

In the few places for which data are available, the commune-based system of extension was not successful. This must have been especially true after 1960-61, when most communes lost power to their brigades and teams. In Lienchiang county, Fukien, one brigade had seven members trained as agro-technicians, but there was no commune technical network to organize their activities.[2] As a result, they ceased such work. Four left the brigade and the other three were assigned to other types of activities. In another county in South China, over sixty agro-technicians were transferred to finance and trade departments in 1961-62, where they could not directly lead agro-technical change.[3]

In 1962, in conjunction with the Tenth Plenum decisions to emphasize technical reform of agriculture, the Ministry of Agriculture issued directives on October 9

---

[1] T'an Chen-lin, "Strive for the Fulfillment Ahead of Schedule of the National Program for Agricultural Development," (speech to Second Session of Second NPC) NCNA Peking, April 6, 1960. CB 616 p. 18.

[2] Yang Fa-ch'i, "Let-Nature-Take-Its-Course Attitude Must be Promptly Changed in Technical Reform of Agriculture--Report on an investigation into results of technical reform, of agriculture in three production brigades, including Hoch'un, in Lienkiang hsien,"NFJP, April 7, 1963. SCMP 2975 p. 20.

[3] Ho Hsi-jung, "Avoid Transferring Agro-technicians Without Authorization," NFJP, January 10, 1063. SCMP 2913 p. 12.

and December 26, to rebuild the agro-technical extension station system.[1] Interest in extension at this time is further suggested by the People's Daily editorial of December 7, 1962, entitled "Energetically Engage in the Work of Propagating Farm Techniques."[2]

The extension stations were established on the basis of five to ten stations for each county. This indicates that they were often set up on a ch'ü (district) basis. Thus each station would serve a few communes. In addition, stations were established for regions with special crops and at state farms.

The primary function of the agro-technical extension station was to popularize the findings of scientific research to the actual producers, that is, the production teams and peasants. The December 1962 directive summarized this function:

> The work and task of the agro-technical extension station is to extend and propagate new techniques, for example concerning new style agricultural tools, machinery, chemicals, application of chemicals, machinery, use of fertilizer, new cultivation techniques and new superior seeds, selection of seeds, management and insecticides, and give technical leadership. (Article 2)

A second function of the extension station was to help solve specific problems of production. For example, if a commune was unable to grow a desired crop on a given piece of land, the extension station was expected to send a cadre to study the soil, seed, techniques, etc., to advise the commune on how to increase production.

---

[1] Chung-hua Jen-min Kung-ho-kuo Fa-kuei Hui-pien, Compendium of Laws of the People's Republic of China, 1962.

[2] "Energetically Engage in the Work of Propagating Farming Techniques," JMJP editorial, December 7, 1962. SCMP 2884 p. 12.

A third function of the extension station was to help educate the peasants. Extension stations were expected to hold part-time schools and ad hoc classes to teach peasants the rudiments of agricultural science. The stations were also expected to give leadership to commune research organizations. Although extension stations were not expected to carry out original scientific research, they were expected to test suggestions made by the Chinese Academy of Agricultural Sciences to make sure that they were suitable for local conditions. In this function they worked with the county-level CAAS branches.

An extension station in Chekiang Province published a book in 1964 summarizing how it perceived its role. The station felt that it had "three powers and four responsibilities." The powers were: 1) the power to lead productive technology in its own team, 2) the power to investigate and spur on new technical measures, and 3) the power to carry out necessary experiments in its own team. The responsibilities of the station were: 1) the responsibility for carrying out propaganda on science and technology to members of communes, 2) the responsibility for raising advanced technical measures in its team and giving its team good advice, 3) the responsibility to its leaders for reflecting the experiences and problems of production, and 4) responsibility for mobilizing the commune members to take part in scientific experiment activities.[1]

The December 1962 directive specified the personnel for the agro-technical extension station. The station was

---

[1] "T'ung-kuo Yin-fa 'Nung-yeh Chi-shu Shou-ts'e' Cheng-tun Ch'ung-shih K'o-hsüeh Shih-yeh-wang" (The Publication of 'The Peasant's Technical Handbook' Improves and Satisfies the Experimental Network), Nung-yeh Chi-shu (Agricultural Techniques) No. 6, 1964, p. 61.

supposed to have at least three and not more than ten cadres; the precise number would depend on the scope and complexity of the task of the station. Cadres were required to be graduates of middle level agricultural schools or of specialized agricultural colleges; they were also required to have rich personal experience in agricultural production and experience in extension work. In Kwangtung province in 1964, eighteen stations were reported to have five to seven cadres each.[1] Both in the late 1950's and early 1960's, it appears that the stations were dominated by young, technically-oriented school graduates.

The 1962 directives stated that cadres in agro-technical extension stations should receive the same salary, living accommodations, and incentives as employees of the ministries of agriculture, agricultural enterprises (state farms), and agricultural research bureaus at the same levels. From this we can guess that wages were fixed and secure at a reasonably comfortable level. They were not paid according to a "work point" system, which related wages to the productivity of the locality, as ordinary farmers were paid.

To ensure (or at least facilitate) the professional expertise of extension station personnel, the 1962 directive stated: "The cadres of the agro-technical stations should not be lightly transferred, so as to enable them to become familiar with work and accumulate experience; they should not be carelessly-transferred temporarily to other work; rather they should concentrate their skill, and do the research work well."

---

[1] "Ts'eng-ts'eng Tsu-chih Chi-shu Tui-wu Shen-ju K'ai-chan Chi-shu T'ui-kuang Kung-tso," (Organize the Technical Ranks on Every Level, Penetrate Deeply and Develop Technical Extension Work), Nung-yeh Chi-shu (Agricultural Techniques) No. 7, 1964, p. 61.

Related to professionalism was the work style advised for personnel of the extension stations, namely to "use facts to convince the masses" (yung shih-shih shuo-ming ch'ung-chung).[1] They could not lecture from party directives; they had to use facts derived from experimental and demonstration fields. The extension station system, it should be noted, had a built-in conservatism because each proposed technical reform had to be tested for at least three years before it was propagated, in order to ensure its success in all kinds of weather.[2]

The agro-technical extension stations were administered by the county office of agriculture. It provided funds for the stations, exerted an important influence on personnel selections, called local conferences to discuss technical problems, and suggested new techniques to the extension stations for consideration. The provincial department of agriculture had the ultimate authority to create or abolish extension stations. In the day-to-day

---

[1]Chao K'o-ming, "Nan-ho-pao Nung-yeh Chi-shu T'ui-kuang-chan Pan-te Hao" (The Agro-technical Extension Station and Nan-ho-pao is Managed Well), Nung-yeh Chi-shu (Agricultural Techniques) No. 4, 1963, p. 40.

[2] This was true of seed stations as well as extension stations. An example of how this works comes from Ting-ho county in Hopei Province, where a new type of seed was gradually introduced over 6 years. The seed was tested for 3 years on 0.2 hectare plots, then it was used by one production team. In 1960, the following year, it was tried on 200 hectares and in 1961 on 930 hectares. Then in 1962 teaching groups went to 7 communes and as a result the seed was used on 1,800 hectares. Liu Mei-yün, "Pi-ma Yi-hao chung-p'o Chi-shu te T'ui kuang" (Extension of the Spring Sowing Technique for Pima Seeds), Nung-yeh Chi-shu (Agricultural Technqiues), No. 2, 1963, p. 46.

operations of the station, however, the provincial office of agriculture was probably distant. The December 1962 directive stated: "The establishment and removal of agro-technical extension stations ought to have the approval of the provincial department of agriculture or the approval of the special district, which should report to the provincial department of agriculture."

The relationships of the extension stations to communes, brigades and teams will be discussed later, but we might note here that in at least one locality, the land on which a station was built and which formed the experimental fields was donated by communes; the crop harvested on the experimental fields was given back to the communes. The net result would appear to be not detrimental to the commune because although the output might be less than previous owing to failure in experiments and less cultivated land because of buildings, the communes were not responsible for paying those who labored on the experimental fields. In addition to county and provincial leadership, the extension station was also supervised by a local Communist Party committee (as are all other organizations) The December 1962 directive stated: "District (ch'ü) and commune Party and government leaders should intensify education to station cadres in ideology and politics, should enforce and control their professional work, and moreover help them solve difficult problems in their work." (Article 6) Criticism emerged during the Cultural Revolution, however, that Party leadership over extension experts in ideology and politics was often weak, and that the technical personnel exercised leadership.

The extension station was expected to maintain close relationships with scientific research organizations and other organs involved in rural technology. These included demonstration farms, seed stations, agricultural

machine tractor stations, irrigation stations, neighboring state-managed animal farms, forests, and schools. It was, however, distinct from all these other organizations.

To carry out its work, the extension station had to establish two types of organized, semi-permanent relationships with the countryside: base points and scientific networks. Base points were extremely important, and their proper management was one of the most important items of work for the station. Each extension station was expected to have several base points. The number was kept small so that the relationship could be intense and the work could be deep.[1] Thus, in Chaoch'ing Special District of Kwangtung province, the 64 comprehensive extension stations had a total of 137 base points; most stations presumably had 2 or 3 base points.[2]

Generally, a production team was taken as a base point. The factors for choosing a particular team to serve as a base point must have been very complex. On the one hand, the base point had to be representative of the surrounding area, so that its experiences could be extrapolated to adjacent farms. Another article, however, suggested that the base point for the extension station should be the same location as the key point (chung-tien) of the Party committee of the commune. This would enable the extension station to "have better concrete leadership of the Party."[3] There were other suggestions for selecting

---

[1] "Chi-tien Kung-tso te T'i-hui" (Reflections on Base-Point Work), Nung-yeh Chi-shu (Agricultural Techniques) No. 7, 1963, p. 61.

[2] "Pan-hao Nung-yeh Chi-shu T'ui-kuang-chan, Ts'u-chin Nung-yeh Chi-shu Ko-ming" (Manage Agricultural Technical Extension Stations Well, Hurry-up the Agro-technical Revolution) Chung-kuo Nung-pao (China Agricultural Journal) No. 4, 1964, p. 5.

[3] Ibid.

base points that were designed to ensure the interests of the local peasants. One urged that a team had to volunteer to serve as a base point. It could not be assigned by the brigade.[1] Another article suggested that a contract, presumably guaranteeing income for the team, was especially welcomed by the masses.[2]

An extension station was expected to provide one or two experts to be permanently associated with each base point. These cadres were expected to live and eat with the masses.[3] At base points, experiments were carried out and demonstration fields were set up so that peasants from the surrounding areas could see for themselves the advantages of new farming techniques. At the same time this local experimentation gave the peasants an opportunity to criticize technical experts or party cadres if they were popularizing ineffective farming techniques. The base point might be used to establish a demonstration plot, over 4,400 of which were established by 1965.[4]

Sometimes the stations set up secondary base points points (fu ch'i tien)[5] and experimental points

---

[1] "Chi-tien Kung-tso te T'i-hui" (Reflections on Base-point Work), Nung-yeh Chi-shu (Agricultural Techniques) No. 7, 1963, p. 61.

[2] "Chien-ch'ih Tun-tien Shih-fan T'ui-kuang Nung-yeh Chi-shu" (Grasping the Focal Point Exemplifies the Extension of Agricultural Technology) Nung-yeh Chi-shu (Agricultural Techniques), No. 5, 1964, p. 57.

[3] Ibid.

[4] Chiang I-chen, "Actively Develop Movement..." SCMP 3446 p. 2.

[5] "Kao-hao Chi-tien, Yi Tien Tai Mien, Tien Mien Chieh-ho" (Do Base-point Work Well, Use a Point to Lead the Surface, the Point and the Surface Should Merge Together), Nung-yeh Chi-shu (Agricultural Techniques) No. 5, 1964, p. 60.

(shih-yen-tien).[1] When conditions were not adequate for the permanent relationship implied by a base point, the station might have key points (chung-tien).[2]

Extension stations were also instructed to help all the surrounding communes and other production units. The extension station could organize agro-technical stations, committees, groups, etc. at various levels (commune, brigade, team) to form a "technical network" (wang). Numerous examples have been reported. For example, in one county in Shansi, five extension stations assisted twenty-eight communes to set up their own extension stations.[3] In Huan County of Kwangtung province, science and technology committees were established at the brigade level. They included the brigade chief, old peasants, active, youths, and young intellectuals. The committee usually had five to seven people, with a maximum of ten. At the team level, science and technology small groups of two to five people were set up. These groups included the team captain, old peasants and young intellectuals. At both team and brigade levels, the members were chosen by that level's party committee and management committee and had to be approved by the brigade congress and team congress. Each group had its own experimental field, where it could test all ideas

---

[1] "Nung-chi-chan Kao Chi-tien Tso Yang-pan ti T'i-hui" (Reflections on Agro-technical Extension Stations Making Base-points into Examples), Nung-yeh Chi-shu (Agricultural Techniques) No. 4, 1964, p. 59.

[2] "Chia-ch'iang Ling-tao, Chung-fen Fa-hui Nung-yeh Chi-shu T'ui-kuang-chan ti Tso-yung" (Strengthen Leadership, Complete Development of the Function of Agro-technical Extension Station) Chung-kuo Nung-pao (China Agricultural Journal) No. 4, 1964, p. 1.

[3] "Communes in Northwest China Set Up Their Own Agro-technical Stations," NCNA Sian, July 17, 1965. SCMP 3502 p. 10.

before propagating them.[1] Another example of this kind of work was carried out in Peking, where technical small groups were organized at the team level. In Yench'ing County there were 3,634 technical personnel in these small groups, of whom 59 percent were young and 41 percent were old peasants. These small groups ran classes, exhibits, and sponsored night schools. All this activity was supervised by the agro-technical extension station.[2] In Shansi province, an agro-technical station in Ch'uwo County set up eleven extension nets and gave training to over five hundred people in about fifty brigades.[3]

The extension station was expected to use both its base points and its technical network to complement each other. At the base point, the extension station might cultivate new seeds, use different fertilizer, or might carry out irrigation in a new manner. It then could use the base point as a demonstration area and could have the small groups of the technical network come and examine the results. Agro-technical stations could also work through their base points and networks of small groups to set up exhibits and demonstrations. They could obtain students for night schools and part-work, part-study programs through the network. The stations would link up with the commune and the youth league to give lectures and classes.

---

1 "Ts'eng-ts'eng Tsu-chih Chi-shu Tui-wu Shen-ju K'ai-chan Chi-shu T'ui-kuang Kung-tso" (Organize the Technical Ranks on Every Level, Penetrate Deeply and Develop Technical Extension Work), Nung-yeh Chi-shu (Agricultural Techniques) No. 7, 1964, p. 61.

2 "Tsai Chi-ts'eng Chien-li Chi-shu Tsu-chih" (Set Up Organization at the Basic Level), Nung-yeh Chi-shu (Agricultural Techniques) No. 7, 1963, p. 64.

3 "Yun-yung Nung-yeh Sheng-chang Hsien-chin Ching-yen T'ui-kuang-wang T'ui-kuang Nung-yeh Chi-shu" (Use the Advanced Experiences of Agricultural Production and Extension Nets to Extend Agricultural Production), Chung-kuo Nung-pao (China Agricultural Journal), No. 6, 1964, p. 60.

Not enough data are available to make any definite comments about the geographical distribution of the extension stations. It is certain that in high and stable yield areas, the government has made a substantial concentration of technical leadership available to the production units.[1] In the period after the Tenth Plenum, when the agro-technical extension stations were strengthened and when demonstration farms were set up, generally all agricultural production units in modernizing areas (at least in the Pearl River Delta) had access to advanced technical advice. The extension stations would report successful experiments to the commune leadership, demonstrate them, and assist the commune leadership in planning the distribution of modern agricultural supplies. Extension station personnel would train production team members in the use of new techniques, including seeds and insecticides. Sometimes extension station personnel taught at local agricultural middle schools. In one production team about four agents from the county extension station would come twice a year for several-day visits to analyze the agricultural situation and make suggestions. Former residents report that the staff of the extension station were generally a combination of high school graduates and local peasants. They appear to be regarded as knowledgeable but not tremendously useful, as local peasants have a great deal of experience with agricultural techniques.

In addition, virtually every commune has some sort of demonstration or experimental field. In many cases the demonstration fields do not use new techniques but rather use greater-than-normal labor input. This labor might be supplied by mobilizing old people who do not normally do work or by using the labor of urbanites sent down to the

---

[1] This is based on interviews conducted by the author in Hong Kong, Spring 1972.

countryside for a short while. To the extent that demonstration fields use inputs that are not available to most production units, their successes cannot be extended and the peasants are aware of this.

It is likely that technical guidance is less available in areas not selected for especially rapid development. For example, in Shashiyü (a fairly poor, backward area to be described in Chapter 7) an important technological innovation was learning how to make and handle explosives to simplify the task of digging cisterns and tunnels through solid rock. Some members of the brigade took a month-long training course at the county seat (offered by the county chemical corporation) on how to make explosives from chemical fertilizer (ammonium nitrate). Brigade agro-technicians had clearly received some special training, as they knew the nutrient content of various chemical fertilizers. They were also familiar with the process of grafting fruit trees. The training had not been too thorough, however, because Shashiyü's agro-technicians were not thoroughly familiar with management techniques that would prevent biennial variations of apple production. Further indication of weakness in distribution of new ideas comes from the fact that the very high yielding wheat varieties that were used in the Peking area were not yet available at Shashiyü or in Ts'unhua County, in which it was located.

Of course in such an area some changes are rather simple from an agro-technical point of view and do not require much sophisticated technical leadership. In Shashiyü, the most important technological changes involved changes in cropping patterns that were possible after the terraces were built and irrigation was possible. Corn and wheat could replace millet and sorghum. This kind of change is rather simple, as it does not involve new technologies, but is basically an extension of a widely known technology to

an area where it previously could not have been adopted.

There is no reason to doubt the success of the extension system adopted after the Tenth Plenum, but it is also clear that it had certain problems which required changes in the system. During the Cultural Revolution, there were some attacks on county-level extension stations on the basis that they were too rigid, bureaucratic, and removed from the problems of production. An article in Peking Review in late 1968 charged that the stations were marked by "intellectualism" and were unconcerned with the problems of economic production. The county agro-technical station had:

> ...experts, trained in foreign methods who showed no feeling about the poor and lower-middle peasants... The county agro-technical station has a minute division of labour with everyone looking only to his own speciality. The person in charge of cotton does not concern himself with rice cultivation and the one in charge of rice does not think about cotton. ...When the time came to raise the rice seedlings last spring, those from the county agro-technical station just stood by the fields giving instructions and gesturing. They talked glibly about this standard and that standard but never did a thing themselves. When the poor and lower-middle peasants wanted them to show how, they were at a loss. The poor and lower-middle peasants described them as "farming with their lips."[1]

During the Cultural Revolution there were recommendations that more extension work be done on the commune level. Moreover, to assure that extension station personnel would be concerned with practical problems of production, it was suggested that they be paid by a work-point system, in which the value of the work point was determined by the profit of agricultural production of the commune.

---

[1] "Indigenous Experts and the Revolution in Agricultural Education," Peking Review, December 20, 1968, p. 3-6.

Chinese agricultural officials with whom I discussed the extension station system after the Cultural Revolution emphasized a different problem, namely that by the late 1960's the general level of agricultural technology had risen so much that the earlier types of stations were inadequate. Communes by then had members who had graduated from middle school or agricultural middle school; they were asking for all types of agricultural chemicals and were eager to do their own experimenting. It was no longer adequate for an extension station simply to give inspiration for new agricultural technqiues; much more sophisticated and detailed technical leadership was required.[1]

Not much is known about how China modified the agro-technical extension station system after the Cultural Revolution. The system continues to exist but seems to be less important. Many more highly trained scientists and technicians have been transferred to commune experimental stations, so that they are now somewhat closer to actual problems of the production process. At one commune-run station (and this is very likely typical) the station's personnel do not receive work points, as had been advocated during the Cultural Revolution because sometimes experiments fail. The salaries for the highly trained agricultural experts (with university degrees) are established by the state but are actually paid from the commune's budget. University graduates earn about double the average commune worker.[2]

---

[1] Stavis diary, April 27, 1972.

[2] Ibid., April 25, 1972.

To supplement the regular extension stations, the Chinese have utilized several other methods of popularizing new agricultural techniques. Before the Cultural Revolution, experienced peasant experts from successful regions were sent to other parts of the country. They were expected to stay for at least a year, to teach all appropriate techniques throughout the agricultural year. For example, 500 peasants from a technologically advanced area of Kiangsu went to brigades and teams in seven provinces to teach the rice cultivation techniques pioneered by Chen Yung-kang, an unusually skilled peasant who became a model peasant-scientist. From the Chaochow-Swatow plain in East Kwangtung, 2,400 rice growers visited four provinces. About 330 experienced cotton growers from Chekiang brought their cotton cultivation techniques to five other provinces.[1]

Very little is known about this method of agricultural extension; for example, the precise extent and importance of such visits is not known. Nor is it clear how they are organized. Specifically, who pays the visiting peasant experts? Their hosts, in exchange for services and labor? Their home towns, as a contribution to national development? Or the national government, through the Ministry of Agriculture, as a subsidy to technologically backward areas? Despite our lack of detailed knowledge of this particular technique for agricultural extension, we can guess that it is inexpensive and effective. Experienced peasants can make very respected, effective instructors because they have the same cultural background as their "students." One limitation on such programs would be the lack of people willing to volunteer to leave their

---

[1] "China Finds New Way to Spread Advanced Farming Techniques," NCNA Peking, July 2, 1965. SCMP 3492, p. 21.

homes for a year. Another question would be whether or not the techniques from one region could be transferred to another without modification. It is not known whether this method of extension was used after the Cultural Revolution.

A somewhat similar program is the formal linking up of two or more communes to exchange ideas for agricultural development. For example, a commune near Shihchiachuang has an exchange program with Evergreen Commune (a very advanced commune near Peking that probably gets technical assistance from one of the scientific institutes in Peking). Peking is about 160 miles north of Shihchiachuang, but apparently environmental conditions are similar enough for this exchange to be helpful.[1] The scope of this exchange program, the frequency of such programs, and the precise manner in which they are organized are not known.

Many other programs are used to inspire agrotechnical change, if not to give concrete technical guidance. Demonstration conferences at a location with marked success in some aspect of agricultural development are common. Commune leaders and higher level agricultural managers frequently visit other communes, especially national or regional models. The media (including newspapers, magazines, films, television) all carry reports of great success, and encourage all localities to emulate such progress. Of course these programs are not the same as extension, in that they do not give detailed technical suggestions for dealing with specific problems.[2] But they do supplement that aspect of an extension program which

---

[1] Silas Wu, "North China Villages under the Commune," report at Association for Asian Studies Convention, April 1, 1974.

[2] Recent visitors report that high quality films stressing agricultural techniques are now avilable in extension programs.

tries to convince farmers that improvement is possible.

C. Mechanical Power to the People

After the Tenth Plenum, steps were taken to improve the utilization of agricultural machinery by placing it under central control. While this policy had many benefits, problems also emerged, and eventually ownership and management of machinery were decentralized to the communes.

When agricultural machinery first came to China in the 1950's, the machinery was owned and managed directly by the central government through a Machine Tractor Station (MTS) system analogous to that in the Soviet Union.[1] In 1958, when communes were established, ownership of agricultural machinery was decentralized to the communes. In the following two years, serious problems of maintenance developed because communes lacked the technical capability to operate and maintain tractors efficiently. When the power of the commune was reduced in 1960 and 1961, it became even less able to manage agricultural mechanization.

In the summer and fall of 1961, a year before the Tenth Plenum, the process of reestablishing central control over tractors began. The system established then was the Agricultural Machinery Station system, in which state agencies owned machinery and hired out services to collective production units (i.e., production teams). State employees were responsible for maintenance and utilization of tractors. This permitted the establishment of strict standards and procedures to assure proper maintenance and efficient utilization of machinery. After the Tenth Plenum, this process was formalized and completed.[2]

---

[1] An excellent survey of the MTS system in the Soviet Union is Robert Miller, One Hundred Thousand Tractors (Cambridge: Harvard University Press, 1970).

[2] Benedict Stavis, "Political Dimensions of the Technical Transformation of China's Agriculture," Columbia Ph.D. dissertation, 1973, pp. 273-75.

Although the centralization of the tractor system got machinery back into operation, several serious new problems were generated. One set of problems concerned the efficient integration of tractors into the agricultural production process. Ironically enough, this problem was caused (or at least aggravated) by precisely the central control system which had been established to improve efficiency. The central authorities gauged the success of a tractor station primarily according to acreage plowed per tractor per unit of fuel and according to its profitability.

Unfortunately, agricultural machinery stations had a variety of ways of improving performance according to these criteria which did not help agricultural production. For example, by plowing to less than the standard depth, fuel consumption would be reduced. Sometimes tractor drivers reduced depth when working at night, when inspection was difficult.[1] A county Communist Party Committee in Shensi conducted observations on tractor service in 1964 and reported:

> It was discovered that in some fields the quality of plowing was not good, and the masses were displeased with this. It was also discovered that, in exceptional cases, tractor teams reported shallow plowing as deep plowing or overstated the acreage plowed with a view to over-charging.[2]

Frequent delays in plowing services presented another problem. Several factors contributed to the

---

[1] "It is Good for Tractors to Revert to Chairman Mao's Revolutionary Line -- report on investigation of change in management of tractors by the collective in Lank'ou hsien," Nung-yeh Chi-hsieh Chi-shu, No. 10, October 1968. SCMM 643, p. 22.

[2] Chiang Wen-hsien, "How the Tractor Station of T'ai-hu Hsien Serves Agricultural Production," Ching-chi Yen-chiu, No. 4, April 1965. SCMM 472, p. 18.

delays. First were the problems of reliability of the machines, which were compounded immensely by the fact that spare parts were in short supply, and by the fact that China's tractors came from many countries. Lack of trained operators and repairmen further aggrevated the situation.

A second reason for delays was that the tractor stations wanted to get all the orders for plowing before beginning, so that the tractors could be dispatched in the most efficient, economical manner. By the time the orders were all in and the routes planned for the tractors, some of the production teams might have decided it was too late and used animals to plow the land.

A third reason for delay was difficulties in financial relationships. The stations sometimes had trouble collecting fees from the production units. One station was owed ¥370,000 in fees from the surrounding communes.[1] The tractor station, reasonably enough, began to demand cash payment in advance, upon signing the contract with the production unit:

> When a production team wanted a tractor to plow its land it had to send somebody to take money to the tractor station in the county government seat to sign a contract, in which were stated the parties concerned and the organ supervising the work to be done, and which we marked with big and small seals in ample space.[2]

This paper work took extra time and added to the delays. The problem of timeliness was so serious that cadres of one brigade summed up the situation in these words:

---

[1] "It is Good for Tractors to Revert to Chairman Mao's Revolutionary Line...," op.cit. SCMM 643, p. 20.

[2] Ibid., p. 18. Similar problems are described in "The P'eng Chen Counter-revolutionary Revisionist Clique's Crime is Most Heinous." SCMM 610, p. 8.

> Tractors of the state-operated station do not come when you need them; yet they are here when you don't need them.[1]

Another problem concerned tractor services to poor, outlying production teams. They had difficulty paying in advance, so that the tractor stations would tend to overlook them. Moreover, being far away, more fuel would be expended getting to them. If, in addition, they were in mountainous areas with small plots, additional inefficiencies would be encountered. Thus, the stations tended to refuse to service such areas.[2]

Corruption was another type of problem. Bribery was sometimes required to get decent service from machine operators. In one location peasants reported:

> ...the tractor drivers worked better if they were well treated. They would not work so well if they were not treated so well. If they were given good food, the land was plowed to a great depth.[3]

Some commune members composed a song:

> If there is food but no wine, the tractor does not move;
> If there is wine and no food, the tractor runs out of order;
> If there are both wine and food, the tractor flies.[4]

Yet another important problem was the potential of substantial financial loss by the agricultural machinery stations. Hsiang Nan, a Chinese specialist on agricultural mechanization, inspected tractor stations in 1963-64 and found several reasons why stations might lose money.

---

[1] "It is Good for Tractors to Revert to Chairman Mao's Revolutionary Line...," op.cit. SCMM 643,p. 18.

[2] Ibid., p. 19. "The P'eng Chen Counter-Revolutionary Revisionsist Clique's Crime is Most Heinous." SCMM 610, p. 8.

[3] "It is Good for Tractors to Revert to Chairman Mao's Revolutionary Line...," op. cit. SCMM 643, p. 22.

[4] Ibid.

One important consideration was whether or not the station had the proper mix of large and small tractors and implements for the local geographic and cultivation conditions throughout the year.[1]

Staff expense was another factor affecting profitability of stations. Hsiang Nan also observed on the basis of his tour:

> ...in some counties a management station with several dozen or up to a hundred tractors has nevertheless established several bureaus and employed a great number of men. The greater the number of men employed, the greater the procrastination, the higher the costs, and the lower the efficiency. This is also an important reason for the financial losses sustained by agricultural machinery stations in some places.[2]

So excessive was the personnel in some places that mechanization was not reducing the labor requirements of agricultural production but merely changing the requirements from farm laborer to tractor station workers.

T'an Chen-lin, Politbureau specialist on agricultural problems, was very concerned about these losses and at a specialized conference on agriculture in 1963 asked that farm machinery stations and drainage and irrigation stations be given two years in which to turn their losses into profits.

> Within two years, they shall not be allowed to incur any losses. Those which continue to lose shall be abolished, while those which operate with profit shall continue to be developed.[3]

---

[1] Hsiang Nan, "Agricultural Mechanization Can be Achieved with Good and Fast Results," JMJP July 6, 1965. SCMP 3518, p. 7. The full article, from which this article was excerpted was published in Chung-kuo Nung-yeh Chi-hsieh, May 1965, pp. 11-20, and is available in translation at JPRS 33, 691.

[2] Ibid. SCMP 3518, p. 7.

[3] "History of Struggle..." SCMM 633, p. 30. Also

Some stations may have been closed after T'an Chen-lin's threat. The growth in the number of tractor stations from 1963 to 1964 was virtually nil and efficiency improved. The farm machinery stations in 1964 did 42 percent more work than in 1963, and each standard tractor increased its work output by 18 percent. At the same time, the cost of cultivating each standard mou dropped by 14 percent.[1]

In 1965, however, the number of new stations increased sharply and with this increase was the possibility of increased losses.

Thus, to all the problems of ensuring quality and timeliness of plowing and keeping machinery in good repair

---

available in: Mass Criticism Team, Revolutionary Great Alliance Committee of Agricultural Machinery Management Bureau, the 8th Ministry of Machine Building, "T'an Chen-lin's Crime of Sabotage Against Farm Mechanization Must Be Reckoned With," Nung-yeh Chi-hsieh Chi-shu, No. 6, June 8, 1968. SCMM 624, p. 2.

How these losses were subsidized is not known for certain. The interest of T'an Chen-lin and the Central Committee, combined with the fact that the tractor stations were operated as agents of the central government (operating through the Ministry of Agricultural Machinery), suggests that losses were subsidized by the central government. It is also possible that provincial and even county governments met part of the losses. There may, however, have been regional differences and experimentation. Sometime in early 1963, the Kirin Provincial Agricultural Administration implemented the policy of "charging the county with full financial responsibility" for the operation of tractor stations. While this may mean only that the county audited the reports of the stations, it also may mean that the county had to meet the losses of the stations.

"News About Agricultural Machines -- Further Improving the Care and Use of 'Iron Cows,'" Chung-kuo Nung-yeh Chi-hsieh No. 6, June 10, 1963. SCMM 374, p. 11.

[1] "Opening Up the Road of Agricultural Mechanization in Our Country," JMJP August 31, 1965. SCMP 3543, p. 7.

TABLE 5.4

Number of Agricultural Machinery Stations

Year	Number of Stations
1963	1,482
1964	1,488
1965	2,263

Source: Kang Chao, Agricultural Production In Communist China 1949-1965 (Madison: University of Wisconsin, 1970), p. 111.

may have been added the problems of substantial deficit operations. The net result of these problems was the overall failure to integrate machinery fully and efficiently into agricultural production. Not the dramatic aspects of the problem, but rather the general contradictions and inefficiencies characterized the system:

> ...it is not easy to link the mechanized plans of the state-owned stations with the production plans of communes and teams. It is not easy to make overall arrangements for and effect the close coordination of mechanical power, animal power and manpower.[1]

A People's Daily editorial, reacting to a conference on agricultural machinery management in the summer of 1965, summed up the institutional contradiction:

> Of course, due to the different systems of ownership practiced by the farm machinery station and the commune, each keeps its own accounts. In some cases, as a result of the unsatisfactory arrangements made by both sides, contradictions such as "two accounts" and "two hearts" have come to the fore. In these circumstances, machinery stations, being only concerned about their own profits and losses, tend to disregard the increased output and increased income of communes and production teams. The latter, on the other hand, may concern themselves only in the use of farm machinery without caring for the profit or losses of farm production and agricultural mechanization.[2]

Hsiang Nan's final judgment about the agricultural machinery management system was simply: "Such a management system has to be changed."[3]

---

[1] Liao Nung-ko, "Knock Down China's Khrushchev and Completely Discredit by Criticism His Line of State Monopoly," Nung-yeh Chi-hsieh Chi-shu, No. 2, 1968. SCMM 620, p. 8.

[2] "Management of Agricultural Machinery Should Better Serve Agricultural Production," JMJP editorial, August 31, 1965. SCMP 3543, p. 11.

[3] Hsiang Nan, "Agricultural Mechanization can be Achieved with Good and Fast Results," JMJP, July 6, 1965. SCMP 3518 p. 7.

One proposed solution to problems of efficient, economical integration of agricultural machinery with production was to centralize even further the management of agricultural machinery through an institution called a "trust." Actually, very little is known about the trusts. Most of the information comes from Red Guard critiques, but there is some contemporaneous material that gives credence to most of the Red Guard statements.

According to Red Guard charges, Liu Shao-chi first proposed the organization of trusts in 1960,[1] and continued to recommend them at unidentified meetings in October and December 1963 and possibly on other occasions. We have fragments of speeches by Liu in 1963 on the subject of trusts. These will be presented in a logical sequence of excerpts.[2]

> Our present method is for provinces, municipalities, departments, bureaus, and various departments of the Central Committee to interfere in the economy. This is an extra-economic method; it is not a capitalist method but a feudal method.
>
> It is necessary to consider the trust method. Control must be exercised over manufacture as well as business management. Rather than set up truck and tractor departments, it is better to organize truck and tractor companies. The operating expenses for agricultural machines should also be controlled by these companies.
>
> The bureaus of the various ministries (of the central government) are to be converted into companies and become not administrative organs but enterprise organizations.

---

[1] "T'an Chen-lin's Crime of Sabotage...," op.cit., SCMM 624 p. 6.

[2] The following quotations come from: The East is Red Commune of the Peking Institute of Agricultural Mechanization of the Capital Red Guard Congress, "The Reactionary Nature of China's Khrushchev in Promoting the Trust," Nung-yeh Chi-hsieh Chi-shu, No. 5, August 8, 1967, SCMM 613, pp. 20,22; "Completely Settle the Heinous Crimes of China's

The power of the trust is very great, greater than that of the government. As a matter of fact, it runs the government.

The Economic Commission should exercise direct jurisdiction over the trust.

(The trust should) take over the supervisory work of the party exercised by Party organizations.

It setting up trusts, let us have national ones.

We must create all over the country trusts more monopolistic than those under capitalism.

...Socialist monopoly will be even greater in degree than capitalist monopolies because it has no competition...The trusts should be on a national, unified basis, free from local interference.

The question of whether convenience would be accorded to the localities will not be considered.

In short, things must be organized and planned. Don't promote things on your own with no regard for the Center. All local undertakings must be organized, and this is what is called socialism.

By getting organized, it is possible to promote specialization, standardization, and systematization, improve the quality, raise labor productivity, increase variety and lower costs. This will benefit society as a whole, the whole country and all places.

We must study the experience of capitalist management enterprise.

We must manage the economy by economic methods.

Enterprises are managed by capitalists just the same. Factories managed by capitalists are as a rule well managed. Monopolistic companies are well organized.

Khrushchev and Company in Undermining Agricultural Mechanization," Nung-yeh Chi-hsieh Chi-shu, No. 5, August 8, 1967, SCMM 610, p. 26; "History of Struggle...," op.cit., SCMM 633, p. 24; "T'an Chen-lin's Crime of Sabotage...," op.cit., SCMM 624, p. 6.

Some additional information about the internal organization of the trusts is known. The provisional regulations for management of the "Tractor and Internal Combustion Engine Spare Parts Company" and the "Tractor and Internal Combustion Engine Industrial Company" were said by Red Guards groups to have included these provisions:[1]

1. "Retention of profits" at separate levels of the company. Thus, an individual factory could use its profits for individual rewards, increased investment, or other purposes.

2. "Retention of deductible sums of money" at separate levels. The meaning of this is not clear, but perhaps it means that each factory was allowed a certain allocation for depreciation; if maintenance was done well, so that the full allocation was not needed for depreciation, then it might be retained and applied to other purposes.

3. "The company takes the responsibility for drawing up a reward system and fixes the rates of reward."

Red Guard groups said that the trust was established on the idea that "the highest criterion demanded of an enterprise is 'profit' and the basic principle underlying labor management is 'reward'."[2] Unfortunately, we lack the full text of the provisional regulations for management of the tractor trust, so we cannot fully evaluate the Red Guard interpretation.

While the trust was envisioned as a centralized organization controlled by economic criteria, it had

---

[1] "History of Struggle...," op.cit. SCMM 633, p. 27.

[2] Ibid.

several important differences from a corporation in a capitalist country. There is no evidence that the trust would have been free to establish prices. Nor is there any indication that the trust would have been free to raise investment capital independently of government economic plans. Thus its production plans would have had little flexibility. Finally, it was assumed that a single trust in each sector would form a monopoly, so that no competition would emerge. A commune would not be able to shop around and compare the services of different tractor stations.

It is reported that after three years of discussion, Liu Shao-ch'i gave instructions at a December 1963 meeting that a trust should be formed in the agricultural mechanization departments:

> It is good to have agricultural machine supply centers. A big trust should be formed and supply substations should be set up along railroads and highways. Don't set up stations according to administrative districts and don't put them under the direct jurisdiction of counties. Local authorities must not lay their hands on such stations. They can make suggestions, but cannot allocate money for making such stations. All agricultural machines should be under the unified management of the supply company and factories should also be under its control. Tractors, irrigation supply company and factories should also be under its control. Tractors, irrigation and drainage machines and oil supply should be under the unified management of the company.[1]

Experiments with trusts were undertaken soon. An experimental trust was established on a regional basis in Shensi

---

[1] "The Reactionary Nature...," op.cit. SCMM 613, pp. 20-21.

province, in one administrative district (Weinan) and confined there for about a year.[1] The experiment was claimed to be successful and by early 1965, it was expanded to include three administrative districts; by the end of 1965 it covered the entire province.[2] It eventually controlled 120 local factories and stations, six major factories, four schools, ten research stations and about one hundred stores.[3]

One of the particularly interesting features of the experimental trust in Shensi was that it established a new style of Communist Party organization. In factories that were part of the trust, the Communist Party branches were subject to the leadership of Party committees in higher-level factories. The instructions for setting up the system in Shensi advocated:

> [A] Party committee be set up at the provincial company, and the Party committees attached to district, county (municipal) companies should be led by the company Party committees of a higher level and the local Party committees, but principally by a higher Party committee of the company.[4]

Red Guards correctly perceived that this pattern of party organization was similar to the "industrial party" advocated by Khrushchev.

---

[1] The Revolutionary Leading Group of the Shensi Bureau of Agricultural Machinery, "T'an Chen-lin Cannot Shun His Criminal Responsibility for Promoting Capitalist Trust," Nung-yeh Chi-hsieh Chi-shu, No. 9, 1968. Special Edition on Mass Criticism and Repudiation. SCMM 644, p. 35.

[2] "Report on the Experimental Wei-nan Semi-Mechanized Agricultural Tool Company," Chung-kuo Nung-yeh Chi-hsieh, No. 7, July 1965, pp. 19-23. JPRS 42,484, p. 47.

[3] "T'an Chen-lin cannot shun...," op.cit. SCMM 644, p. 35.

[4] Ibid. SCMM 644, p. 37.

Another experimental trust was established in March 1964, when the "China Tractor and Internal Combustion Engine Spare Parts Company" was set up with control over thirteen local plants emphasizing tractor spare parts.[1] The authority of the trust grew, and by 1965 it controlled the distribution of 5,000 kinds of spare parts.[2] By early 1965, the spare parts trust was judged successful and expansion was urged.

In 1965 and 1966, discussions were held in China concerning the further expansion of the trust system, so that all of the Agricultural Machinery Stations, which provided most of the tractor service in China, would be included in the trust system of organization. By that time, twelve trusts altogether had been established in the industrial and transportation sectors.[3]

In the course of the Cultural Revolution, the idea of a centralized trust owning and operating all of China's agricultural machinery was crushed. Ownership of tractors was again decentralized (as it had been during the Great Leap period of 1958). Tractor stations were established under the leadership of the commune, and tractor station personnel were placed on the commune payroll. Decisions to purchase tractors were made by communes, and investments were made with commune funds. It was hoped that by placing the tractors and specialized personnel under the commune, agricultural mechanization would proceed

---

[1] "History of Struggle...," op.cit., SCMM 633, pp. 24,26; "T'an Chen-lin's Crime of Sabotage...," op.cit., SCMM 624, p. 7; "News About Agricultural Machinery," Chung-kuo Nung-yeh Chi-hsieh, No. 4, April 1965, pp. 2-3, JPRS 42, 484, p. 10; "Completely Settle the Heinous Crimes...," op.cit., SCMM 610, p. 27.

[2] "Completely Settle the Heinous Crimes...," op.cit. SCMM 610, p. 27.

[3] "T'an Chen-lin's Crime of Sabotage...," op.cit. SCMM 624, p. 6.

more efficiently and there would be less tendency for a corrupt and privileged class to emerge.[1]

D. Summary

There can be little doubt that these technical services provided by the central government (including research, extension, and mechanization) made important contributions to the success of China's green revolution after the Tenth Plenum. However, it is equally clear that the Chinese have been ambivalent about how to organize these services. There was a need to improve the technical capacity of each service. (This was most noticeable in the administration of the tractor station system, for the wastefullness of a broken tractor is more obvious than that of an unused scientist or extension agent.) In each case, centralization permitted improvement of technical abilities of the service. Centrally-determined procedures assured that tractors would be maintained properly and assured that extension stations would be effectively staffed. Centrally organized conferences and centrally published periodicals permitted the rapid sharing of technical information. In most organizations training and assignemnt of personnel was also centralized, and this further enhanced the technical capabilities of the organization.

While centralization did help alleviate the shortcomings of technical expertise in the various organizations, it caused new problems. The first problem was paradoxically with regard to the efficiency with which the technical service actually meshed with the agricultural production process. As centralization increased and bureaucratic

---

[1] Benedict Stavis, "Political Dimensions of the Technical Transformation..." p. 309-321.

regulations multiplied, the basic-level organs had less autonomy and flexibility to fit into local needs. The result was often serious inefficiencies, as was seen with the Agricultural Machinery Station system, where in order to satisfy central regulations concerning payment for tractor services and fuel usage, the stations failed to plow at the proper time or to the proper depth. Similar tendencies sometimes developed in the extension station system. The extension station personnel sometimes despite their scientific training did not understand the local crops or technical needs.

Another problem resulting from the centralization of services was the tendency to form social differences which might lead to renewal of a class system. The personnel of these organizations were paid fairly high salaries and given important fringe benefits (health and retirement rights). These factors made them quite distinct from the peasants whom they served (whose wages were based on the harvest). Moreover, officials in these organizations sometimes took advantage of their power and received special treatment. Tractor drivers, for example, sometimes demanded special meals and liquor before they would plow. Because the administrative system emphasized technical expertise, there was a certain tendency for it to be staffed with university graduates, who often came from urban areas and were often children of the former bourgeoisie. Thus there was a tendency for the system of privilege to be developed (or continued).

During the mid 1960's the Communist Party system of leadership was relied upon to reduce these tendencies towards bureaucratism and class division, but whether it would have been sufficient to check the tendencies cannot be known. Mao felt that the traditional pattern of Party leadership would not be sufficient, and decided instead

that bureaucratic restructuring would be necessary. The Cultural Revolution, which began in 1966 and continued for several years, sharply changed the structure of these organizations in an attempt to minimize these problems. The extension service and the agricultural machinery system were taken out of the central bureaucracy and placed under the supervision of the communes. This meant that the personnel of these systems were no longer members of a special, powerful, national elite. They were simply commune members with special responsibilities. Moreover, since their work was more directly related to problems of production of the commune, it was hoped that it would be simpler to integrate their specialized knowledge with the production process.

Whether these decentralized technical units will be able to maintain high technical standards is not yet clear, but there are a few reasons why they could do so. First, the number of skilled technicians in the various fields has increased tremendously since the initial unsuccessful decentralization attempt in 1958. Secondly, there are some indications that the central government has maintained some central technical leadership services. This is symbolized by the reappearance of scientific journals published by central organizations. Furthermore, even though scientists are employed by communes, it is clear that there are central regulations governing the terms of their employment. Thus the evidence is that China is seeking to maintain technical expertise in the context of decentralized management of highly technical services. As suggested above, however, the problem seems most acute in the field of scientific research, where it is not yet clear that the new patterns of organization are leading to satisfactory scientific work. For all these services our conclusions must be highly tentative, because we lack detailed data, and the institutional changes are quite recent.

Chapter 6

"RURALIZING" THE ADMINISTRATIVE INFRASTRUCTURE

While for some sections of government the main problem was improving the level of technical expertise, for others the main problem was making them more accessible and more relevant to the rural population--i.e., "ruralizing" them. After the Tenth Plenum the central leadership tried to reorient the educational, commercial, and banking systems to rural needs in order to assure agricultural growth and rural development. Despite rather vigorous efforts, however, China was not especially successful in "ruralizing" these services until the Cultural Revolution in the late 1960's.

A. Education

Education has always been considered a crucial element in agricultural development.[1] It provides everyone involved in agriculture--including peasants, extension agents, distributors of agricultural supplies, and policy makers--with both technical knowledge and attitudes toward change and experimentation. The Chinese leaders have been very sensitive to the importance of education and have stressed both the expansion of educational opportunities until universal education is attained and the character

---

[1] Careful studies have shown that education has made a very large contribution to economic development. A good review of the literature dealing with this theory is William Miller, "Education as a Source of Economic Growth," Journal of Economic Issues I:4 (1967), pp. 280-296. A collection of essays on this topic has been edited by Arnold Anderson and Mary Jean Bowman, Education and Economic Development (Chicago: Aldine, 1965). See also: Anthony Tang, "Policy and Performance in Agriculture," in Alexander Eckstein, Walter Galenson and Ta-chung Liu (eds.), Economic Trends in Communist China (Chicago: Aldine, 1968), p. 494;

of education, so that it is more appropriate for rural needs.

Concerning the expansion of educational opportunities in rural areas, overall statistics are not available, but scattered reports suggest that by the mid-1960's, primary education was nearly universal. In the communes Burki visited in 1965, school enrollment constituted about 22 percent of the total population of the communes.[1] One demographer estimated that children aged 5 to 14 years constituted 24.3 percent of the population in 1958;[2] so if this is assumed to be the school-age population in these communes (obviously an imprecise assumption), then about 88 percent of the school-age children was in school. In Kwangtung in September 1964, it was reported that 69 percent of school-age children were enrolled in school.[3] Also, in 1964, it was claimed that 80 to 90 percent of primary school-age children in China were in school in the rural areas.[4] These reports indicate a fairly consistent range, with percentage enrollments probably higher now, some ten years later.

---

and Ramon Myers and Adrienne Ching, "Agricultural Development in Taiwan under Japanese Colonial Rule," Journal of Asian Studies XXIII (August 1964).

[1] Shahid Javed Burki, A Study of Chinese Communes, 1965 (Cambridge: Harvard University East Asian Research Center, 1969), pp. 50-97.

[2] John Aird, The Size, Composition, and Growth of the Population of Mainland China (Washington: Bureau of the Census, 1961), p. 83.

[3] "Kwangtung Adopts Measures for Consolidating Farming-Study Primary Schools," Canton Yang-ch'eng Wan-pao (Canton Evening News) October 19, 1965. SCMP 3572 p. 16.

[4] "China Develops Rural Primary Education," NCNA Peking, May 26, 1964. SCMP 3229 p. 10.

Despite these advances, there were still important problems with the education system stemming mostly from the urban orientation which prevailed at middle-school level and above. As late as 1964, most middle schools were boarding schools in urban areas, and required payment of tuition. At these schools, students tended to see themselves being trained (or at least qualified) for government jobs in cities and industry.[1] Of course, the idea of education being used to qualify people for secure, urban, government jobs is obviously closely related to a strand of Chinese culture thousands of years old.

Regular primary schools in the countryside tended to be shaped by this orientation. Curriculum was developed to prepare students for these urban schools. Examinations were used to select students for further schooling and to promote them to higher classes. The county education department operated these schools and supervised the teachers, teaching material, school calendar, and all other aspects.[2]

The result of this system was that the regular primary schools tended to be removed from the activities of rural life. Academic calendars were not fixed to make it convenient for students to help with farm labor during seasons of labor shortage. It was very difficult to cancel school to meet emergency needs of farming, caused by

---

[1] Marianne Bastid, "Economic Necessity and Political Ideals in Educational Reform During the Cultural Revolution," China Quarterly No. 42 (April-June 1970), p. 17.

[2] About 78 percent of rural primary schools were operated by the state; the remainder were run by communes or brigades. "China Develops Rural Primary Education," NCNA Peking, May 26, 1964. SCMP 3229 p. 10.

flood or drought, for example. The curriculum was not closely keyed to the problems of agriculture, the science courses and mathematics courses did not use rural reality for examples.[1]

Towards the end of 1964, a new educational policy emerged in which a second school system was to be established to train students at all levels in agricultural technology. To encourage the establishment of farm-study schools at the primary level, provincial conferences were held,[2] followed by a national conference in May 1965, which was addressed by Liu Shao-ch'i and Lu Ting-yu.[3]

The new farm-study primary schools were not expected to replace the regular state-run schools.

> At the conference of Kirin Province, it was unanimously held that we must realize that for a great length of time to come, these two types of schools must exist side by side. They should all be run properly.[4]

It was, in fact, hoped that the schools would help each other:

> The educational departments must in no way pay attention to one type while neglecting the other. The teachers and cadres of the two types of schools should learn from each

---

[1] Bastid, op.cit., p. 19.

[2] "Many Provinces and Autonomous Regions Hold Conferences on Part-Farming and Part-Study Education--Uphold the Spirit of the National Rural Conference on Part-Farming and Part-Study Education," KMJP July 25, 1965. SCMP 3518 p. 8.

[3] "National Conference in Peking on Farm-Study Education," NCNA Peking, May 29, 1965. SCMP 2470 p. 20.

[4] "Many Provinces and Autonomous Regions Hold Conferences on Part-Farming and Part-Study Education..." KMJP July 25, 1965. SCMP 3518 p. 8.

> other, encourage each other, make up for what one lacks in another and seek common progress.[1]

What was the magnitude of the farm-study school program at the primary level? In Kwangtung it was a large program. From September 1964 to May 1965, the number of schools in the countryside increased from 16,000 to 36,000, the increase reflecting the establishment of farm-study schools. The establishment of these schools raised the percentage of school-age population in school from 69 percent to 80 percent.[2] In Kiangsu, an additional 60,000 farm-study primary schools for 1,500,000 students (representing roughly 10 percent of school-age children) were created. These schools, averaging 25 students, were at the production team or brigade (i.e., village) level. Hopei and Kwangtung also reported similar programs.[3]

Efforts were also made to establish (actually re-establish) a "second track" for middle and higher education. The Ministry of Agriculture (not the Ministry of Education) called a National Conference on Higher and Intermediate Agricultural Education in August 1965. The conference was important enough to have Mao Tse-tung, Liu Shao-ch'i, and Politbureau agricultural specialist T'an Chen-lin participate.[4] The deliberations proceeded on the

---

[1] Ibid.

[2] "Kwangtung Adopts Measures for Consolidating Farming-Study Primary Schools," Canton Yang-ch'eng Wan-pao (Canton Evening News) October 19, 1965. SCMP 3572 p. 16.

[3] "Many Provinces and Autonomous Regions Hold Conferences on Part-Farming and Part-Study Education..." KMJP July 25, 1965. SCMP 3518 p. 8.

[4] "Profound Revolution in China's Agricultural Education," NCNA Peking, September 8, 1965. SCMP 3536 p. 20. Also: "Agricultural Education Must Be Oriented to

principle of "from the commune and back to the commune," meaning that the students of agricultural schools should come from peasant families living in communes, and that the graduates would return to the communes and would assume agro-technical jobs such as accounting, managing, veterinary services, and teaching.

At the middle school level, there had been some experience with specialized agricultural schools during the Great Leap of 1958, but many of these were closed soon afterwards. From 1962 to 1964, a new system of farm middle schools was established. These schools recruited 11,300 students by March 1964.[1] By September 1965 they had recruited 30,000 students of whom 10,500 had graduated.[2] These schools were run at the county level, but it was not clear if they were supervised by the education department or the agricultural department.[3] One striking feature

---

the Countryside, to the Peasants and to Production--Chairman Mao gave an important directive on the revolutionary direction for agricultural education," JMJP August 24, 1965. SCMP 3538 p. 6. Also: "Carry Out Gradually the Part-Farming and Part-Study, 'From the Commune and Back to the Commune' Education System," JMJP August 24, 1965. SCMP 3538 p. 7. Also: "Try to Conduct 'From the Commune and Back to the Commune' Agricultural Education Properly," JMJP comentator, August 24, 1965. SCMP 3538 p. 9.

[1] "Chinese Agronomical Schools Train Agrotechnicians for Communes," NCNA Peking, March 27, 1964. SCMP 3189 p. 18.

[2] "Carry Out Gradually the Part-Farming and Part-Study, 'From the Commune and Back to the Commune' Educational System," JMJP August 24, 1965, SCMP 3538 p. 7; and "Profound Revolution in China's Agricultural Education," NCNA Peking, September 8, 1965. SCMP 3536 p. 20.

[3] Successful models were reported in several provinces, including Fukien, Kwangtung, and Hopei, "Agricultural Middle Schools in P'ingho Hsien, Fukien, Are Developed and Consolidated," KMJP June 17, 1964, SCMP 3257 p. 15; Work Team, Propaganda Department, CCP Kwangtung Provincial Committee, "Cultivate New People on the Basis of Half-Farming

about them is that they foreshadowed the Cultural Revolution reforms with regard to the method of student selection: "The Party organizations of various communes and brigades make a careful choice of the students to be sent to the schools. This insures the quality of students."[1] Although no specific goals were published, it seemed that this system was to be expanded greatly, perhaps at the commune level. Some schools were reported being sponsored by one or a group of production brigades.[2]

A similar system of "from the commune and back to the commune" was recommended for adoption in the agricultural colleges within the various ministries involved with agriculture. NCNA reported that "apart from certain departments and classes for special purposes, all new agricultural colleges and schools should be run along farm-study lines." The existing colleges would not be subject to great pressure, but they were asked to change over to the new system "gradually."

At the August 1965 conference, it was reported that 37 of the 66 agricultural colleges were practicing or trying out the system of fully integrating academic work and labor; but these new programs involved only 15 percent of the students. In agricultural secondary schools, work-study programs were reported in 222 of 307 schools, involving 52 percent of the total enrollment.[3]

---

and Half-Study--Introducing Yaishan Agricultural Middle School in Hsinhui Hsien," JMJP July 5, 1964. SCMP 3262 p. 9; "Successful Agricultural Middle School Popular in East China," NCNA Hangchow, October 13, 1964. SCMP 3320 p. 16.

[1] "Carry Out Gradually the Part-Farming and Part-Study, 'From the Commune and Back to the Commune' Educational System," JMJP August 24, 1965. SCMP 3538 p. 8.

[2] "Establish Agricultural Middle Schools in Production Teams," JMJP November 22, 1964. SCMP 3353 p. 13.

[3] "Profound Revolution in China's Agricultural Education," NCNA Peking, September 8, 1965.

A serious problem emerged from this attempt to change the educational system in a manner more suited for agricultural development. The establishment of a second educational system must have heightened fears that a class system might be re-established in China because only the urban youths could go to the top-rate universities and get jobs leading to political power. After the Cultural Revolution a different method was developed to assure the relevance of education. Primary and middle schools were to be run by brigades and communes. As for university education, its relevance would be assured by the requirement that students work in farms and factories before admission. The concept of a dual education system was dropped.

B. Commercial System

The commercial system in traditional rural economies dealt in previous times with consumption rather than production activities. Traditionally it did not deal with means of production for agriculture as these were all supplied locally.[1] The system handled primarily a few mass consumption items like cloth and kerosene or luxury commodities of high enough price to justify transportation, e.g., specialized food products or small manufactured goods. Modern agriculture, however, requires a different type of commercial system which can provide manufactured inputs for higher levels of production. It also requires supply on a large scale of manufactured consumer goods, so that rural people have an incentive to market a portion of the crop and obtain cash.

The problems of transforming marketing conditions are large in any case, but were even larger in China because

---

[1] Some modification can be made to this generalization, inasmuch as there was some trade in traditional bean cake fertilizers and night soil from cities to nearby farm areas.

of the socialist transformation of the 1950's. In winter 1955-56, state trading companies took over most of the commercial system, and Supply and Marketing Cooperatives were established to control domestic trade. In 1958, when communes were established, these supply and marketing cooperatives were given increased control over trade and the traditional periodic markets in market towns were terminated. Severe disruption of the marketing system resulted from three causes.[1] First, there was confusion resulting simply from the change in institutions, controls, incentives, procedures, etc. Any institutional change must be accompanied by some confusion. Second, when communes were first established, they were larger than the traditional marketing communities; no one could know the precise marketing situation within the new units. This was complicated by the fact that in many cases the traditional marketing patterns did not correspond to the new political-administrative regions. Third was the question of personnel. The state-run trading companies and supply and marketing cooperatives probably were staffed with people with a political background, supplemented by school graduates. They probably did not employ many of the old traders, who often had an intimate knowledge of the rural marketing situation.[2] Thus, while the state take-over of the marketing system created opportunities to tackle directly some problems of the traditional system, it also created new problems which had to be solved.

---

[1] G. William Skinner, "Marketing and Social Structure in Rural China," Journal of Asian Studies Vol. 24 No. 3 (1965) pp. 367-376.

[2] I am unaware of primary or secondary material concerning the extent to which old traders were absorbed into the new commercial system. Perhaps in some regions many people with experience in rural marketing remained in the commercial system. This would be an interesting point for further research.

After the Tenth Plenum the Chinese leadership made serious efforts to improve the commercial system. However, this task has proved to be very large and complicated, and the leadership has had only mixed success. As suggested above, the most common means of distributing both agricultural inputs and consumer goods is through state-owned and operated supply and marketing cooperatives.[1] The basic level supply and marketing cooperatives are essentially general stores. They retail both consumer goods (such as thermos bottles, writing paper and pens, flashlights and batteries, clothing, material, shoes, etc.) and agricultural inputs such as chemical fertilizer, insecticides, seeds, farm tools, etc., that are supplied both from modern industry and from traditional handicrafts. The supply and marketing system had both fixed points at the basic level (analogous to stores) and outlets at traditional rural fairs.

At the time of the Tenth Plenum, the marketing system had many features analogous to a capitalist system, even though it was owned by the state. While the stores could not set their own prices for most goods (prices were fixed by the state trading companies), each store had substantial autonomy and was generally expected to show a profit, although subsidies are probably given in poor areas. Each store selected by itself (with advice from local Party cadres) what items to stock and how large an inventory to maintain. (Of course, for items included in the state plan, such as fertilizer, the store had no such discretion.) Delivery arrangements were subject to negotiation between the store and purchaser. Generally, these decisions were based on market considerations and were

---

[1] Wang Chung-kung, "On Commerce's Aid to Agriculture," Kung-jen Jih-pao (Worker's Daily, hereafter KJJP) November 5, 1961. SCMP 2633 p. 20.

designed to maximize profit. The result was that the marketing system had serious shortcomings from the point of view of agricultural development because stores had a tendency to stock those items which had both high mark-up and high turnover. They tended to carry goods which had a high cost-to-bulk ratio, so that delivery would be less of a problem. The stores sometimes refused to merchandise bulky goods. Stores were also reluctant to handle items such as machinery or pesticides which required extensive education to be used profitably. Nor did stores like to handle items for which demand was seasonal, such as specialized implements. If they are not made available at the right time, they would have to be stored for a year, resulting in loss of working capital. Marketing in rural areas was further complicated by the fact that agricultural inputs are often bought before harvest, and therefore require credit. The supply and marketing cooperative was unable to arrange credit unilaterally, and had to coordinate such transactions with a bank, which would provide credit. This would involve a certain effort in filling out forms and waiting. To avoid this inconvenience stores sometimes simply sold to wealthy communes which had cash on hand. "As a consequence, when some poor production teams are now in urgent need of chemical fertilizer, it is not available even if they have the cash to pay for it."[1] Another problem was simply that personnel of the supply and marketing cooperatives (i.e., salesmen, cashiers) were not familiar with most recent agricultural chemicals and supplies, and had to spend much effort to learn the usages of various new supplies. As a result of

---

[1] "How Should we Handle the Work of Supplying Means of Agricultural Production? -Letter from a Reader," TKP April 10, 1965. SCMP 3449 pp. 18-19.

all these problems, the retail system of the late 1950's and early 1960's was not geared to encourage technical transformation of agriculture.

One article in 1961 conveniently summarized many of these problems of the commercial system:

> Some commercial workers do not actively push the trade in small farm implements because they think that these implements are too many kinds and specifications, and command low prices, and they are therefore loath to take the trouble of handling them or carrying large stock. They are also afraid of losing money.
>
> Some commercial workers fail to organize the production and purchasing of certain native, special products because they are miscellaneous and scattered.[1]

Another article in June 1962 laid the blame squarely on the bureaucratic factors in the organization of the commercial system:

> Some [commercial] bureaucrats considered farming as none of their business. They could not see beyond their noses and were obsessed with thoughts of the interests of their own departments, oblivious of the fact that only by bolstering agricultural production and developing agriculture unceasingly can they advance the programs of their own departments. Therefore, though they verbally admitted or expressed the need of support for agriculture, they did not act accordingly without reserve, or even did something contrary to the spirit of serving agriculture.[2]

---

[1] Wang Chung-kung, "On Commerce's Aid to Agriculture," KJJP November 5, 1961. SCMP 2633 p. 20.

[2] Fang Nan, "Open the 'Greenway' for the Massive Undertaking of Agriculture," NFJP June 2, 1962. SCMP 2773 p. 12.

Liang Yao, Vice Chairman of the All-China Federation of Supply and Marketing Cooperatives, pointed out that commercial problems were growing as modern agricultural supplies became more available. Improvement in the distribution of chemical fertilizer was important so that it would be concentrated in locations of high commodity yields, though some was supposed to be saved for poor areas. With regard to tools, more supplies were needed of smaller, light-weight tools for mountainous areas. However, the supply and marketing cooperatives were warned not to popularize "blindly" equipment that had not been properly tested. Supplying of chemical insecticides posed special problems.

> It is also necessary to institute and perfect systems of special warehouses for insecticides and special persons in charge of them. We must step up the technical guidance and tell the masses, by means of extensive propaganda, the properties of insecticides and what points they must pay attention to when using it, thus preventing insecticides from becoming ineffectual due to deterioration and preventing poisoning.[1]

He, too, saw organizational factors and the profit motive as reducing the efficiency of the supply and marketing cooperatives:

> The workers of the supply and marketing cooperatives...must not choose goods in which they are to deal in terms of profit. They must overcome the erroneous thought that it is not worthwhile dealing actively in those means of production which do not yield high or any profit.[2]

---

[1] Liang Yao, "Further Improve the Supply of Agricultural Means of Production, Support Agricultural Production, and Consolidate the Collective Economy of the People's Commune," KJJP February 12, 1963. SCMP 2934. p. 1.

[2] Ibid.

The leadership tried in a variety of ways to improve the commercial system. Instruction after instruction was issued, pleading with store personnel to learn more about the realities of rural commerce. In 1963, the supply and marketing cooperatives' personnel were advised:

> In organizing production and supply of agricultural means of production, members of supply and marketing cooperatives, particularly those at basic levels, must go among people's communes and production teams and mix with the masses of peasants so as to understand the situation of agricultural production. They must listen to and respect the peasants' ideas and arrange business in agreement with local demands and according to the special features of agriculture, forestry, animal husbandry, fishery, and side occupations. The manner in which business is blindly conducted without consideration of conditions and demands must be firmly opposed.[1]

Similar suggestions came in 1965:

> What is most important is, through purchasing and marketing activities, to ascertain the trends of the market and, in accordance with the characteristics of the locality at that moment, to master the objective laws of enlivening the rural market, so as to promote the development of the socialist cause by enlivening the market.
>
> ...in doing business with the peasants, it was necessary to purchase farm products before selling industrial articles in the countryside. The primary task of going deep into the countryside, therefore, is to purchase the peasant's small, native products

---

[1] "Supply and Marketing Cooperatives' Important Task at the Present Moment," TKP January 23, 1963. SCMP 2936 p. 12.

> and support the peasants in turning out small, native products. When a firm hold is taken on this link of purchase, it will be possible to enliven the whole rural market.[1]

Another way of dealing with this problem was to reassign personnel to basic level units. This was done in 1965 in Heilungkiang, when 2,000 cadres were transferred from county and higher levels to the basic levels. While this number is not insignificant, we note from Table 6.1 that the supply and marketing system had become so top heavy in the years after 1957 that the transfers were not enough to re-establish the proportions of 1957. The retrenchment campaign was not terminated with the transfer of these 2,000; but there is no way of knowing how much further it went.[2]

TABLE 6.1

Supply and Marketing Cooperative Personnel in Heilungkiang

Year	Personnel at Basic Level	Personnel at County and Higher	Total Personnel
1957	44,000 (80%)	11,000 (20%)	55,000
1964	45,500 (70%)	19,500 (30%)	65,000
1965	47,500 (73%)	17,500 (27%)	65,000

Source: "Retrench Administrative Personnel at Higher Levels and Reinforce the First Line of Purchasing and Marketing Work in the Countryside--Heilungkiang supply and marketing cooperative system meets the needs of the new upsurge in agricultural production." Takung Pao, July 7, 1965. SCMP 3509, p. 8.

---

[1] "Greater Numbers of Commercial Workers are Required in the Countryside," JMJP editorial, June 5, 1965. SCMP 3489 pp. 7-9.

[2] "Retrench Administrative Personnel at Higher Levels and Reinforce the First Line of Purchasing and Marketing Work in the Countryside--Heilungkiang supply and

The drift of personnel to higher levels from 1957 to 1964 is interesting and important. It reveals a desire of cadres to achieve higher-level jobs in an urban environment. This tendency is fully in accord with centuries of Chinese tradition. The tendency, of course, is not unique to China but in fact recurs and is a problem in most underdeveloped parts of the world. This tendency, stemming from cultural heritage, has very deleterious effects on agricultural development. (It is not known whether the retrenchment carried out in Heilungkiang in 1965 was typical of all provinces or was experimental and unique.)

In addition to buying and selling, the supply and marketing system was asked to assume certain technical educational functions. In Anyuan County, Kiangsi, a supply and marketing cooperative took the initiative in teaching production teams how to organize collective sideline production.[1] Until the supply and marketing cooperative did this, the production teams in the area were unable to develop collective sideline production because the richer peasants were monopolizing those sideline products with the largest profit. The collective was left with the unprofitable activities, and naturally, there was little enthusiasm for collective sideline activities under these circumstances. The supply and marketing cooperative was able to take initiative in this situation because it could instruct the commune on production of a specific item and assure purchase of the item.

---

marketing cooperative system meets the needs of the new upsurge in agricultural production," TKP July 7, 1965. SCMP 3509 p. 8.

[1] "Will Development of Collective Sideline Production Affect Family Sideline Production?--Workers of the Anyuan hsien, Kiangsi, positively assist production teams in developing collective production," TKP June 28, 1965. SCMP 3498 p. 7.

In another case, a supply and marketing cooperative in Kwangtung discovered that production teams and communes were purchasing new tools in part because they lacked the knowledge to repair tools. The supply and marketing cooperative took the initiative to organize training programs. Technicians were transferred from handicraft cooperatives and used to train repairmen for the production teams. Over 1,500 people were retained for 1,300 of the county's 2,800 production teams.[1]

Another example of a supply and marketing cooperative was reported in the Swatow area, an area in which new seeds and cultivation techniques had been widely adopted. In late 1964 and winter 1965, the supply and marketing cooperative foresaw that the available supplies of modern, chemical insecticide would fall short of need. Thus the supply and marketing cooperative organized cadres to go to the production teams to teach the teams how to make native insecticide from picrasma quassioides, mullusca shell, lime, sulphur, and soap. It was reported that it was 80 percent effective and cost only ¥0.50 for each mou.[2] This same supply and marketing cooperative also discovered that spraying equipment for insecticides was not in good repair. It ordered spare parts and organized handicraftsmen to visit the teams to fix the sprayers. In ten days, 101 sprayers were repaired.[3]

---

[1] "Farm Tool Repairers Trained for Production Teams in Shunte hsien, Kwangtung," TKP April 20, 1965. SCMP 3458 p. 11.

[2] "Supply and Marketing Cooperatives in Various Parts of the Swatow Administrative District Give Energetic Support in Eliminating Insect Pests," NFJP May 19, 1965. SCMP 3481 p. 9.

[3] Ibid. In this area where so much extension work had been reported to have been done with respect to seeds and cultivation techniques, it seems surprising at first

It is important to note that in all of these efforts to reorient commercial departments to the rural areas, it was always presumed that in the long-run economic profitability would be maintained.

> In the long run [organizing large number of commercial workers to go to the countryside] helps to purchase all sorts of small, native products, supports rural production, improves the peasants' living, thereby not only activating the rural market to a further extent, but also further expanding the urban market. That is to say, the commercial workers should regard the countryside as a vast activity center where potentials are inexhaustible, develop the full role of commerce as a bridge, take the initiative in promoting industrial and agricultural production, and create an ever booming rural market.[1]

Despite all these directives, suggestions, programs, etc., these types of problems continued into 1965. Of course, we don't know which problem areas predominated, but they remained troublesome to the leadership. When Chiang Hsi-chang, a high-level cadre in Kirin, was "sent down" to work at a local store, he was surprised to discover continued weaknesses of the marketing system:

> ...Some basic-level supply and marketing cooperatives believe that after handling supply work in the last few years, the

---

that the commercial personnel are assuming this responsibility. One might have thought that these tasks would have been performed by the agro-technical extension stations. But it seems that this sort of flexibility was encouraged.

[1] "Greater Numbers of Commercial Workers are Required in the Countryside," JMJP editorial June 5, 1965. SCMP 3489 pp. 8-9.

> needs of the rural areas for small farm tools have basically been met. They think they no longer have any more things to do.
>
> As a consequence, they have shifted the backbone personnel to groups which handle the sales of industrial goods for daily use. Thus they have devoted a great deal of attention to the work of supplying consumer goods--in this way letting those sales personnel who are less professionally competent handle concurrently or supervise the sales of means of farm production.
>
> These people are not familiar with the specifications, quality, performance, directions for use, as well as maintenance and servicing of agricultural machinery and tools, insecticides, chemical fertilizers, and other means of production. They do not even know how to distinguish three-blade plows from four-blade ones.
>
> Moreover, these sales personnel are frequently transferred. Any job that needs to be done is turned over to the group which handles the sales of means of production. When commune members want to buy small farm tools, sometimes they cannot find the sales supervisors. Even if they do find the right man, the latter may not necessarily be able to solve their purchasing problems.[1]

Weaknesses in selling production supplies included subtle factors such as the way goods were displayed. Chiang perceptively observed:

> What is the most suitable place for the display of small farm tools for sale? Some sales personnel of basic-level supply and marketing cooperatives always find

---

[1] "How Should We Handle the Work of Supplying Means of Agricultural Production?--Letter from a reader," TKP April 10, 1965. SCMP 3449 pp. 18-19.

> plows, steel forks, hooks or hoes, saddles, cattle gear, as well as rope and cords unsightly. They find it difficult to display these tools because they occupy considerable space. If placed in the sales rooms, they simply become eyesores.
>
> Therefore, they make a practice of prominently displaying industrial goods for daily use and putting small farm tools in neglected corners. Moreover, the range of farm implements on display is incomplete and their quality insufficient. In some sales rooms, certain small farm tools are not displayed at all. When commune members come to buy them, they have to get them from the warehouse. Even so, they have no choice but to take what they can find there.[1]

In June 1965, despite several years of attempted reorientation, People's Daily editorialized in detail about the weaknesses of the rural commercial network:

> ...Generally speaking, rural commercial work still lags behind objective demands. The situation in many counties shows that commercial strength is strong in townships and weak in rural areas. Great numbers of the personnel of the commercial departments in many localities stay in townships and few go regularly to rural areas. Sales departments of various forms are set up in the county government seat, so that the commercial workers are insufficient on the first line of the countryside. Some people are accustomed to doing business in townships, but not in the countryside. Can this work method meet the demand of making commercial work serve the countryside? Is it in accord with the principle of the socialist relationship between the cities and the countryside? It is not.[2]

---

[1] Ibid.

[2] "Greater Numbers of Commercial Workers are Required in the Countryside," JMJP editorial June 5, 1965. SCMP 3489 pp. 7-8.

During the Cultural Revolution it was again "discovered" that the supply and marketing system was not performing properly.[1] One of the serious problems was that supply and marketing cooperatives were often still unable to serve the needs of agricultural production. Their personnel often were unaware of what tools and other supplies were needed at what times. The stores often kept hours that were inconvenient for peasants. Sometimes stores stocked certain delicacies that only wealtheir people could afford and failed to stock commodities that poor people needed. In addition to these problems, it was implied that there were moderately frequent cases of corruption. Pilferage of stocks was not unknown; stores sometimes purchased goods for individuals; prices were sometimes manipulated; and kickbacks may have been involved in the distribution of commodities in short supply.

To cope with these problems, it was recommended during the Cultural Revolution that the poor and lower-middle peasants seize control over some aspects of rural commerce. The commune revolutionary committees were urged to assume control over the management of the supply and marketing cooperatives. This included making decisions on personnel, salaries, business hours, and political education of personnel. At the same time, the financial, price, supply and marketing plan, and the delivery and disposal of goods remained under strict unified state control. Data are unavailable to indicate the extent to which this pattern of managing the supply and marketing system was adopted.

---

[1] A lengthy discussion of the supply and marketing system was commenced by the publication of "Is it a Good Thing for Poor and Lower-middle Peasants to Run Rural Commerce?" JMJP January 18, 1969. This seminal article and the ensuing articles are available in CB 875.

The difficulties China has encountered in creating a commercial system more suitable to modern agriculture are impressive. It is impossible to separate out the different causes of the problems. Some were inherent in the modernization process. Others, primarily the urban orientation and ignorance of rural conditions, are probably related to the state take-over of marketing and presumed replacement of experienced merchants with urban school graduates. The Chinese leadership clearly believes that an effective commercial system is very important for agricultural development, and most Western observers would agree. The Chinese experience also shows how fragile a commercial system is, how easily it can be disrupted, and how difficult it is to reconstruct and transform, especially in the absence of capitalist incentives.

C. Banking

Another requirement for the development of agricultural technology is a suitable credit system. Credit is particularly important for agricultural development because agricultural production is seasonal, with expenditures for inputs required before receipts from harvesting are available. As more modern inputs are utilized, cash-flow problems become more serious. In addition, banking facilities can supply important technical services. Since the credit is usually for agricultural inputs, the banking personnel, if they are knowledgeable about the details of agricultural technology, can offer valuable advice to the purchaser concerning the technical suitability of the desired inputs. Moreover, bank personnel can assist the production unit in establishing financial records that will permit accurate cost accounting.

In 1960 and 1961, leaders in the finance system in China wrote about how the banks could provide these

services.[1] After the Tenth Plenum, a decision was made to strengthen the rural banking services and agricultural credits were increased.[2] A National Rural Financial Work Conference was held in March 1963 -the first such conference since the founding of the PRC.[3] At the same time, an Agricultural Bank was re-established as a separate organization. (It had existed from 1955 to 1957.)[4]

Because China is a socialist country, credit for expanding the production resources goes only to collective units, i.e., to a commune, brigade, or team. An individual farmer cannot get credit to buy machinery or any other means of production in China. (Individual families can get loans for personal matters; for example, for hospital bills.)

In making loans to collective units, the agricultural banks in China faced important contradictions. On one hand, they were to promote agricultural development; on the other hand, the banks wanted to maintain their financial position. Some banks refused to loan out money for fear that they would not be able to get the loans repaid.[5] Another problem was that banks often preferred

---

[1] Ko Chih-ta, "On the Relationship between Agriculture and Finance," TKP February 23, 1961. SCMP 2462 p. 1. Also, "Ways in Which Banks May Support Agricultural Production," TKP editorial, April 25, 1961. SCMP 2462 p. 1.

[2] "Proper Management and Utilization of State Funds for Agriculture," JMJP editorial, January 28, 1964. SCMP 3162 p. 64.

[3] "The Glorious Duty of Rural Financial Workers," TKP editorial, March 28, 1963. SCMP 2565 p. 12.

[4] Franz Schurman, Ideology and Organization in Communist China (Berkeley: University of California, 1968), p. 186.

[5] Kuan Sen, "Promptly Issue Agricultural Loans to Aid Needy Production Teams," TKP July 9, 1962. SCMP 2787 p. 16.

to issue long-term loans instead of short-term loans for agricultural supplies. Perhaps this was done to reduce administrative costs associated with making loans. This often meant that it was difficult for production teams to purchase fertilizer on credit.

There was also a contradictory problem in offering credit in China. Because China is a socialist country, there is pressure towards egalitarianism; at the same time, banks lend to those who are most (or sufficiently) credit worthy. One manifestation of this contradiction would be that banks would give out money according to the size of the production team or its yields. The actual needs of production would be ignored.[1] Such a formula presumably simplified the work for the bank and reduced hard feelings between the teams. It did not, however, use credit selectively to assist production.

Another set of problems for rural banks concerned relations with other organizations. Credit had to be coordinated with actual supplies of agricultural inputs. If a production team was issued a loan but could not procure the desired fertilizer, then the loan was wasted. Thus coordination with the supply and marketing cooperatives was desired. Another problem has been how to relate the availability of credit to the needs of social justice. This required making a special effort to supply credit to poor production teams, despite the fact that they might be bad credit risks. Another responsibility of the rural banks was to assist the production units in

---

[1] "Intensify the Examination of the Result of the Use of Agricultural Funds," TKP editorial, July 7, 1963. SCMP 3031 p. 14. Also, Kuo Chen-pang, "Agricultural Loans Should Not be Distributed Evenly," TKP August 13, 1962. SCMP 2810 p. 11.

developing bookkeeping systems that were accurate and would permit evaluation of various production techniques. Moreover, the rural banks were expected to assist communes establishing and managing credit cooperatives to handle the personal banking requirements (savings and loans) of individual farmers.[1]

The financial system tried to cope with these problems after 1963. Journals carried articles on the problems; banking cadres were organized to visit the poor peasants to learn of credit needs.[2] An editorial in 1965 suggested that party leadership over the banking system be strengthened and that the poor and lower-middle peasants should exercise supervision over the system.[3] While many articles suggested improvements for the rural banking system, the extent to which these improvements were implemented is not known.

* * * * * * * *

Orienting these services--education, marketing, banking--to rural needs has been a persistent challenge in China.[4] These services need educated personnel; such personnel tend to come from urban areas and tend to shape their institutions to an urban culture. In addition, they

---

[1] "Agricultural Bank Organizes Credit Cooperative Cadres to Serve Poor and Lower-Middle Peasants," TKP March 10, 1965. SCMP 3424 p. 12.

[2] "Assist Poor Peasants and Lower-Middle Peasants in Improving Their Economic Position by Providing Them with Funds," TKP editorial, September 12, 1963. SCMP 3074 p. 8.

[3] "Make a Good Job of Issuing Agricultural Assistance Funds, Bring About a New High Tide in Agricultural Production," TKP editorial, April 2, 1965. SCMP 3440 p. 10.

[4] We have not examined here other services such as health services which encountered similar problems but have less direct relevance to agriculture.

may simply be ignorant of rural needs. Leadership of these organizations by the Communist Party has not, by itself, been able to assure responsiveness to rural conditions. Decentralization and increasing the power of the commune over the organizations has also been necessary.

Chapter 7

POLITICAL LEADERSHIP FOR AGRO-TECHNICAL CHANGE

In addition to the production and distribution of modern agricultural supplies, the creation of a rational economic incentive system, the improvement of agro-technical services, and the "ruralization" of other government services, most of China's leaders believed that vigorous leadership by the local government and by Communist Party committees was also necessary. There were two reasons. First, leadership would assure that technical transformation would have desirable social consequences, that collective interests would be reinforced, and that no new elite could arise from control over modern technology. In addition they thought leadership was needed to get growth in productivity. Thus precisely at the time when overall policy shifted to emphasizing technological transformation, political leadership was intensified also.

A. The Function of Political Leadership

Before looking at the actual leadership methods adopted, it is useful to understand the broad Chinese vision of leadership. A fundamental precept in Chinese Communist ideology is that class struggle, of varying intensity, continues throughout the period of socialism and transition to communism; the forces of capitalism remain quite strong, and are constantly attempting to regain power.[1] The Chinese leadership (or at least the Maoist elements in the leadership) believe that such a

---

[1] There are many people in China who disagree with this analysis. They argue that the socialist revolution has been victorious and that the forces of capitalism have been annihilated. Therefore they advocate a theory of the dying away of class struggle. (One formulation of this

capitalist restoration has taken place in the Soviet Union, the cradle of socialism, since the mid 1950's, and that this proves the necessity for vigilance and constant struggle against capitalism, even in the era of socialism.

While the Chinese leaders often refer to the evils of capitalist restoration, the precise definition of "capitalism" in this context is not simple. From a narrow economic point of view, capitalism refers to private ownership and management of the economy, with the profit going to an individual. But equally or more objectionable are the attitudes which accompany private property. From property arises a selfish viewpoint, in which an individual feels his own self interest is more important than the interests of his fellow countrymen or fellow workers. Associated with selfishness is arrogance, a disregard bordering on contempt for the interests of others.

The Chinese believe that selfishness and arrogance are invariably associated with private property, but can also emerge from possession of political power. These traits are particularly likely to be manifested in political systems in which those with power are separated from those

---

thesis is the philosophical concept "two turns into one" erh-fen-yi, which was severely criticized in the early 1960's.) Mao strongly believes that the people who advocate dying away of class struggle are, at best, dupes of the capitalists if they are not died-in-the-wool capitalists themselves. Acceptance or rejection of this precept has been one of the major cleavages within the leadership in China, and underlies many of the intense political struggles in China from the early 1950's through and beyond the Cultural Revolution. Mao Tse-tung seems most closely associated with the view that class struggle must continue, and generally has won the internal struggles on this issue.

without power by cultural differences or by layers of bureaucracy. Centralized systems and systems which sharply differentiate between management and physical labor are prone to selfishness and arrogance. Thus, even a socialist system can be transformed (or revised) into a revisionist, capitalist system if selfishness and arrogance reemerge, based on political power. Selfishness and arrogance are also related to localism, because it implies a desire to place the interests of the locality above the interests of the whole nation, class or international movement.[1]

Because the Chinese definition of capitalism is rather psychological, stressing selfishness and arrogance, the battle against capitalist restoration must be waged primarily in every individual's psyche.

It requires the conscious creation of socialist culture and ethics based on selflessness, to replace feudal and bourgeois culture.[2] From this point of view

---

[1] The Chinese leadership believes that localism can also exist, on a national level, in which case a single country's interests are placed above the interests of the proletariat and oppressed peoples and nations throughout the world. Such a foreign policy would be considered revisionists by the Chinese.

[2] K. T. Fann, "The Ethics of Liberation: The Example of China," Monthly Review, Volume 25, Number 11 (April 1974), p. 34-44.

It is no accident that China places such emphasis on political and social qualities of local leaders. This type of leadership was crucial to success in the guerilla war against the Japanese, the revolution against the Nationalist government, and the movements for land reform and for collective farming. Altogether, these were perhaps some of the most extensive social transformations in human history. In addition, this type of local leadership is

it is obvious why major political movements have as a theme cultural transformation. The Great Proletarian Cultural Revolution (with the slogan "fight selfishness, criticize revisionism") and the new campaign to criticize Confucius (and the traditional values of "self-restraint and return to the rites") are recent dramatic manifestatations of this aspect of political leadership. It is in this context that the issue of material incentives becomes very important. The Chinese frequently say that non-material incentives must eventually replace material incentives because the latter reinforce bourgeois individualism. (However, as we have noted in Chapter 4 the Chinese have not eliminated material incentives, and indeed have refined them, realizing that a long transitionary period is needed before people will accept new values.)

In this extremely complicated, continuing class struggle victory will not come from simple institutional reorganization such as public ownership of means of production. This struggle needs the Communist Party to provide the vision and dynamism to keep society moving, to prevent society from sliding back into capitalism.

---

entirely harmonious with Chinese traditions going back for thousands of years. Chinese political philosophers have almost always urged that local leaders be "generalists," men trained in the Confucian classics, men of "virtue." Technical qualification was never deemed relevant.

The Communist Party analyses class relations, points out contradictions between different sectors of society, mobilizes the poorer, potentially oppressed classes to protect their interests, and opposes the powerful, privileged people who have the potential of forming a new ruling class. It also plays a crucial role in instilling new values, both by organizing study sessions and by offering positive models of appropriate behavior.

Although the prime importance of political leadership is leading social transformation, the Chinese believe that it is conducive to growth in production as well. The establishment of socialist values, in which everyone works for the benefit of the entire society, is presumed to liberate the productive forces of society. People are assumed to work harder; leaders are presumed to show more entrepreneurial spirit. In contrast, the Chinese believe that when a country is dominated by selfish, arrogant people (i.e. people taking the capitalist road), the economy will either stagnate or develop in a manner which enriches only a few. The great majority will be oppressed, exploited, and humiliated. They will refuse to participate in construction projects and will refuse to offer suggestions for economic improvements.

The Chinese vision of the contribution of leadership and social relations to productivity is undoubtedly true in certain cases. Mobilization of labor power for rural public works projects, including terraced fields, land leveling, irrigation and drainage projects, roads, etc. is simplified by the fact that everyone will benefit from the project (assuming the project is technically sensible), and by the fact that the leadership participates in the physical labor. These factors combine to give people a feeling that they will receive the fruits of their labor, and to assure them that they are not laboring for the benefit of a small class.

The Chinese often hold up particular people and actions as concrete models. Perhaps we can do this too, and can explain the desired pattern of leadership at the village level by giving a model. In China the model for agricultural development and rural leadership is the Tachai Brigade. The model is rather broad, containing elements relevant to improving both productivity and social justice. The slogan "In agriculture, learn from Tachai" appears everywhere in China. The vast resources of the state are used to help the Chinese peasants learn about Tachai. Newspapers, magazines, books, all relate experiences of Tachai.[1] Tachai has almost become a national shrine. Hotels have been built nearby, and, by 1969, 1.5 million visitors (mostly Chinese but also some foreigners) had come to Tachai to learn about its experiences. For example, more than half of the leaders of the Tangshan Special District (East of Peking) agricultural department had visited Tachai. There are other such models; perhaps the second most famous is Shashiyü (Sandstone Hollow) about 150 miles east of Peking.[2] It, too, has received much publicity in the press and has

---

[1] The sources for the discussion of Tachai are: The Red Sun Lights the Road Forward for Tachai (Peking: Foreign Language Press, 1969); Gerald Tannebaum, "The Real Spirit of Tachai," Eastern Horizon X(2) (1971), pp. 5-36; "Ideological Revolutionization Leads Farm Mechanization," Peking Review No. 39, September 24, 1971, pp. 12-14; "Yields High Despite Drought," Peking Review No. 52, December 29, 1972, pp. 13-15; Diary of Frank Kehl, July 7, 1971.

[2] Sources for the discussion on Shashiyü are: Diary, Benedict Stavis, April 22, 23, 1972; Chang Kuei-shun, "Sandstone Hollow's Twenty-year Battle," China Reconstructs, January 1972, pp. 14-20, 44; "How the Party Branch Leads the Peasants Forward," Peking Review No. 2, January 12, 1973.

received many visitors, both domestic and foreign (including me). A color documentary film about Shashiyü has been made and distributed throughout China.

Both Tachai and Shashiyü are small hamlets in rugged, mountainous, fairly arid regions. Tachai has eighty-three households and 380 people; Shashiyü has 130 households and 681 people. In both areas the people have invested huge amounts of labor to create massive terraced fields. Mountains have literally been chopped off by the bare hands of people working for decades. At Shashiyü, soil has been carried up the mountain and placed behind stone walls which form the terraces. Control of water has similarly involved huge expenditures of labor power. At Shashiyü, a large cistern was dug into solid rock to store water from sporadic rainstorms.

As a result of these tremendous land improvement campaigns, crop yields have grown enormously. In Tachai, the rocky, broken land used to yield about one ton per hectare of grain. Now it yields over seven tons per hectare. The increases in productivity at Shashiyü are comparable. Needless to say, such increases in productivity have brought substantial increases in the standard of living at both places. Diets have improved, new housing has been built, electric lights are used in both places, and a variety of consumer goods (bicycles, clocks, sewing machines) are widely available. People even have grain reserves and personal savings in banks.

It seems somewhat strange that Tachai and Shashiyü have been chosen as national models for rural development. In many respects they present very different problems from the rest of China. Both are in sparsely populated,

mountainous areas, where only increased labor power can reclaim land. Their ecological settings are very different from that in which most of the Chinese people live, namely densely populated plains and valleys where there is little land that can be reclaimed.

The reason Tachai and Shashiyü have been chosen as national models is that the Chinese attribute their success to the spirit of the people in each place. It is the spirit of Tachai which enabled the mobilization of the huge labor resources for the construction of the projects, and it is, therefore, the spirit which is to be emulated and applied to whatever specific problem a locality has.

The spirit of Tachai is, quite simply, that through collective action over a long period of time people can improve their living conditions. People do not migrate out from an impoverished area. Rather, they change the area. The time span is long. "If we can't finish the job in three years, we will finish it in five. If we can't do it in five years, we will do it in ten. If we can't finish it in our lifetime, our sons and grandsons will carry on."

The task of improving one's village can be done without significant external aid. This is the principle of "self-reliance." In fact, external aid was consciously rejected in Tachai:

> The [brigade] members figured it out for themselves: if they had to spend their own hard-earned cash to repair the damage, they were going to count every cent and use it carefully. If the money came via state aid, their hands would surely be more loose and there would be less austerity. In the end it was better to spend one's own money and effort, and this would prove the efficacy of self-reliance.

Rather than rely on external resources for investment, Tachai and Shashiyü developed a cash crop that would provide investment funds. In Shashiyü the sale of apples and nuts provided cash income. (While Tachai and Shashiyü have stressed self-reliance, it is clear that both have benefited to some extent from some state investments, and in reality might be considered to be located in modernizing regions. Both model brigades have rural electrification, which has been invaluable for irrigating terraced fields on the mountain sides.)

This spirit of determination, confidence, and persistence does not come automatically. It is based on intense political study and class struggle. Groups are organized to study Mao's works and China's history, so that they will "never forget class struggle." Old peasants are encouraged to recall how bad life was under capitalism. At virtually every point in Tachai's recent history, the former landlords and rich peasants have been politically isolated. Class struggle has been manifested over the first proposals for collective farming, over the efforts to build and rebuild the farmland of the village, and over the workpoint system. In every case, the leadership of Tachai has perceived the issues in terms of class struggle, has elevated them to an ideological level and has dealt with them on that basis.

This pattern of political study and class struggle required excellent leadership at the village level. Tachai's leader, Ch'en Yung-kuei, is such a leader. He has shown remarkable political insight, technical ability and physical strength. All these features have been reinforced by a charismatic quality which has been noted by foreigners visiting Tachai as well as by the Chinese. He is in his 60's and was originally a local landless laborer; he joined the Communist movement in the 1940's.

He probably has had no formal education, with the possible exception of adult literacy classes and political study. (He is now on the Central Committee of the Communist Party and may well play an important role in shaping agricultural policy.) The leader of Shashiyü, Chang Kuei-shun, is virtually identical in every respect.

In their leadership style, both men make great efforts to reduce any distance between themselves and the masses. The fact that they are genuine, indigenous peasants is of critical importance. Both participate in physical labor, along with all the other peasants. In Tachai, the eight leading cadres each work an average of 300 days a year on farm labor. The cadres of Tachai say: "There are five advantages in taking part in productive labor: you can see, hear, learn, say and do things that you otherwise couldn't." At the same time, the leadership encourages the masses to participate in making basic decisions about local development.

One of the peculiar features about the campaign of learning from Tachai is the fact that in both Tachai and Shashiyü the crucial leadership is at the basic, village level, not the commune level. Both Tachai and Shashiyü are brigades but both are accounting units. In neither case has commune level leadership been considered very important. It is not known whether the leadership of Shashiyü or Tachai receive any regular salary from the central government; if so it would be because they have certain commune and other state responsibilities, but this is not known. The "Agriculture Learn from Tachai" campaign suggests that leadership is crucial, and the most important leadership is at the village level. The state employees working at the commune level are important for their role in encouraging village leadership.

Tachai is the national model, but there is no way of specifying how many areas actually succeed in adopting Tachai's methods of leadership and long-term programs for changing the face of the earth. Tachai and Shashiyü are by no means isolated examples of success. In fact, some of the surrounding brigades have actually surpassed Tachai's very high yields, and in the locality surrounding Shashiyü virtually all of the lower sections of mountains have been terraced as in Shashiyü. Nevertheless, it is clear that the success of Tachai and Shashiyü have been related to some extent to the charisma of their leaders and such leadership cannot exist everywhere.

It is appropriate to note that encouraging the Tachai style of leadership at the local level requires certain leadership activities at the central level. Higher levels of government have to do much propaganda work to help the entire country learn about Tachai through press, film, personal visits, etc. Propaganda teams are organized, and party committees are encouraged to study the experience of Tachai. Large exhibitions are organized showing the achievements of selected communes, and then masses and local leaders are taken to these exhibitions. Leadership at the higher levels is necessary to inspire confidence and to encourage people to try new approaches.

B. Political Leadership After the Tenth Plenum

In the context of the decision of the Tenth Plenum to stress agro-technical transformation, political leadership assumed renewed importance. The communique of the Tenth Plenum paid much attention to the problem of class relations in China:

> ...throughout the historical period of proletarian revolution and proletarian dictatorship, throughout the historical period of transition from capitalism to communism (which will last scores of years or even longer), there is class struggle between the proletariat and the bourgeoisie and struggle between the socialist road and the capitalist road. The reactionary ruling classes which have been overthrown are not reconciled to their doom. They always attempt to stage a come-back. Meanwhile, there still exist in society bourgeois influences, the force of habit of old society and the spontaneous tendency toward capitalism among part of the small producers. Therefore, among the people, a small number of persons making up only a tiny fraction of the total population who have not yet undergone socialist remolding always attempt to depart from the socialist road and turn to the capitalist road whenever there is an opportunity. Class struggle is inevitable under these circumstances. This is a law of the history which has long been elucidated by Marxism-Leninism. We must never forget it. This class struggle is complicated, tortuous, with ups and downs and sometimes it is very sharp.[1]

This concern was summarized by Mao in his clarion call "Never forget class struggle!"

There were several reasons why the issue of class relations was becoming more salient after the Tenth Plenum. The decisions to maintain the private sector, to continue private marketing, to expand diversified products and

---

[1] "Communique of the 10th Plenary Session of the 8th Central Committee of the Chinese Communist Party," NCNA Peking, September 28, 1962. CB 691 p. 3-4.

sideline industry--these decisions made more relevant the question of what balance would emerge between the private and collective sector. Would the private sector be able to monopolize the high-profit diversified products, leaving the collective sector with the unprofitable crops? Secondly, the decision to make the production team the basic accounting unit brought certain risks towards localism. Thirdly, the decision to give increased responsibilities and powers to scientists and technicians had the potential of leading to the formation of a new class, whose power came from control over technology. They could become as arrogant and selfish as a traditional capitalist class whose power came from private ownership of the means of production. In short, the question (as Mao saw it) was: to what social purposes will modern agricultural technology be put. Will it reinforce socialism, or generate tendencies toward capitalism?

Not all leaders in China agreed with Mao, however. Some felt that the problems in rural leadership were not related to class struggle, but were rather simple and were confined to questions such as corruption and technical qualifications of rural local leaders. During the years of agricultural crisis in 1959-61, commune leadership disintegrated to some extent. People were unwilling to serve in leadership capacities because it required too much time and worry and ended up being unpopular. Those who remained in leading positions sometimes could not resist the temptations of corruption. During the 1960's as campaigns were undertaken to improve rural local leadership, the differences between these two perspectives about the problems of leadership magnified.

Soon after the Tenth Plenum, the Socialist Education Movement was launched to improve rural leadership.[1]

---

[1] Richard Baum and Frederick Teiwes, Ssu-Ch'ing: The Socialist Education Movement of 1962-1966 (Berkeley:

At first it dealt primarily with corruption, and was directed at cleaning up accounting procedures with regard to 1) account books, 2) grain holdings in grainaries, 3) ownership of property, and 4) work points. Hence it was called the "four clean" campaign. The campaign also had broader political implications. Cadres were required to participate in manual labor, the Poor and Lower-Middle Peasant Associations were established to oversee commune activities. Work teams were sent out by the central government to visit communes and make sure the campaign was carried out properly.

During 1964 and 1965 there was extensive debate in China concerning the direction of this campaign. Many leaders including Mao feared that the "four clean" campaign was too narrow, and was simply reducing corruption but was not consolidating the collective economy of the commune and was not establishing the proper style of leadership. Some of this debate can be inferred from subtle changes in instructions on how to carry out the campaign. (These instructions have the titles First Ten Points, Later Ten Points, and Revised Later Ten Points.) Finally new instructions, the Twenty-three Articles, were written under the personal supervision of Mao. This last document stressed that rural leadership had to stress politics, and that good leadership was not simply the lack of corruption. The four items that had to be cleaned were changed from account books, grainaries, properties, and work points to politics, economics,organization, and ideology.

Whether or not the campaigns of the mid 1960's (the "four clean" campaign and the Socialist Education Movement) were in fact properly conducted became an important issue in the Cultural Revolution. During and

---

Center for Chinese Studies, 1968); Richard Baum, "Revolution and Reaction in the Chinese Countryside: The Socialist Education Movement in Cultural Revolutionary Perspective," China Quarterly No. 38 (April-June 1969) p. 92-119.

after the Cultural Revolution, commune leadership was again strengthened in similar manners. Commune leaders had to participate in physical labor and live in the villages. They were open to criticism in the course of the Cultural Revolution, and in the final analysis had to be approved by both the commune's masses and by their superiors in the county government and party committee.

Although the Chinese have not explicitly discussed the question of leadership in this context, I think there is great utility in separating out the two different functions of leadership (promoting social justice and promoting productivity) and analyzing their roles under different types of agro-technical situations (rapidly modernizing and basically traditional). Figure 7.1 shows these different situations; a "+" or "++" indicates that it is relatively easy for leadership to solve the problem. A "-" indicates that problems may be encountered frequently.

FIGURE 7.1

Suitability of Model Leadership Patterns Under Different Conditions

	Questions Emphasized by Leaders	
	Social Relations	Level of Production
Advanced Areas	++	-
Backward Areas	+	++

The manner in which leadership can affect social relations, keeping them from becoming exploitating is rather self-evident, and we have discussed above why such efforts become particularly relevant in advanced areas. In general, I suspect that the leadership prevalent in China is in a good position to make allocations among people and groups. It can distribute fertilizer and electric wire in a manner consistent with ideals of social justice, and this is very important, especially in modernizing areas.

The productivity effects of leadership are more complex, and vary according to agro-technical environmental factors. In many regions of China, especially backward mountainous regions, rural public works are essential for agricultural development, and leadership can play an important role in getting them built. However, these rural public works often require complementary supplies of industrial equipment (such as pumps) before they will have much productivity effect. In the areas which are already advanced (including the 20 percent which is already substantially modernized) modern inputs, such as chemical fertilizer, seeds, better methods of pest control, selective mechanization, and careful field management seem more important than increased labor mobilization, although labor is not irrelevant. It can level and rearrange fields for more efficient use of irrigation and other machinery. One potential deficiency of leadership in advanced areas is a lack of entrepreneurial skills. Do leaders have the capacity to invent? Can they imagine new types of economic production? Can they think up new markets and new ways of producing? Can they accept suggestions from innovators? Can they make the highly differentiated, localized, changing decisions needed for modern agriculture? This may be a weakness in the Chinese system at the local

level. Similar weaknesses may also exist at higher levels of the political system. These weaknesses may become increasingly relevant as modern agriculture expands. The Chinese are not unaware of this problem, and often discuss the need for innovation; but often in the past, the "mass innovation campaigns" have lacked a sound technological basis, so that many innovations have been worthless or harmful. Finding a way of having innovative, technically proficient local leaders who retain a clear sense of social justice and an appropriate work style remains the basic problem in rural leadership in China.

Chapter 8

CONCLUSIONS AND EMERGING PROBLEMS

China has experienced a real and rapid change in its agricultural technology. During the 1960's, about 20 percent of China's cultivated area with transformed from traditional to substantially modernized agriculture, based on agricultural chemicals, machinery, and scientific seed breeding. Much of the remaining area of China has experienced some transition towards modern agriculture. Over the last two decades, total food production has at least kept up with population growth. To carry out this change, Chinese policy was very broadly conceived and implemented. In the previous chapters we have examined different elements of this policy, so here it should be sufficient merely to list (in Table 8.1) the eleven elements of policy which seem most important.

It would be of great value to be able to say which of these elements of policy were most important, and under what conditions. Unfortunately, however, this is not possible, given still insufficient data.[1] We can say that success in China was related to the recognition that many policies would have to be interwoven to get gains in productivity and to assure that social relations would develop in the desired fashion. The role of conscious leadership at both the central and local levels, appears critical in whatever success was attained.

---

[1] If we had data on the implementation of these different policies in different communes or counties, and if we had data on changes in production in these areas, then a careful statistical analysis, perhaps multi-regression analysis, would be possible. Perhaps some day such data will become available, but until then it will be impossible to say with confidence that success in China was due to any particular policy.

TABLE 8.1

Elements of China's Agricultural Development Policy

Political and Economic Reorganization

1. size of administrative and accounting units
2. decentralization of authority
3. rational economic incentives

Centralized Technical Services

4. agro-science research
5. extension services
6. mechanization

Administrative Infrastructure

7. education
8. marketing
9. banking and credit

Leadership

10. leadership for social justice
11. leadership for production

While Chinese progress during the past decade has been impressive, China faces many problems in the future such as regional and personal inequalities of income, bureaucratic organization, scientific capabilities, and political authority. Some of these problems are caused, ironically, by success in the past. None of these difficulties is insurmountable, but each will require continued attention of the Chinese leadership and people.

A. Emerging Problems of Regional Inequalities

Agricultural development cannot be uniform; certain areas and people benefit more from modern techniques than others. Geographic conditions sharply influence the ability to profit from modern agriculture. Most obviously, areas with good water resources can use high-yielding varieties more effectively. Another critical factor is proximity to urban centers. Areas near cities have the advantages of a large market for high-priced perishable products (such as fruits, vegetables, dairy) and of more ready access to supply of industrial inputs such as electricity, machinery, and chemicals. One additional advantage is that some peasants may get full-time or part-time work in urban factories, which provide a higher wage than agricultural work.

Because the production units can retain the bulk of the increments in income from improved productivity, and because wealthier communes invest more (see above Figure 4.4), it is clear that the richer production units can become even wealthier. This would suggest a general pattern of increasing inequality in the Chinese countryside. There are no statistical data that would conclusively show this pattern of increasing inequality, but a variety of reports from many communes from visitors to China show that family income is much higher in communes with good

natural conditions and near cities than in other communes. The potential seriousness of this problem was hinted at in Chapter 1, where we noted that food production has not kept up with population growth in many regions. The Chinese refer to this as the problem of "uneven development."

We have pointed out in Chapter 4 that China does not use its power of taxation to redistribute income from wealthier regions to poorer regions. China does, however, have important policies to mitigate against regional inequality. First and most obviously, the government can use its power to allocate agricultural supplies to prevent excessive inequalities. In addition, it can make grants and investments in localities which it wishes to develop. As a practical matter, with investment funds limited and with the policy of self-reliance so important this is not much of a solution. Second, the government can facilitate the transformation of backward areas by giving technical aid. To some extent this is being done; many agricultural scientists and technicians have been transferred to rural areas, although it cannot be documented that they have been sent to the most backward areas.[1]

The government also encourages equality through the application of the policy "take grain as the base and have all round development." This means that most areas close to cities will not be permitted to specialize completely in high-priced agricultural commodities, for they will have to take grain as their base, i.e., devote some of their land and labor to grain production. At the same time, poorer areas will be encouraged to plant some diversified crops under the policy "have all round development." Because the state controls marketing, this policy can be

---

[1] L.C. Schenk-Sandbergen, "How the Chinese People Remove Polarity Within Their Countryside," Eastern Horizon Vol. XII No. 3 (1973), p. 8-17.

implemented by state power. Some indication that state power was in fact being used in this fashion came from a commune near Loyang, where commune officials realized that it was more profitable to plant apples than grain, but felt constrained (by themselves and by the government supply and purchasing plans) to be self-sufficient in grain.[1]

The government can also help backward areas by encouraging the development of specific technologies that will be relevant to their needs. It is not clear that this has been done in food crop research, for in China, as elsewhere, the main breakthroughs have been in paddy rice; not many advances have been made for upland crops such as millet or sorghum. However, certain tools have been developed for backward areas. Especially for mountainous areas in southern China, a turbine-run pump that uses the force of moving water to pump the water up the hill has proved quite useful.

As for the inequalities that are caused by the mutually advantageous relations between industrial centers and the agricultural regions which surround them, China has been dealing with this by increasing the number of industrial centers. During the 1950's, much of the industrial investments were located in the interior of China, precisely to create new regions of growth. After the Cultural Revolution, an important element of policy was to encourage the development of local industries, primarily at county and commune level, so that the beneficial interaction between industry and agriculture could be more widely distributed.[2] Of course, the expansion of the

---

[1] Stavis Diary, May 1, 1972.

[2] Carl Riskin, "Small Industry and The Chinese Model of Development," China Quarterly No. 46 (April-June 1971), pp. 245-273; Jon Sigurdson, "Rural Industry - A Travellers View," China Quarterly No. 50 (April-June 1972), pp. 315-332.

transportation system has been another way that the government has tried to spread the benefits of industrialization.

Another method by which the central authorities can reduce tendencies toward inequality is to increase extraction of commodity grain from wealthy provinces. There is, however, very little data on this aspect of government policy, especially concerning the extent to which provincial quotas for delivery may have changed during the 1960's when agricultural techniques were changing. It is clear, however, that provinces that were undergoing rapid agro-technical change tried to resist central pressures for increased grain procurement. During the Cultural Revolution, Red Guard Groups charged that T'ao Chu, Party leader of Kwangtung (where the successful Pearl River Delta project was sharply increasing production) opposed large-scale inter-provincial deliveries of grain:

> At a national conference on food grain, T'ao Chu advocated fixing grain output quotas throughout the country (meaning each place might deal with its surplus grain itself after fulfilling the task of surrendering tax grain to a higher level). His aim was to encourage independence and localism so that the economic plans of the Center could not be unified and there would be an imbalance of living standards for the people of various places. Because of T'ao Chu's policy of fixing output quotas, some places in the municipality of Canton were obliged to feed on bran and dry sugar cane powder for a period of time. At that time, after fulfilling their own output quotas, some counties were unwilling to surrender additional grain in support of other places which experienced greater hardship.[1]

From this statement, it would appear that during the "difficult years" of 1960-61, inequalities were permitted,

---

[1] "T'ao Chu's Six Major Crimes Against the Thought of Mao Tse-tung, The Party and Socialism," Peking T'ien-an-men No. 2, March 1967. SCMM 578, p. 27.

at least within Kwangtung Province. There are similar charges against Li Ching-chuan, Party leader of Szechuan:

> In the beginning of 1962, when the Center decided that Szechwan was to supply so many hundred million catties of food grain, Li Ching-chuan said: "Here, I am a small State Council; give it a refusal" ..In order to conceal goods, he reported smaller figures than the figures for the production of grain, cotton and timber when reporting to the Center, bringing serious consequences to the State socialist construction.[1]

There was very little discussion of the issue of regional inequalities during the Cultural Revolution. It came up in the debate on agricultural mechanization to some extent, and after the Cultural Revolution, policies were adopted to assure broader distribution of agricultural machinery and local industry. However, the Cultural Revolution also strongly endorsed the policy of "self-reliance" which permits regional inequalities. The announcement that in 1971 the poorer northern provinces no longer had to import grain from south China may indicate reduced desire (or ability) to effect inter-regional transfers, as well as increased food production in north China. Grain procurement targets at local level are now held constant for three or five years, and this would further indicate that the state is not trying to redirect the benefits of modernization.

One policy which seems to have been stressed after the Cultural Revolution has been to increase the scope of commune enterprises, for example, small factories. This means that the entire commune will make a profit and will be able to provide services equally to all teams in the

---

[1] News from Chinese Provincial Radio Stations, September 5 to 11, 1967. No. 224, p. Q6.

commune. This has the effect of increasing equality among production teams within the commune, but may contribute to increasing differences in income between communes. China's leaders foresee a gradual expansion of collectively-owned enterprises at higher and higher levels, beginning with the commune and the county, and eventually provincial and national levels. However, for a long time, this policy will increase income differentials between communes. The time is very distant when enterprises at the central level will be numerous and profitable enough to equalize income.

While numerous mechanisms exist for encouraging more regional equality, the one the Chinese discuss most frequently is the role of ideology. Cadres are sent to poor, backward areas and try to develop new ideas for economic development and increase enthusiasm for labor intensive construction projects. Officials in one province explained that the major way they assist poor, backward areas is by helping them study the experiences of Tachai, especially with regard to self-reliance.[1] In another locality, local officials explained their attitude about how to help poorer areas:

> It is not a matter of money; it is a question of mental attitude, a question of ideological level. In former days we helped with money, but nowadays we do not. It is an ideological matter.[2]

A recent Chinese article summarized the problem and the approaches to solve inequalities within one commune:

> [The Commune's 146 teams] have seen tremendous changes in these 15 years. But development has been uneven and there are still differences between richer and poorer teams.

---

[1] Stavis Diary, May 2, 1972.

[2] L. C. Schenk-Sandbergen, "How the Chinese People Remove Polarity Within Their Countryside," Eastern Horizon Vol. XII No. 3 (1973), p. 13.

> In the present stage of the people's commune, with "ownership at three levels and ownership by the production team as the basic form," such differences have to be recognized and, at the same time, gradually reduced. This is done not by material transfers from the richer to the poorer teams but by strengthening the leadership, improving the work, and mobilizing the masses of the poorer teams to change their own position. Meanwhile, the brigade and the commune also give suitable economic help to poorer teams to develop production. In this way gaps between the production levels of various teams are gradually reduced, and their conditions gradually become more even.[1]

While ideology and the spirit of Tachai may be important, they cannot substitute for material inputs. Thus, differences in income between different regions will last for a very long time indeed. I would presume that at some point in the future the issue of regional inequalities would have to become an important political issue in China, especially if some regions are experiencing reductions in food production per capita, which is probably the case.

It would seem to me that at some point, China will have to consider restructuring the agricultural tax so the richer areas have to share their wealth with other areas. At the moment, China is reluctant to do this, lest a high tax reduce incentives to undertake labor projects for improving land and water conservation. According to present policy, for example, the people of Lin County, Honan, are entitled to all the benefits of their labor that went into the Red Flag Canal, a model project which has received widespread publicity in China;[2] the increments in production will not be taxed away. But what about the children and grandchildren of the

---

[1] "In the Communes--Ownership on Three Levels," China Reconstructs, January 1974, p. 38.

[2] "Carved in the Cliffs--The Red Flag Canal," Peking Review No. 48 (December 1, 1972), pp. 12-15; No. 49 (December 8, 1972), pp. 13-17.

laborers on the Red Flag Canal? If there is no increase in agricultural taxes, are they not inheriting certain means of production? In the industrial sector, such patterns of inheritance are impermissible because they violate the basic tenets of socialism. Will this form of inheritance always be permitted in rural areas? Should there not be an "inheritance tax" for canals or other important infrastructure? As yet, I have seen no discussion along these lines, but eventually this type of discussion will be inevitable, and the political issues it will raise will be important.

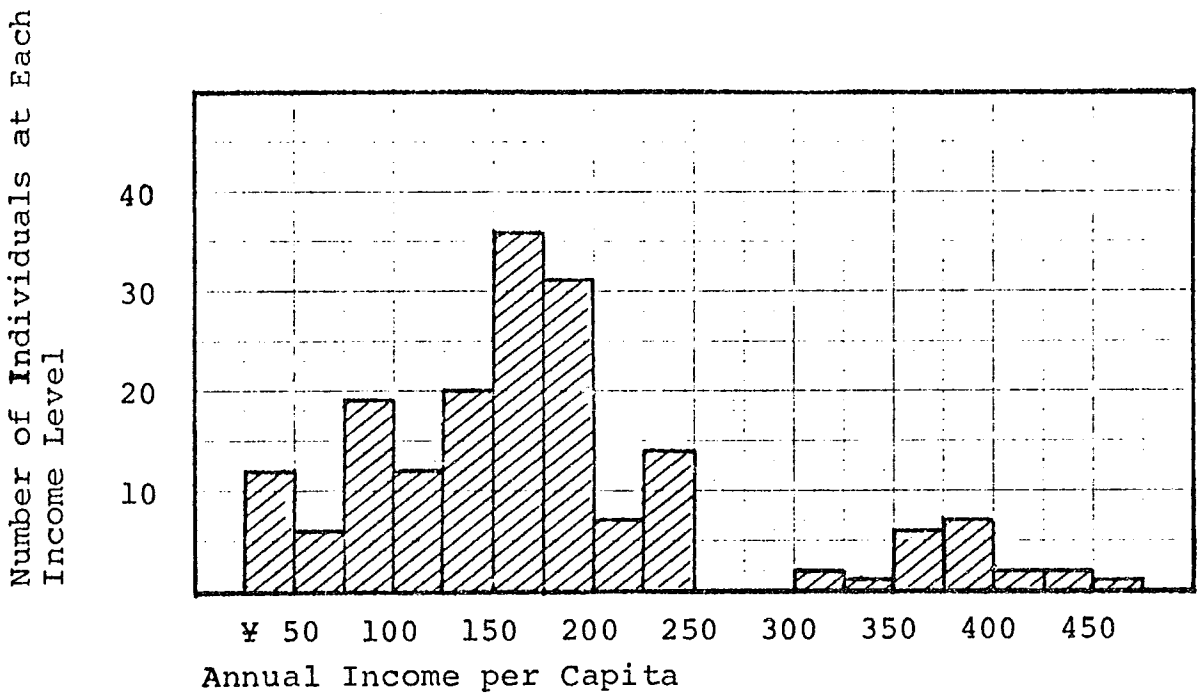
B. Inequalities within the Village

Another problem China faces concerns inequalities between individual families within the production units. Hard data are scarce, but the broad outlines of what has happened are clear. Land reform demolished the economic, political, and social power of the traditional elite. Land was redistributed in a fairly equal manner, and political power was seized by the Communist Party. The land was pooled in a collective system of ownership in the mid 1950's, and since then, income of the farmers has been determined primarily by the socialist principle of payment according to the amount of labor performed. Since there are significant differences in the amount of labor farmers perform, there are also significant differences in income levels.

Further, when income is computed on a per capita basis, the differences in income levels become larger because of different household structure. Households which have many laborers and fewer mouths have had relatively high income per person. These households might be single middle-aged men, or middle-aged couples with only one or two children. On the other hand, households with few laborers and many mouths have low average incomes. For example, if there are many children and if the husband works in the city, average income per capita in that family will be very

FIGURE 8.1

Distribution of Income, Liuling, 1961



Source: Jan Myrdal, Report from a Chinese Village (New York: Pantheon, 1965), pp. 38-44, 120-122, 154-156.

Notes:

Income includes both cash and grain (computed at ¥10 per 100 catties). Original data were given in terms of family income; these have been divided by household size to find income per capita.

The figures refer only to income from collective sources, and do not include income from the private sector.

The families which make up this sample lived in Liuling village. They were members of the Liuling Village Labor Group and the Labor Group for Vegetable Cultivation; these were two of the five production teams in the Liuling Brigade.

low, if only agricultural income is counted. Also, if there are very old people in the household who do not labor much, the average income will be lower.

These patterns of inequality are revealed in Figure 8.1, which shows average income (from collective sources) per capita in one village (Liuling) in 1961. Many of the people with low incomes are not as poor as it might appear because they had a family member working in a city to supply additional cash income. What cannot be ascertained from data available is how income from the private sector affects the distribution of income. Perhaps families with less income from collective sources put more effort into their private plots, and get higher returns from them.

For very poor families, the production unit grants money and food as welfare. Data from a variety of communes indicate that the amount of funds available for welfare is quite small until the gross income is quite large, over ¥1,600 per family. It would seem likely, then, that considerable income inequality within an accounting unit would remain until the average collective income is very high. It must be noted that the issue of equality has received much attention from Chinese leaders since 1961 (the date of the data for the above chart) and distribution of food has become more equal especially since the Cultural Revolution.

While there is not equality between individuals or families, it is very important to note that all people in a production unit can obtain some benefits from agricultural development because agricultural modernization raises the value of each work point. China does not have the pattern of development common in capitalist countries where a small group of people monopolize the benefits of modern technology because of their larger land holdings and because of their ease of access to modern ideas, supplies, and credit, while poor peasants and tenants are forced into greater poverty. This is one of the most important differences between col-

lective and private ownership of the means of production.

Not all the benefits of modern technology are shared equally in China. Many of the jobs directly associated with modern technology in China (e.g. tractor driver) are relatively high paying. This type of difference was substantially reduced during the Cultural Revolution, but not entirely. Most agricultural technicians are now employed by the communes, but highly educated scientists and technicians are still paid a high salary; most technicians are paid work points. The number of work points for technical work is usually set quite high. (In one work team, the people with technical jobs were paid the average of the five highest laborers.) Also, it is common for people who work at the more profitable diversified activities (including fruits and vegetables, animal husbandry, and local industry) to receive somewhat higher salaries than the average farmer. Individuals are selected for these better paying jobs by commune, brigade, and team leaders according to several criteria, including skill, education, interest, and social position in the village. Former poor and landless peasants and their children have more access to these jobs if they are qualified for them.

There will continue to be inequalities in income in China and throughout the long period of socialism. In theory, when China arrives at the stage of communism and people receive income according to their needs, then there will be equality between individuals. However, the Chinese revolution is now at the socialist stage, and the transition to communism will be a very long historical process.

There are several important policies to mitigate the importance of income differentials and to develop a trend towards equality. First, the inequalities in income cannot, in theory, be used to build greater inequalities. A family cannot save money and invest in more land or machinery and thereby expand its income further. Nor can increased income

guarantee an easy life for children. Nor can income assure deference and status in China, as it can in a capitalist system. (This is, of course, in theory, and the Chinese have frequent campaigns to assure that these principles are maintained. The most common deviation from policy is the efforts of officials to get their children admitted to college "through the back door.") The Chinese, thus, seem willing to permit differences in income to serve as material incentives, but restrict what people can do with increased income.

Another very important policy is the gradual expansion of services offered by the commune. As income from commune enterprises rises, the commune will have greater ability to offer services to all commune members. These services will include health, education, recreation; eventually they may include assistance in housekeeping services such as cooking and sewing. These services will be available equally to everyone, so this will lead to increasing equality within the village.

Chinese policy with regard to income inequalities resulting from unequal access to higher paying jobs is not clear. Eventually many people in China will question the appropriateness of using class status of people in 1948-51 to influence work assignments and income of children, grandchildren, and more distant descendants decades later. In urban areas there appears to have been a move away from the class labels of the land reform era; there are some data indicating that when young people graduate from middle school and are assigned to farms or factories, their class background becomes "peasant" or "worker," regardless of the class standing of their parents. I have seen no indication that this is possible yet for children in rural areas.

C. Problems Involving Bureaucratic Organization

Earlier chapters discussed the problems of assuring adequate technical expertise in some government services,

without developing a powerful elite, and the problems of orienting government services to the rural sector instead of the urban sector. These are the types of problems that are never completely solved. There will always be contradictions between the needs to strengthen and to "ruralize" government services, and China will have to experiment continually with new ways of solving this contradiction.

My own guess is that the problems of expertise will be most critical in the field of scientific research. China has definitely entered the era of modern agriculture, in which agricultural science plays a critical role. One of the distinctive features of modern agriculture is that once it begins modernizing it cannot become static again. Precisely the changes that permit high yields (more fertilizer and high-yielding varieties) also make agriculture much more susceptible to drought, pests, and disease because the resistance of traditional agricultural methods to unfavorable natural conditions is given up.

Examples of the risks involved in modern agriculture include the corn blight in the United States, which reduced production 10 percent in 1970 for the whole country, and up to 50 percent in some southern states. The blight was so serious because the variety of corn very widely used (Texas male-sterile cytoplasm) had no resistance to a new type of southern leaf blight fungus. Similarly, the new varieties of rice popularized in the Philippines were not resistant to Tungro virus and serious crop losses were experienced in 1972. Such cases highlight the <u>increased</u> importance of agricultural science research after agriculture begins to modernize.

In addition to these types of problems, China agricultural scientists continue to face the challenge of modernizing vast areas of unirrigated farmland in north and west China. The data examined in Chapter 1 suggested that China has been less successful in developing high-yield wheat for north China than other countries.

In the years after the Cultural Revolution, Chinese policy emphasized decentralizing agricultural scientists by placing them in communes. This had the beneficial effect of making sure that agricultural scientists knew about the concrete realities of agricultural production and could advise those directly responsible for production. It is interesting to note that an American agricultural economist believes that such a decentralized system is most desirable:

> There is also evidence that a decentralized research system that is at least partially dependent on local funding and responsive to local commodity and development interests is more likely to be productive than a highly centralized system.[1]

Another advantage of the decentralized system is that it can reduce tendencies of agricultural scientists to become an urbanized elite. However, it is not clear whether there are enough personnel at central levels to do sound research and to arrange communication among scientists throughout the country. By 1972, China resumed publication of agricultural scientific periodicals, indicating renewed recognition of the necessity of scientific communication. In addition, in 1973 China began to develop direct contacts between its agricultural scientists and those in the United States. One of the first groups of Chinese scientists to visit the United States (since 1949) was a group of entomologists, wishing to establish contact on the question of insect control through the use of hormones rather than through the use of conventional insecticides.

As for agricultural mechanization and extension, I think China will have fewer problems in the future than in

---

[1] Vernon Ruttan, "Induced Technical and Institutional Change and the Future of Agriculture," The Future of Agriculture: Theme Papers (Oxford: 1973). Reprinted by Agricultural Development Council, December 1973. The quotation is at page 7 of the reprint.

the past. By the early 1970's basic mechanical skills and experimental ideas were widespread in China. Repair and maintenance of machinery was no longer the problem that it was when machinery was originally introduced. By the early 1970's the problem was more that of establishing the appropriate methods of management and rational incentives. The system of commune ownership of agricultural machinery seemed to be appropriate. It provided a large enough scale of operation so that much machinery could be concentrated in one location for efficient maintenance and repair. At the same time, it kept the machines close enough to the production units to assure that the machines would be integrated into production efficiently. Likewise the integration of the extension system seems sensible. Centralization seems necessary for technical services at the initial stages of their introduction when there is no widespread technical knowledge, but as more and more people become technically proficient, the structure of the service can (and should) change.

For thousands of years Chinese culture has emphasized the desirability of a bureaucratic position which can free one from the rigors of manual labor and rural life. Despite the more than two decades of communist rule, these values have not been eliminated. Many Chinese still see education as an avenue to escape from the countryside. Undoubtedly the Cultural Revolution has had an important effect in this regard. With the new requirement that all college students must have worked for two years in a farm or factory, the bureaucracy is assured of increasing numbers of workers who are aware of rural conditions, but this tension will remain in the future.

Throughout the past two decades the efforts at ruralizing the commercial, financial, and educational systems have been organized and pushed by certain members of the central leadership (led by Chairman Mao) who had a clear vision of social development. The efforts at ruralizing

these services were by no means spontaneous. If either Liu Shao-ch'i or Lin Piao had defeated Mao in the struggles for power that characterized the late 1960's, it is entirely possible that the policies for ruralizing the bureaucracies would have been dropped. Thus it is clear that the patterns of bureaucratic development are closely related to contests for national leadership. The Cultural Revolution succeeded in ruralizing many of the services for agricultural development, but this process is not irreversible; without constant leadership, reversion to elitist, urban-based organization is possible.

D. Problems Involving Government Authority and Leadership

To a large degree, China's success in agricultural development has been based on the tremendous authority of the central political leadership. The central political leadership has had the power to lead land reform and collectivization, to reorient industrial development so that it emphasizes agricultural inputs, to select certain regions for especially rapid agricultural growth, to define the broad incentive system, to orient many bureaucracies to serve better the needs of rural people. None of these decisions were easy to make or carry out. Many farmers preferred private agriculture. Many factory managers preferred to continue making goods for industry; many bureaucrats wanted to stay in the cities; undoubtedly people from poor areas questioned the selection of some areas for especially rapid development and the type of incentives that permit those areas to retain most of the benefits of modern agriculture.

What is the source of this tremendous power? While this paper cannot analyze fully this question, it can suggest some of the reasons. Two very important historical factors contribute to the legitimacy of the central government and its ability to shape agricultural development. First is the fact that in the decades before the liberation of 1949, the

general rural situation was appalling. Very simply, survival was uncertain. Drought, flood, or war was bound to cause from time to time the deaths of millions of people in any one region. Between famines, the living standard may have been adequate; but periodic famine and disaster were a certainty. All of the people who experienced such uncertainty in life were bound to give great credit to a governmental system which made life certain and secure.

In addition, the Chinese people emerge from a political culture which assumed that the government would have great power in planning the economy. For thousands of years, governments in China have constructed and managed waterworks. Chinese people would not be surprised by the fact that their government continued developing the economy, and assumed power to allocate crucial inputs and make decisions concerning regional balance. Such activities were deemed legitimate.

Another important element in government power is its monopoly of the elements of coercion. The government in China, as many strong governments elsewhere, can mobilize force (as embodied in the army and/or police) to achieve compliance in the last resort; and in changing social relations and ownership of the means of production, control over force is essential. This does not mean that the government rules by force. In Chinese political culture, the <u>use</u> of force is generally unnecessary. What is important is that the government have the <u>ability</u> to use force. When people perceive the ability, they tend to credit the government with authority, and accept its policies.

The fact that most people feel that the political system represents them and serves their interests is another reason for the extent of government power. This feeling emerges from the concrete policies adopted by the government in the past, insofar as the policies have in a broad sense been sensible. (Because the authority of the political

system depends to a large degree on the actual policies chosen, the fear of the central leaders that certain policies will prove unpopular and will result in a loss of authority acts as a powerful limiting factor in the policy making process.) In addition to the actual content of policies, the style of policy making and administration are important factors in maintaining legitimacy. People are more likely to feel that the government represents their interests when there is broad consultation and participation in policy making and when government leaders shed their elitism and come to live and work with the masses.

Another factor undoubtedly contributes to the power of the political system. This is the practice of criticism and self-criticism in the context of a group. A person's deviations from government policy or values can be subject to ridicule from his social peers. The withholding of esteem and deference can be as strong a sanction as deprivation of goods or services. This process is orchestrated by the Communist Party and is helpful in securing compliance, both because people can be shamed into accepting policy and can also be convinced of the policy's correctness and of the "reactionary" nature of their objections.[1]

For several reasons these bases of central authority will be changing in the future. First, people who personally experienced the appalling situation of uncertainty of life before liberation will be dying out. Already, only people more than 40 years old have a vivid recollection of life before liberation. The government now constantly requires young people to learn from older people about the past. Special discussions are set up in which older people "recount bitterness of the past," and younger people "learn from the poor

---

[1] Cognitive dissonance theory explains that actions are more likely to determine beliefs than vice versa. People come to value what they do--call it rationalization or whatever.

and lower-middle peasants." This theme recurs in contemporary Chinese art. Despite the vast efforts to get young people to become more familiar with the past, it is impossible that they can ever feel the same way about the past as the older generation who actually experienced it. Certainty of life seems so "natural" that it is very easily taken for granted. Younger people may tend to think more about restrictions on their personal freedom (especially regulations concerning location and type of work) then about the importance of certainty of life. This generational change will certainly affect the legitimacy of the central government and the kinds of demands placed upon it.

Another obvious change affecting the authority of the central government will be the inevitable changes in leadership in the next few years. At the highest levels China's leadership has been relatively stable since 1949, with the result that most of the top leaders are men in their seventies. Of the people likely to assume leadership in the next years, none has the national reputation or the charisma of the present leaders, primarily Mao and Chou En-lai. This is not to say that they lack competence, but it is clear that future leaders will have much more difficulty in convincing people, regions, bureaucratic interests, etc. that they should make sacrifices for the future and for the nation.

At intermediate and lower levels, there will also be a change in leadership. Style of leadership is important both to effect technological changes (primarily through mobilization of labor) and to maintain government authority. By and large, most of the leadership up to now emerged from situations of great social conflict--war, land reform, collectivization--in which their ability to mobilize people was most important. After the early 1960's China did not have such a high level of social conflict, so leadership could not emerge in the same fashion. The Cultural Revolution must be

seen in part as an attempt to generate social conflict and an atmosphere that would produce leaders capable of mass mobilization. However, given the extraordinary complexity of the Cultural Revolution and the tendencies of some leaders towards "ultra-leftism," it is clear that the Cultural Revolution cannot duplicate the types of leaders from earlier days. To a certain extent Chinese policies on training leaders have emphasized ability to mobilize the masses. There has been rather little attention to questions of economic entrepreneurship. How will local leaders realize that is possible to plant a new type of crop, or that there is a need for a new industrial product? Likewise, the importance of technical issues will increase as agriculture modernizes. There do not appear to be strong policies to deal with these types of problems.

A third factor reducing the authority of central leadership is related to decentralization. To prevent bureaucracies from becoming too powerful and too elitist, many important powers have been decentralized to various subordinate units. Provinces, counties, and communes are all quite free to make whatever investments they choose with funds that are raised locally. This is part of the policy of self reliance. If local investments increase, however, the relative power of the central government decreases.

A fourth factor springs from the role of the state in allocating scarce commodities needed for agricultural development. As industry grows and can produce enough equipment to meet demands at the prices set, then the state will no longer have to allocate equipment. It will be able to rely more and more on market mechanisms for distribution. In this way the state will be giving up one of its powers in its relations with regions. Similarly, the power of the Communist Party in a locality will be diminished as the party committee loses the power to allocate scarce resources.

All of these factors will combine in the future to

reduce the power of the central government relative to regional and local governments, and will also reduce the power of the entire state apparatus in China at all levels. At the moment, it appears that the central leadership is quite willing--perhaps even happy--to see this happen. Mao is very much concerned that a strong central government could result in elitism, in a new class, in reduced participation of the masses. Thus he sees diminishing power of the central state apparatus as desirable.

These trends may make it more difficult in the future for the central government to move resources around the country, to shape the behavior of bureaucracies, to influence the development of social relations and class positions in rural areas. Mao's answer, presumably, would be that cultural revolutions, repeated periodically, can assure that people's consciousness is correct and that their actions will follow the correct path. But as the power of regions and localities increases, relative to the central government, is it not possible that areas will be able to avoid carrying out the periodic cultural revolutions?

By this argument I do not wish to imply that the central government of China will collapse and that China will return to a period of warlords. At the same time, it is clear that the distribution of authority will change in the future, and this will mean that the pattern of agricultural development may change. It may mean that regional differences will increase, as provinces and counties have more and more resources to invest. It may mean that there will be a higher degree of variability in social organizations and relations, as the ability of the center to influence society is reduced. It may mean that problems of ruralizing government services will emerge again and again.

Presumably there will be some people in the central government who will attempt to prevent this. They will attempt to increase the tax revenue available to the central

government and will try to increase central control over regions. Perhaps Liu Shao-ch'i would have done this. If there is no charismatic leader to convince the country of the suitability of this course, the repressive machinery of the state would have to be increased. The Communist Party would, presumably, be the core organization of this. This would require major changes in the behavior of cadres. There could no longer be "open door rectification," in which the masses publicly criticize party members; nor would cadres be safe physically when they were sent down to live and work with the masses. It would, of course, involve a major change in economic and political organization to reduce mass participation. Undoubtedly much of China's politics in the future will be oriented to this type of question.

E. Conclusion

The policies used successfully in China to develop agriculture relate to a specific cultural and historical experience. China is a mature, agrarian society with a very high man-to-land ratio and a very low economic surplus. The Chinese farmers have been interested in improving agricultural techniques for hundreds of years. Moreover, decades of training were required to supply the scientists and other trained personnel; a huge political revolution was needed to establish the political and social climate; and a decade of economic construction was needed to create the industrial base and economic infrastructure needed for agro-technical transformation. All these preconditions had to be met before the Green Revolution could develop in the 1960's.

Since then the Chinese have adopted fairly conventional policies and carried them out very well. Strong socialist government and values have permitted the rational application of these policies, and the collective nature of the village economy has mitigated against the tendencies toward inequality that emerge elsewhere. A subtle mix of central power and local

autonomy has also been essential. Undoubtedly some elements of China's policies would be useful in other countries, but of course each country has its own circumstances to which policies must be shaped.

Simply because China has been successful in starting the modernization of agriculture does not mean that all problems are solved. Continuing to improve the modern areas and transforming the other areas will be a constant challenge to China. The political issues that will emerge in the future will be as great as those in the past.

China's experiences do not constitute a simple model which can be adopted by other countries. They may not even be suitable for the China of the future. But they stand as proof that planned socioeconomic change is possible, that even the poorest, most powerless peasant in the world need not forever be poised on the brink of existence. China's experiences prove once again that man can shape his own history.

Chapter 9

UPDATING OF ANALYSIS, AS OF JANUARY, 1975

An updating to the estimates in Making Green Revolution is possible because of additional data now available. Most recent data from China confirm that the modern portion of China's agriculture is expanding and now represents over one-fourth of China's agriculture.

Up until the late 1960's most of the modernization of China's agriculture was confined to a few "high and stable yield" regions. In the early 1970's, efforts were redirected to other areas, where yields were raised and stabilized, but not (yet) brought up to the level of the earlier high and stable yield regions. Thus this set of estimates differentiates between (a) high and stable yield regions, (b) progressive regions, and (c) traditional regions.

In the past few years, the most dramatic source of growth has been the improved water control in vast regions of the North China Plain (including the Hai and Huai River basins), and upper Yellow River Valley, and

TABLE 9.1

Summary of the Spread of Modern Grain Production in China, 1974

	Area Sown To Grain Sown Area million HA[a]		Total Cultivated Area million HA[b]
1. Modernizing Regions:			
A. High and Stable Yield Areas	11	41 (29%)	28 (23%)
B. Progressive Regions	30		
2. Traditional Regions	98		93
TOTAL ----------	140		120[c]

Notes: a. Computed from Table 9.3 below.
b. Computed from Table 9.2 below.
c. This is total cultivated area, included land sown to crops other than grains.

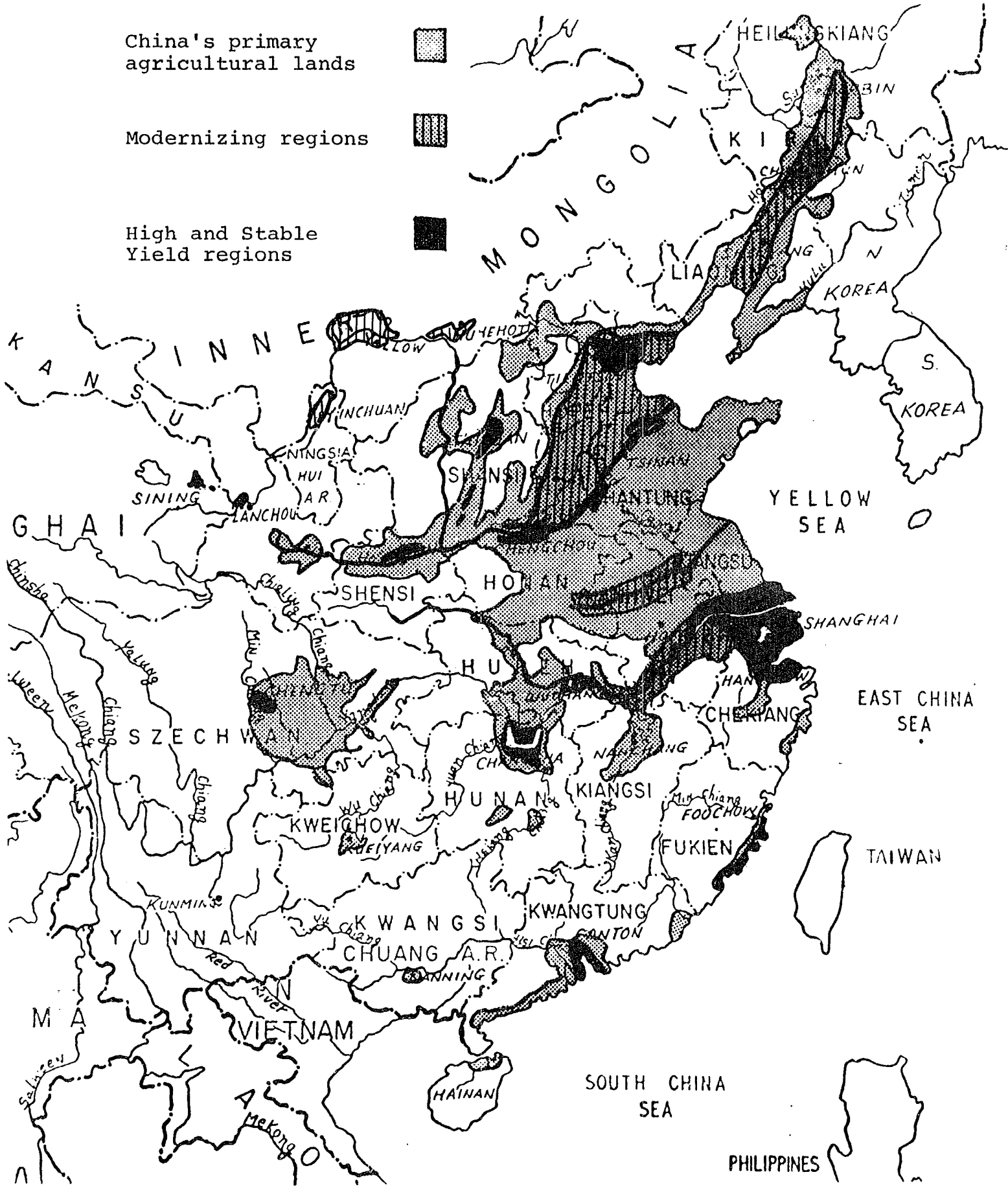
the Yangtze River Valley. Vast amounts of human labor have been mobilized in the past decades to construct irrigation canals, dikes, drainage projects, etc. These labor intensive projects have finally been completed and are now increasing and stabilizing yields in North China. One reason these projects are now thought to be effective (in contrast to the 1950's) is the widespread availability of new energy sources to move water. On the North China Plain deep wells with mechanical power, similar to tubewells recently adopted in other parts of Asia, have been widely adopted. By 1974 roughly 1.3 million mechanical pump wells had been developed, servicing 7.3 million hectares. The horsepower of mechanical irrigation has risen very quickly, from 8.6 million in 1965 to 12 million in 1971 with a very rapid jump to 30 million in 1974.[1] [See Figure 9.1].

---

[1]Chi Feng, "Thirteen Consecutive Years of Rich Harvests," Peking Review, No. 1, January 3, 1975, p. 11.

FIGURE 9.1

Regions of Modernizing Agriculture, 1974



Because of the strongly complementary nature of traditional water control projects, modern pumps and other inputs, and new cropping techniques and systems, it is now much more difficult to associate increases in production with "modern" or "traditional" inputs. For example, regions near the Yangtze Valley and in South China have increased their sown area through multiple cropping and intercropping techniques, made possible by an increased supply of chemical fertilizers, increased ability to regulate water and provide water at different times of the year, new varieties of seeds with shorter growing seasons, and selective mechanization to reduce pressure on labor supplies in busy seasons.

The estimate that wheat production went up from 24 million tons in 1957 to 45 million tons in 1974 is reinforced by some additional data. The Chinese reported that "the total increase in wheat output in the past eight years [1965-73] is equal to that of the 16 years before the Cultural Revolution [1949-65]."[1]

Chinese statistics show wheat production at 13.8 million tons in 1949 and 23.6 million tons in 1957. An increase to 29 million tons in 1965 is conceivable, considering that 2.5 million hectares were sown to high yielding varieties of wheat (with 1.5 to 2 tons per hectare increased yield, output would increase 2.7 to 5 million tons) and considering significant mechanization which would increase yields somewhat. This would suggest an increment of about 15.2 tons of wheat from 1949 to 1965. If the same increment is assumed from 1965 to 1973 (as the Chinese claim), then wheat production in 1973 would have been 44.2 million tons.

---

[1] "Rich Summer Harvest," Peking Review No. 31, August 2, 1974, p. 3.

High wheat yields were reported in many regions in 1974. Twenty-two of the roughly 90 wheat-growing special districts reported average wheat yields over 2.25 tons per hectare. (The previous year only 12 special districts had wheat yields at that level). Eighty counties (in contrast to 61 the previous year) reported wheat yields of 3.0 tons per hectare. Some regions had wheat yields as high as 4.5 tons per hectare. Peking Review claimed:

> Over 80 good strains have been popularized and these account for more than 80 percent of China's wheat acreage. Once most harmful to wheat crops, yellow rust and smut are basically under control.[1]

There are more data suggesting that the Chinese are improving varieties of maize and sorghum. In 1965 over 66,000 HA planted to maize yielded 3.7 to 4.5 tons per hectare. In 210 counties yields were over 2.25 per hectare.[2] By 1972 the area sown to hybrid maize had gone up to 1.73 million hectares.[3]

A recent report suggests some success in popularizing these varieties, but also suggests great room for improvement; and implies that the hybridized strains are not especially high yielding:

> Since the Great Cultural Revolution started, much headway has been made in the search in the hybrid vigour of cross-bred maize and sorghum...Over 100 maize hybrids came into wide use, and 15 sorghum

---

[1] Ibid.

[2] The Scientific and Technical Group of Maize of the Chinese Academy of Agricultural Sciences, "A Summing-Up of the Experiences on Obtaining a Stable and High Yield of Maize in 1965," Chung-kuo Nung-yeh K'o-hsüeh, 1966, No. 3, p. 3.

[3] Science for the People, China: Science Walks on Two Legs, (New York: Avon, 1974), p. 130.

> hybrids were each grown on at least 200,000 hectares. [This implies a total of at least 3.0 million hectares.] The hybridized strains normally increase the yield by 20 percent.[1]

More recent data confirm the projections of tractorization on p. 48. The tractor-plowed area nearly doubled from 1965 to 1974.[2] In 1964 it was reported that tractors cultivated about 10.7 million hectares (Kang Chao, op.cit., p. 115). Presumably tractors cultivated a bit more in 1965, so the area plowed by tractors in 1974 would be about 20 million hectares. [See Tables 9.2 and 9.3, pp. 282-287.]

The discussion in Chapter 5, Strengthening Agro-Technical Services, should include reference to the strengthening of management over irrigation systems. After the Tenth Plenum, directives were issued that irrigation systems should be operated as enterprises, separate from the normal administrative system. The irrigation enterprise would have its own staff and allocate the use of water to the various production units according to scientific, rational criteria. Water fees from the production units would cover the staff expenses of the irrigation enterprise.[3] Detailed instructions were issued by the Ministry of Agriculture on January 18, 1965 that clarified the power of the irrigation enterprise (now called the irrigation district water

---

[1] "China Improves Farm Crop Seeds," NCNA Peking, October 30, 1974.

[2] Chi Feng, "Thirteen Consecutive Years in Rich Harvests," Peking Review, No. 1, January 3, 1975, p. 12.

[3] "Strengthen the Management of Irrigated Areas and Irrigation and Pumping Stations," JMJP editorial, December 13, 1963. SCMP 3130, p. 13.

control commission). The directives also specified that superior government offices had to approve the water distribution plans; the directive also set the priorities in water distribution as: 1) human and animal drinking water; 2) drought-ridden regions; 3) crops with an optimum irrigation effect; and 4) regions which traditionally have a high priority in utilizing irrigation water.[1] To assure that the irrigation management authorities had adequate technical information to make rational plans for the utilization of water, they were encouraged to establish their own experimental farms, which could test crops for optimal water use.[2]

---

[1] "Irrigation Engineering and Administration," Nung-t'ien yu Shui-t'u Pao-ch'ih (Agricultural Water and Soil Conservation), No. 5, May 1965. JPRS 31,339, p. 6-17.

[2] The establishment of experimental stations is described in some Chinese publications. Wei-chuan Shui-k'u Kuan-kai te Kuan-li (Management of the Wei River Dam Irrigation) Peking: Water Conservancy and Electric Power Publishing House, 1974, p. 27. See also Chou Chih-yuan and Liang Yung-hsun, Kuan-kai Kuan-li (Peking: China Industrial Publishing House, 1965), pp. 122-153. I am indebted to Jim Nickum for calling my attention to these publications he obtained in China, and, in general, for sensitizing me to the significance of these special systems for irrigation district management.

TABLE 9.2

Regions of Modernizing Agriculture, 1965-1974 (million hectares)

Region	Mechanical Irrigation Systems, i.e. High and Stable Regions 1965 (cultivated area)	Modernizing Regions 1974 (cultivated area): Safely Irrigated and Drained		Modernizing Regions 1974 (cultivated area): Mechanized	Planted to very high yielding varieties (sown area)
Wheat					
1. North China Plain					
a. Peking-Tientsin area	1.3[a]	6.6[i]		(4.0)	
b. Hai-Huai River Basins					
2. Upper Yellow River					
a. Honan (Chengchow-Loyang)		2.67[j]		3.6[r]	wheat: 2.5(1965)[u]
b. Shansi, Kansu, Ninghsia		.37[k]	20.4		
3. Northeast China	.2[b]	(.2)		5.6[s]	maize: .07(1965)[v] 1.73(1972)
Wheat and Rice					
4. Mid and Lower Yangtze					
a. Shanghai, T'ai Lake	3.1[c]	10.0[l]			
b. Mid regions, incl. Wuhan	.13[d]				
5. Szechwan	.6[e]	.53[m]	12.7		6.7(1973)[w]
Rice					
6. Pearl River Delta	.4[f]	(.50)			
7. Tungting Lake Region	.4[g]	.67[n]			
8. Fukien		.6[o]			
9. Other identifiable		.35[p]			
TOTAL	6.6[h]	22.5[q]		21.[t]	10.9

Sources for Table 9.2

a. "Medium and Small Factories Serve Agriculture in North China," NCNA Tientsin, September 7, 1964. SCMP 3316, p. 12.

b. "New Pumping Stations in Northeast China," NCNA Changchun, August 26, 1964. SCMP 3290, p. 14.

c. "More Electricity for People's Communes in China," NCNA Peking, April 24, 1964. SCMP 3208, p. 16. "Electric Pump Operators and Tractors Drivers Trained for China's Rural Areas," NCNA Peking, January 10, 1963. SCMP 2898, p. 13. "China Uses More Pumps for Irrigation and Drainage," NCNA Peking, April 3, 1963. SCMP 2955, p. 15.

d. "New Electric Pumping Projects in Central China, Yangtze Province," NCNA Wuhan, January 9, 1963. SCMP 2897, p. 13. "Big Power Transmission Project for Central China Rural Area," NCNA Wuhan, July 26, 1964. SCMP 3269, p. 17.

e. "China's Leading Rice Producing Province Makes Headway in Technical Transformation of Agriculture," NCNA Chengtu, October 24, 1966. SCMP 3809, p. 27.

f. "Fifth Year of Construction on Pearl River Delta Pumping Stations," NCNA Canton, October 23, 1964. SCMP 3326, p. 19.

g. "Giant Pumping Station Network Finished Around Tungting Lake by the Yangtze River," NCNA Changsha, July 16, 1966. SCMP 3342, p. 27.

h. "How China Achieves Good Harvest in 1965," NCNA Peking, December 28, 1965. SCMP 3609, p. 24.

i. "Grain-Defficient Provinces in Northern China Have Enough and to Spare," NCNA Peking, October 14, 1974. Includes Pi-Shih-Hang Project, Anhwei: 0.2 million HA. China Tames Her Rivers, (Peking: Foreign Languages Press, 1972), p. 20.

j. "China Mechanizes at Full Speed," China Reconstructs, December 1970, p. 22.

k. Ninghsia: .20 million HA: "Yellow River Multi-Purpose Project Benefits Vast Area," NCNA Yinchuan, September 16, 1974. "Yellow River Water Control," China Reconstructs, January 1975, p. 12.

Shansi: .07 million HA: "First Phase Completed in Big Yellow River Pumping Project," NCNA Taiyuan, October 20, 1974. "China Develops Mechanized Irrigation," NCNA Peking, December 21, 1961. SCMP 2648, p. 19.

See also: China Tames Her Rivers, (Peking: Foreign Languages Press, 1972), map facing p. 2.

l. "New Look of Yangtze River," NCNA Peking, October 10, 1974. Includes Chiangnan Plain Hupeh Project: 0.86 million HA. China Tames Her Rivers, p. 44.

m. "Irrigated Area Becomes Southwest China Grain Producing Center," NCNA Chengtu, October 12, 1974. For yields in these regions, see "Impressive Results of Scientist-Peasant Cooperation on Demonstration Farms in Szechwan, NCNA Chengtu, February 4, 1966. SCMP 3634, p. 16.

n. "Tungting Lake Today," China Reconstructs, October 1973, p. 5.

o. "China's 1971 Achievements in Water Conservancy," Economic Reporter (English Supplement), January-March 1972, p. 14.

p. Red Flag Canal, Honan: 0.04 million HA. Figure Given to Jim Nickum at briefing at Lin County, September 5, 1974.

Tanchiangkou Project on Han River, Hupei, 0.146 million HA; "Major Irrigation Project in Central China Put Into Use," NCNA Wuhan, September 14, 1974. See also "Socialist Construction Flourishes," Peking Review No. 40, October 4, 1974, p. 37.

Hainan Island, .16 million HA. "Low-Yield Land Improved on Hainan Island," NCNA Kwangchow, November 3, 1974.

q. The figure here is the sum of the figures above. More recent Chinese figures suggest an even larger area has improved water control. "Farmland with harvests guaranteed in spite of drought or flood has been increased to 33 million hectares." "Sharp Rise of Farm Machinery," Peking Review No. 6, February 7, 1975, p. 23. Of this 33 million hectares, it seems that a major problem was to reduce waterlogging, a problem on the North China Plain where the water table is high. "More than 22 million hectares of farmland that was vulnerable to waterlogging in old China is now mostly protected against it." "What is the Root Cause of the Food Problem?" NCNA Peking, November 6, 1974. Total irrigated area is thought to be roughly 40-44 million hectares.

r. "How Honan Achieves Self-Sufficiency in Grain," Peking Review No. 40, October 6, 1972 , p. 27.

s. "China Extends Range of Tractors," NCNA Peking, January 31, 1966. SCMP 3631, p. 19.

t. Estimated on the basis that China had 207,000 standard (15 HP) tractors, each capable of serving 100 HA.

u. "Mass Seed Selection Underway in China," NCNA Peking, June 17, 1965. SCMP 3482, p. 15.

v. 1965: Scientific and Technical Group of Maize of the Chinese Academy of Agricultural Sciences, "A Summing-Up of the Experiences on Obtaining a Stable and High Yield of Maize in 1965," Chung-kuo Nung-yeh K'o-hsüeh, 1966, No. 3, p. 3.

1972: Science for the People, China: Science Walks on Two Legs (New York: Avon, 1974), p. 130.

w. "New Achievements in Rice Research," Peking Review No. 6 (February 8, 1974), p. 22. For an excellent summary of the situation up to 1965, see Rice Scientific Technical Group of the Chinese Academy of Agricultural Sciences, "Preliminary Summary of the Cultivating Techniques in the 1965 Bumper Rice Harvest," Chung-kuo Nung-yeh K'o-hsüeh No. 2, February 1966. JPRS 36,217.

TABLE 9.3

Estimates for Area, Yield and Production of Food Grains, 1957-1974

	1957				1974				
	Sown Area (million hectares)	Yield (Tons/ hectare)	Production (million tons)		Sown[2] Area (million hectares)		Yield[3] (Tons/ hectare)		Production (million tons)	
Rice	32.2	2.69	87	regular	25.9	38.5	2.7	3.1	70	118
				safely irrigated	5.9		3.5		21	
				high-stable	6.7		4.0		27	
Wheat	27.5	.86	24	regular	5.2	30.0	.8	1.5	4	45
				unirrigated, mechanized	4.4		1.0		4	
				safely irrigated, partially mechanized	17.9		1.7		30	
				high-stable	2.5		3.0		7	
Coarse Grains	50.6	1.04	53	regular	56.4	60.6	1.1	1.2	62	72
				progressive	2.3		2.0		5	
				high-stable	1.7		3.0		5	
Potatoes[4]	10.5	2.09	22			10.5		2.1		22
TOTAL	120.8	1.54	186			139.6		1.85		257

Notes to Table 9.3.

1. Figures for 1957 are official Chinese figures given in Ten Great Years.

2. We assume an expansion of sown and cultivated area as follows:
   a) In rice areas, we assume that in one-half of the regions in which irrigation was greatly improved (12.6 million HA), an additional crop of rice was possible, so sown area went up 6.3 million HA.
   b) In wheat areas, we assume that consolidation of irrigation in the Lower Yangtze region permitted multiple cropping of wheat with an addition of 2.5 million HA.
   c) We assume that the area sown to coarse grains was expanded by 10 million HA by land reclamation and terracing.

3. Estimates of yield in 1974 in different circumstances are based on a wide variety of reports from China including reports by Chinese scientists and by foreign visitors. A useful source is Gilbert Etienne, China's Agricultural Development (Geneva: Asian Documentation and Research Center, 1974) esp. p. 20-24.

4. Potatoes have been converted to grain equivalent by multiplying actual yield and production by 0.25.