AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523

BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY

1. SUBJECT CLASSIFICATION

A. PRIMARY: Agriculture — AE10-0000-G635

B. SECONDARY: Agricultural economics--India

2. TITLE AND SUBTITLE

Modernisation of the rice milling industry,lessons from past performance

3. AUTHOR(S)

Lele,U.J.

4. DOCUMENT DATE	5. NUMBER OF PAGES	6. ARC NUMBER
1970	23p.	ARC IN338.17318.L537a

7. REFERENCE ORGANIZATION NAME AND ADDRESS

Cornell

8. SUPPLEMENTARY NOTES *(Sponsoring Organization, Publishers, Availability)*

(In Cornell int.agr.development reprint,43)

9. ABSTRACT

10. CONTROL NUMBER	11. PRICE OF DOCUMENT
PN-RAA- 326	

12. DESCRIPTORS

Government policies
India
Mills
Rice
Technological change

13. PROJECT NUMBER

14. CONTRACT NUMBER

CSD-1438 Res.

15. TYPE OF DOCUMENT

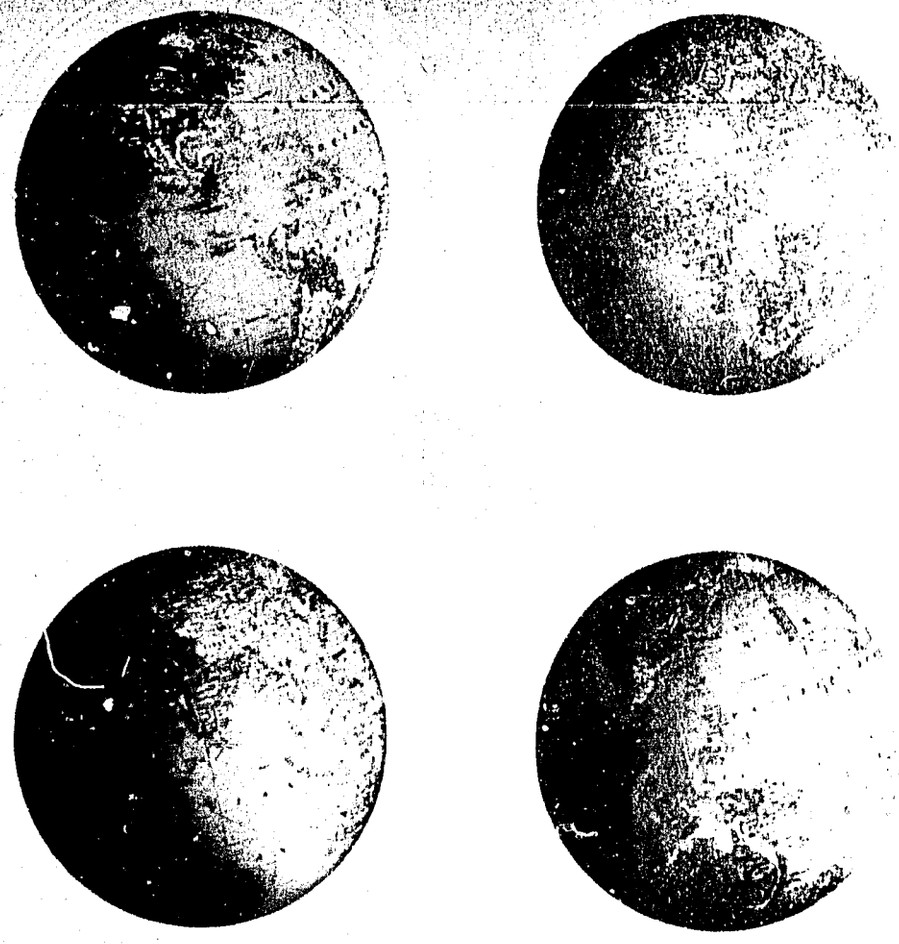
AID 590-1 (4-74)

IN
338.17318
L537a

CORNELL INTERNATIONAL AGRICULTURAL DEVELOPMENT REPRINT 43

csd 1435

cal Weekly
July 11, 1970



Modernisation of the Rice Milling Industry

Lessons From Past Performance

Attachment to csd 2805
occasional paper of Cornell L. H. 44 Ag. Econ.
Project Title Impact of New Ag. Technology
on Rural Employment & Income
Cornell U.

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A.I.D.
Reference Center
Room 1656 NS

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NEW YORK STATE COLLEGE OF AGRICULTURE, A STATUTORY COLLEGE
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Single Copy Free
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Reprinted from
Economic and Political Weekly
Vol. V., No. 28, July 11, 1970

MODERNISATION OF THE RICE MILLING INDUSTRY

Lessons from Past Performance

Uma J. Lele

This paper discusses the factors that determine the efficiency of the rice milling industry. It examines the performance of the traditional rice milling industry during a recent period of free trade and shows that the spread between prices of rice and paddy was well above technologically determined milling margins. There were, besides, considerable year-to-year fluctuations in the utilisation of the effective rice milling capacity.

The author contends that the traditional rice milling industry has not operated efficiently. This can be attributed to various Government policies that inhibited efficient operation through their effects on choice of technology, on competition and on capacity utilisation. Government policies have encouraged expansion of antiquated hullers and discouraged modernisation, thus raising milling costs and affecting outturn. Not only have Government policies not enhanced competition but they have reduced utilisation of effective capacity through instability of price movements.

The following policies seem desirable for efficient performance of the rice milling industry.

First, a favourable atmosphere needs to be created which would encourage private investment in technologically superior milling equipment.

Second, the need for extension of technical knowledge ought to be recognised and a positive programme adopted for making millers in the private sector aware of modern milling technology.

Third, credit should be made available to millers for modernising existing rice mills so as to foster competition between those who can raise their own capital and those who for lack of capital would fail to modernise.

Finally, a price policy which would stabilise off-seasonal price movements and market supplies from year to year would considerably reduce uncertainty in trading operations, thereby increasing utilisation of effective capacity and decreasing average costs and increasing competition.

CONSIDERABLE attention has centered on the question of modernisation of the rice milling industry in recent years. Upon the recommendation of a Ford Foundation team, the Food Department made a decision in July 1964 to set up seven imported modern rice mills as the first step towards modernisation. The Food Corporation of India subsequently undertook establishment of 25 Japanese modern rice mills financed by a yen credit. The Fourth Five-Year Plan proposals called for establishment of over 300 modern mills in the public and co-operative sectors. This is expected to create a capacity to mill 8.5 million tons of paddy out of the proposed increase of 20 million tons by the end of the Fourth Plan.

Three indigenous firms have entered into collaboration with two Japanese and a German firm for manufacturing modern rice milling machinery in India. The first indigenously manufactured milling machine has already come off the assembly lines. Although the role of the private sector in modernisation remained obscure in the initial stages, commercial banks have now been given directives to advance loans to private millers up to as much as 90 per cent of the cost of modernisation so as to accelerate replacement of traditional hullers and underdisc runners by rubber roll shellers in the private sector.

Modernisation policies and programmes have thus made considerable strides. A rapid pace of modernisation and subsequent efficient operation of the rice milling industry is, however, not necessarily assured by the present policies and programmes.

This paper discusses the factors that determine efficiency of the rice milling industry. It then examines the performance of the traditional rice milling industry during a recent period of free trade in terms of the efficiency criteria outlined.

It is the contention of this paper that certain governmental policies have detracted from efficient operation of the rice milling industry through their effects on choice of technology, on competition and on capacity utilisation. The paper then discusses the implications of deficiencies in the industry's past performance and suggests Government policy measures which would lead to more effective meeting of social objectives on the part of the public and private sectors.

FACTORS AFFECTING EFFICIENCY

Efficiency of the rice milling industry may be gauged in terms of three factors, technology, degree of competition and capacity utilisation. Technology through its effect on costs of conversion and quantity and quality of rice and by-products produced affects the margin between paddy and rice prices. It thus determines the floor to the paddy rice margins. Less than full capacity utilisation raises costs and may widen margins. Degree of competition has a considerable effect on the margins over and above the technologically determined margins between paddy and rice prices. Thus, given a competitive framework and full capacity utilisation, paddy-rice margins will be almost completely determined by the milling technology. Technology, competition and capacity utilisation are, however, not mutually exclusive and almost always inter-act, thus complicating the problem of distinguishing the effects of one from the other. For example, technology may dictate the size of individual firms thus affecting degree of competition and capacity utilisation. On the other hand, governmental policies may enforce firm size which in turn may limit the choice of technology. However, even in a competitive industry capacity utilisation may vary considerably from one year to another thus affecting milling costs and hence margins.

In a perfectly competitive market, rice and paddy prices bear the following relationship.

> Price of one quintal of rice = Price of paddy equivalent of rice costs of milling the paddy equivalent - value of by-product - the value of the quality differential in milling.

It must be emphasised at this point that relationship between paddy and rice prices may also be affected by movements over space and time, in which case transport, storage, and handling costs must be considered. We are isolating from these factors which have been analysed elsewhere and which show margins generally commensurate with costs.[1] Here we are strictly concerned with returns to milling as distinguished from those to shipping and storage.

We will briefly discuss the effect of these various components on paddy rice margins in general and then proceed to examine the actual behaviour of the paddy-rice prices during the period of free trade through the effect of these technological factors on general degree of competition, and capacity utilisation.

Milling outturn determines the paddy equivalent of rice. Ceteris paribus, the larger the milling outturn the smaller the price spread between rice and its paddy equivalent. The Central Food Technological Research Institute's findings show that in the case of parboiled rice, modern rice mills yield on an average 0.8 per cent more rice over underdisc runner shellers and 1.6 per cent over hullers. In the case of raw rice, the outturn in modern mills is 2.5 per cent higher than traditional shellers and 6.6 per cent higher than hullers.[2]

Prices of paddy, expected and actual, may considerably affect the quantities purchased and the timing of purchases. This in turn will affect capacity utilisation of rice mills. We will discuss the implications of price factors for capacity utilisation. We will also examine the effect of utilisation on milling costs in the short run and on allocation of capital to milling in the long run.

Milling Costs

Costs of milling paddy consist of the direct costs that vary with the quantities of paddy milled and the fixed costs. Both the direct variable costs and fixed costs vary considerably in different milling technologies. Fixed costs may, however, also vary between mills using the same technology.

Variable costs in traditional huller mills, excluding the costs of paddy itself, consist mostly of the labour required for parboiling, drying and moving paddy and for bagging rice. The data collected from selected modern rice mills and traditional huller mills point out the significant difference in the labour intensity of the two milling technologies.[3] The other variable costs such as fuel and electricity are much more substantial in modern mills due to greater automation.

Fixed costs consist of depreciation and maintenance, salaries of permanent employees, taxes, license fees and other establishment costs. Depreciation may vary considerably according to the age of the milling machinery even between two mills using the same technology. Due to the relatively higher capital intensity of the modern mills, depreciation constitutes a much more significant component in modern rice mills as compared to their traditional counterparts. This has important implications to unit fixed costs likely to ensue under the two technologies at different levels of capacity utilisation. Our data show a significant variation in unit fixed costs for different levels of capacity utilisation in modern rice mills. Other costs such as salaries of permanent employees are also higher and are likely to vary much more significantly at different levels of capacity utilisation in modern rice mills due to the higher management component. The absolute level of fixed costs[4] and hence the variation according to capacity utilisation are relatively much less significant in traditional hullers.

Value of By-Products

Value of by-products is determined by the quantity and quality of by-products produced by the different milling technologies. In the traditional huller bran is usually mixed with powdered husk and not separated. Millers sometimes sell this so called bran as cattle feed. They use the husk as fuel in mills. In m n rice mills, 4 per cent bran can be obtained in unadulterated form. The price of bran obtained from traditional hullers ranged from Rs 20.00 to Rs 30.00 per ton in 1969. The bran produced in modern rice mills fetched Rs 400 to Rs 450 per ton. By-products thus would have significant implications for size of margins in different technologies.

Central Food Technological Research Institute's evaluation indicates that for raw paddy, increases in head rice yield, defined as all grain of 3/4 size or larger, in the modern mills over sheller mills varied from 1.0 per cent to 12.4 per cent with an average increase of 6.1 per cent.[5] As compared to huller mills, the corresponding increases varied from 6.5 per cent to 27.7 per cent with an average of 15.1 per cent.[6] For parboiled paddy, the corresponding increases over sheller units varied from zero to 2.5 per cent with an average of 1.3 per cent. The increases over huller mills varied from 1.0 to 8.5 per cent with an average of 4.1 per cent.[7] Rubber roll sheller mills are thus obviously much superior in quality of processing to traditional hullers and even to traditional shellers mills.

Considerable difference of opinion exists in India and other rice-consuming countries in Asia as to whether quality differences would gain significant price differentials. The underlying contention is that consumers in Asia do not show a marked preference for higher head rice content and that, in fact, in some cases, there is a special demand for broken rice for traditional preparations made out of such rice. Due to an absence of a free market in rice in India since establishment of modern rice mills little can be said about quality differentials in rice prices. Price differences due to quality should be distinguished from those due to varieties for which we have abundant evidence from the past.[8] An interesting study made of the domestic rice market in the Philippines indicates that price differences due to quality are much smaller in the domestic market in the Philippines as compared to those in the international market.[9]

The excessive emphasis on improvement in physical characteristics of rice processed in modern mills has been mainly due to the importance given by American consultants in the initial stages in India and elsewhere in Asia to the appallingly poor quality of domestic processing when compared with the standards of the international trade. The point, no doubt, is particularly relevant in countries such as Pakistan that have been unable to compete in the international market due to poor processing methods. In the domestic markets of Asia, however, investment in modern mills seems much more justifiable on the grounds of increased outturn and improved by-products both of which by themselves provide enough economic justification for investment.[10]

Milling technology thus has different effects on the various components discussed above and hence may provide quite different levels of market margins that may be justified under competitive conditions.

Efficiency of Traditional Milling Industry

It is of interest to examine whether the rice milling industry operated efficiently when considered in terms of the milling margins set by the traditional technology. The actual spread between paddy and rice prices in Tamil Nadu and West Bengal during 1955-56 and 1963-64 are, therefore, compared below with the milling margins hypothesised to exist under conditions of traditional technology and perfect competition. The following assumptions are used for estimating the various components of milling margins.

For the comparison of rice and paddy prices, a ratio of 2:3 is used as the outturn of rice from parboiled paddy. This is in conformity with the outturn from parboiled paddy estimated in most standard government publications of the Central and State Governments and is consistent with the recent findings of the Central Food Technological Research Institute regarding milling outturns from parboiled paddy in huller mills.

In West Bengal all the paddy is parboiled before milling. In Tamil Nadu almost all the medium and coarse paddy is parboiled. A major portion of the fine paddy is also parboiled. Consumption of raw rice is usually reserved for special religious ceremonies and confined to some specific communities.

Since almost all the marketed surplus for this period was milled in traditional hullers, milling costs are considered only for huller mills. Existing secondary data on milling costs have several drawbacks. First, they are often outdated and refer to the pre-War and early post-War period. Second, they show considerable diversity in costs even for the same types of milling equipment. This is particularly true of data for West Bengal. Third, they show considerably higher milling costs for West Bengal than for other States. Since, secondary estimates almost never specify what components of costs are included, it is not known whether this is

due to differences in definitions or whether costs are, in fact, so high.

Milling costs allowed by various State Governments under their procurement programmes also show considerably higher milling costs for West Bengal and probably are not indicative of the actual milling costs. Unlike Andhra Pradesh, Tamil Nadu and Maharashtra that allowed Rs 1.50 per quintal of paddy milled (i.e., Rs 2.25 per quintal of rice) as milling charges in 1967, the West Bengal Government allowed Rs 5.36 per quintal of rice. The Tamil Nadu Government subsequently reduced this to Rs 1.00 per quintal of paddy milled or Rs 1.50 per quintal of rice. The West Bengal Government also reduced the rate to Rs 4.70 per quintal of rice. In addition, both the governments pay for procurement costs, procurement commission and incidentals. In Tamil Nadu, the Government paid Rs 3.25 per quintal of rice to cover these various charges. Thus the Government paid Rs 4.75 per quintal of rice delivered in Tamil Nadu. As against this the Food Corporation in West Bengal paid Rs 7.13 per quintal of rice delivered. In both the States extra payments were made for gunnies. These were more or less comparable with each other.[11]

Because of the variation in costs shown by these other sources, we used milling data collected through our own surveys in Tamil Nadu and West Bengal. Our investigations show a remarkable degree of uniformity in the variable costs of milling in Tamil Nadu. The direct milling costs that consist of labour costs and costs of oil and fuel ranged between Rs 1.00 and Rs 2.00 per quintal of rice. Fixed costs vary somewhat more, due entirely to variation in the depreciation component. Our data for Tamil Nadu show average total cost of milling to be Rs 5.50 to Rs 6.00 per quintal of rice in 1969.[12]

In order to examine whether actual milling costs were in fact higher in West Bengal than in Tamil Nadu or whether some other elements caused milling costs to be so high, we also collected data on milling costs directly from selected rice mills of various sizes in West Bengal. Our data for West Bengal show that the direct costs of milling which include oil, fuel, electricity and salaries of temporary workers range between Rs 1.50 to Rs 4.00 per quintal of rice as against Rs 1.00 to Rs 2.00 in Tamil Nadu. On the contrary the fixed costs of operation defined to include

depreciation, interest on block capital, insurance, maintenance and salaries of permanent employees, range only between Rs 1.00 to Rs 2.75 per quintal of rice.[13] The average total milling costs per quintal of rice for 1968 show a range of Rs 2.70 to Rs 5.10 in West Bengal.[14] The costs show no consistent variation according to the size of the plant.

The total milling costs per unit, therefore, do not seem to have been higher in West Bengal. It is, however, noteworthy that mills in West Bengal show considerable variation in variable costs of milling. Various reasons seem plausible. In 1968-69 mills were milling paddy for the West Bengal Government. Records of some mills show operations much below capacity. If the low level of operation was unexpected this must have affected the millers' hiring of labour and hence costs. However, a less generous view of the situation would suggest that some millers milled more paddy than their records indicate and assigned all their variable costs only to the stocks submitted to the Government. Our data show that there was a substantial decline in the reported quantities of paddy milled by rice millers in West Bengal during periods of control while the supplies in fact found their way to the consuming markets, although in part through single hullers.

The third possible explanation for such a substantial variability in variable costs may be that some mills are simply more inefficient in their operations than others and do not really have to attempt to reduce their costs due to the high milling rate allowed by the State Government as compared to any other State in India. On the contrary, pressure from the millers for maintaining such high milling rate may be the result of such inefficiencies on part of some millers while the efficient millers reap profits from high milling rates. The fourth likely explanation is that due to controls other components such as bribes to Government officials, and heavy storage losses due to clandestine storages, which normally do not enter economic calculations, raise milling costs for some millers.

Whatever the reasons, our data from Tamil Nadu and West Bengal suggest that millers in West Bengal have been paid adequately to cover fixed and variable costs of processing. On the contrary, the Tamil Nadu Government obviously seems to have paid too little to its millers for milling when the official milling rates are compared with our milling cost estimates. Either policy is

likely to encourage inefficiency. The case of high milling charges needs no further labouring. When milling rates are so low as in the case of Tamil Nadu, there is also likely to be a considerable pressure on millers to recover costs through devious means. It is of interest to know how well the actual spread between paddy and rice prices corresponded with milling costs in a free market.

On the basis of our total average milling cost of Rs 5.0 or 6.00 per quintal of rice for Tamil Nadu in 1969 we have assumed total milling cost to be Rs 5.00 per quintal of rice during 1955-56 to 1963-64. Although millers indicated that milling costs have nearly doubled since 1963 (see footnote 12), we have made a lesser discount, so as to allow for a reasonable return to the miller for his milling operations. There was no significant increase in milling costs from 1955-56 to 1963-64. Therefore, only a single estimate of Rs 5.00 is assumed to have been applicable to the whole period under consideration.

Price differences due to differences in the quality of rice and value of by-products were ignored since our analysis is confined only to parboiled paddy milled in hullers.

Thus during the period of free trade, rice prices were expected to have been equal to 1.5 times the price of paddy+Rs 5.00.

Actual Margins between Paddy and Rice Prices in West Bengal and Tamil Nadu

Weekly wholesale prices of rice and of their paddy equivalents within single markets for the period 1955-56 to 1963-64 were compared in several primary markets in West Bengal and Tamil Nadu.[15] In Kanchipuram out of 484 weeks, half the times the price difference was above Rs 5.00 per quintal of rice and as much as 28 per cent of the time above Rs 8 per quintal. In Tirunelveli price difference was above Rs 5.00 31 per cent of the time of which 7 per cent of the time it was above Rs 8.00. In Cuddalore the difference was 21 per cent of the time above Rs 5.00. In Tiruchirapalli the difference was above Rs 5.00 17 per cent of the time of which 5 per cent of the time above Rs 8.00. In Tiruvarur the difference was above Rs 5.00 only 11 per cent of the time, and in Mannargudi 8 per cent of the time.

The examination of the paddy-rice prices in West Bengal shows a much larger spread in the West Bengal markets than in Tamil Nadu. In Burdwan, the spread remained above Rs 5.00 88 per cent of the time of which it was above Rs 8.00 23 per cent of the time, in Guskara 87 per cent of the time of which 27 per cent above Rs 8.00, in Sainthia 77 per cent of which 33 per cent of the time above Rs 8.00 and in Bolpur 34 per cent of the time of which 8 per cent of the time above Rs 8.00. The evidence thus shows that the milling industry did not operate efficiently within the technological confines and that considerable scope existed for excess profits.[16] The lower percentage in Bolpur may have been due to the poor transport facilities in Bolpur which probably kept rice prices depressed as compared to other nearby markets. The generally larger spread in West Bengal may partly have been due to the fact th t paddy brought to the market usually has a much higher rate of refraction (i.e., dust and foreign matter) as compared to other States, where cultivators clean paddy before marketing it. This was consistently noted in discussions with procurement officials in West Bengal and Tamil Nadu. However, the refraction rate is by no means adequate to explain such high margins. The larger spread in Bengal is also commensurate with the higher milling costs claimed to exist in West Bengal. These factors, however, do not completely explain the high market margins in the two States.

A further examination of the operation of the rice milling industry during the period of free trade and after shows several interesting features of the competitiveness of the system that have a direct bearing on the level of margins between paddy-rice prices.

When rice mills are divided into the organised and the unorganised sector, data both for West Bengal and Tamil Nadu show that a major expansion of the rice milling industry was brought about by an increase in single hullers. These have been most significant in replacing hand-pounding of paddy, used for domestic consumption but not in providing competition to the organised rice mills. This is borne out by the evidence on number of rice mills in the organised sector, their effective capacity and the quantities of paddy milled during the period under consideration. They indicate that utilisation of effective capacity in the organised sector was not as low as generally believed to be true (Tables 1 and 2).[17] The data also suggest that there was no declining trend in the capacity utilisation of rice mills in the organised sector until 1965.

The considerable year-to-year fluctuations in the capacity utilisation during 1955 and 1964 were due to fluctuations in production which resulted in fluctuations in the marketed surplus. Various other factors may also explain the phenomenon of fluctuations in capacity utilisation. Among them behaviour of market prices seems to have been highly important.

Table 1: Number of Licensed Rice Mills in the Organised Sector and Estimates of Effective Capacity Utilisation, West Bengal, 1955-69

Year (1)	No. of Rice Mills (2)	Estimates Effective Capacity of Rice Mills* (in rice) (3)	Our Estimates of Quantities of Milled Rice** (4)	Our Estimates of Utilisation of Effective Capacity (4 as Per Cent of 3) (5)	Official Estimates of Quantities of Milled Rice (6)	Official Estimates of Utilisation of Effective Capacity (6 as Per Cent of 3) (7)
		(000 metric tons)		(per cent)	(000 metric tons)	(per cent)
1955	360	900	765	85	NA	NA
1956	391	977	836	86	NA	NA
1957	425	1062	940	88	NA	NA
1958	446	1115	860	77	NA	NA
1959	467	1167	851	73	NA	NA
1960	494	1235	857	69	650	53
1961	497	1243	1067	86	810	65
1962	515	1288	963	75	790	61
1963	NA	NA	899	NA	710	NA
1964	NA	NA	1088	NA	700	NA
1965	711	1778	1126	63	510	29
1966	NA	NA	990	NA	450	NA
1967	729	1823	980	53	150	8
1968	741	1853	1005		310	17
1969	742	1855	NA	NA	350	19

* Based on average 10 metric tons of milled rice per rice mill in a single shift of 8 hours and 250 days of running in a year.

** Calculated at 20 per cent of the State's production.

Table 2: Number of Rice Mills Effective Installed Capacity and Capacity Utilisation Tamil Nadu, 1964 to 1968

	Number of Rice Mills				Million Metric Tons		
Year*	Huller Type	Sheller Type	Combined Huller-Sheller Type	Total	Effective Installed Capacity**	Paddy Production	Per cent Utilisation of Effective Capacity
1964	8,636	15	110	8,761	6.97	6.00	86
1965	8,818	16	110	8,944	7.26	5.28	72
1966	8,972	14	111	9,097	6.73	5.70	85
1967	9,310	19	113	9,432	7.01	6.17	88
1968	10,000	69	100	10,169	8.89	5.84	66

* Installed capacity refers to calendar years 1964, 1965, . . . etc.
** Installed capacity is estimated on the basis of a single 8-hour shift and 250 days of working.
Source: Department of Civil Supplies, Government of Tamil Nadu.

Price Stability

In years of small crop it is, of course, not possible to operate mills at full effective capacity. However, even in normal years it may not be profitable to operate at capacity. Where there is only a single major harvest of paddy, cost of raw material increases due to the need for at least partial purchases in the off-season.[18] The costs are particularly high in periods of sharp seasonal price increases. If purchases are restricted to the immediate post-harvest period, stocks required for the full capacity utilisation of a rice mill are indeed high and involve considerable working capital. When there is a general heavy build-up of stocks by the milling sector immediately after the harvest, prices in the off-season do not rise as sharply as otherwise even if production is low.

The evidence on the grain trade's operations strongly suggests that traders and millers avoid building up heavy stocks of grain in the immediate post-harvest period and depend considerably on a quick turnover of stocks for profits. This is due partly to the fact that they depend to a considerable extent on their own private

sources for working capital. Even when millers desire to borrow funds for purchase of paddy, there are often considerable restrictions on the availability of bank credit and when credit is available millers have less flexibility in their operations as it is tied to the stocks of paddy. But a major factor further discouraging heavy build up of stocks in the immediate post-harvest period is the uncertainty of the seasonal price movements that often show excessively high seasonal margins in some years and low margins in others. Although average profit margins over a period of 8 to 10 years may not seem very low ex post facto, the year-to-year variability in the margins emphasises the high element of uncertainty implied in storage operations. A large build-up of stocks greatly raises the loss function in a situation of high uncertainty and discourages millers from such a commitment. Utilisation of milling capacity is even further discouraged by the Government's policies generally aimed at curbing stocks as an anti-hoarding measure.

The seasonally low utilisation of milling capacity seems to have been even further reinforced in areas where technical restraints on parboilding during monsoons raise costs of carrying stocks beyond monsoons and further reduce effective capacity utilisation. The data from modern and traditional rice mills show that even when less than 50 per cent of the capacity is utilised variable costs including the price of paddy constitute as much as 96 per cent of the total operating costs, with the cost of raw material and interest itself being slightly over 90 per cent of the total. Variable costs would constitute an even higher per cent of the total costs with increase in the capacity utilisation. Where variable costs form such a major portion of total costs decline in average costs as a result of increases in capacity utilisation are insignificant and, therefore, do not provide an incentive for extending capacity utilisation.

This argument is supported by actual behaviour of millers as evidenced by data collected from private rice mills of various sizes in Birbhum and Burdwan districts in West Bengal. It is evident from the data that a close relationship exists between effective milling capacity and storage capacity. The data further show that storage capacity in these private mills never exceeded 60 per cent of the annual effective capacity. Further evidence on highly seasonal utilisation of capacity is provided by the estimates

of monthly production of rice by organised rice mills in West Bengal during 1960 and 1967. It is noteworthy that data for the 8 years covering both free trade and Government procurement show a remarkable uniformity in the milling pattern except for a gradual increase in the seasonality of milling in the later years when open private trade and hence seasonal fluctuations in prices were abolished.

Examination of the nature of variable costs of rice mills emphasises the fact that milling is predominantly a trading operation involving mainly storage and little value added in actual processing. It thus seems highly plausible that the level of utilisation at which optimisation of profits occurs may change significantly from one year to another according to market conditions. The evidence on capacity utilisation when considered in terms of optimisation thus seems generally consistent both in terms of absolute level and in terms of year-to-year fluctuations in the level.

This brings forth an interesting distinction between technical capacity, effective capacity and economic capacity of rice mills and emphasises the need for policies to move the economic optimum as close to the engineering capacity as possible. For an investment pattern which reaches optimum at low levels of engineering capacity although profitable from an individual miller's point of view is obviously inefficient for the society as a whole. It may result in excessive allocation of society's scarce capital into the milling sector with several intermediaries having to share the function of storage. In the long run the total milling capacity will expand beyond what would be justified under full utilisation of engineering capacity.

This divergence between private and social return is obviously a result of the manner in which market forces are structured either through lack of appropriate policies or through misguided ones which not only raise the variable costs of operation, but frequently make it almost impossible to predict returns on operations with any degree of certainty. It is also a function of environmental restraints built into the traditional technology of drying and parboiling. There is obviously a great scope for public policy with respect to prices, stocks and credit on the one hand and technology on the other to change this state of affairs.

Underutilisation of capacity does not have a considerable impact on milling costs in the traditional rice mills as fixed costs constitute a small proportion of the total milling costs. To the extent that underutilisation is due to environmental restraints, it would be eliminated in the process of modernisation that would involve replacement of the traditional technology. However, underutilisation that is due to market forces will have significant impact on costs in the context of modernisation of the rice milling industry where fixed investment is much larger. The higher capital requirements have two implications. First, this would influence unit fixed costs and hence market margin more significantly than now and second, it would mean greater allocation of capital per unit of unused capacity than now due to higher capital requirements of modern mills. It raises some important questions about the size of the modern milling plants and their competitive position in the future.

Causes of Decline in Capacity Utilisation

The downward trend in the quantities milled, as distinguished from year-to-year fluctuation in capacity utilisation, noticed in West Bengal since 1965 until 1968 was due to various factors (Table 1). There was a substantial decline in production which affected the size of the market surplus. Marketed surplus was also affected by levy on millers and fixation of prices that disregarded market forces. This diverted marketed surplus away from the regulated market channels as cultivators found it profitable to convert paddy into rice in hullers so as to sell rice in the open market. Single huller operators also indulged in clandestine milling and trading. Single hullers thus proved to be competitive only during periods of control. The decline in recorded quantities milled was also to a considerable extent due to under-reporting by millers of the quantities milled as a result of severe restrictions on trade. The decline in the capacity utilisation was thus not a result of genuine competition from single hullers during normal times. The evidence strongly suggests that intensification of competition in the organised sector was certainly not a saving grace of the mushrooming of hullers.

The lopsided development of the milling industry was encouraged by several aspects of Governmental policy. The frequent

controls, levies and price fixations in West Bengal are an excellent example of how policies helped diversify marketed surplus of paddy away from the regulated market channels. The policies prompted cultivators to sell their surplus more in the form of rice thus making hullers more profitable. They also encouraged surreptitious trade by operators of hullers who normally hulled paddy only on custom basis.

The policies also induced expansion of single hullers indirectly by hampering the growth of the organised mills. Fluctuations in marketed surplus caused by factors other than production fluctuations raised doubts among millers about the continuous availability of supplies for milling in the future. More important, the general tenor of the policy towards the organised milling sector was hostile. Policy pronouncements in the early and mid-fifties favoured handpounding although eventual actions did not uphold the principle. By the end of the fifties, there was a shift in pronouncements towards nationalisation and take-over of milling and trading, thus creating a great deal of uncertainty about the existence of the private industry and discouraging those millers who would have been inclined to modernise. The threat of nationalisation seemed much more real in the case of modernised mills than in the case of antiquated ones.

The policy makers did not recognise the need for modernisation until recently and hence as a corollary, the policies during the period studied did not permit extension of knowledge of the improved milling technology to millers.

However, worse still, the policies had a negative tone. They classified rice milling as a traditional industry along with dal and oil mills, thus denying credit for modernisation even to those few millers who seemed to recognise the profitability of changing from hullers to traditional sheller mills. It was not until October 1969 that a directive was issued to commercial banks to advance credit to private millers for modernisation.

Governmental policies resulted in emergence of illegitimate market charges such as bribes, etc., which normally should not enter economic calculations. They also increased storage and handling losses as a result of diversification of stocks and holding of stocks as rice rather than in the form of paddy. The examination

of the Governmental policies in West Bengal thus suggest that apart from discouraging competition which affected the actual spread between paddy and rice prices, policies of controls also caused widening of the spread by increasing milling costs.

A great deal of scope obviously exists for a positive, facilitative Governmental policy in the future. There seem to be at least four ways in which this could be brought about. First, a favourable atmosphere needs to be created which would encourage private investment in technologically superior milling equipment. Second, a need for extension of technical knowledge ought to be recognised and a positive programme adopted for making millers in the private sector aware of the modern milling technology. Third, credit should be made available to millers for modernising existing rice mills so as to foster competition between those who can raise their own capital and those who for lack of capital would fail to modernise. Four, a price policy which would stabilise off-seasonal price movements and market supplies from year to year would considerably reduce uncertainty in the trading operations thereby increasing utilisation of effective capacity and thus decreasing average costs and increasing competition.

A complete replacement of private milling will be unworkable, for the same reasons for which replacement of grain trade is unworkable.[19] This is because milling is much more a trading activity than it is a processing activity. Efficiency could be enhanced considerably through policies outlined above, the onus for which lies jointly on the government and the private sector.

NOTES

1 See Uma J. Lele, "Foodgrains Marketing Systems in India", Cornell University Press, Forthcoming. Also see John W. Mellor, Thomas F. Weaver, Uma J. Lele and Sheldon R. Simon, "Developing Rural India", Cornell University Press, Ithaca, N.Y., 1968, pp. 237-291.

2 Central Food Technological Research Institute. Mysore, Report on Evaluation of Modern Rice Mills in Comparison with the Existing Mills.

3 In Tamil Nadu, approximately 4 to 5 unskilled and semi-skilled workers are employed per ton of paddy milled in traditional huller mills as against 1 skilled worker per one to 1-1/2 tons of paddy milled in a modern mill.

4 For making such estimates we used a standard accounting procedure of assuming a rate of 10 per cent depreciation on machinery buildings. We also used market rate of interest of 9 per cent per year rather than a rate of 5 per cent on part of the capital and zero per cent on the rest as done in several official evaluations earlier. Our estimates for Tiruvarur rice mill show that unit fixed costs vary from Rs 980 per ton when only 1,000 tons of capacity is used in a 24,000 ton-annual capacity rice mill, as against Rs 64 per ton when capacity is fully utilised. Although fixed costs are somewhat exaggerated, due to the accounting method of depreciation used, they rather effectively show the variability resulting from variation in utilisation.

5 Op. cit.

6 Ibid.

7 Ibid.

8 Quality differences refer to various physical characteristics attributed to appearance of rice as different from varietal differences which are partly inherent and affect cooking quality and flavour for which consumer preferences are highly articulate in India.

9 Roger A. Aspiras, "The Relationship between Quality and Price in Philippine Wholesale Rice", unpublished mimeograph of International Rice Research Institute, Philippines.

10 This is abundantly proved in various evaluation reports conducted of modern mills in India, by official and non-official agencies, that do not allow for increase in return due to improved quality of rice processed in modern mills. See for example V. K. Gupta, T. P. Gopalaswamy and D. P. Mathur, "Studies on Modernisation in Rice Paddy System", Indian Institute of Management, Ahmedabad, 1969, Report of the

Committee on Rice Milling and Allied Problems Set up by the Food and Nutrition Board, Government of India. "Rice Milling Industry in India—Proposals for the Fourth Five Year Plan". Department of Food, Ministry of Food and Agriculture Government of India, and several other unpublished documents.

11 The official explanation usually offered for this is that millers in West Bengal are required to surrender by-products whereas those in other States are not. Our inquiries consistently show that in fact, no miller ever submitted the by-products. Nor is the disparity explained fully by variation in the time of off-take from mills subsequent to milling in different States.

12 Millers, however, indicated that since the early sixties milling costs have nearly doubled due to higher costs of spare parts and repairs and due to higher taxes and licensing fees. Data collected by the Tamil Nadu State Department of Agriculture in its surveys in 1963 show the cost of milling to be Rs 3.15 in Alandur market per quintal of rice, when rice was boiled once. In the case of double boiling, costs were slightly higher and amounted to Rs 3.90 per quintal of rice at Erode, Rs 3.60 at Tirrupur, and Rs 3.45 at Karaikudi. At Mannachanallur, one of the largest milling centres in the South, the cost was Rs 3.15 per quintal of rice in 1963. These data are in close agreement with what our estimates for 1969 would indicate if we extrapolated costs for earlier years on the basis of our interviews.

13 Depreciation is calculated as 10 per cent of the value of machinery and 5 per cent of the value of buildings. Any overstatement of depreciation is probably somewhat counter balanced by the fact that the effective capacity was generally not used fully and hence the unit fixed costs were slightly higher than those assumed here. There is an additional reason why costs may have been somewhat overstated. The data was collected in 1969 and refers to the 1968 calendar year. Interest on fixed capital was assumed to be 9 per cent, the market rate in India in 1968-69. Interest rates were much lower in the fifties.

14 The additions of the lowest fixed and variable costs do not coincide with the estimate of the lowest per unit total milling cost because the firm with the lowest variable costs did not necessarily have the lowest fixed costs. The estimates of the average

total milling costs are arrived at independently by adding average variable and fixed costs for each mill.

15 For a detailed discussion of the paddy and rice prices and the manner of estimating price spreads see Uma J. Lele, "Food Grain Marketing Systems in India", Cornell University Press, forthcoming. Examination of regional price disparities shows price differences between areas commensurate with transport costs.

16 It is noteworthy that regional price differences were generally commensurate with shipping costs during the same period and although, seasonal price movements showed a considerable year-to-year variation, on an average, profits over a period of years seemed to have been adequate to cover storage costs and a reasonable return to the trader. See: Uma J. Lele, op. cit.

17 Effective capacity, as different from engineering capacity, is defined as 250 days of operation at a single 8 hour shift a day. Engineering capacity may be defined as the highest number of working days that could be maintained in a year. Thus engineering capacity could be 300 days and 3 shifts of operations. In the case of the new modern rice mills, effective capacity coincides with the engineering capacity. In traditional mills effective capacity tends to be much lower due to several factors. First, family oriented nature of the mills brings the operation down to only a single shift. Second, in areas where paddy is parboiled mills have to remain virtually out of commission in monsoons when drying parboiled paddy becomes difficult and at times impossible thus increasing losses and costs. Third, costs of carrying stocks beyond monsoons increase so substantially that millers often prefer to minimise a lengthy carry-over of stocks.

18 For evidence on seasonal price patterns, pace of market arrivals and purchases by millers see Uma J. Lele, op. cit. V. K. Gupta provides some direct statistical evidence on the size of operation and costs of raw material in Raipur which clearly indicates that "raw material costs increased as the utilisation of capacity increased and this formed the major chunk of the total costs". V. K. Gupta, T. P. Gopalaswamy and D. P. Mathur, op. cit., p. 165.

19 See Uma J. Lele, "Agricultural Price Policy", Economic and Political Weekly, August 30, 1969, for discussion of this.