NEW TECHNOLOGY AND RURAL DEVELOPMENT

The Social Impact

Edited by
M. J. CAMPBELL

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In most developing countries agriculture is still the predominant occupation of the majority of the people. Recently, however, the transfer of technology from developed to less developed countries has stimulated quite rapid change. This book contains a comparative study of the impact of increased modernization in the rural sector in six important developing countries. It considers cases where the deliberate introduction of technology has formed part of a wider national development plan, and examples where technology has been introduced into communities as a result of pressure from within these communities. In both cases the impact of the technology can be seen to have been profound with new skills having to be learnt and new working relationships adopted.

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The Association of Development Research
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CONTENTS

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As ADIPA is primarily an association of research and training institutions it was institutions within the target countries which were first identified for the research. All were members of ADIPA and were chosen for their previous record in the fields of social and economic development. The leading researchers were then identified by the participating institutions. The research was directly supported by the Asian and Pacific Development Centre (APDC) in Kuala Lumpur through UNDP funding, and the APDC provided a co-ordinating role for the project throughout the research implementation. A preliminary meeting of the researchers and the lead scholar and co-ordinator was held in Bangkok in June 1985 and the details and timing of the project finalized. The lead scholar and the APDC Project Co-ordinator visited the participating institutions in December/January 1985/6 to discuss research issues arising from the field studies. A second meeting of researchers at APDC in August 1986 evaluated the results of the survey and agreed upon the findings. Considerable praise is due to the dedicated work put in by the researchers in the six countries together with their research teams.

A study of this magnitude demands a high standard of administration to ensure its smooth passage and the co-ordination necessary to ensure its success. The Project Co-ordinator of the Asia and Pacific Development Centre and his staff are to be congratulated on their management of the research which has resulted in completion within the time span allocated by the donors of the research grant.

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INTRODUCTION

BACKGROUND

In most Asian countries agriculture is still the predominant occupation of the majority of the people (Thailand 75.4 per cent, Nepal 92.6 per cent). It is also true that, until relatively recently, the farmers of these states formed the main reservoirs of poverty and were engaged largely in subsistence agriculture employing traditional methods for tillage and cultivation; methods of production inadequate to meet even basic needs. Modernization of the rural sector and increased productivity from the land have therefore been important elements in national development plans throughout the region.

Since the 1960s the 'green revolution' has provided a stimulus to rural development. Development through the transfer of agricultural technology from the industrialized countries has played a pivotal role in anti-poverty programmes. Because of its nature, however, technology transfer has also become a matter of increased political and social concern to the states of Asia.

The transfer of new technology is not new to Asian communities. They have been absorbing technology from foreign countries for centuries. Such a process however has been slow and incremental and might be termed technology absorption rather than transfer of technology. (1) The deliberate transfer of technology for industrial or agricultural improvement implies more than the normal market forces operating to facilitate the introduction of new ideas into Asian society and its impact is correspondingly greater.

Agricultural technology has been introduced in a number of ways. In some cases a deliberate transfer of technology has come about through specific programmes as part of the national development plan. Sometimes the transfer has been imposed from above; at other times it has arisen as a result of encouragement by government but without imposition. Yet again examples abound of technology which has been introduced in communities as a result of community pressure itself. By a common recognition of the ability to improve standards of living such action has been generated by the farmers themselves.

Where communities themselves have been initiators or promoters of change, the organization for change can come from a number of sources. Rural co-operatives provide one base of organization for the purpose. In some cases the initiative has come from a family or the extended family group possessing the resources to implement changes and from a recognition of the advantages stemming from such change. Community development, in a range of forms, has also proved the catalyst for encouraging change to new forms of production. (2)

Urban communities, in general, appear to be easily adaptable to technology changes because they experience regular exposure to modern technology in the day-to-day environment. Thus adjustment to new patterns of lifestyle occasioned by the introduction of new techniques can be more readily accepted and lifestyles can alter relatively easily to accommodate new priorities and changes to the environment. The

acceptance and use of electricity, refrigerators, elevators and other common ingredients of urban living prepare town dwellers for other innovations. Changes in work techniques also may be absorbed without personal or family problems except in the short term. The introduction of new techniques into the rural sector however is different. Traditional methods are deep rooted and form an integral part of the culture which binds the community together. Radical technological change affecting important aspects of the traditional lifestyle is capable of producing deep-seated attitudinal and economic changes that can fundamentally affect the structure and cohesiveness of the community. (3) Individuals and families will develop new aspirations and new sets of relationships. New work patterns will emerge and new skills will need to be adopted.

The economic impact of technical transfer in agriculture in Asia has been the objective of a number of studies. (4) The social implications of transfer, however, have not been examined to the same degree and to date there is no study that is both comparative in nature and of sufficient depth to be capable of providing empirical evidence of the extent and direction of social changes occasioned by the introduction of a new and radical technology. (5) A recent attempt to study the sociological implications of technology has been the ESCAP Secretariat conference on 'Technology for Development' held in April 1984 in Tokyo. This conference attempted to examine experience in a number of important aspects of technology transfer and sought to shed more light on the various facets of social change resulting through transfer from advanced to less advanced areas. It has provided a useful base for further research.

The present study was initiated by the Association of Development Research and Training Institutes of Asia and the Pacific (ADIPA) as part of its ongoing research into Technology Transfer and Social Transformation in 1984. (6) ADIPA was fortunate in attracting a research grant for this latest study from the Asia and Pacific Development Centre. The research attempts to carry the initial discussions of the Tokyo conference a step further and to identify common factors in social change and the establishment of new social patterns in a number of rural developments. It is recognized that it is in the rural environment particularly that the effect of technology can be most acutely felt. Subsistence-based communities are by nature conservative and use methodologies and techniques which have withstood the trial of centuries. The implantation of new methodology into such communities has a strong effect on the producers because it involves a very large step forward both in attitudes and skills within a short space of time.

The study covers six countries in Asia, comprising India, Indonesia, Korea, Nepal, the Philippines and Thailand, and provides evidence of social change against a diverse background of cultures and degrees of economic prosperity. In all the countries chosen, rural development is seen as a vital element reflected in the policy objectives of national development programmes over the time span of a number of plans.

Since the Second World War those rural communities engaged primarily in food production have undergone a number of changes which have been directly brought about by the introduction of overseas methods and techniques. The use of fertilizers to improve crop yields, the more recent introduction of high-yield varieties (HYV) of seeds in staple crops, the use of pesticides and other innovations have altered the traditional patterns and rhythm of agricultural work. In rice production the land potential has been increased enormously through controlled irrigation. The speed of change has increased over the past two decades. These introductions have, in themselves, provided for many changes to production patterns both at community and family level. The support services for villages have changed. The introduction of motorized transport to carry goods to market and refrigeration to ensure that perishable goods have a longer useful life have built up new forms of infrastructural need. The use of machinery has developed maintenance and spare parts needs. Farmers once dependent entirely on their own acquired or inherited skills must now turn to government departments or to the private sector for expert advice, and in some cases, financial assistance.

Perhaps the biggest single long-range effect upon agricultural production has been the widespread transfer from subsistence to cash crops whereby the peasant farmer may develop not only products required

for sustaining life but those that can be sold for profit to national and overseas markets. The change has been one from subsistence orientation to economic development orientation.

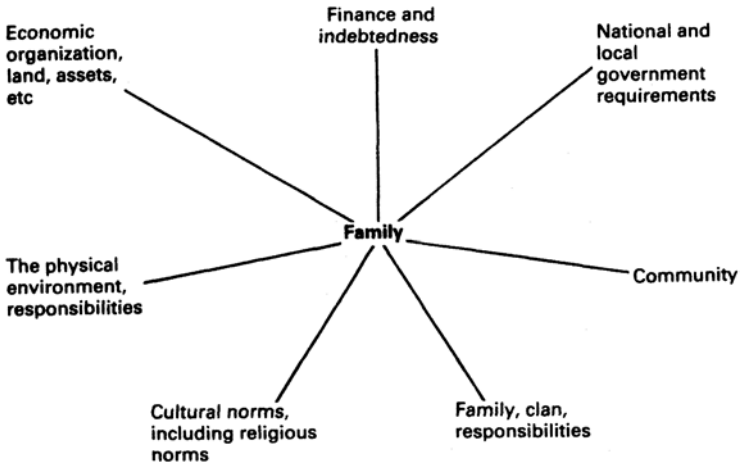
Each of these external changes in rural production methods has had its own impact upon the social patterns of the rural community, and at a lower level the social cohesion within the family group. Rural communities are notoriously difficult to evaluate comparatively. A whole range of factors may differentiate one rural community from another: the availability and productivity of the land, the existence of large land owners, the presence of landless peasants, the extent to which poverty in some rural areas provides the incentive for exodus to other centres of wealth or perceived wealth. To control the comparative evaluation of one community against another is therefore difficult and requires careful selection within the countries concerned. The choice of suitable communities by the research institutions involved in this study was no easy task. The results of social surveys of this nature might also be of limited value if the sample chosen is too narrow to provide the bases of wider generalization.

The present study seeks to overcome this potential limitation to some extent by focusing not upon the community but upon the rural family group as both an integrated social unit and a production unit. The size and composition of the family varies between cultures. The nuclear family consists of spouses with or without unmarried children. The average family size in some communities however consists of the parent or parents of one or both the spouses and may include other direct relations such as brothers or sisters. It is important to recognize such differences. In some cases the family group will consist of a small number of inter-related persons with common objectives and direct blood ties. In other cases the extended family group may provide a larger number of persons, not all of whom may share a common purpose or locality. The important issue is seen as the commonality of purpose, that is to say, the group of related persons who are engaged directly and exclusively in production for the social unit and primarily through agriculture and husbandry. Clearly this group would include the spouses and their direct children with the possibility of the parents of either or both spouses equally contributing to the objectives.

The rationale for examining rural rather than periurban or urban communities has already been mentioned. The rural community is normally a more integrated unit and has greater commonality of purpose. The impact of new technology upon a rural community might be considered far greater than that upon an urban equivalent because of the limited exposure of the former to new ideas and general innovation in the immediate environment. The rural community is often more sensitive to the need for cohesive action and for the maintenance of close relationships. Patterns of living, cultural and social ties, are more clearly defined and relationships more strictly adhered to.

One of the radical changes in the family group as a production unit comes when there is a decision to move from a traditional to a mechanized farm production model. This implies a decision to move from human and animal labour to mechanical cultivation and all that stems from the introduction of such sophisticated equipment as tractors or cultivators in preference to domestic animals or manual labour.

It assumes an extensive development potential either in terms of using more land or using the existing land more intensively. It is the impact of mechanized farming therefore that is taken as the basis for this study. There are of course other factors which facilitate this change. Such complementary concerns as irrigation; the use of high yield seed varieties; the prosperity of others that have made the changes; the need for a rapid turnaround in land preparation, are all seen as contributing incentives in the decision to move to mechanized tillage. Agriculture is not normally decided upon a single issue but on a combination of issues. The question of mechanical tillage however seems of particular importance to social change within the family as it is a ‘quantum step’ in changing traditional attitudes to land productivity. The level and thrust of the survey were developed in the belief that a study of the rural family would further knowledge of rural



poverty at the grass roots level. It is important to know what kind and level of technology are acceptable to the rural poor and the social constraints and consequences arising from its use.

THE CONCEPTUAL FRAMEWORK FOR THE STUDY

The rural family unit is subject to a number of restraints and controls. These commitments vary from family to family and from country to country. In broad terms, however, they can be seen as comprising some, or all, of the following:

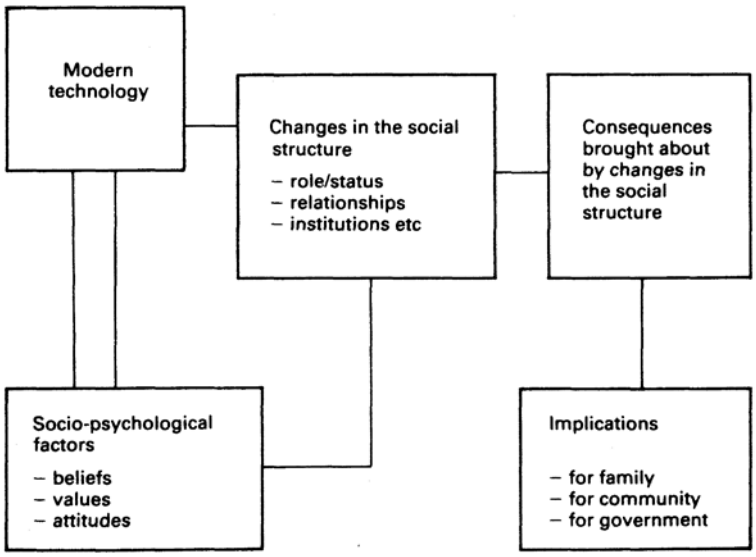
An input-output model shows the family as an economic production unit which derives its inputs into the production process from a variety of sources including natural resources (land, water, climate), the human resources of the family, external resources (the community, hired labour, local and central government and the private sector) and technology (seed, fertilizer, irrigation, pumping, tractors, etc.).

In addition to being an economic unit, however, the family derives its strength from being a social unit, bound into a cohesive whole by its blood-ties and relationships. The introduction of new technology into this social unit can have an impact, to a greater or lesser extent, on the existing beliefs, values and attitudes which in turn can induce changes in the structure of the family. These changes will produce consequences which will have implications not only for the family itself but also for the community within which it resides and for government.

The research sets out to study the adoption of technology and its social impact upon the rural communities in Asia within the following framework:

1. An examination of technology of a degree that can impose a radical change on traditional and long established methods of land husbandry.
2. Technology which can operate at the family, small group or individual level within the village.
3. Technology which is within the operative competence of village cultivators.

The study, whilst concentrating on the social effects of change, cannot ignore the economic implications that go with it. In addition to any changes in human relationships there is the effect of an increase in real incomes within the family, the changes in economic behaviour, the demand for services which are needed



as a result of the economic change and the economic infrastructural pattern which must be built up in related goods and services to complement the economic changes that have taken place in the families.

The economic and sociological implications of such technological change are so closely intertwined that it is impossible to separate them, nor is it particularly desirable to do so. The emphasis of the study, however, is on the sociological effects of the transfer and acceptance of new technology rather than on the economic implications resulting from new production methods. It has been left to the research teams to decide upon the balance between economic implications and sociological responses within each particular environment.

A number of studies have been initiated to examine the economic impact of mechanization in agriculture within Asia. Notable amongst these is the work of the International Rice Research Institute in Manila in co-operation with a number of collaborating institutions in Asia and with the Agricultural Development Council. This research covered field studies in three countries, the Philippines, Thailand and Indonesia and examined information gathered from more than 1,200 farm and landless households over a two-year period. (7) These were augmented by collaborative evidence from other Asian states. The findings are essentially economic in content although there are, of course, social implications. The present study helps to complement the IRRI study and broaden the sample.

METHODOLOGY

The empiricial study has been developed to consist of two elements in each of the countries surveyed. Firstly there has been a study of national policy concerning the modernization and increased productivity of agriculture as reflected in the national development plan and in other relevant policy documents. Secondly there was a field study to study the changes in attitudes and relationships in communities that have adopted mechanized tillage, with or without other appropriate agricultural technology. In order to compare the extent of social change that takes place after the introduction of mechanized farming it is important to

provide a control against which to measure possible alternations in relations and attitudes. In each of the countries under survey, therefore, the research has consisted of a comparative study of two villages of comparable size, culture, and background, one of which has introduced mechanized farming methods for a period of five years or longer (to enable the new situation to stabilize) and a second village that has retained its traditional methods of cultivation.

These requirements for the field studies, although simple on the surface, were not easy to achieve in practice. Firstly it was difficult to find a control village in which only traditional approaches to cultivation were used (for example Indonesia, Korea). Secondly although villages of comparative size were easy to identify in a similar economic region, the background and makeup of villages often differed. It was found necessary in some cases (for example India, Indonesia, Thailand) to stratify the village in terms of land ownership. In the Philippines four small villages were needed to provide an adequate sample. Despite these adjustments, however, it has been possible to identify and evaluate a range of social differences that has appeared as a result of the mechanization of land preparation and their implications. The samples within the villages have also varied in the light of local circumstances. Table 1.1 (p.15) shows the variations arising from the field studies. It is submitted however that such variations are acceptable, and indeed inevitable, in a comparative study of this nature and they do not detract from the value of the findings in any way.

The number of families interviewed was determined in the light of local conditions and was influenced by the following factors:

1. The sample reflects adequately the views and attitudes of the families in the villages.
2. The sample takes into consideration all important sub-divisions in the farming community, including cultural and religious groupings.
3. The sample covers a range between the most and the least entrepreneurial families in the community.
4. Similar sized and diversified samples are taken from both villages.

It was left to the discretion of the individual research groups to prepare questionnaires for the interviews with the selected families. However it was suggested that they might be conducted within the following (mutually agreed) guidelines:

1. That interviews would more likely be productive if they were focal in character rather than based on formal questionnaires.
2. That basic family data were evaluated in respect of each family. A suggested basis for this information study was provided for each research group.
3 That the interviews should be conducted with the objective of obtaining a clear picture of the following social and economic pattern:

   i. the socio-economic base of the family;
   ii. relationships within the family;
   iii. responsibilities within the family;
   iv. the division of tasks within the family;
   v. the responsibilities of the family to the community; and
   vi. relationships between the family and other social groups, e.g. rural co-operatives, landless labourers, tradesmen, commercial interests.

The success of field work in a social study depends upon the sensitivity and acumen of the field researchers. Family surveys need to be carried out in such a way as to ensure that the perceptions of all the components of the family are obtained and all relationships are adequately explored. It might be unwise to rely upon a single spokesperson for a family, on the other hand it might be equally dangerous to pressurize participants for views when to do so might cause ill-will or run contrary to cultural norms. It is important that information is offered willingly and that confidentiality is both expected and given. Individual interviews are sometimes preferable to those carried out in groups or in the presence of authority, but this may again be subject to cultural norms. Interviews need to be conducted in a way consistent with conventional procedures in that setting. Norms of public procedure, if violated, will likely give the impression of disrespect or even desire to undermine established prerogatives, generating barriers to open dialogue and perhaps defensive backlash. (8)

The participating institutions were aware of the reaction of government authority to interviews in villages in their areas and it was recognized as important that the field research had the approval and indeed the encouragement of local and government authority. The country reports reflect this sensitivity.

In all cases the field work was undertaken in two stages. In addition to the main data collection survey a second (and in some cases a third) visit was made to confirm the results already obtained and to seek clarifications on aspects that remained unclear.

Interviews with the chosen families were supplemented by discussions with key persons in the villages and with government officials and political notables as and when appropriate. In one study (Indonesia) discussions were held with the village school children who were also asked to write essays on their future and expectations. In all cases the researchers found the respondents co-operative and eager to assist.

THE FINDINGS OF THE STUDY

The study attempts to provide some insights into the complexities of rural economy and society in a comparative framework in Asia and to highlight some of the social changes that may have occurred in rural communities that have transferred from traditional cultivation practices to mechanized farming. Although the field studies associated with this research have been undertaken at the micro (community) level they must be evaluated within the context of the national policy for rural development.

The research therefore consists of two sections. First, there is a survey of national policy for rural development including an evaluation of policy for the introduction of technology into the rural sector for the increased productivity on agriculture, and in particular, the social impact of such policy. This may be considered as a macro approach to the issue. To complement this and to seek empirical evidence of the social impact of government policy for rural advancement the second aspect of the research concerns a micro study of farming communities at the village (or equivalent) level. A study of these two levels can provide insights into the impact of existing policy and indicate issues for future policy.

There are implications (as the conceptual framework shows) not only for national government but also for the community and for the family. Areas for further research can be identified and a number of contributory issues illuminated. Each of the country studies identifies a series of social implications and changes in relationships that have come to light as a result of the field studies. These changes are then examined in a comparative chapter presenting a regional overview of the new patterns that seem to be emerging. Finally the implications evidenced by the researchers are brought together in a final chapter suggesting probable impacts on family, community and government.

This research is not seen as an end in itself. It is but a step towards illuminating the dominant issues in Asian rural society. It can hopefully lead to a better understanding of the needs and problems of rural

communities in relation to the process of rural transformation at present influencing their lives and destinies. It can help to dismantle some of the myths and fallacies about Asian society that abound in the literature on rural development. It can do this in two ways. First, the national case studies can assist policy formulation in the individual countries that have contributed to the research. Second, the comparative study illuminates a number of common factors that emerge in the rural societies that have been scrutinized. A knowledge of common problems and implications is the first step towards greater regional co-operation in Asia. It provides an opportunity for individual Asian states to consider the feasibility of replicating ideas and experiences in their own socio-cultural context which have been successfully experimented in another socio-cultural setting. Comparative evaluations in the field of the social sciences are becoming recognized as valuable evidence for new initiatives in policy determination. The present research provides the first comparative study of any magnitude in this field.

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Chapter One
TECHNOLOGY AND RURAL DEVELOPMENT: THE SOCIAL IMPACT

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INTRODUCTION

This chapter attempts to join together in a comparative format the findings of the six country research programmes. In setting out to undertake research of this magnitude it is inevitable that the field studies in each of the countries must be adjusted to the local environment and as a result they will differ slightly one from another. Every attempt was made in the planning stages of this project to establish guidelines of sufficient clarity to ensure that the conduct of the field studies would follow common paths and parameters. These guidelines were agreed upon through lengthy discussion and consensus by the institutions and individuals involved. Despite these precautions however, some difficulties were experienced in the field in finding situations where the common guidelines could be met. An example of one difficulty was experienced in the research carried out by the Philippines and by India. In both cases it was not found possible to identify villages that were either fully mechanized or non-mechanized; a degree of mechanization was present in all the villages in the chosen area. It was thus only possible to identify villages with a greater or a lesser degree of mechanization and to study the family groups in each category in both the villages. The sizes of the samples were linked inevitably to the size of the communities examined, in some cases it was possible to interview the majority of the families in a community (Philippines), in others a sample of 30 to 40 per cent of the families in each community was the limit possible for the study. Table 1.1 indicates the size and form of the samples.

Table 1.1 The sample

Country	Form of sample	Sample size	Family size	Farm size	Homogeneity between villages
India	Two villages A=Highly mechanized B=Less mechanized but with mechanization	A=25 households B=25 households	In both villages 5.8	A=4.7 hectares B=3.4 hectares	Hindu A=91.9 majority B=93.9 Moslem A=8.1 minority B=6.1 Castes A=16.0 B=14.0
Indonesia	Two villages A=Non-mechanized B=Mechanized	3 strata (farm size) in each village and 10 families each strata A=30	In both villages 4.5	i) less than 0.25 hectares ii) 0.25–0.5 hectares	High

Country	Form of sample	Sample size	Family size	Farm size	Homogeneity between villages
		B=50		iii) 0.5 hectare and over	
Korea	Two villages A=Developed B=Non-developed	Total sample 198 A=95 families B=103 families	In both villages 4. 57	Varies in both villages between 0.5 to 2 hectares	High
Nepal	Two villages A=Mechanized B=Non-mechanized	A=25 (Total 81) B=30 (Total 101)	A=13.7 B=10.4	A=1.37 hectares B=1.49 hectares	High
Philippines	Four villages each with both mechanized and non-mechanized families	93=35 mechanized (complete group) 58 non-mechanized	Mechanized=5.7 Non-mechanized 4.47	Varies between 0. 5 and 3.0 hectares	High
Thailand	Two villages i) Irrigated rice area ii) Rain-fed rice area	i) 46 (37%) ii) 41 (32%) =87	i) 5 ii)6	i) Irrigated 3.57 hectares ii) Rain-fed 3.35 hectares	High

The family sizes varied from country to country. The smaller family groups of immediate blood relationships came out relatively stable at between four to six persons. In Nepal however, the numbers in a family group were much higher, varying between ten to thirteen. In all cases it was possible to find samples where the communities lived within easy distance of each other and shared the same environment. In some cases the method of cultivation was different and this in itself has had implications for undertaking mechanized tillage or following traditional methods; for example in Thailand the two sample communities respectively used irrigated rice fields, and rainfed fields for the cultivation of their staple crop. With the ability to obtain water throughout the year the irrigated area had taken advantage of high-yield varieties with fast germination and had embraced mechanization to permit multi-cropping. The rain-fed area by contrast was unable to increase its cropping pattern and therefore did not see the same need for moving into mechanized tillage.

In all cases the family was taken as the production unit for the farm and the relationships between the family members and the impact of mechanization upon the individual family members were seen as the important issue for study. In the Philippines the household was used as the social production unit embracing the basic family and other relatives under the same roof. The reports from the individual countries reflect the methodology used for investigation. In all cases questionnaires were produced as the primary basis of obtaining data. These were supplemented by official records in the areas concerned and by interviews with a range of persons who were seen to be important within the community. Where possible the individual members of the household were questioned in turn but a degree of sensitivity was necessary to ensure that the community norms were not contradicted or that the questioners were not seen as invaders of family privacy. While in some instances there was a slight hostility initially to the work of the field researchers, in all cases relationships between the sample families and the questioners remained cordial and, indeed, in the majority of cases those questioned were happy to provide information and to be as co-operative as possible. The research workers in Indonesia, all female social anthropologists, were particularly successful in engendering good working relationships with the respondents.

GOVERNMENT POLICY AND MECHANIZATION OF AGRICULTURE

The researchers have recognized that in order to obtain a full picture of the extent and impact of mechanized tillage upon rural families it has been necessary in the first instance to examine government policy towards mechanization in cultivation and in related areas. Each of the country chapters therefore has included a survey of government policy in this field from national development plans and other policy documents. Agricultural development has been recognized as one of the paramount needs for national development in all the countries under survey. National plans from the 1960s onwards reflect these concerns with the improvement of agriculture and the enhanced productivity of rural communities. Agriculture in Asia is still the predominant occupation of the vast majority of the people and the governments of Asia are only too aware of the poverty that is associated with rural subsistence agriculture. Indeed, with the single exception of Korea, despite brave development efforts there is the recognition of an uncertain future for these countries in terms of rural prosperity. It is estimated, for example, that at the present rate of its development India needs 196 years to reach the present stage of development of the Eastern European countries and 254 years to reach that of the United States of America. (1)

The 'Green Revolution' of the 1960s and 1970s, however, has given new hope to the governments of Asia and recent developments in cultivation methods and high-yield varieties of seeds have encouraged all the countries in the present survey to change from being rice-importing countries to being self-sufficient in that staple crop.

There has been a range of interesting strategies developed for the promotion of rural development. It is not possible however, within the scope of the present study, to examine the various development plans of the countries under survey in depth or to evaluate their strategies for rural development. The present study concerns itself with the introduction of mechanized tillage and this forms only one aspect of the broader implications of rural development and agricultural productivity.

The mechanization of land tilling is but one factor in the modernization process of agriculture. It is closely tied to other innovations in land cultivation. The ability to grow more than one staple crop per year opened up by developments in irrigation and in high yield varieties of seed has required the farmer to prepare his land quickly after each harvest. Greater productivity and financial reward per acre through fertilizers and pesticides has led the entrepreneurial farmer to acquire more land and to fully utilize what he possesses. The subsequent decrease in grazing land has caused the buffalo population to diminish. These and other factors have promoted the need for a faster and more reliable method of land preparation. The studies show that investment in tractors has paid off and those who own mechanized tillers have benefited considerably and improved their standard of living. Clothing, housing, feeding and recreation are the visible signs of new rural wealth and these in turn have spurred on those without tractors to attempt to obtain or use them in their own farms where it is possible to do so. Market forces have encouraged the production and sale of mechanized tillers throughout the region.

In some countries this change in agricultural practice has had the positive encouragement of government which has undertaken research into the development and sale of suitable models and the provision of soft loans for their purchase. In Java the high population and limited agricultural land available have encouraged the government to promote both irrigation and mechanized tillage as national priorities. Other countries however have been more cautious and not given overt support to mechanized cultivation. Nepal is anxious that new technology should not add to the potential for unemployment among the rural landless. Once enthusiastic the Philippines is now unwilling to permit imports of hand tillers and tractors because of the devaluation of the peso and the subsequent high cost of fuel to operate them.

Governments do not always foresee the consequences of agricultural mechanization. The wealth that accrues to those that utilize mechanized tillage has tended to stratify communities in terms of economic

standing. This has the potential for dividing communities once socially unified, and to be disfunctional in the long term. Mutual aid given between families without cost at times of planting and harvesting has been replaced by hired labour. The role of the landless peasant or the small-holder has changed. In some cases those without land have sought alternative employment in the cities (for example Indonesia). In others they have increased employment in weeding and planting because of the ability to grow two or three crops of rice in a single year (for example Thailand). Small-holders unable to take advantage of mechanized tillage and seeing immediate advantages often sell their small parcels of land to augment those of the larger owners and in consequence become landless. Mechanized agriculture calls for specialized infrastructural services. Better transportation services, maintenance and repair shops for tractors and greater access to low interest loans are matters that cannot be left to market forces in the private sector without some government intervention, at least in the short term.

Government policy towards expanding services in the agricultural sector does not always seem to be rational. In some cases there are gaps in the services provided (Philippines, Thailand), in others (Indonesia, Nepal) there is evidence of a multiplicity of agencies which overlap. As policy direction changes and new priorities emerge new institutions are set up but the existing agencies continue to operate. The result is a large number of agencies often without clear directives for action and complicating the whole pattern of development.

That Asian governments have recognized the importance of rural development and are aware that the greatest need for the alleviation of poverty lies in the rural sector is not in dispute. The priorities of national development plans and the institutional reorganizations to emphasize positive action in the rural sector in the various countries bear witness to this. The methods used to develop rural areas have varied. A number are notable for their success in changing the levels of rural life in a relatively short period of time.

Perhaps the most impressive record is to be seen in the Saemaul movement in Korea. This was initiated to extend the improvement of living environments and increasing income, accompanied by the development of better work ethics by farmers formed the basis for the movement. Farmers were encouraged to be more industrious, have greater self-reliance, greater co-operativeness, frugality and a positive attitude towards self-improvement. (2) During the first and second five-year development plans of Korea between 1962 and 1971, the economy grew at an annual compound rate of just under 10 per cent. This high rate of growth was achieved by an export oriented industrialization. The growth of agriculture, however, during that time was slower than the other sectors and produced a disparity in income levels between the rural and urban sectors. There was a high rate of urban drift in search of work in the new industries. To improve the imbalance national policy goals set out to achieve full employment and a more equal distribution of income through raising the income levels of farmers.

To achieve these goals the Saemaul movement was launched in 1971, based on pilot projects carried out in the previous year. The movement required a multidisciplinary and innovative approach. It represented a nationwide mobilization of talent and energy together with the co-ordination of potentially conflicting interests and forces within the various sectors of the economy. The movement began in selected areas in 1972 and placed emphasis on the improvement of the living environment, spiritual enlightenment and an increase in farm income. By 1973 it was a nationwide movement in which all the villages of the country participated. They were classified into three categories as underdeveloped, developing and developed. The underdeveloped village was required to make an improvement in living conditions. The developing village was to emphasize infrastructure, building projects by self-reliance, and the developed village was to include increased income generating projects. Income generating activities were to include increased food production, the promotion of regional specialization in agriculture and the promotion of co-operative organizations and marketing.

The initial thrust on rural development increased food production by about 15 per cent per year and showed marked improvements in the average living standard in the villages. By 1977 the emphasis turned to improvement on a regional rather than a village level and with intensive research into non-farm income sources, including small-scale rural industries. Whilst the initiative for such development was to be planned and organized by the village people themselves a national institute trained Saemaul leaders to act as catalysts for change. The living environment programmes ranged from the development of feeder roads, sanitation and rural electrification, to village halls and village irrigation systems. Income generating programmes focused on special crops, the development of the livestock market and general marketing and transportation arrangements. Perhaps the biggest value coming from the Saemaul programmes however, was a change in farming attitudes. This was largely achieved through the development of village councils and an emphasis on community self-reliance. In order to inculcate changes in values and attitudes the government established a special educational programme for villages. A wide range of social education schemes and communication activities was initiated. These were carried out through voluntary organizations or by government agents, notably agricultural extension workers and community workers of various types. The movement emphasized the role of women and younger people in community development as a result of which communities are more integrated and work towards common goals.

In India and Nepal a number of rural development programs have attempted to raise living standards and productivity in the rural communities. Initially these took the form of community development programmes but more recently have developed into integrated rural development activities which emphasize a multi-disciplinary approach and the active involvement of local government agencies in the development process, both politically and administratively. They developed from strategies evolved to increase food production to a policy aimed at increases in productivity combined with equity, in other words to achieve the required rapid growth in agricultural output through anti-poverty programmes designed to raise the standard of living, particularly in marginal areas. Both countries set up a number of specialized agencies. In India these included the Small Farmers Development Agency and the Marginal and Agricultural Labourers Development Programmes. Backward areas such as drought prone and desert regions and the hill areas also came in for special consideration. In Nepal the emphasis lay in the hill tracks and the mountain areas where the standards of living were particularly low.

The rural development planning of Thailand has concentrated upon the development of infrastructure facilities to promote land productivity. High priority has been given to the development of dams and catchment areas to provide adequate irrigation facilities for as large an area as possible. This has been supplemented by government encouragement, and production, of high-yield variety seed, fertilizer and pesticides at subsidized prices to promote changes in cultivation methods. These measures have improved productivity and in consequence raised living standards in large areas of the country. They have been supplemented by programmes in those areas seen as poor or marginal and directed towards poverty eradication. In such areas the programmes include the development of fisheries, village water supplies, cattle and buffalo banks for providing livestock to poor farmers, and community development projects aimed at opening up employment opportunities for 300 farmer groups.

Indonesia has faced a particular problem for rural development on the island of Java, where there is a high population and where the average land holding in the villages is less than one hectare. Rural development in such a situation depends on the optimization of the land available and the continued productivity of the available land throughout the year. The encouragement of irrigation schemes and high productivity yields of rice seed have therefore been given high priority. As one of the foremost instigators in the field, the Ministry of Agriculture has carried out programmes of intensification, extensification and rehabilitation of arable lands and a diversification of rice cultivation. These measures have been

supplemented by the provision of agricultural credits to farmers, partly in kind and partly in cash, and a programme of social education. Such a policy indicates the high degree of importance attached to mechanical tillage as a vehicle for increased land productivity.

The Philippines government has also favoured an integrated rural development approach and this has been assisted by the recent Marcos government efforts to decentralize activities to the regions and to local communities. There is no explicit policy on farm mechanization although some of the economic policies have features favourable to the promotion of mechanization. For example, a series of loans has been underwritten by the Central Bank of the Philippines and is used to finance farmers for the purchase of four-wheel and two-wheel tractors. Again it has been the introduction of high yield varieties of seeds and irrigation schemes that has promoted mechanization in agriculture and provided the impetus for farmers to invest in farm technology.

It would be true to say that the underlying motives behind national rural development schemes were in the first instance to increase productivity, particularly in staple grains and secondly to encourage equity and eradicate pockets of rural poverty. Whilst these efforts provide adequate information on the macro effects of rural development throughout the region it is to the rural community itself that one must turn to study the social implications of these policy changes which have promoted the introduction of a wide range of new ideas and new techniques in the cultivation of land in the region.

The findings of the study

The objective of the research was to identify within the limits of the sample, what changes, if any, have occurred in the rural family as a result of transferring from traditional to mechanized forms of land cultivation. Such changes have been examined by studying the social patterns within a family that has undertaken the change to mechanized tillage against one which has continued to employ traditional methods. A number of hypotheses were formulated at the commencement of the study, marking the common thought of the researchers concerned. These have already been indicated in the introduction to the work.

The study has also, inter alia, aimed at understanding the socio-economic profiles of people in both agriculturally mechanized and traditional communities in rural Asia; to analyse the impact of the adoption of mechanized tillage on family/community relations and social norms, and to indicate some of the policy implications that would appear to flow from such attitudes.

Changes in the role of the family

One of the most important social indicators of change is the introduction of new attitudes to decision making within the family. In all the countries included in the survey the traditional decision maker on agricultural issues is the male head of the family. No change in broad terms has occurred since the introduction of mechanization in the role of the male head of the household making all decisions of an agricultural nature. This is evident in the studies on Indonesia and Thailand. There is however a growing acceptance of the increased importance of the spouse in decision making. In India, Indonesia, Korea, Nepal, Philippines and Thailand there is greater liberalization and wives, children and sons-in-law have become involved directly in the productivity of the family unit and in the making of the necessary decisions for the family. In Korea the Saemaul movement has for some time involved women as decision makers formally, both in family and community affairs.

The mechanized families spend less time in the fields due to the speed of cultivation. Women do not have to prepare food over long periods for the field labourers. Children are no longer required to act as food carriers to the fields or to undertake some degree of manual work as formerly, either in planting, weeding or in the care of livestock. In some cases the women and children have taken on the role of engaging and paying farm labourers (for example the Philippines) and in keeping the family accounts (Indonesia). Brothers and sons of the household head often learn tractor maintenance in order to keep the family equipment operative. The time gained from the previous duties of farm cultivation and the production of food is taken up in other ways and is used to both immediate and long-term advantage. In mechanized families there is a greater diversification of economic activity. Livestock are now kept for breeding and sale. The women undertake a variety of small economic enterprises and are active in making improvements to the home. Overall it can be said that there is a broadening in the decision-making process and an involvement by the whole family group, or at least the adult members, in the most important decisions affecting the household both in connection with agriculture and in other matters.

The impact on children

It is in the attitude towards children that the changeover to mechanization by families shows most marked differences. Traditionally children were expected to contribute to the family tasks from an early age. Girls undertook household chores, helped the mother fetch wood and water and assisted in the cooking. Boys were used to looking after the livestock, particularly the cattle and buffaloes and to assisting father on the farm. Now all families recognize the advantages of education and children of both sexes attend primary school and, where possible, progress to secondary education. Girls now stay at school longer and marry later. The advantages of a literate wife are recognized and better marriages can be arranged if the girl has attended school. Although marriages are still arranged on a family basis there are signs of greater liberalism towards marriage. Although children are still required to contribute towards work within the family their important development is seen as education. Boys are still considered a greater asset than girls but female children are increasingly being given an opportunity at least for primary education.

The expectations of children are of interest. Their relationships with their parents are now more relaxed than formerly and they are influenced more by the modern lifestyle of the cities. Greater mobility (see p. 29) and familiarization with the media have encouraged this trend. There are few villages that do not have some contact with films, televisions, radios or newspapers and these have changed the expectations of children and broadened their appreciation of wider issues. There are new attitudes to food, clothing, entertainment and the future. A survey of children's expectations in Indonesia showed that boys hoped to obtain work in the cities, in the uniformed forces, or in religious institutions. Girls expected to marry either wealthy farmers or husbands with career jobs. Both sexes expected that the partner would be educated and would have interests outside the parameters of the village.

Finally children of the family have become more involved in group decision making and in the implications of productive farming as an economic unit. They are interested in technology and in innovation. In return the family makes use of the children's education, particularly in financial matters. They are able to take details of bills, payments and keep simple farming accounts.

The impact on rural labour

There has been a fear in most of the governments of the sample that mechanization of agriculture could lead to rural unemployment and exacerbate the problems of rural poverty. The exception to this has been Korea

where the modernization of agriculture was seen as important in order to break down the differences in living standards between town and country and so prevent an urban drift. There is no doubt that in many countries there is insufficient land now available to allow all families to be landowners. Thailand and Indonesia (particularly Java) provide examples of this state of affairs. In other states farming competes with other natural resources such as timber (for example Nepal). The results of the survey, however, indicate that to date there has been little displacement of labour. This has been due to a number of factors:

1. Mechanized tillage combined with high yield varieties of seeds and irrigation has promoted multi-cropping. Two or three crops of rice per year is now becoming the norm. Farm labour is still needed for such operations as planting and weeding and in the levelling of new ground. Although the time taken to prepare land is shorter the number of crops per annum has increased and the need for farm labour is higher.
2. Better infrastructural facilities such as roads and transportation have encouraged landless labourers to seek work elsewhere or to travel daily to small urban centres where employment can be assured.
3. Government rural initiatives in all the countries in the survey have developed new employment prospects, at least in the short term and there is a ready demand for unskilled or semi-skilled labour.

   There is, therefore, with few exceptions, the same ability for rural labourers to find employment within the neighbourhood of the village. In real terms there has been little increase in the wages paid for rural labour but evidence seems to show that there has been no increase in poverty. In some countries, for example India and Indonesia, there have been more income sources available, often allowing labourers to undertake more than one job.

   One further socio-economic issue in relation to rural labour is worthy of note. In the traditional farming pattern of one major harvest per year there was a degree of flexibility in deciding upon the timing of transplanting and harvesting of the rice crop. Under these circumstances it is possible to use a system of mutual labour exchange between neighbours. This practice established a social relationship between the co-operating families. The introduction of multiple-cropping and its short ‘turn around’ period takes away this flexibility and mutual labour exchange tends to decline or disappear. Hired labour takes the place of neighbour co-operation and the contract becomes economic rather than social.

Changes in occupation and skills

The introduction of mechanization has increased the sophistication of agriculture. The ownership of machinery such as tractors, trailers, water pumps, huller s and biogas plants has forced the farmers to become familiar at least with simple maintenance procedures and repairs. In most cases this knowledge has been learnt locally and not through any formal training. The tractor and the cultivator pay for themselves not only by tilling the owner’s land but also through hiring out to non-tractor-owning farmers. It is important therefore that the machinery is kept serviceable. Allied to this is the skill required to operate the tractor safely and economically. Here again the family has learnt through experience the best techniques to accomplish operational efficiency.

Wherever possible the family, alone or with the co-operation of neighbours or relations, attempts to maintain its own equipment. In most cases there is little alternative as professional mechanics are not in the immediate vicinity and, even where they are accessible, they are expensive to use.

The improvement in productivity, multi-cropping and the development of additional economic ventures have complicated the family operations and the family production unit is forced to acquire new management skills. Figures from all the samples show this new complexity both in income and outgoings. A

specialized division of labour begins to take place within the family with each member having his or her own special skills and responsibilities. There have also been changes in the skills of traditional agro-based artisans. Blacksmiths, as in Europe and the United States in an earlier era, are changing their traditional role to meet the needs of the machinery owners by learning welding and other new skills to assist in the maintenance and repair of machinery. The same process is taking place with carpenters and house builders, as the newly affluent mechanized farmers require (and have the capital to pay for) modern houses, electrification and water sanitation. Linking the old with the new, moreover, is intermediate technology where owners and craftsmen have successfully married traditional equipment with modern needs.

The family and the community: relationships and influence

The impact of mechanized tillage upon the community has produced both advantages and disadvantages. In villages that include both mechanized and non-mechanized families an economic stratification has developed between the rich and the poor. The incentives to modernize in such a situation, however, should not be under-estimated. Mechanization and the increased wealth that it brings have improved community services and have also increased expectations. Housing standards have risen and there is a demand for reticulated water supplies and electrification in the community. The improvements to roads and transportation or marketing have had spin-offs for other services. Children travel further to school and links between urban and rural life are closer. The private sector has moved into more rural areas as technicians, tailors, beauticians, restaurant owners and cinema operators recognize the advantages of either visiting or settling in rural communities as opportunities expand. Community-based operations have also grown as progressive communities have met common needs that government has not been able to provide. An example of such work is in the building of mosques, churches and temples. The centre of community action in Korea is the village hall or meeting place built by the community effort. There is some evidence that there have been changes in cultural relationships. In some instances the old traditional festivals connected with harvest and planting have decreased in importance with the introduction of multi-cropping. In others, religious beliefs directly connected with the importance of the staple crops have died and national festivals such as independence day celebrations have taken their place.

There is no doubt that tractor-owning families have increased their influence in the rural communities. They have become employers and buyers. They have provided their tractors for help in times of emergency (Nepal) and they have become more active in their demands for services from public servants. In some cases (for example Indonesia) they have challenged the authority of the traditional village governments and in all cases the mechanized farmers have become an important force in community decision making.

Relationships with other marketing sectors

The impact of an improved economic base for mechanized farmers on the entrepreneurial elements in the private sector has already been mentioned. New markets have been opened up in small towns and even in villages themselves. There are dominant areas of operation that are involved in this process:

1. Financial credit and marketing institutions, either government- or private-enterprise-owned.
2. Technical institutions varying from the sale and repair shops for machinery to government extension services for agriculture and allied interests.
3. Political and religious institutions, particularly those concerned with rural development.
4. Leisure institutions ranging from restaurants to cinemas and meeting halls.

5. Private health clinics and other social services.

Markets in small town centres have also developed to cater for higher living standards and for the sale of surplus produce and livestock from the farmers. Diversification in the economic base has produced both market needs and a wider range of produce for sale. People have become more mobile in their choice of markets and this has had the advantage of breaking down the role of middle man or merchants who formerly monopolized the purchase of food produce.

Family mobility

There is no doubt that throughout the region both traditional and mechanized families have become more mobile physically and have broadened their horizons in recent years. Social mobility has also increased although in caste societies (India and Nepal) there are limitations to the range of social intercourse.

Government influence has increased overall in the communities and the range of services offered to rural areas has expanded (Thailand, Nepal, Indonesia). Families have learnt to deal with a range of agencies and because of the increased complexities of their undertakings mechanized families have a number of institutions to which they readily relate.

Mobility has both advantages and disadvantages. On the one hand it broadens the outlook of the farming families and makes them more receptive to change. On the other hand it tends to break down traditional community disciplines and cultural norms, particularly among the young, and this may loosen the cultural and social bonds which help to maintain the community self-reliance. In youth it may breed a desire to move into the more sophisticated life-style of the city. Mechanized family households tend to be more cosmopolitan in outlook and therefore show greater social and physical mobility. There is also some evidence (Philippines) that they tend to become more politically minded.

Family changes in aspirations and expectations

With the change in its economic base the mechanized family is aware of greater potential and this in turn has bred a wider range of needs. In general there is a feeling that government will not be able to meet these needs in full in the foreseeable future. This does not prevent the community, however, from voicing its needs and requests. There is a realistic attitude, built upon past experiences, of the extent and rate of public sector change, particularly in the field of social services. The most common demand recorded is that for increased education facilities for children and for the ability to obtain secondary schools and technical colleges within easy reach. High priority is placed by all communities on the educational facilities. With mechanized families there is a recognition that education can provide a greater choice of career whereas with the traditional families it is seen as being able to release their children from the hard and unremitting life of farming. There is a common demand for advice and information from government on technological advances in agriculture. Coupled with this is the demand for better credit facilities to obtain the necessary technology. In most instances the non-mechanized families would be pleased to change their agricultural practices if opportunity occurred, e.g. irrigation facilities in rain-fed areas, or by suitable technology for increasing production in marginal areas. The examples of successful farmers employing technology are now sufficiently common to increase expectations for those still tied to traditional methods of agriculture.

Credit facilities, not only for the purchase of machinery, are seen as a key to change (India, Philippines) and it is felt that the government should guarantee its credit at low rates of interest even to the extent of writing off bad debts where the farmer is unable to repay the loan.

Expectations can be classified under the headings shown in Table 1.2 and are identified specifically by some or all of the communities surveyed. They fall into four main categories:

1. High living standards including piped water and electrification. The use of refrigerators, radios, televisions, modern furniture, new clothing at regular intervals and nearby medical care are common demands.
2. Better housing: galvanized iron or tiled roofs, concrete construction, modern cooking facilities, water-borne toilets and flyscreens all come high on the list.
3. Better infrastructural facilities: particularly all-season roads to commercial centres and adequate public transport to transport both people and produce.
4. The use of leisure activities. These can range from education and productive skills courses to the ability to take advantage of cinemas, the organization of public festivals and easy travel to shopping centres in the neighbourhood.

Changes in the family economic base

The use of mechanical cultivators combined with other agricultural technology has both expanded and complicated the family economic base. The purchase of machinery is a large investment for the farming family and creates an urgency to utilize the equipment to the full. Some families are unwilling to undertake this burden and prefer to hire tractors and other machinery to prepare their land. The purchase of agricultural equipment is inevitably linked to two forms of use. Firstly to prepare one's own land and secondly to rent out to prepare that of others. Tractors and pumps are often over used or inadequately maintained in order to pay off a loan as soon as possible.

The use of farm land has changed. As much land as possible is used for mono-cropping and grazing land or marginal land is cut to a minimum. In areas where multiple-

Table 1.2 Changes in aspirations and expectations

Country	Education for children	Higher housing standards	Higher living standards	Leisure activities	Cultural and religious activities
India	High priority	High	High demand	Religious festivals, movies	Still high
Indonesia	High priority	High	High demand	National and religious festivity Travel to towns	Loosening of old cultural needs but increase in religious observance
Korea	High priority	High	High demand	Social meetings, particularly in the non-farming season	
Nepal	High priority	High	High demand	Religious festivals, movies	Still high
Philippines	High priority	High	High demand	Movies, TV	Still high
Thailand	High priority	Greater demands	High demand	Movies	

Country	Better infrastructural activities and public utilities	Credit organisations	Orientation to city living	Better social services
India	Strong demand but little expectation	High demand	High	Demand
Indonesia	Strong expectations	High demand	High	Only small expectation of governmental change
Korea	Many infrastructural needs already met			Continued expectation from government
Nepal	High demand but little expectation	High demand		Demand
Philippines	Expectation for change	High demand	High	Demand
Thailand	Strong expectations for change	High demand	Entertainments Restaurants High	Little likelihood of change

cropping is possible (usually with the aid of irrigation) the larger land owners endeavour to buy up parcels of land from small land owners in order to increase their capacity. One result of multiple mono-cropping has been to cut down on livestock or to limit livestock grazing to upland or very marginal areas. Buffalo and cattle numbers have decreased dramatically across the region in irrigated areas and in some instances the limitations for grazing livestock are causing problems.

The mechanized farmer with a record of profits over a number of years is in a favourable position with credit institutions. There is an increasing tendency to borrow money for production purposes and in order to diversify the economic base. In addition to direct farm income, mechanized families are investing in a range of other ventures of a commercial nature either in their immediate community or further afield. This use of capital and credit facilities has increased the stratification between the successful farmer and the small holder or the traditional cultivator.

SPECIAL PROBLEMS AND ISSUES

Each of the studies in the survey identified a number of special problems concerned with the research. In some cases these problems are specific to the country study concerned and are included in the relevant chapter. There are some common issues however which reflect upon the methodology of the research.

The limitations of the research

It must be recognized that research of the type based on a qualitative approach has some limitations. Firstly the size of the sample limits the validity of the findings. It is difficult to generalize on the problems of nationwide rural development on the basis of observations carried out in two villages. Regional differences within the state are not accounted for. There is no evidence to confirm that the sample taken was not atypical. The study in Thailand was taken in an irrigated area. The Indian experience cannot reflect the national situation for a country with such diversity of environment. The Philippines study is concerned only with the rice growing area of one island. Further research is needed to justify the findings in each country.

The methodology for field studies

The second limitation concerns the methodology. The bulk of the data obtained was on the basis of prepared questionnaires to rural families supplemented by local interviews. There was no possibility within the time span of the field studies to confirm the information received through longer term observation studies. In each case the research team returned to the villages at least once after the initial inquiry but the time between visits was short and most was taken up with confirming earlier responses and identifying lacunae in the questionnaires. Evidence from some studies (for example Korea, India) showed some of the evidence obtained from villages may have been inaccurate. A number of the respondents feared a loss of privacy and limited their answers on matters of personal sensitivity, for example on family relationships and on educational background. Others, fearing that the information might be fed to government agencies, deliberately underestimated income and overestimated expenditure. Some of these limitations might have been overcome by a longer period in the field and a less formal approach to the information search.

The true impact of mechanization

Finally, it is difficult to be sure that the differences between the 'treatment' and the 'control' groups are due predominantly to the decision to change to the mechanical cultivation of land. The Thailand and Indonesia studies emphasized the important link between irrigation systems and mechanized tillage. There is a direct connection between a shortage of farm labour and the decision to buy tractors. High yield varieties of seed with a short maturing period have encouraged multi-cropping and therefore a short period between crops for land preparation, often too short to allow for preparation by buffalo or manual labour. This has also promoted the use of tractors for faster ploughing. Radical changes in agriculture are due to a number of factors and not to one alone.

The studies overall, however, show clear evidence that the use of mechanized tillage was an important, if not the dominant element in changes to the economic and social structure of the rural family. It is still not easy to reach definite conclusions, of course, on the effect of a specific technology upon social patterns and values. Initially it is probably that the example of the use of technology, often deliberately introduced by government, resulted in cultural change, for example in Korea and Thailand. High yield varieties of seed production by agricultural research are no longer recognized in Indonesia as the gift of the goddess Dewi Sri who traditionally was worshipped as a divine originator of rice. As the adoption of technology spreads, however, the cause and effect process between technology and societal norms becomes blurred and is more difficult to identify. As cultural and social relationships to agriculture diminish it is the economic considerations that predominate and social patterns adjust to meet economic needs. The main limitation to the adoption of mechanical farming by non-adopters, except in remote and unsophisticated communities, is a physical or technical constraint. Examples include the place of irrigation in areas of Thailand, topographic difficulties in Korea and Nepal and the size of land holdings in Indonesia. In other words technology is primarily adopted for its economic impact and little thought is given by rural communities to its social effect upon their society.

NOTES

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Chapter Two
INDIA

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INTRODUCTION

In the developing countries of Asia where agriculture is still the mainstay of the vast majority of the people, recent estimates of the prevailing poverty portray a bleak future for these countries. For example, it is estimated that at the present rate of its development, India needs 196 years to reach the present stage of development of the Eastern European countries and 254 years to reach that of the USA. (1) One of the reasons for such a disheartening view about India's economic prospects is its inability to cope with the technological advancement of the Western countries in various production spheres. Therefore, in the context of a high rate of population growth which makes traditional methods of production inadequate to meet the basic needs, adoption of modern technology to increase productivity can hardly be overemphasized. However, it is also necessary to keep in view the question of how adoption of new technology in production would affect the socio-economic base of the people concerned. The dynamics of rural transformation at the grass roots level in India requires a proper understanding of the relationship between technology and society (and also economy) at the village and the household levels. The need for such an understanding acquires added importance in the context of growing emphasis on micro level planning in Indian five year development plans.

Background of rural problems

In 1951, about 62 per cent of the national income originated from the agricultural sector which declined to 38 per cent in 1981. Even after three decades of planning, 64 per cent of the country's labour force contributes only 38 per cent of the national income. This reflects the low productivity of Indian agriculture which has achieved an annual growth rate of about 3 per cent per annum during the planning regime. The unimpressive performance has been found inadequate to raise the standard of living of the rural people. Consequently, Indian rural economy continues to face many problems.

Indian agriculture is still dependent on monsoons not withstanding the fact that Rs 193,310 million have been invested on major, medium and minor irrigation projects to increase the area under irrigation. Today about 40 million hectares are actually under irrigation constituting about 28 per cent of net area sown. Even the gross irrigated area is only about 52 million hectares constituting about 30 per cent of the gross cultivated area. What is more, the net area irrigated varies from region to region ranging from 14 per cent of net area sown in Madhya Pradesh to 85 per cent in Punjab. What is worse, the part of the irrigated area which is dependent on minor irrigation, particularly wells and tanks, depends to a large extent on recharged water from the rainfall. Thus the creation of irrigation potential has been lagging in many states. As a result,

though the cropping intensity has increased in some of the irrigated pockets like Punjab (1.85), it has remained as low as 1.10 in other states and even for the country as a whole it is only 1.26.

Besides this, even the irrigation potential created, which is estimated to be 68 million hectares, has not been properly utilized because of improper water management and the slow process of providing irrigation extension facilities like land levelling and field channels. In some of the perennially irrigated areas, unwanted problems like salinity and waterlogging have further compounded the task of Command Area Development. These two problems have not been successfully solved by the irrigation authorities in India. Wherever assured irrigation facilities are available, India's agriculture has experienced commercialization in the sense that the farmers have started opting for commercial crops rather than food crops with a view to increasing their gross income. Though this is inevitable and even rational from the point of view of the farming community, its social desirability has been questioned.

Wherever irrigation facilities have been assured, new technology in agriculture has spread and as a result these areas have experienced a green revolution. But the green revolution is confined only to a few areas like Punjab, Haryana, Western Uttar Pradesh and some parts of Maharashtra and Tamil Nadu. Even within these areas, HYV technology has been successful only in wheat crops and the efforts to stabilize it in rice crops have not met with success.

In dry-land agriculture, it has not been possible to achieve breakthroughs and increase productivity because of the uneven distribution of rains during the season and even failure for several years and seasons in arid zones. The existing technology is inadequate to assure production in dry land agriculture. Dry-land agriculture therefore is acting as a depressor on the overall performance of the agricultural sector in India.

The operation of the law of inheritance has led to a phenomenal dwindling of the size of land ownership as well as operational holding. The sub-division and fragmentation have increased unprecedentedly, thereby making the average size of the land holding uneconomic in India. This is astonishingly evident in states like Kerala where 'handkerchief holdings' are emerging.

This has no doubt attracted the attention of the policy makers. Several state governments have introduced legislation for enforcing consolidation of holdings. No effective solution has been found for sub-division however as it depends on the creation of adequate non-land-based economic opportunities.

The Indian agriculture which was largely dependent on cheap labour has all of a sudden started facing increased costs mainly because of an increase in prices of fertilizers, HYV seeds, credit and even labour. As a result of the increase in costs of inputs, agriculture has become unremunerative, thereby creating unrest among the farming community. This is in spite of the fact that the guaranteed prices of foodgrains in India are higher than the international market prices.

Finally, though Indian agricultural development strategy envisaged peaceful and democratic transformation of rural socio-economic institutions through such measures as land reforms, strengthening of Panchayat Raj institutions and co-operatives, in actual practice, the achievements have been far from satisfactory. These failures have only awakened the rural masses and the democratic political process has only hastened conflicts between landless and land-owning classes. Consequently, India's rural scene bristles with socio-political unrest which may turn violent if impressive results are not obtained in rural development. It is in this context that technology plays a crucial role in the future socio-economic stability of rural India.

Technology transfer in agriculture has mainly occurred in three spheres: hydro-technology, bio-technology and mechanical technology. Hydro-technology encompasses the technology used in irrigation like use of diesel and electric pumpsets, modern sprinklers, etc. Bio-technology includes a package of modern inputs, namely chemical fertilizers and modern pest control devices. And mechanical technology involves the use of power operated tools and equipment such as tractors, power tillers, disc-harrows, sprayers, dusters, threshers, etc., in agricultural operations.

The impact of hydro-technology has been studied by economists, sociologists and engineers with reference to different sources of irrigation such as multipurpose irrigation dams, tanks, tube wells and canals. (2) Similarly, agricultural economists, rural sociologists and agricultural scientists have tried to probe into different aspects of the bio-technology (3) which is so widespread and hence is practised in almost all types of agriculture. However, the transfer of mechanical technology has not spread so widely because of its far reaching social and economic implications. This area has not been much researched into and hence it would be rewarding to study the social impact of mechanization of agriculture on the village communities.

Earlier studies

The existing literature on this theme suggests that though different aspects of the transfer of mechanical technology have been studied by some scholars in different socio-ecological contexts, the social impacts of technology transfer and its broader implications have not received adequate attention by the researchers. Except the study of Aslam (4), who has selected a border state (Kashmir), in northern India as his field, other studies have not dealt with the problem in a representative setting. Even Aslam's study is not complete as he has not covered the impact of new technology on family, community and intercaste relationships. Aslam selected one agriculturally more mechanized village (Dyalgam), and one traditional village (Kamar), and analysed the impact of mechanized farming on the size of land holdings, religiosity, income, educational and occupational aspirations of the households. He found that religiosity, educational levels, income and size of land holdings were higher in the mechanized village than in the traditional one. He also found that as the level of technology increased, the proportion of nuclear families declined. In another study Agarwal (5) has analysed the social implications of mechanical technology in the context of a community development block. She has attempted to assess the combined impact of mechanical technology and community development on the social life of the villages. Khanna (6) has attempted to separate the impact of mechanical technology. Her study area however is Chambal region which is not typical of the Indian agricultural region. In another study of an Indo-German project on Intensive Agricultural Development Programme in six villages of Mandi district of Himachal Pradesh, Rajagopalan and Singh (7) have examined the social impact of various agricultural innovations, such as HYV, chemical fertilizers and improved equipment. But this is mainly an evaluative study.

In their Dharwad study, Sarkar and Prahladachar (8) have found that tractors were used only for about 130 days in a year, including thirty-eight days of use on own farm. It was natural therefore that instead of increasing the cropping intensity and demand for labour, tractorization led to a reduction in the work of labourers and animals. According to Sharma, (9) this reduction in the use of labourers was not much, as demand for them increased in weeding, irrigation, harvesting and threshing operations. His unique finding is that the net return per acre was the same for both tractor and bullock operated farms due to the higher input costs of mechanized farming. Mitra (10) has found unemployment of artisans as a result of adopting mechanized farming as they cannot repair the improved agricultural equipment within the ambit of their traditional skill. Sharan (11) and her associates have been more concerned with the energy consumption aspect than with socio-economic implications of mechanized farming. They have found that tractor operated farms need more energy than bullock operated farms. Thus, the earlier studies have not probed exclusively into the social impact of the adoption of mechanical technology in agriculture. Besides, in a country with such diversity as India, many studies covering different socio-cultural settings are required for proper understanding of the social impact.

Hypotheses

Available studies on the impact of mechanical technology on rural India have thrown up several micro level conclusions and macro level generalizations. In fact Hans Binswanger (12) has formulated some general hypotheses in the light of the findings with reference to many developing countries. Keeping in view these generalizations, we have formulated the following hypotheses for testing in the selected case study villages.

1. Since agricultural mechanization is more remunerative to farmers with more lands, either only such farmers will go in for mechanization or farmers will tend to accumulate lands after adopting the mechanization.
2. Since farm mechanization is less remunerative to farmers with smaller holdings, a tendency to combine the modern equipment with traditional technology (for example operation of wheat threshers by bullocks) increases as the size of holdings declines.
3. Apart from having more land, farm mechanization is possible only when farmers are more enterprising, more educated and can afford more capital.
4. This implies that infrastructure facilities like credit institutions (co-operative societies or banks), transport facilities, etc., are better developed in agriculturally mechanized areas than in the traditional areas. It also implies that the agricultural mechanization takes place where these facilities are available.
5. One of the main economic implications of agricultural mechanization has been the change in the cropping pattern from subsistence crops to cash crops. As such, most of the transactions in agriculturally mechanized regions would be in terms of cash, rather than in kind.
6. If we stretch the fifth hypothesis slightly and hypothesize that with the increased use of cash, people will begin to interpret barter payments in terms of money, this increases the awareness of the value of such payments, especially for customary services, and would subsequently affect the age-old jajmani system (patron-client relationship).
7. Because of the change in the cropping pattern and cropping intensity and also the resultant increase in the need for labour in certain operations of the mechanized farms, employment opportunities and wage rates will be higher in the agriculturally mechanized areas.
8. Due to the increase in the need for undivided family property to invest in the modern costlier agricultural equipment and to meet the increased cost of cultivation, mechanized farming households would continue to be undivided and tend to be bigger in size.
9. As a result of the improved cash position of the mechanized farm households, not only their expenditure pattern will change, but also they will become modernized in their lifestyle (housing, food, dress, religion, etc.) and their aspirations and horizons will widen.

METHODOLOGY

The study area is located in a southern Indian state— Karnataka. Karnataka is a typical Indian state in some economic characteristics and atypical in other respects. For example, the proportion of net domestic product at current prices originating from the primary sector in 1981–2 was 43 per cent in Karnataka whereas it was 35 per cent for India. But in regard to the use of agricultural equipment the number of tractors, mould-board ploughs, disc-harrows, harvester combines, seed planters, and trailors per 1,000 operational holdings, Karnataka is in the same position as the nation. This is also true of the number of electric pumpsets, seed planters, sprayers, dusters, disc-harrows and levellers per 1,000 hectares of gross cropped area. In regard to the number of power tillers, government tractors and rotavators per 1,000 hectares of gross cropped area, Karnataka is one of the three highly-mechanized states. Even so, we cannot claim that Karnataka is a

representative state of India in all respects. For a country of sub-continental size like India with all its diversities, no single state can claim to represent the whole country. In fact, Karnataka is behind the national average both in respect of irrigation and tractor use. The experience of Karnataka, therefore, can be more indicative of what is happening in the country in contrast to a more advanced state like Punjab. This is because the higher level of development of agriculture as well as small industries with developed infrastructure has enabled the Punjab state to absorb farm mechanization with relatively greater ease and less social costs in terms of displacement of labour. This is not likely to hold good for many other states. Karnataka has a moderate level of industrialization nearer the country's average. This is evident from the fact that the proportion of the workforce engaged in non-agricultural sectors in 1981 was 34.9 per cent in Karnataka as compared to 33.3 per cent in India.

Indian states are divided for administrative purposes into districts and each district is further divided into talukas. In Karnataka, we have selected Dharwad district, and within this district, Dharwad taluka. Two villages were selected from Dharwad taluka by using the indicators of farm mechanization in relation to cultivated area. Though Chickmagalur district ranks first in respect of as many as eleven indicators of mechanized farming, it is not the representative district in respect of agriculture. It receives very high rainfall and a very high percentage of land in the district is under coffee plantations. These are not the common features of most of the districts in the country or in Karnataka.

Dharwad district ranks next highest in terms of four indicators and, therefore, we have selected this district. Judged by the same indicators of mechanized farming, we found that Dharwad taluka is agriculturally the most mechanized one among seventeen talukas of the district. It stands first in respect of eight out of eighteen types of modern agricultural equipment used. And it is also a fairly representative taluka in terms of the proportion of land used for agriculture and work force engaged in agriculture. (13) For these reasons, villages for the case studies were selected from the Dharwad taluka.

Within the Dharwad taluka, one village having a high degree of mechanized farming (reference village) and another village which is similar to the reference village in many respects but dissimilar (traditional) in agricultural technology (control village) were selected.

Though Table 2.1 shows that fifty-four out of 105 villages in the taluka had 265 tractors, Marewada village

Table 2.1 Number of villages possessing different types of agricultural equipment in Dharwad taluka (1981)

Name of equipment	Modern/ traditional	No. of villages	No. of pieces of equipment
Wooden ploughs	Traditional	87	11,962
Iron ploughs	Traditional	59	1,914
Seed drills	Traditional	8	1,005
Carts	Traditional	78	7,643
Tractors	Modern	54	265
Power tillers	Modern	12	75
Electric cane crushers	Modern	6	11
Sprayers	Modern	55	1,075
Dusters	Modern	32	426

Source: Computed from information furnished in village-level Green Cards relating to the Dharwad taluka. These cards give basic information on each of the villages and they are maintained by Dharwad District Statistical Officer of Karnataka Government.

alone possessed twenty-six (9.8 per cent) of them. In terms of the number of tractors per 100 operational holdings (it was 5.78 per cent) and per 100 hectares of net sown area (it was 3.21 per cent), Marewada village stood first in the taluka. It was later confirmed in the course of our visit to the villages that the number of tractors had increased in the village, and that the villagers were using several tractor-operated and power-operated items of agricultural equipment, which may be referred to as 'new mechanical technology'. Besides, with a population of 2,176 in 1981, the village was found to be moderate (neither too big nor too small) in size. These factors convinced us to select Marewada village as agriculturally the most mechanized (reference) village in the Dharwad taluka.

There were nine villages, namely, Mansur, Mummigatti, Shinganahalli, Harobelawadi, Kallur, Kabbenur, Kotabagi, Pudakalkatti and Yadwad, which could match more or less the Marewada village in population. Among these nine, the

Table 2.2 Indicators used for selection of Marewada and Harobelawadi villages as agriculturally mechanized and traditional villages

Indicators		Marewada (the most mechanized village in Dharwad taluka)	Villages of Dharwad taluka which are similar to Marewada in the size of population, but are traditional in agriculture				
Mansur	Mummigatti	Shinganahalli	Harobelawadi	Kallur			
1.	Population in 1981*	2,176	1,859	2,467	1,966	2,191	2,156
2.	Distance from the Dharwad city**	8km	8km	8km	24km	20km	25km
3.	Using modern agricultural equipment?	Extensively	No	No	No	Very little	Very little
4.	Type of soil	Black and fertile	Red with stones	Red with sand	Red	Black	Red and black
5.	Similar to Marewada in rainfall and climate	–	No	No	No	Yes	No
6.	Similar to Marewada in respect of amenities	–	No	No	No	Yes	No
7.	Percentage of SC and ST population in 1981*	6.11	5.37	19.33	3.81	8.67	3.66
8.	Percentage of literates in	22.15	16.40	14.34	13.37	30.44	24.84

Indicators		Marewada (the most mechanized village in Dharwad taluka)	Villages of Dharwad taluka which are similar to Marewada in the size of population, but are traditional in agriculture				
Mansur	Mummigatti	Shinganahalli	Harobelawadi	Kallur			
	1971 census**						
9.	Type of main road	On the state highway	Unsealed road	On the national highway	On the national highway	On the state highway	Unsealed road
10.	Distance from Marewada	–	16km	16km	32km	12km	33km
11.	Percentage of dry land to total cultivated area	100	100	99.92	100	100	99.33

Sources: * Census of India 1981, Series 9, Karnataka—paper 3 of 1984 Final Population—Totals—Villages and Towns Dharwad District, 1984, pp. 8–11.
** District Census Handbook, Dharwad District—Census of India, 1971, Series 14 Mysore, Part X-A: Town and Village Directory, Part X-B: Primary Census Abstract, pp. 36–41, 220–7.
Notes: 1 Information on indicators in serial numbers 3, 4, 5, 6 and 9 was collected by personal visits.
2 The paradoxical situation in regard to literacy rates of reference village and control village is explained in the course of analysing the social impact.

last three were more mechanized in terms of agricultural technology (from the information furnished in the village-level Green Card). Therefore, the control village was selected from only the first five villages.

If we compare Marewada with these five villages in respect of ten variables presented in Table 2.2 we find that Mummigatti and Kallur are different from Marewada in respect of eight variables, Shinganahalli in respect of seven variables, Mansur in respect of six variables and Harobelawadi in respect of three variables. Thus dissimilarities between Marewada and Harobelawadi are minimal as compared with those between Marewada and the other four villages. Besides, distance from Marewada village is the least (12 km only in the case of Harobelawadi), and the two villages are also on the same state highway: the Dharwad-Saundatti highway. Harobelawadi has not been influenced by the urban culture and the nearness to an urban centre cannot play a dominant positive role when agroclimatic and soil conditions are not conducive. (This is clear from the experiences of Mansur and Mummigatti.) Therefore, Harobelawadi village was selected as an agriculturally traditional village to provide a control group to the Marewada village.

In the next stage, a census of all households of these two villages was conducted and then samples of twenty-five households in Marewada and Harobelawadi villages were selected. Minimum information on the levels of technology, caste/religious background, occupational status, educational levels, types of traditional and modern agricultural equipment used, cropping pattern, etc., was collected through a census of all households in both the villages. This exercise gave a universe of 374 and 385 households in Marewada and Harobelawadi villages respectively. These households in Marewada and Harobelawadi were divided into two broad categories as cultivating households and non-cultivating households. There were 177

and 91 non-cultivating households in Marewada and Harobelawadi (14) respectively. Since the main focus of the study is on the level of technology, the cultivating households were further divided into three categories as agriculturally more-mechanized, less mechanized and not mechanized.

'More mechanized' households were those which used modern (tractor-operated and power-operated) equipment more frequently and for many operations. Most of them owned such equipment. Less mechanized households were those which usually used traditional (hand-operated and animal-operated) equipment for different purposes. Only when they found that the traditional equipment could not help them complete the agricultural operations on time, they either hired-in or borrowed the modern equipment for use from others. In that sense, they used the modern equipment for limited operations. Otherwise, these households carried out all their agricultural operations by using only traditional equipment. The non-cultivating households, on the contrary, included households which pursued agricultural labour, traditional artisan professions, government service, etc., without owning or cultivating any land.

Taking into account time and resource constraints, a sample of twenty-five households was selected from each of these two villages. Particularly, in the case of Marewada these twenty-five households were proportionately distributed (15) among different technological categories as shown in Table 2.3.

Final selection of the required number of households from each category was done on a simple random basis giving some weightage to castes and religions (16) of the households coming under that category. The sample of twenty-five households relating to Harobelawadi village was not proportionately distributed among different technological categories, as they had to match the sample households in the Marewada village. Besides, the technological categories in Harobelawadi could not match with their counterparts in Marewada village in respect of the number of households.

Scope and limitations

Though the main focus of the study is on the social implications of mechanized farming in its broader policy implications, its scope is very wide. It encompasses the economic impact as well as the social impact. Within the social impact also, it covers a wide range of issues such as type and size of the family, inter-family and intra-family relations, community relations, role of governmental and institutional agencies, status of women, attitude towards female children, pattern of decision making, etc.

However, it is necessary to mention some of the limitations of the study:

Table 2.3 Distribution of census and sample households in Marewada and Harobelawadi villages, 1985

Technological category	Census		Sample	
Marewada	Harobelawadi	Marewada	Harobelawadi	
More mechanized	44	15	3	3
Less mechanized	93	34	7	7
Not mechanized	60	245	4	4
Non-cultivating (including agricultural labourers)	177	91	11	11

1. Selection of the reference and the control villages was made only from one district (Dharwad), which is a rainfed, though not a drought-prone, region. Thus irrigated and drought-prone regions are not covered in this study.
2. Indepth analysis is confined to a purposive sample of only twenty-five households selected from each of these villages.

3. The term ‘new agricultural technology’ is used only in the sense of mechanical technology. Bio-technology and hydro-technology are not specifically covered, though bio-technology has become part and parcel of irrigated agriculture in the mechanized village.

GOVERNMENT POLICY ON TECHNOLOGY FOR RURAL DEVELOPMENT

Review of government policies and programmes

The Indian economy is still characterized by the predominance of the rural sector. This predominantly rural character is reflected in the very high proportion of population living in rural areas. It was as high as 85 per cent in 1951 which declined to only 76 per cent in 1981. Therefore, Indian planners very rightly accorded top priority for the development of rural India and in particular agriculture as an important component of rural development. No doubt the objectives of rural development have been much broader than mere development of agriculture. They include comprehensive development of rural areas so as to transform the rural society from the semi-feudal stage to a modern dynamic society, expansion of employment opportunities in the rural areas by increasing irrigation facilities and encouraging the use of HYV and modern inputs so as to increase the cropping intensity and crop productivity and reduction of regional disparities and strengthening redistributive bias with a view to achieving equity. Accordingly, successive Five Year Plans allocated increasing amounts of outlay to rural development to achieve certain pre-set targets in agricultural development.

Infrastructure development for rural development

Under the planning regime, attention was paid to developing necessary infrastructures for agricultural development. For centuries, Indian agriculture depended on the mercy of monsoons. Therefore, first priority in the development of both agriculture and the rural economy had to be given to expanding irrigation facilities. Accordingly, Five Year Plans have made substantial investment spread all over the country in major, medium and minor irrigation projects. So far, the country has invested Rs300,000 million for irrigation development. While the construction of major, medium and minor irrigation tanks has been undertaken by the central and state governments, the farmers themselves were allowed to sink irrigation wells particularly in drought-prone areas where major rivers are not flowing. Besides, the government also provided tube wells on a large scale particularly in the Gangetic Plain. All these efforts have no doubt yielded fruits by increasing the net area under irrigation which was hardly about 17.6 per cent of the net area sown in 1950–1 to about 28 per cent in 1985–6. Though at the national level the percentage of irrigated areas looks impressive, state-wide distribution of the irrigated area varies considerably from state to state partly because of inter-state disparity in the distribution of water resources, particularly perennial rivers. Even so, India has not yet fully exploited its entire irrigation potential which is estimated to be around 128 million hectares. And in future, in view of the cost-escalation, it will be very difficult to extend irrigation facilities substantially through major and medium irrigation projects.

Next to irrigation, Indian planners focused their attention on the supply of electricity to rural areas, particularly for agricultural operations. In this programme, they were guided by the Soviet experience in rural electrification. They considered that the supply of electricity to rural areas would not only provide energy for irrigation purposes but also would usher in an era of modernization. This was considered as an important step towards the introduction of technology into the tradition-bound rural economy. In 1950–1, power consumption in KWs per 1,000 hectares of gross cropped area was only 1.5 which increased to

almost eighty in 1984–5. This is a remarkable achievement considering the vastness of the country and the high capital-output ratio involved in the generation and distribution of hydro-electricity which is still predominant in the total power generation and supply of power in India. Here again the inter-state disparity in power consumption varies substantially, the highest being in Andhra Pradesh and Tamil Nadu and the lowest being in Bihar, Orissa and Rajasthan. In view of this, the Government of India has established the Rural Electrification Corporation which is an autonomous development corporation to raise funds to provide loans and subsidies to State Electricity Boards to push rural electrification on a large scale. In spite of the increasing cost of power generation in the country and resistance of the farmers to pay for it, rural electrification is going on full swing all over the country.

Immediately after independence it was realized that the Indian rural credit scene was characterized by an unorganized money market and exploitation of poor farmers by the rural money lenders. The money lenders supplied almost the entire credit required by agriculturists. The Reserve Bank of India (RBI) (which is the central bank of the country), was asked to intervene in the rural credit scene and develop appropriate institutions to provide rural credit.

The Reserve Bank of India established three Agricultural re-finance funds, viz., Long-term Operations, Stabilization and Relief, and Guarantee Funds in order to re-finance the co-operative banks and land mortgage banks at the state level. Commercial banks were made to advance a minimum proportion of their credit to agriculture as priority sector lending. During the Sixth Plan period the National Bank for Agricultural and Rural Development (NABARD), was created by transferring the re-financing funds from RBI to provide re-financing facilities to the state level co-operative institutions. As a result of all these efforts, the dependence of the rural economy on the rural money lenders has come down by almost 50 per cent. Today commercial banks and co-operative credit institutions provide the remaining half.

Today the country has what is known as a multi-agency approach to providing rural credit. This includes co-operative credit institutions, commercial banks, regional rural banks, and other credit institutions. All the nationalized commercial banks have been asked to identify districts in the form of lead bank districts and adopt those for financing agriculture. Restrictions have been placed on the commercial banks from opening branches in the urban areas and they are compelled to open their branches in rural areas. Even then, while deposit mobilization from rural areas is increasing, commensurate bank credit is not flowing into the rural areas thereby reducing the credit-deposit ratio for the rural areas. Though the credit needs of the rural sector are not entirely met by the organized financial institutions, the very fact that they are covering about 50 per cent of the total credit needs of the rural economy is not a small achievement of the planning strategy of providing credit facilities to the agriculture sector.

Another important infrastructural facility which the planning regime has provided to the rural economy has been the development of regulated markets. Indian farmers were exploited by middlemen, particularly the trader-cum-money lender. Traditionally he used to advance money at very high rates of interest and on the hypothecation of expected farm produce. There were several forms of exploitation in the marketing process such as forcing him to sell his produce at a very low price, cheating in grading of the produce and its weight. Therefore, several state governments in India have established regulated markets by enacting legislation. These markets provide protection to the farmers from some of the malpractices though they have not been totally eliminated. But the fact that regulated market and store house facilities are available for the farmers is an indication that the Indian farmer has got an alternative market to sell his produce. The development of regulated markets has been generously funded by international funding agencies like the World Bank. The government has made a beginning and it will take time for the farming community to reap the fruits of the operations of the regulated markets.

The Government of India has also encouraged extensive research in the field of agriculture and rural industries so as to bring about an increase in productivity by embracing modern practices of agriculture such as the use of modern equipment and adoption of HYV technology. For this purpose, a network of agricultural universities was developed all over the country and their research activities are co-ordinated by the Indian Council of Agricultural Research located in New Delhi. It may not be an exaggeration to say that agricultural research is the strongest part of government-aided research in India and has contributed substantially to the formulation of various agricultural development policies and programmes in the country.

No doubt the rural roads have been developed. But considering the vastness of the country, the quality of the roads still remains much to be desired. Today rural areas of the country are opened up by the network of railways and roadways and this transport development has also enabled government officials to visit the villages frequently for monitoring the progress and impact of various development programmes. Today the government servant is a modernization agent as well as a change agent in rural areas. He may be a school teacher, rural health worker, extension officer or a revenue officer. All of them carry with them some elements of modernism, new methods, new schemes, new ideas. Their very existence in rural areas makes technology transfer easy and the only constraint in its absorption process is finance.

Specific rural development programmes

The first rural development strategy was influenced by the American strategy of the community extension programme. The Community Development Programme (CDP) was started in India to provide infrastructural support to rural development. The CDP strategy was incorporated in the First Five Year Plan and subsequently an ambitiously named programme called National Extension Service (NES) was launched in 1953. CDP was taken up in all fields of rural development, whereas NES was designed to provide basic and essential staff and limited funds. The NES blocks were subsequently converted to CDP blocks. However, CDP was expanded phenomenally under political pressure and thereafter it became a national programme encompassing the entire rural population. It was decided to extend NES to the entire country in eight years and CDP in twelve years. Consequently both the programmes and their inputs had necessarily to be diluted under this abnormal rate of expansion. The CDP now covers all the rural areas (5,011 blocks) in the country and includes agricultural activities, rural communication, education, health, training, social welfare, a supplementary employment programme and housing.

Thus the CDP included virtually everything that one can think of for developing rural areas. But it was soon realized that this programme did not have much impact on the development of rural areas mainly because although it was supposed to be implemented with the participation of the rural community it became, by and large, a government initiative. Once the government controlled the CDP by appointing field level staff, it became a part of the revenue department which was known for its reliance on the status quo. Besides, the CDP programme could not muster enough resources and the limited resources which were available were spread too thinly all over the country resulting in inadequate thrust and sometimes wastage. Though the CDP was conceived as a pilot project, it became a national programme thereby defeating the original purpose of experimenting with it in a very limited area.

Against this initial experience during the First and Second Five Year Plans, during the Third Five Year Plan period altogether a different, though related strategy was adopted named the Intensive Agriculture District Programme (IADP). This programme was conceived mainly as a crash programme for increasing foodgrains output. For this purpose high production potential districts, encompassing all the infrastructural facilities, including irrigation, were selected. The programme aimed at concentrating efforts on selected

districts to increase output to tide over the food problem. This programme came to be known as a 'package programme'. It was very different from the CDP in its approach. It employed the concentration principle in deploying resources as opposed to the equity criterion used in CDP, where the limited resources were spread all over the country. The IADP was started in 1960 and by 1966 the basic concept of concentration, effective use and better management of resources had gained national importance. It ultimately emerged as a foundation of India's present strategy of agricultural development. It is necessary to recall here that this strategy was also influenced by foreign technical assistance.

The main objective of the programme was to increase agricultural production through a concentration of financial, technical, extension and administrative resources. Its ultimate goal was to achieve a self-generating breakthrough in productivity and a raising of the production potential. The programme was also intended to provide lessons for extending such intensified programmes to other areas.

The activities of the IADP included adequate and timely supply of credit, fertilizers, pesticides, and implements, channelled mainly through co-operatives. Arrangements were made for marketing and other services through co-operatives to enable the cultivators to get remunerative prices. Intensive educational efforts, strengthening of transport arrangements, and such other related facilities as workshops for training were also implemented. The IADP achieved considerable success within its narrow objectives which is evident from the rapid increase in the production of foodgrains. It also proved that Indian farmers can be educated in modern agricultural production practices. This programme also convinced the planners that any successful planning for agricultural development required an integrated package programme requiring inter-departmental co-ordination. It is this programme which ultimately paved the way for the green revolution which turned the historically foodgrains-deficit country up to the 1970s into a surplus and a marginally exporting country in the 1980s. In a way IADP was the first experiment to transfer a package of modern technology to Indian agriculture which ultimately paved the way for the nationwide adoption of new technology in agriculture in the form of HYV.

The failure of the growth-oriented strategies in the 1950s and 1960s to make any dent on rural poverty and unemployment led to some rethinking about the strategies for rural development. It was realized that the over-emphasis on the heavy industries model and the failure of the 'trickle down' process coupled with unhampered growth of population increased the number of poor and unemployed in the rural areas. Over and above this, the regional disparities continued to widen creating the problem of political protests from the backward regions. Thus the problem of backward regions, poor people and the unemployed became very pronounced and the government could not afford to remain indifferent. This situation called for immediate solution and therefore the Planning Commission and the Government of India had to think of more direct strategies to solve the problems of poverty and unemployment.

It was against this background that the emphasis on a rural development strategy was expanded to cover equity. In other words, the strategy of achieving fast growth of agricultural output contemplated under IADP and HYV technology came to be supplemented by anti-poverty programmes during the period of the fourth five year plan. Accordingly, it was decided to have special programmes for the weaker sections of the rural population and the backward areas. To start with, programmes for the development of small and marginal farmers were formulated, known as the Small Farmers Development Agency (SFDA), and the Marginal Farmers and Agricultural Labourers Development Programmes (MFALDP). These two programmes were intended to help the landless and the marginal farmers in rural areas in getting employment during the slack season and also, in the process, to create assets for their self-employment in the course of time. For the backward areas, the Drought-Prone Area Programme (DPAP), Desert Development Programme (DDP), Hill Area Development Programme (HA DP), and Tribal Area Development Programme (TADP) were started. Besides all these, crash schemes for rural employment and food for rural employment programmes

were also begun. All these initiatives which began during the fourth five-year plan have been continued since, by adding, reformulating and reorganizing their implementation processes. Today there are about twenty such special programmes intended to alleviate rural poverty and to promote the development of backward areas. In all these schemes, the main aim is to provide employment opportunities through projects which will create community assets such as roads, bridges and housing.

The IRDP is the single largest poverty alleviation programme currently implemented in the country. It covers all the community development blocks today. Though it was launched in 1978–9 in only 2,300 selected blocks in the country, it was extended to all the 5,011 blocks with effect from 2 October 1980.

It aims at providing income-generating assets for self-employment to the rural poor to eventually enable them to improve their income and go above the poverty line. Its targeted beneficiary groups are small and marginal farmers, agricultural and non-agricultural labourers such as rural artisans and craftsmen, and rural weaker sections like scheduled castes and scheduled tribes, who are below the poverty line. A farmer with a land holding of about two hectares or below is considered as a small farmer, and one hectare and below is considered as a marginal farmer. The IRDP employs the cluster approach for selecting villages for implementing various components of the programme. The Anthyodaya approach (village assembly or Gram Sabha) is used for selecting beneficiaries within the selected villages and a package approach is used for implementing the programmes. The cluster approach ensures that the supporting infrastructure facilities are either readily available or can be made available at a relatively low cost. The Anthyodaya approach makes sure that the poorest of the poor are selected first and the package approach facilitates realization of the full benefits by the beneficiaries.

In this respect IRDP strategy represents a synthesis of various approaches which were tested and found effective in earlier rural development programmes, especially IADP, SFDA, DPAP and CADA. The IRDP gives special preference to the scheduled castes and scheduled tribe people because of their social as well as economic backwardness. At least 30 per cent of beneficiary families have to be drawn from scheduled caste and scheduled tribe families and 30 per cent of the subsidies and loans should be earmarked for them. The sixth plan provided Rs 750 crores under the central sector with an equal amount of matching state government outlay. But other programmes like the Rural Landless Employment Guarantee Programme (RLEGP) have 100 per cent funding from the central government. Almost all IRD programmes are implemented by the state governments. The IRDP beneficiaries are assisted through viable bankable projects which are financed partly by subsidies and partly by loans. The beneficiaries can select projects which suit their background, skills and personal preferences from a range of sixty-one schemes in the fields of agriculture, irrigation, animal husbandry, village industries and the tertiary sector. The individual subsidy varies by type of beneficiary and the maximum amount varies between Rs 3,000 and Rs 5,000. All these programmes have been implemented by the various developmental departments of the state governments like irrigation, rural development, animal husbandry, fisheries, horticulture, public works, etc. Their departmental schemes are co-ordinated at the district level through the District Rural Development Societies (DRDS).

In recent years, however, several criticisms have been levelled against these anti-poverty programmes. First, it has been alleged that corruption at the local level has resulted in ineligible beneficiaries being selected. The percentage of ineligible beneficiaries varies between 10 per cent and 50 per cent from state to state. This has led to large-scale leakages in the meagre funds allocated and as a result during the Seventh Plan period, strict monitoring of the implementation of these programmes is enforced. Second, it has been found that the amount of subsidy or loan given under this programme is inadequate to enable the beneficiaries to acquire economically viable assets and use them for the purpose of income generating self-employment. It has been suggested that the amount should be, at least, doubled under some schemes. Third,

it has also been argued that the total amount spent under IRDP and other anti-poverty programmes has been small and has been spread too thinly all over the country making its impact invisible. It has also been realized that huge amounts of funds cannot be spent on unremunerative projects/schemes when the country is facing a resource crunch for large-scale investment, particularly in the context of an increased capital-output ratio. Fourth, it has been felt that some of the programmes like Training Rural Youth for Self-Employment (TRYSEM) are not properly conceived and the necessary infrastructure facilities in the case of some schemes under agriculture, animal husbandry etc., have not been ensured. For example, it has been found that milch cattle were provided without ensuring that the farmer would be able to gather the required fodder and nutrients. Similarly, milch animals were provided without ensuring the marketing of the milk. Wherever these infrastructure facilities were not available, the schemes failed to help the beneficiaries. On the whole, however, the anti-poverty programmes have made some mark in the rural areas and therefore they have been continued during the Seventh Plan period also.

Over and above these, from the fifth five-year plan period onwards, it was also decided to have a minimum needs programme to meet certain basic minimum collective needs of most rural people in an attempt to implement the basic needs strategy of development.

The minimum needs programme includes elementary education, housing for the rural landless, rural health, rural water supplies, rural roads, rural electrification, environmental improvement and nutrition. It may be observed from this list of eight minimum needs that most of them go to meet the collective needs of the people. But the two most important basic needs, viz. food and clothing, are missing. These two basic needs have been attempted to be met through employment programmes under the above mentioned special programme for poverty alleviation. Thus the basic needs strategy has been attempted to be implemented in India indirectly through minimum needs and anti-poverty programmes.

All these programmes have no doubt been implemented through five-year plans by making appropriate allocations under separate budgetary heads, but they are not integrated logically into the five year plan strategy. For instance, it is not clear as to what extent these programmes are assumed to contribute to the targeted growth of output. They have been conceived as some sort of supplementary programmes to take care of the equity objective while concentrating on the growth objective through a macro-econometric model. Further, these programmes were started with a very unimpressive amount of expenditure allocation, although in recent years the amount has increased substantially. In other words, these programmes were implemented more on an experimental basis with very limited funds but later on the amount has come to be spread too thinly over the entire area of the country. Perhaps this was inevitable in view of the very nature of these programmes because of their political importance. As a result, it has been realized that we cannot solve the problem of poverty and unemployment through such programmes alone. It is in this context that Indian thinking on planning has reached a plateau both in terms of ideas as well as strategies for the future development of the country.

Role of technology in rural development

In India the volume of investment has been increasing during the successive Five Year Plan periods. But along with the increase in investment, the rate of growth of national income has not been steadily moving upward. This inconsistency is explained in terms of an increased capital-output ratio. In other words, the use of increased capital has been considered to be either below potential and/or inefficient resulting in a low level of output. This situation has also been interpreted as an indication of the slow rate of technological progress in the Indian economy.

In India adoption of technology in agriculture has received considerable attention particularly at the national level. In recent years, several studies have attempted to measure the contribution of technology in the development of Indian agriculture, particularly in the field of foodgrains output. But studies intended to comprehend the socio-economic impact of adoption of technology in rural areas both at micro and at macro levels are still required.

The technology transfer to rural areas has resulted no doubt in increased production in those pockets where it has been adopted, but the resultant prosperity from the adoption of technology is confined to a few specific spatially distributed pockets in rural India. As a result, it has added to the regional disparities both between regions and within regions. In other words, inter and intra-regional disparities have been further accentuated by technology transfer in agriculture. Following from this, the prosperous farmers have been getting the benefits from government by effectively articulating their demands as an organized pressure group. Consequently, the rural society which was already polarized as a result of social stratification based on the age-old caste system and land-based semi-feudal order, has come to be further polarized economically as a result of increased income inequalities resulting from the adoption of technology by a few people in a few pockets of rural India. The operation and the mechanics of the big farmers lobby combined with a blind operation of market forces have resulted in the dilution of equity objectives in rural India under the planning regime.

The surpluses generated in the farms of those prosperous farmers who have adopted new technology were expected to be ploughed back into farm investment for further expansion of other farm related and non-farm economic activities within the rural economy. But the savings of the rich farmers have been increasingly flowing into the urban areas in the form of investment in real estate and other quick yielding economic activities. Thus the surplus generated in the rural areas consequent on technology adoption is not ploughed back into rural areas or invested within the rural areas. A major portion of it is diverted to urban areas thereby depleting the investment resources available for further development of the rural areas. Following from this, there is an increasing nexus between the rural and urban rich who have established themselves in both rural and urban areas. They have also developed a political nexus by using their prosperous economic position. These are some of the broader macro level socio-economic consequences of technology transfer in agriculture on rural Indian society.

THE CASE STUDY

Analytical framework of the study

As already stated, the country chapter attempts to study the social impact of mechanized tillage in rural India, by comparing two villages—one agriculturally mechanized and one traditional village. Since the two villages are drawn from a reasonably typical Indian setting, the two case studies would enable us to link the macro perspectives presented in the earlier sections with the micro level findings. Though the diversity of the country renders this linking difficult and perhaps unreliable, it is an attempt to portray the main findings of the case studies within the macro perspectives. However, in view of the usual limitations of the case studies, it is necessary to treat the findings of these case studies with caution.

The changes in family relations, community relations, status of women, role of children, physical mobility, economic base and expectations of the people against the background of changes in the living standards and lifestyles of people of these two villages have been analysed. These changes are assessed by making two types of comparison, horizontal and vertical. Horizontal comparison of households using the same level of agricultural technology in the two villages helps to identify pre-mechanization factors such as

original endowment (owning of bigger landholdings etc.) and vertical comparison of households, using different levels of farm technology within the village, and facilitates clear understanding of the relative role of farm mechanization in socio-economic changes.

Background

Marewada and Harobelawadi are located at a distance of eight and twenty kilometres respectively to the north of Dharwad city, which is their taluka and district headquarters. These two villages had 374 and 385 households respectively in 1985, comprising 2,216 and 2,250 inhabitants.

Historically, the two villages formed part of Dharwad district, which had always been a heartland of political developments in South India. Before the British established their control (1818 to 1920), the district was a part of the southern territories which were chronologically under the control of Mauryas, Satavahanas, Pallavas, Gangas, Kadambas, Chalukyas, Rastrakutas, Hoysala-Ballalas, Viayanager Kings, Mughals and Martha Peshwas. After independence until the reorganization of the Indian states in 1956, Dharwad district formed part of former Bombay state. Since 1956, it has been a part of the Karnataka state.

The two villages have some common and some dissimilar geographic features. Both have plain land, black soil and rainfed agriculture. Marewada has access to three tanks in the vicinity of one kilometre, while Harobelawadi has a small stream, which of course, is in the same vicinity. However, data on other geographical features like altitude, annual rainfall and maximum and minimum temperature are not available for the villages in particular.

As for the political background of the villages, no party politics seem to have played any role during the local panchayat (17) elections. People of both the villages explained that during the recent elections to the (now dissolved) local panchayats, in which Janata Party candidates were elected, they knew the panchayat members more by their names and castes than by their political affiliations. As far as the villagers could remember, the presidents and a majority of members in both the panchayats, the directors of local co-operative societies, leaders of youth clubs and the women's club (Mahila Mandals) and representatives of the villages in taluka and district level bodies mainly belong to the Lingayat community, which is both numerically dominant and ritually superior in both the villages.

Cultural background in the Indian context is mainly understood in the sense of religious and caste backgrounds. Religion and caste determine the main cultural traits of the people in India. According to the Dharwad District Gazetteer (18), Marewada had three old temples and one mosque, while Harobelawadi had four such temples and one mosque. If the presence of the Hindu temples and one mosque confirm the co-existence of only Hindu and Muslim cultures for a very long time in the villages, numerical strength of the Hindu shrines indicates that in both the villages Hindus have been in the majority.

Regarding the caste composition, our field work in the two villages reveals that both the villages are numerically dominated by Lingayats, whose leaders are now claiming their community to be outside the Hindu fold (Veerashaivism, started as a heretic religion to Vedic Hinduism). Notwithstanding such recent claims, probably motivated by political considerations, traditionally they have been considered as Hindus because of a common presiding deity, Siva, and a common culture. Akkasale, Kammara, Ganiga, Kumgara, Brahmin, Reddy, Uppara, Kshatriya, Kuruvinashetty, Beda, Kuruba, Dhobi, Hadapada, Bhovi and Harijan are other Hindu castes of the two villages. Except Brahmin and Reddy, (and perhaps Harijan) the others are traditional artisan castes practising caste-based occupations.

The economic background of these villages indicates that more than 80 per cent of the workers have been engaged in agriculture. But in respect of non-agricultural pursuits, the two villages show some differences. For instance, in Marewada, people are also engaged in dairying, trade and commerce, household industry,

other services, manufacturing (other than household industry), transport, storage and communications and construction. In Harobelawadi, household industry, trade and commerce, other services, construction, dairying, transport, storage and communications and manufacturing (other than household industry) follow agriculture in descending order of importance.

Land tenure and land distribution

According to the 1971 census, Marewada had 948.4 hectares of land, out of which 862.4 hectares were unirrigated but cultivated and thirty-four hectares were not available for cultivation (excluding fifty-two hectares of cultivable waste). In contrast, Harobelawadi had as much as 2,198 hectares, of which 2,139.2 hectares were unirrigated and 58.8 hectares were cultivable waste. In 1985, total

Table 2.4 Percentage distribution of land holdings and land owned by size of holding and levels of agricultural technology in Marewada and Harobelawadi villages in 1985 (Census) (Hectares)

Percentage of holding and land owned and mean size of holding	Level of farm mechanization	Marewada					Harobelawadi						
0–1	1–2	2–4	4–10	Above 10	Total	0–1	1–2	2–4	4–10	Above 10	Total		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Percentage of holding (by size of holding)	More	–	4.54	22.72	31.82	40.92	100.00	–	–	–	33.33	66.67	100.00
Less	37.63	22.59	27.95	11.83	–	100.00	2.95	14.70	23.52	44.12	14.71	100.00	
Nil	73.33	15.00	6.66	3.34	1.67	100.00	16.73	32.25	21.63	26.53	2.86	100.00	
Total	40.10	16.25	20.30	13.70	9.65	100.00	14.28	28.57	20.75	28.92	7.48	100.00	
Percentage of holding (by level of technology)	More	–	6.25	25.00	51.85	94.74	42.33	–	–	–	5.88	45.45	50.10

Percentage of holding and land owned and mean size of holding	Level of farm mechanization	Marewada					Harobelawadi						
0–1	1–2	2–4	4–10	Above 10	Total	0–1	1–2	2–4	4–10	Above 10	Total		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Less	44.30	65.62	65.00	40.74	–	47.21	2.38	5.95	13.11	17.65	22.72	11.57	
Nil	55.70	28.13	10.00	7.41	5.26	30.46	97.62	94.05	86.89	76.47	31.82	83.33	
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
Percentage of land owned (by size of holding)	More	–	0.73	7.10	21.96	70.21	100.00	–	–	–	13.30	86.70	100.00
Less	10.35	16.77	41.25	31.13	–	100.00	0.31	3.35	9.69	46.10	40.55	100.00	
Nil	31.93	20.68	15.60	15.60	16.19	100.00	3.52	14.72	19.19	48.68	13.89	100.00	
Total	5.90	7.12	17.65	23.95	45.38	100.00	2.17	9.46	13.27	40.47	34.63	100.00	
Mean size of holding	Total	0.53	1.58	3.13	6.28	16.90	3.58	0.74	1.57	3.04	6.70	21.94	4.73

cultivable land was found to be less than that in 1971. It stood at 707.94 hectares for Marewada and 1,396.3 hectares for Harobelawadi. This greater availability of land was one of the reasons for land-owning households constituting 73.86 per cent in Harobelawadi in 1985, while they constituted only 52.67 per cent in Marewada. Cultivable land per land-owning household was 3.58 hectares in Marewada and 4.73 hectares in Harobelawadi.

As regards the land tenure, which refers to the relationship between the land-owner cultivator and the government in the payment of land tax, the rayatwari system predominated (19) in both the villages. However, the distribution of land among the households in these two villages was uneven. For instance, in Marewada large farmers (owning more than ten hectares) constituted only 9.65 per cent of the land-owning households but controlled 45.38 per cent of the village lands. Whereas small farmers owning up to 2 hectares of land accounted for 56.35 per cent of the land-owning households but owned only 13.02 per cent of the village

lands. In contrast to this, large farmers constituted only 7.48 per cent in Harobelawadi, but controlled 34.63 per cent of the village lands. Whereas small farmer households accounted for nearly 43 per cent of the cultivating households, but they possessed only 11.63 per cent of the village lands (see Table 2.4).

In a very few cases an informal lease system under which the owner gets a share in the produce has also emerged in both the villages. (20) It is operating mostly between land-owning non-agricultural households (for example carpenters, barbers, etc.) and medium and semi-medium (owning two to ten hectares) cultivating households. This implies that getting lands on lease by these middle level farmers from non-agricultural households appears to be the beginning of the accumulation of lands by the large farmers (those owning more than nineteen hectares of land).

Process of adoption of new technology

Adoption of new technology in agriculture refers to the use of modern agricultural equipment in various farming operations, which may have a direct or indirect bearing on agricultural productivity. Thus, mechanization of ploughing, tilling, levelling, sowing and plant protection operations directly influences agricultural productivity, while mechanization of various harvesting operations (cutting, threshing, onion cleaning, potato-digging, etc.), indirectly increases the productivity by reducing the wastage involved in traditional methods.

However, the use of tractor-operated trailers for transporting harvested crops to places of storage or market does not directly or indirectly influence agricultural productivity.

Different phases of farm mechanization can be identified if one considers the number of households using modern farm equipment against the number of agriculturally-mechanized households which use tractors, trailers, mould-board ploughs and band sprayers. This would suggest that transportation of manure, fertilizers and nutrient soils, ploughing and plant protection by using pesticides and insecticides are the three agricultural operations which the farmers mechanized first. During the second phase they mechanized tilling operations by using disc-harrows, which are in use in both the villages. Sowing equipment like seed drills, seed-cum-fertilizer drills and seed planters which are used by 60 to 80 per cent of the mechanized farm households in Marewada appear to have been added during the third phase. But households using levellers (in Marewada), irrigation pumpsets (in Harobelawadi) and power threshers and power sprayers constitute less than 10 per cent in both the villages. This indicates that levelling, irrigation, threshing and plant protection (by power sprayer) operations came to be mechanized during the fourth phase. However, it is necessary to mention that, although an attempt has been made to demarcate the phases of the farm mechanization on the basis of the percentage of households using them, it is difficult to identify the years during which each of these phases occurred.

It was observed that farm mechanization first started about twenty years ago (around 1965) in the mechanized village, while it is only about twelve years old (around 1974) in the traditional village. Even in the case of latecomers to the mechanized farming, it is sixteen years old in the former village, as against only eight years old in the latter. It is interesting to note that in the traditional village, one-third of even the more mechanized households have adopted mechanized farming very recently (within two years), though such households accounted for only 6.81 per cent in the mechanized village. In fact only 5.26 per cent of the large farmers (owning more than ten hectares) and 7.41 per cent of the medium farmers (owning four to ten hectares) are not yet mechanized in Marewada. In contrast to this, 31.82 per cent of the large farmers and 76.47 per cent of the medium farmers are yet to be mechanized in the traditional village (see Table 2.4). This indicates that the farm mechanization has started becoming popular in Harobelawadi only recently, while it has already become well established in Marewada. (21)

Table 2.4 also shows that as size of the holding increases, the percentage of holdings also increases in the case of more-mechanized households in both the villages. This association is negative in the case of non-mechanized households in the two villages. But in the case of the less-mechanized households this association is negative in Marewada but positive in Harobelawadi. This would imply that in the mechanized village, even small farmers have gone for some degree of farm mechanization, while in the traditional village they continue to follow traditional practices in farm technology.

Social processes related to mechanized farming

Two social processes related to mechanized farming are observed in these two villages. One of them relates to the manner of accommodating modern farm technology, while the other relates to different modes of using modern equipment.

In the first type of process, there are three different ways in which modern technology has come to be accommodated. In the first method, the farmers use traditional equipment, but operate it by tractors. For instance, olped threshers (rollers) and wooden ploughs are operated by tractors for threshing and potato digging respectively. Here, the new technology replaces bullock power by mechanical power. In the second method, modern equipment (for example wheat threshers) is operated by animals, instead of by tractors. In the third method, modern agricultural equipment is used and operated by power or tractor. This method involves complete farm mechanization and is usually practised by the more mechanized households in both the villages; whereas the less mechanized households in these villages have adopted the first and the second methods, forming a sort of intermediate technology.

As for the second type of process, the mechanized households use the modern equipment in three different ways, viz., owning, hiring and borrowing. Table 2.5 shows that 55 to 57 per cent of the more mechanized households use owned equipment, while 73 to 90 per cent of the less mechanized households hire it whenever they need. Borrowing on a mutual-aid basis is greater among the more mechanized households in Harobelawadi and the less mechanized households in Marewada than among the more mechanized and the less mechanized households in the respective villages. Besides these three ways, a fourth method has been in operation in Marewada. Marginal farmers, who also work as agricultural labourers for the more mechanized households, use the modern equipment of their employers whenever necessary, free of charge. This is allowed by the owners, probably to ensure a supply of labour from such agricultural labour households (as labour supply is becoming uncertain during busy seasons).

Table 2.5 Percentage distribution of more mechanized and less mechanized households in Marewada and Harobelawadi in 1985, by degree of mechanization and by mode of using modern farm equipment

Mode of using	Marewada		Harobelawadi	
More mechanized	Less mechanized	More mechanized	Less mechanized	
Owning	56.97	28.26	54.72	59.06
Hiring	34.06	89.57	38.55	73.53
Mutually borrowing	10.79	17.39	21.66	9.09
Using free of charge	12.40	16.20	–	–

Note: Percentages do not add up to 100, as they are averaged for twelve different types of modern equipment used.

Institutional structures related to mechanized farming

Four types of institutional structures have been observed, viz., extension work carried out by government agents, financial assistance by banks, demonstrations by the Dharwad-based University of Agricultural Sciences (UAS), and initiatives by local institutions. For people of both villages, extension agents of the government are providing timely guidance on agricultural problems. Hand-sprayers are provided at highly subsidized rates without any discrimination. Similarly, branches of the United Commercial Bank and the Malaprabha Grameena (Rural) Bank, which are within the distance of two kilometres from Marewada and Harobelawadi respectively, are advancing long-term loans up to 85 per cent of the cost of tractors and other allied equipment. But in regard to the UAS demonstrations, local institutions such as co-operative societies, (two in Marewada and one in Harobelawadi), Ryta Sanghas (farmers' associations) and politically influential local leaders, Marewada farmers seem to benefit more in comparison to Harobelawadi farmers.

Structure of family groups

Before analysing the impact of mechanized farming based on the data collected from the sample households from the two villages, it would be worthwhile to understand whether the samples drawn from the two villages are strictly comparable. For this purpose, certain broad features such as the structure of family groups, the degree of homogeneity and existing living standards of the sample households are discussed next.

Size of the family and intra-family relations are the main components of the family structure. Both the villages have some commonalities like average size of the family (ranging between 5.8 and 5.9), predominance of families consisting of 3–6 persons, (48.5 and 53.4 per cent), and preponderance of nuclear families consisting of husband and wife with or without unmarried children (48 to 56 per cent). However, some village-level and household-level differences between the mechanized and the non-mechanized groups are observed.

Table 2.6 shows that in the mechanized village the percentage of joint families (lineal, collateral and extended)

Table 2.6 Distribution of sample households in Marewada and Harobelawadi in 1985 according to their size, type and level of agricultural technology (per cent)

Size and type of family	Marewada					Harobelawadi				
MM*	LM	NM	NA	Total	MM	LM	NM	NA	Total	
Size:										
Below 3	–	–	25.00	–	4.00	–	–	–	18.18	8.00
3–6 persons	66.67	28.57	25.00	72.72	52.00	33.33	57.14	75.00	54.55	56.00
6–9 persons	33.33	28.57	25.00	9.10	20.00	33.33	42.86	25.00	9.09	24.00
9–12 persons	–	28.57	–	18.18	16.00	33.34	–	–	9.09	8.00
12 and more persons	–	14.29	25.00	–	8.00	–	–	–	9.09	4.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Type:										
Sub-nuclear	33.4	28.5	–	–	12.00	–	14.20	–	18.10	12.00
Nuclear	66.6	–	25.00	81.80	48.00	33.30	42.80	75.00	68.60	56.00

Size and type of family	Marewada				Harobelawadi					
MM*	LM	NM	NA	Total	MM	LM	NM	NA	Total	
Lineal joint	–	14.20	25.00	–	8.00	–	–	25.00	9.00	8.00
Collateral joint	–	–	–	–	–	–	28.50	–	–	8.00
Extended	–	57.30	50.00	18.20	32.00	66.70	14.50	–	9.30	16.00

Notes: * 'MM' stands for more mechanized, 'LM' for less mechanized, 'NM' for not mechanized, and 'NA' for non-agricultural.
+ Extended families are a combination of lineal joint and collateral joint families.

Table 2.7 Percentage distribution of families of different size and type (census and samples) by level of technology in Marewada and Harobelawadi in 1985

Size and type of family	Marewada				Harobelawadi					
MM*	LM	NM	NA	Total	MM	LM	NM	NA	Total	
Size (census)										
Below 3 persons	3.92	9.81	19.60	66.67	100.00	–	2.94	52.95	44.11	100.00
3–6 persons	9.00	22.50	18.50	50.00	100.00	2.13	8.55	65.25	24.07	100.00
6–9 persons	15.85	32.92	12.20	39.03	100.00	6.25	11.46	67.70	14.59	100.00
9–12 persons	16.66	45.84	4.17	33.33	100.00	20.00	5.00	70.00	5.00	100.00
Above 12 persons	41.17	29.41	11.77	17.65	100.00	7.14	28.58	57.14	7.14	100.00
Size (sample)										
Below 3 persons	–	–	100.00	–	100.00	–	–	–	100.00	100.00
3–6 persons	15.38	15.38	7.70	61.54	100.00	7.15	28.58	21.42	42.85	100.00
6–9 persons	20.00	40.00	20.00	20.00	100.00	16.66	50.00	16.67	16.67	100.00
9–12 persons	–	50.00	–	50.00	100.00	50.00	–	–	50.00	100.00
Above 12 persons	–	50.00	–	50.00	100.00	–	–	–	100.00	100.00
Type (sample)										
Individual	20.00	13.34	6.66	60.00	100.00	5.88	23.52	17.65	52.95	100.00

Size and type of family	Marewada				Harobelawadi					
MM*	LM	NM	NA	Total	MM	LM	NM	NA	Total	
Joint/ extended	–	50.00	30.00	20.00	100.00	25.00	37.50	12.50	25.00	100.00

Notes: * 'MM' stands for more mechanized, 'LM' stands for less mechanized, 'NM' for not mechanized and 'NA' for non-agricultural.
+ Individual families comprise sub-nuclear and nuclear types just as joint families include both lineal joint and collateral types.

is slightly higher (40 per cent), than in the non-mechanized village (32 per cent). In contrast to this, 60 per cent and 68 per cent of the families in Marewada and Harobelawadi respectively are nuclear families. In terms of the size of family also, families consisting of more than nine persons constitute 12 per cent in Harobelawadi and 24 per cent in Marewada; whereas families with less than six persons constitute 64 per cent in Marewada and 56 per cent in Harobelawadi. This implies that with the adoption of mechanized farming, the size of the family appears to have increased and/or encouraged the continuation of the joint family system in Marewada. This provides empirical evidence to one of the hypotheses listed earlier. This phenomenon is encouraged by the need for preservation of undivided family property which makes generation of surplus easy for investment in expensive modern farming equipment and also to meet the increased cost of cultivation of the mechanized farms.

The distribution of the families of broad type and size by levels of mechanization shows some household-level differences between the mechanized and the non-mechanized categories. Table 2.7 reveals that 29.4 to 33.3 per cent of the individual families belong to the mechanized households, which constitute 50 to 62.5 per cent of the joint families. In terms of the size of the family also, the relative proportion of the mechanized households increases with the size of the family. This is true of both the villages.

Degree of homogeneity

Apart from the average size of the family and the numerical predominance of the small and the nuclear families, there are many other factors in which most of the sample households are homogeneous in both the villages. Table 2.8 indicates that 52 to 64 per cent of the sample households are homogeneous in respect of type of family, size of family and occupational structure.

This homogeneity increases to 80 per cent, 84 per cent, 92 per cent and 100 per cent in respects of housing tenure status, caste composition, size of holdings and residential (local or immigrant) status respectively. More or less the same trends are observed at different levels of farm technology. This would imply that the reference and the control samples are fairly homogeneous.

Table 2.8 Percentage of sample households which bear common features in both Marewada and Harobelawadi villages

Indicators of degree of homogeneity	Levels of technology				
MM	LM	NM	NA	Total	
Same family size	66.66	57.14	50.00	72.72	64.00

Indicators of degree of homogeneity	Levels of technology				
MM	LM	NM	NA	Total	
Same family type	33.33	28.57	50.00	72.72	52.00
Same size of holdings	66.66	100.00	75.00	100.00	92.00
Same caste	100.00	85.71	50.00	90.90	84.00
Same occupations	100.00	42.85	25.00	63.63	56.00
Same residential status	100.00	100.00	100.00	100.00	100.00
Same housing tenure status	100.00	71.42	75.00	81.81	80.00

Notes: 'MM' stands for more mechanized, 'LM' stands for less mechanized, 'NM' stands for non-mechanized and 'NA' stands for non-agricultural.

Sources of wealth in the family

There are two main sources of income for the sample households in the selected villages, viz., occupational and non-occupational sources. As for the occupational sources, Table 2.9 reveals that 48 per cent and 44 per cent of the sample households are mono-functional (pursuing only one occupation) in Marewada and Harobelawadi respectively. While the remaining households in Harobelawadi are all bi-functional (pursuing two occupations), those in Marewada are mostly (36 per cent) bi-functional and to some extent tri-functional (pursuing three occupations at a time).

By observing the levels of technology across a number

Table 2.9 Percentage distribution of sample households in Marewada and Harobelawadi in 1985 by number and type of occupation and level of technology

Number of occupation and level of technology	Occupation	Marewada	Harobelawadi
Mono-functional	Total	48.00	44.00
More mechanized	Agriculture	12.00	12.00
Less mechanized	Agriculture	8.00	8.00
Non-agricultural	Priesthood (OAP)	4.00	–
	Government service	4.00	4.00
	Medical practice	4.00	–
	Agricultural labour	16.00	16.00
	Washerman	–	4.00
Bi-functional			
(Mainly agricultural)	Total	16.00	28.00
Less mechanized	Trade	4.00	–
	Government service	4.00	–
	Agricultural labour	4.00	16.00
	Flour mill	–	4.00

Number of occupation and level of technology	Occupation	Marewada	Harobelawadi
Non-mechanized	Construction	4.00	–
	Government service	–	4.00
	Agricultural labour	–	4.00
Bi-functional			
(Partly agricultural)	Total	4.00	8.00
Non-mechanized	Agricultural labour	4.00	4.00
	Government service	–	4.00
Bi-functional	Total (others)	16.00	20.00
Non-agricultural	Government service and factory work	4.00	–
	Tractor servicing and tailoring	4.00	–
	Barber and agricultural labour	4.00	–
	Washerman and agricultural labour	4.00	–
	Labour	4.00	–
	Carpentry and blacksmithing	–	4.00
	Tailoring and agricultural labour	–	8.00
	Agricultural labour and vegetable vending	–	4.00
Tri-functional	Total	16.00	–
Less mechanized	Government service and society	4.00	–
	Carpentry and blacksmithing	4.00	–
Non-mechanized	Trade and government service	4.00	–
	Agricultural labour and milk supply	4.00	–

Table 2.10 Distribution of per capita annual income of sample households in Marewada by level of technology, occupation and source of income (Rs)

Level of technology and occupation	Income from occupation		Non-occupational income	Total income
Main	subsidiary			
More mechanized (agriculture)	21,647	–	1,235	22,882
Less mechanized (total)	1,485	558	179	2,222
Agriculture	1,542	–	–	1,542
Agriculture and trade	2,778	933	411	4,122
Agriculture and government service	1,667	400	83	2,150
Agriculture, government service and society	250	1,200	–	1,450
Carpentry, blacksmithing and agriculture service	1,667	1,000	666	3,333
Agriculture and agricultural labour	1,200	144	–	1,344
Not mechanized (total)	1,115	666	150	1,931
Agriculture, trade and government service	2,000	2,800	–	4,800
Agriculture and construction	2,000	–	1,333	3,333
Agricultural labour, agriculture and milk vending	746	500	1,301	2,547

Level of technology and occupation	Income from occupation		Non-occupational income	Total income
Main	subsidiary			
Agricultural labour and agriculture	825	115	–	940
Non-agricultural (total)	1,210	85	58	1,353
Priesthood (plus old-age pension)	667	–	200	767
Government service	2,850	–	60	2,940
Government service and factory service	1,300	–	30	1,830
Medical practice (RMP)	4,500	–	–	4,500
Tractor servicing and tailoring	500	200	–	700
Agricultural labour	965	–	56	1,021
Barber and agricultural labour	333	284	–	617
Washerman and agricultural labour	500	800	125	1,425
Village average	3,153	342	224	3,719

Note: Rs 12.70=US $1

Table 2.11 Distribution of per capita annual income of sample households in Harobelawadi by level of technology, occupation and source of income in 1985

Level of technology and occupation	Income from occupation		Non-occupational income	Total income
Main	Subsidiary			
More mechanized agriculture	3,542	–	–	3,542
Less mechanized (total)	1,250	307	23	1,580
Agriculture	2,273	–	–	2.273
Agriculture and flour mill	1,000	800	–	1,800
Agriculture and agricultural labour	893	339	36	1,268
Not mechanized (total)	1,248	746	230	2,224
Agriculture and government service	1,600	1,560	–	3,160
Government service and agriculture	2,640	800	–	3,440
Agriculture and agricultural labour	800	270	–	1,070
Agricultural labour and agriculture	438	500	662	1,600
Non-agricultural (total)	890	98	74	1,052
Government service	1,992	–	–	,992
Carpentry and blacksmithing	1,108	–	–	,108
Tailoring and agricultural labour	900	250	–	,150
Agricultural labour and tailoring	1,280	300	–	,580
Vegetable vending and agricultural labour	650	300	–	950
Agricultural labour	645	–	213	858
Barber and agricultural labour	1,000	480	–	1,480
Washerman	429	–	–	429
Village average	1,449	236	67	1,752

Note: Rs 12.70=US $1

of occupations, it can be seen that all the more mechanized households are mono-functional (agricultural only) in both the villages. Going from the more mechanized households to the less mechanized and the non-mechanized households however it is evident that the percentage of bi-functional and tri-functional households increases. This is mainly because in the more mechanized households agriculture has become highly remunerative and they do not have any incentive to diversify their occupation; whereas the less-mechanized and the non-mechanized households are forced to diversify their occupation as the income from agriculture which is not so mechanized is inadequate (see Tables 2.10 and 2.11).

Coming to the non-occupational sources, Tables 2.10 and 2.11 reveal that such non-occupational sources as rents on agricultural equipment and on draught animals, which go with agriculture, are more important in Marewada. They are not so important in Harobelawadi. This is mainly because most of the farming households in Harobelawadi do not have more than two hectares of land for cultivation, they neither keep all the required agricultural equipment and animals nor can afford to use them on hire. Therefore, they usually use them on a mutual-aid (barter) basis. In Marewada, however, the need to complete all agricultural operations in time for harvesting two crops in a year and the capital intensiveness of modern farming equipment have made the hire of such equipment inevitable, an action which their financial position also permits. In contrast, main sources of non-occupational income in Harobelawadi include remittances from members of the family living outside the village, income from animal products, rent on buildings and old-age pensions from government.

Changes in living standards and lifestyles

Although the level of income determines the standard of living of the people, it is the basic needs like food, clothing, housing, sanitation, health, recreation, etc., which truly reflect the living standards and influence the lifestyles of the people. In the present context, an attempt has been made to analyse how these basic needs have been provided for and their variations in terms of quantity, quality and content between agriculturally mechanized and agriculturally traditional villages. This will assist in understanding differences, if any, in the lifestyles of the people of the villages studied.

Food

Farm mechanization has not brought about any change in food intake in these villages. The number of meals per day (three to four in the case of children and two to three in the case of adults), seems to have remained the same.

So also their staple food, which is jowar. However, three changes can be observed as a result of the adoption of mechanized farming and the consequent increase in income: use of instant food and drink items, such as potato chips and Horlicks, substitution of jowar bread by snacks like uppittu for breakfast, and increased consumption of sugar and milk.

Clothing

Some changes have taken place in respect of clothing.

Before mechanization, elderly men were reported to be wearing dhotis, sidetag shirts and turbans or caps of white cloth. Now they use full shirts, jubbas, dhotis or pyjamas. Especially, youngsters are using pants, bush-shirts, handkerchiefs and modern foot-wear which were not widely used about ten years ago. Similarly, women were reported to be wearing only sarees and blouses earlier. Now they are reported to be using

petticoats and brassieres. The substitution of Savulu (a kind of salinated soil used for washing clothes) by soaps/soap powder, use of pressing irons, shaving sets, cosmetics, shoes, etc., replacement of traditional beds (mats, kamblis, kaudis) by cotton beds, use of mosquito curtains and shawls and the increasing tendency to go to urban based skilled tailors for getting modern dresses stitched are other indirect effects of mechanized farming.

Housing

In both the villages, mechanized households mostly live in pucca (well-built) houses, which are also spacious and have separate rooms. Non-mechanized households however live in katcha houses (built of country brick/stone walls, with mud floors and tiled roofs). Apart from such differences, the mechanized and the non-mechanized households also differ in some respects which may be called post-mechanization differences. These include renovation, extension (horizontal and/or vertical) of the living houses, gradual separation of cattle sheds from the living houses, replacement of magical safeguards (like amulets, coconuts, etc.) by framed photos of Swamiji of Murugha Mutt of Dharwad. These changes are observed in the case of mechanized households. They are not prominent in the case of non-mechanized households. Although separate bathrooms, latrines, electrification and installation of gobar-gas plants are all common features of mechanized households in both villages, only separate latrines and gobar-gas plants stem from the post-mechanization phenomena which have been mainly due to the improved income position of the mechanized households. Finally, with mechanization, awareness of the benefits of sanitation is slowly spreading, reflected in the separation of cattle sheds from the living houses of a few mechanized households.

Sanitation and health care

With the improved cash position in the mechanized village, people have become increasingly aware of the benefits of sanitation and health care. This is reflected in their habit of taking daily baths, substitution of ash powder by cleaning powders for cleaning utensils and vessels, use of toothpowder and toothpaste in place of charcoal powder, admitting expectant mothers to government hospitals for the purpose of child birth (so that immunization protection is available at the time of the birth itself), and preference for private doctors for the treatment of diseases. In contrast to this, traditional practices like resorting to witch doctors and native medicines, using charcoal and ash powder for cleaning teeth and vessels are still common in the traditional village.

Recreation

In regard to changes in men's activities gambling for nominal money-stakes and drinking liquor have been the main modes of recreation of the members of the non-mechanized households, whereas seeing dramas (folk theatrical performance) and/or movies is becoming common among the members of the mechanized households. In the case of females, seeing local dramas and attending religious fairs or festivals are the main recreational activities in non-mechanized households. In the mechanized households the participation in Mahila Mandal activities and accompanying their husbands to the movies are prominent. These are again the effects of increased income resulting from mechanized farming.

Family: changes in roles of the family

As a fundamental and universal institution of human society, the family occupies an integral part of any social system. Therefore, any change in this sub-system in matters of division of tasks and responsibilities, the relative importance of the sexes, role of children, skills of the family workers and pattern of decision making, usually has an impact of generating far-reaching changes in the main (social) system. Various changes in the family as a social institution are evident as a result of mechanization.

Division of tasks and responsibilities

Unlike a formal organization like an industry in which the division of labour is based on skills, training and qualifications, the family has an informal system of division of labour based on age and sex. For instance, on the basis of age, children usually have smaller roles (status-wise) such as assisting the parents and other elders in their family occupations and domestic activities. On the basis of sex, females and males have separate roles and status, sharing domestic tasks and economic activities respectively. Furthermore, these age and sex considerations (to define roles of members in the family) change according to the type, size and economic conditions (including the type of production technology) of the family.

A number of interesting changes which have been identified by the present study are:

1. A decline in the number of workers per household in the more-mechanized category and an increase in leisure time.
2. The substitution of female workers of the family by maid-servants for domestic chores and thereby allowing the female workers to take supervisory roles.
3. The replacement of hand-operated flouring stones by flour mills to prepare atta or chilli powder.
4. Women, who used to carry food for their husbands working on the farms, now send meal packets by tractors, which take their husbands to far-off farms.
5. Changes in some age-based roles, as reflected in sharing of family responsibilities (like purchasing agricultural inputs, approaching government officials) by some educated youths, especially the son in the family.

However, certain tasks and responsibilities such as arranging marriages have still remained the prerogatives of the elitist male and the eldest female members of the family.

Relative importance of the sexes

Though the two villages and different technological categories within each of them are patrilineal, patrilocal and patriarchal in the family structure, female members have come to receive relatively better treatment now, as a result of farm mechanization. This improved treatment can be seen in the following changes:

1. Earlier there used to be implicit preference for boys' education and upbringing. But now, girls are getting equal attention in their upbringing and education (up to the level of locally available education, which is highschool).
2. As women have obtained economic status, they have gained a right to be consulted in important family matters like the purchase of durable consumer goods, settling matrimonial alliances, and so on.

3. Parents have started thinking in terms of a happy married life for their daughters. They take due care in marrying their daughters to economically sound boys even at the cost of some dowry and/or costly gifts.

Pattern of decision making

In the traditional setting, the eldest male member in the patriarchal family is the main person who takes family decisions. When female and young male members of the family gain economic status, however, they tend to influence family decisions. This is an important social change. This has happened in the mechanized households in both the villages. Between literate males and working females, the former have a greater say in the family decisions, especially those relating to economic and political affairs. Similarly, the consent of brides and bridegrooms is increasingly sought before settling matrimonial alliances.

Family: impact on children

One significant change in the role of children on account of farm mechanization has been the decline in the percentage of child workers. In both the villages they are sent to schools and are not forced to work, as they used to be formerly in the mechanized village. If internal compulsion to seek employment in non-agricultural pursuits is the reason for this in Harobelawadi, increased awareness of the value of education and a decline in the scope for work for children in most of the operations of mechanized farming are responsible for this change in Marewada. However, the role of government and private organizations in spreading the message of the value of education cannot be denied in both the villages.

Family: impact on rural labour

Due to the direct effects of farm mechanization such as increases in the cropping intensity, the demand for outside labour has increased in the mechanized village. It is true that the mechanized technology is a labour-saving device. Owing to use of tractors, there is some displacement of labour in operations like ploughing and sowing. The phenomenon of double cropping which has been made possible by mechanization, however, has increased the demand for labour, mainly in weeding and harvesting operations. This not only compensates for the displacement of labour in ploughing and sowing but because of double cropping also creates additional demand for labour all through the year.

Family and community: changes in occupation/skills

Table 2.12 shows some occupational changes such as a declining percentage of cultivators and an increasing percentage of agricultural labourers, trends common to both the villages. Careful observation of the table however shows that not only are these trends sharp in Marewada, but also the male agricultural labourers are proportionately more than the male cultivators in the village, which is not so in Harobelawadi. This would suggest that the Marewada people prefer wage employment to cultivating uneconomic holdings. This is mainly due to farm mechanization and the consequent increase in the employment opportunities in their village.

Two more occupational changes, though indirect, have occurred due to farm mechanization. In the mechanized village, a relatively greater proportion of male workers has taken to trade and commerce and there is an increasing tendency for women workers to take to dairying and household industry, mainly

tailoring. Although some Harobelawadi women have also entered into household industry, others have found manual work in construction activities.

Changes in skills

Farm mechanization has created some new skills in the mechanized families. The adoption of intermediate technology, providing mechanized power to the traditional farm equipment or operating modern equipment by animals are improvements in the skills of the mechanized households. Autonomy in driving and doing minor repairs to the tractors and knowledge of multiple use of some modern equipment (like using disc harrows for tilling land and lifting threshed material) are other new skills which the workers of the mechanized households have acquired.

Family and community relationships

The mechanized village is relatively better off in respect of amenities, occupational structure and institutional infrastructure and even in its appearance. Moreover, the improved economic conditions of its families have facilitated their greater participation in community affairs. This is reflected in the changing community expectations and in the unity of the villagers in promoting community interests such as arranging a village fair, building a marriage choultry, encouraging Mahila Mandal activities, running a dairy co-operative and the recent opening of a godown. It has also encouraged better co-ordination between

Table 2.12 Occupational structure of male and female workers in Marewada and Harobelawadi in 1961, 1971 and 1985 (%)

	Male workers					
Marewada				Harobelawadi		
Occupation	1961	1971	1985	1961	1971	1985
Cultivators	56.35	42.15	34.45	63.80	62.89	56.76
Agricultural labour	32.99	42.56	49.21	24.07	28.98	31.72
Livestock, forestry, fishing, hunting and allied activities	–	1.45	1.21	0.78	–	1.00
Mining and quarrying	Nil	Nil	Nil	Nil	Nil	Nil
Household industry	5.32	3.10	2.95	5.09	3.22	5.01
Manufacturing other than household industry	0.26	0.61	1.05	0.59	–	0.33
Construction		0.41	0.52	0.19	0.18	0.33
Trade and commerce	1.52	4.13	5.91	1.76	1.50	2.35
Transport, storage and communications	–	0.20	0.70	–	0.58	0.50
Other services	3.56	5.39	4.00	3.72	2.65	2.00
Total workers	100.00	100.00	100.00	100.00	100.00	100.00
Number of non-workers per 100 workers	73.41	82.02	98.43	66.73	83.90	91.48

	Female workers					
Marewada				Harobelawadi		
Occupation	1961	1971	1985	1961	1971	1985
Cultivators	76.92	2.18	1.91	53.18	20.00	23.28
Agricultural labour	15.38	92.75	70.89	44.11	72.50	59.49
Livestock, forestry, fishing, hunting and allied activities	–	–	15.32	–	–	–
Mining and quarrying	Nil	Nil	Nil	Nil	Nil	Nil
Household industry	–	–	5.75	1.47	5.00	7.75
Manufacturing other than household industry	–	–	–	0.24	–	–
Construction	–	–	–	–	–	5.17
Trade and commerce	–	2.18	3.45	0.50	2.50	3.45
Transport, storage and communications	–	–	–	–	–	–
Other services	7.70	2.89	2.68	0.50	–	0.86
Total workers	100.00	100.00	100.00	100.00	100.00	100.00
Number of non-workers per 100 workers	4,931.00	518.11	311.87	106.37	2,320.00	850.86

Notes: 1. Data for 1961 are computed from District Census Handbook, Dharwad District, 1961, pp. 40–1—computed; 2. Data for 1971 are computed from District Census Handbook, Dharwad District, 1971, pp. 224–5—computed; 3. Data for 1985 are computed from our survey 1985.

the local institutions such as the Rait Sangha, co-operative societies and the village panchayat. In contrast, in the non-mechanized village, there is a lack of co-ordination between the local level institutions and people seem to have not really grown beyond their personal or family interests.

Family: relationships with other marketing sectors

Even though agricultural co-operative societies are functioning in both the villages, only those farmers who can afford to buy agricultural inputs, such as fertilizers, improved seeds and pesticides, from these societies for cash payments avail themselves of their services. In this system, middlemen do not play any role. Several small and marginal farmers, who need such agricultural inputs on credit, inevitably buy them from

private merchants in the nearby villages or in Dharwad. Under the latter system, farmers are either charged exorbitant (up to 60 per cent) interest or forced to agree to sell their produce at predetermined prices.

Even in respect of articles of daily consumption, such credit facility is allowed for creditworthy people in both the villages by the private traders and merchants. Such facility is mostly made use of by middle income groups such as medium farmers and government employees. Mechanized households usually buy their provisions in bulk once in a month on a cash basis. In Harobelawadi, some of them, however, resort to purchase on credit from hotels.

Family: influence in the community

Changes in the village customs, in the pattern of decision making at the community level and in the status of women have been observed in the mechanized village. Farm mechanization has made inroads into village customs. The non-mechanized households, which use bullocks for agricultural operations, do not use bullocks on Monday which is supposed to be the day for worship of the God Shiva, as the bull is the chariot of Shiva. The mechanized households do not have this problem as they use mechanical equipment. They can engage in agricultural operations on Mondays without violating the religious custom. In this way mechanized households have an additional day of work in the week as compared to traditional households.

Traditionally in both the villages the area of community decision making has been the monopoly of the dominant caste—the Lingayats. Of late, due to political awakening and support, a few Harijan leaders have also emerged asking for a say in the community decision making. Even so, Lingayats continue to dominate the process of community decision making on account of their numerical and economic strengths which largely determine their political influence.

A new trend in this system of decision making is that even among the Lingayats and the Harijans, educated youths have come to take the lead over their elders, at least at village-level decision making. Such youths are mostly from mechanized households in both the villages.

Finally, farm mechanization has brought about changes in various determinants of the status of women such as working status, occupational structure, age at marriage, participation in socio-political activities, husband-wife relationships and decision making. In Marewada, women of both the mechanized and the non-mechanized households enjoy greater economic status than those in Harobelawadi. While the women of the mechanized households have a supervisory role, which is a status-giving task, those of the non-mechanized households are benefiting from increased employment opportunities on the mechanized farms and thus earn considerably more income. Because of their increased contribution to household income, they have now come to influence family decisions.

An important social change which has been the indirect consequence of mechanized farming is that child marriage (mostly of girls), which was common in both the villages some years ago, is disappearing fast in Marewada owing to the increasing tendency of the parents to send their daughters to school and also to marry them to economically better-off boys. Now grown-up girls are also having their say in the choice of their prospective husbands, although inter-caste and non-arranged marriages have not yet occurred.

Even leadership among women is making some headway in Marewada. Women of the village now have a platform in the form of the women's club (Mahila Mandal) which is teaching them new skills like tailoring, baking, preparation of wire baskets and toymaking. Some enterprising women have become the office-bearers of the women's clubs. In this way, the clubs foster leadership qualities among the women.

In husband-wife relations, such old practices reverentially followed by women such as touching the feet of their husbands after bathing, eating food only after serving to their husbands, keeping some distance while walking with their husbands, and sitting on mat or floor while their husbands are sitting on chairs

have been discontinued in the mechanized village. New lifestyles such as accompanying their husbands to movies and participating in the Mahila Mandal activities are increasing. It should, however, be noted that all these social changes in the status of women are not necessarily the result of mechanized farming only. They are the inevitable consequences of the combined operation of increased income and a general awareness about modern lifestyles.

Family mobility

People move from place to place for varied reasons, such as marriage, employment, pilgrimage, education, or entertainment. Particularly while comparing the agriculturally mechanized households with the non-mechanized households, it is interesting to know whether these households differ in terms of purpose, frequency and distance of their movements due to differences in agricultural technology.

Family movements

At the village level, not much difference is found between the mechanized and the non-mechanized villages in regard to migration due to marriage, education and to some extent religious visits. But there are a few differences between them in family movements for purposes like pilgrimages, excursions, business tours and journeys for employment and entertainment.

It is observed that out-migration for employment is more evident in Harobelawadi while in-migration for work is more common in the case of Marewada. There are forty-seven in-migrant households constituting 12.6 per cent of the total households in Marewada and twelve households in Harobelawadi constituting 3.1 per cent of the total households. Most of these households pursue agricultural labour and are seasonal in-migrants. This is mainly because of the employment opportunities created by mechanized farming through increasing the cropping intensity in Marewada. In contrast, households whose members have moved out seeking a livelihood, are eight and fifty-five in Marewada and Harobelawadi respectively. The greater number of out-migrant households in Harobelawadi is the result of a lack of employment opportunities within the village, as the households are using traditional farm technology which enables them to get only one crop in a year.

For the people of Marewada, Dharwad city, which is only nine kilometres away from their village, serves as a centre for excursion, entertainment and business. For the people of Harobelawadi, Saundatti, the Naveelathirtha dam on the Malaprabha river and Dharwad city are the centres of pilgrimage, excursion and business respectively. Though movements of people of Marewada are generally more than those of Harobelawadi, this is not entirely due to the difference in the agricultural technology. Improvement in the cash position due to the adoption of mechanized farming and relatively better transport facilities available for the people of Marewada play an equally important role in their increased mobility.

Extended areas of operation

It is observed that with mechanization, the area of operation has also widened in the case of the agriculturally mechanized households in both the villages. Increase in the cropping intensity (from one to two crops in a year), change from subsistence production to surplus production and the introduction of cash crops (potato, onion and cotton), which have been the direct results of the adoption of mechanized farming, have widened the market area for their produce. Mechanized households try to choose from among Dharwad, Hibli and Belgaum wholesale markets, depending upon the prevailing price advantage. Two less

mechanized households in Marewada have even opened foodgrain shops in these cities for selling their own farm produce. Contacting taluka (sub-district-level) and district level officials in Dharwad and going up to the state capital (Bangalore) to obtain bank loans sanctioned for purchasing modern agricultural equipment are also observed in the case of some mechanized households in Marewada. This is also true of such households in Harobelawadi, though to a lesser extent.

The extended area of operation is not the experience of only agriculturally mechanized households in Marewada. A few agro-based occupational households also have made headway in their family occupations. For instance, one blacksmith household in the village, which was preparing and repairing traditional agricultural equipment, found its traditional technology and skills inadequate to repair the modern farm machinery. The adoption of mechanized farming and the consequent use of mechanical equipment have encouraged this blacksmith household to modernize its family occupation by opening an engineering workshop in the village. Examples of such enterprising initiatives are also observed in the case of similar families in Harobelawadi.

Family: changes in aspirations and expectations

Expectations and aspirations are necessary qualities for human achievement. Of course, they vary with changes in the socio-economic conditions, which again are dependent on several factors such as the types of production technology. It is interesting to observe the changing expectations of the people of the two selected villages, which have responded differently to the mechanization of their predominant occupation, agriculture. At the village level, it would be more appropriate to understand the changing expectations relating to the existing basic services like drinking water, social services like education, public utilities and other facilities.

Basic services

These include community amenities like drinking water, sanitation and health care. Marewada is in a much better position than Harobelawadi in regard to drinking water supplies. Though the number of open and bore wells is more or less the same in both the villages, water from most of these sources is potable in Marewada, while it is not so in Harobelawadi. Moreover, earlier water sources like the three nearby tanks in Marewada and a nearby stream in the case of Harobelawadi have also been showing significant differences in the supply of water. The Toprihalla stream is completely dried up during summer, which is not so in the case of the Marewada tanks. In addition, affluent families in Marewada have further eased the problem of lifting water from their private wells by installing pumps. In contrast, Harobelawadi people must, at times, spend more time fetching adequate potable water from the main source from a distance of 1.5 km. Therefore, they want the state government to provide a piped water facility. No doubt, Marewada people also want a similar facility.

Marewada village is also in a better position in regard to sanitation and sewerage disposal facilities. Straight and broad lanes and by-lanes, regular cleaning of open drains and spraying of DDT near bore wells and to the open drains have made Marewada streets relatively more hygienic. Harobelawadi lags behind in such basic services. Besides, the salty water of bore wells in Harobelawadi is used for cleaning bullocks, washing and other non-drinking purposes and water thus used is allowed to stagnate, leading to mosquito breeding. Therefore, it is natural for the people of this village to expect regular cleaning of the existing drains, provision of more drains and dustbins at specific places and the construction and proper maintenance

of community latrines. In contrast, Marewada people expect underground drainage and well maintained roads for the village.

There is no difference in the existing health facilities between the two villages though the expectations of their people differ. Though the medical sub-centre at Amminabhavi serves both villages, people of Harobelawadi have access to another sub-centre at the nearby Inam Hongal village.

Besides the nearby sub-centre, Marewada has two private male doctors whose services are found to be better than those of the doctors working at the sub-centre. Since the village does not have the facility of a lady doctor to look into the health problems of the village women, leaders of this village want the services of a private lady doctor at least on a visiting basis. But the Harobelawadi people are not happy with the treatment from the sub-centres and therefore they want the services of a private male doctor who practices allopathy.

Social services

In both the villages, voluntary agencies like youth clubs and women's clubs have been rendering social services by providing recreational facilities, cultural programmes and skill formation programmes, which deserve mention here. The youth club of Marewada is engaged in such activities as constructing a building for celebrating a marriage (Kalyan Mantap), effecting repairs to roads, organizing night patrolling and intends to organize adult education classes for illiterate men of the village. But the youth club of Harobelawadi is mainly providing recreational facilities (through indoor games), for which the villagers need to have a separate building. Similarly, the women's club activities are also diversified in Marewada and include training the local women in tailoring, bakery, wire-basket making, doll-making, etc., and also getting free sewing machines for the poorest of the trainees every year. In contrast to this, Harobelawadi women's club is not very active other than providing training in tailoring. Therefore, people of this village want the club to diversify its activities, while those of Marewada expect follow-up steps from the government to utilize productively the skills obtained through the women's club.

Education

Both the villages have two to three primary schools, one middle school each, adult education facilities for illiterate women, one Balawadi and also access to a high school within a distance of 2 km. Despite these uniform educational facilities, some disparities in performance levels such as the high percentage of literacy in Harobelawadi and relatively higher levels of education in the case of mechanized households in Marewada stand out. Harobelawadi people lag behind in the levels of education in spite of the fact that the literacy level is higher than that of the people of Marewada. The inability of the people of Harobelawadi to afford education beyond the locally available primary level, the distance from Dharwad (the nearest centre for higher education) and relative inadequacy of the transport facilities are mainly responsible for this paradoxical situation. In consequence, their expectations include provision for a greater number of scholarships, free or subsidized hostel or boarding facilities and improvement in the transport facilities for their village. As against this, Marewada people want a Commerce Institute (for courses in typewriting and shorthand) at least in the nearby Amminabhavi village.

Public utilities

Electricity, veterinary services, communication and public transport facilities are some of the important public utilities available in both the villages. Both the villages are electrified, having street lights in the main lanes and are covered under the Bhagyajyothi Scheme of providing free light with free electricity to the poorest households. Yet, fused street lights are not immediately replaced in Harobelawadi, while they are quickly attended to in Marewada. The Marewada people demand additional and better lights to the Janatha Housing Colony, while immediate replacement of fused bulbs in all lanes and by-lanes would suffice in Harobelawadi.

Reasonably good veterinary services are provided in both the villages. Still the demand for special veterinary services is advanced by the people of Marewada, because many households have dairy farming as their subsidiary occupation. Such a demand is not present in Harobelawadi, probably because dairy farming is not yet becoming an important subsidiary occupation in that village.

Both the villages are provided with a sub-post office each. However, Harobelawadi post office, apart from the usual postal facilities, has an edge over that of Marewada as it is also provided with a public telephone. The people of Marewada demand a similar facility, for which at present they depend on the nearby Amminabhavi post office.

As noted earlier, the two villages are on the same state highway (Dharwad-Saundatti Road). Marewada, however, has more bus transport facilities than Harobelawadi. In consequence the Harobelawadi people are pressing for more frequent bus transport facilities.

Other facilities

These include provision and fair price shops and co-operative institutions in the two villages. In all these matters, Marewada people have not only better amenities but also higher expectations. They aspire to open a variety of shops such as general stores, medical stores, fancy stores and demand better quality goods through the fair price shops, all of which their counterparts (in Harobelawadi) have not yet come to expect. Thus farm mechanization has raised the level of expectations and made the people of Marewada more materialistic in their outlook.

Table 2.13 Yield per hectare of different crops at different levels of mechanization before and after the mechanization in Marewada and Harobelawadi (quintals per hectare)

Village	Potato	Cotton	Groundnut	Jowar	Wheat	Onion	Chillies
1. Marewada							
More mechanized							
— BAM	97.50	6.20	21.25	26.25	5.63		2.50
— AAM	140.00	20.00	20.63	33.75	9.38		10.00
Less mechanized							
— BAM	50.00	5.00	21.88	16.25	4.33		
— AAM	75.00	7.50	26.25	23.75	6.88		
Non-mechanized		67.50			15.00	5.63	
2. Harobelawadi							
More mechanized							
— BAM		6.88		8.75	1.88	13.75	5.00

Village	Potato	Cotton	Groundnut	Jowar	Wheat	Onion	Chillies
— AAM	5.00	18.75		11.25	3.13	22.50	7.50
Less mechanized							
— BAM	3.75	4.38		8.75	6.25	17.50	3.12
— AAM	5.00	9.38		11.25	8.13	25.00	3.88
Non-mechanized		8.13		4.38	2.50	10.00	

Notes: BAM=Before adopting mechanization. AAM=After adopting mechanization.

Family: changes in economic base

It has been observed that farm mechanization itself has not yet directly induced social changes, but has acted indirectly through economic impact. It would be relevant therefore to analyse the economic impact of farm mechanization which, in turn, creates social change. Table 2.13 shows that the yield per hectare has increased in the case of all crops in both the villages after adopting farm mechanization. For instance, in the case of potatoes, the yield per hectare was 97.5 quintals before the adoption of mechanized farming in the more mechanized households.

This has increased to 140 quintals after they adopted farm mechanization. Similarly, less mechanized households in Harobelawadi used to get 17.5 quintals of onions before adopting farm mechanization. After adopting mechanization, they have started getting 25 quintals of onions per hectare.

Increase in real income

Consequent on increased productivity, the levels of nominal income of the mechanized households have risen. However, it is also relevant to examine the changes in real incomes of the mechanized and non-mechanized households.

Changes in real income may be assessed by comparing the two villages at the same point of time and also by making comparisons of the same village at different points of time. In the first method, the per capita annual income in 1935 of the more mechanized households was Rs 22,882 in Marewada as against Rs 3,542 in Harobelawadi (see Tables 2.10 and 2.11). Similarly, in the less mechanized category, the per capita income was Rs 2,222 in Marewada as against Rs 1,580 in Harobelawadi. In the non-agricultural category, the corresponding annual household incomes were Rs 1,052 in the respective villages. But in the non-mechanized category, this trend is reversed in the sense that the per capita income was Rs 1,931 in Marewada as against Rs 2,224 in Harobelawadi. Thus it is clear from the foregoing figures that farm mechanization has led to an increase in the levels of income of mechanized households.

In the second type of comparison, the analysis is limited to the households which pursue mechanized agriculture and agricultural labour. For it is only these households which have come under the direct influence of mechanized

Table 2.14 Money and real wages of agricultural labourers in Marewada and Harobelawadi from 1970 to 1985 (Rs per day)

Sex	Year	Marewada		Harobelawadi	
Money wages (1970 base)	Real wages (1970 base)	Money wages	Real wages		
Male	1970	5 to 6	5.5	4 to 5	4.5
1975	6 to 7	3.3	4 to 5	1.92	
1980	8 to 10	4.52	6 to 8	2.67	
1985	10 to 12	3.62	8 to 10	2.14	
Female	1970	3 to 3.5	3.25	2.5 to 3	2.75
1975	3 to 4	2.3	2.5 to 3	1.4	
1980	5 to 6	3.52	4 to 5	2.2	
1985	6 to 7	2.99	4 to 6	1.64	

Notes: 1. Lower wages prevail during off-season and higher wages prevail during ploughing, sowing and harvesting seasons. 2. Indian Rs 12.70=US $1.

farming. Those households which are dependent on other occupations like trade, government service or professions have not directly experienced changes in the levels of income though they also may have benefited indirectly from the multiplier effect of farm mechanization.

Table 2.14 shows that money wages for agricultural labourers have increased in Marewada since farm mechanization became widespread. In real terms, the wages have not increased all along. It may be observed that real wages declined during the period 1970–5, increased during 1975–80 but declined again during the period 1980–5. In spite of this fluctuation in real wages, it is observed that the economic conditions of the agricultural labourers in Marewada are better than those in Harobelawadi. This is confirmed by Tables 2.10 and 2.11, which indicate that the per capita income of agricultural labour households (in the non-agricultural category) was Rs 1,021 in Marewada as against Rs 858 in Harobelawadi. This is mainly because of the availability of employment opportunities in agriculture virtually on all days in a year in Marewada, which is not the case in Harobelawadi.

Expenditure on 'non-subsistence' activities

The term 'non-subsistence' refers to items which are not considered essential for subsistence. Since the economic backgrounds of people differ, what is 'non-subsistence' for one section of people may be otherwise for another section. Taking the economic background and particularly the standards of living of the people of the two villages, food, clothing, house rent or house tax, medical care and fuel or electricity may be considered as subsistence items and entertainment, religious ceremonies, transport, communication and others may be considered as non-subsistence items of expenditure.

Table 2.15 indicates that at the village level, expenditure of the sample households on the subsistence items is relatively higher (82.55 per cent) in the non-mechanized village than in the mechanized village (75. 65 per cent), which is also true at the household level. It is interesting to observe that household expenditure on the subsistence items varies inversely with the levels of mechanization. For instance, it constituted 87.44 per cent in the case of non-agricultural households, 81.71 per cent in the case of the non-mechanized households, 72.93 per cent

Table 2.15 Proportion of household expenditure of sample household in Marewada and Harobelawadi by levels of mechanization in 1985 (per cent)

Item of domestic expenditure	Marewada household				Harobelawadi households				
MM	LM	NM	NA	All HH	MM	LM	NM	NA	All HH
Total subsistence expenditure	55.18	79.22	81.71	87.44	75.58	84.22	84.29	87.02	78.33	82.55
of which expenditure on:										
Food	24.35	51.70	59.94	64.28	49.30	59.96	52.66	59.24	58.61	57.11
Clothing	11.13	16.62	15.90	15.44	14.67	17.02	21.38	14.94	11.70	16.10
House tax/rent	0.46	0.30	0.64	3.26	1.33	0.35	0.27	3.93	0.51	0.95
Fuel/electricity	0.78	3.37	1.10	1.11	1.62	0.86	1.98	1.29	0.90	1.29
Health	18.46	7.23	4.13	3.35	8.66	6.03	8.00	7.62	6.61	7.10
Total non-subsistence expenditure	44.82	20.78	18.29	12.56	24.42	15.78	15.70	12.98	21.67	17.45
of which expenditure on:										
Education	17.46	2.13	6.19	2.92	7.07	1.18	1.16	1.84	4.53	2.49
Entertainment	3.47	1.93	2.14	1.05	2.08	1.31	1.50	1.21	0.86	1.19
Religion	5.37	5.72	2.90	2.81	4.37	5.76	4.73	3.96	4.54	4.71
Transport	9.55	5.90	2.97	2.52	5.46	4.71	4.87	2.11	5.77	4.74
Communication	5.44	0.34	0.42	1.39	2.06	0.20	0.39	1.04	0.61	0.54
Miscellaneous	3.53	4.76	3.67	1.87	3.38	2.62	3.05	2.82	5.36	3.78
Total of both subsistence and non-subsistence expenditure	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Notes: MM=more mechanized; LM=less mechanized; NM=non-mechanized; NA=non-agricultural; All HH=all households.

in the case of the less mechanized households and 55.17 per cent in the case of more mechanized households. These data support the operation of a form of Engels' Law. Though this trend is also true of Harobelawadi, the difference between the non-agricultural and the more mechanized categories in this village is only about 6 per cent as against 22 per cent between such households in Marewada.

The expenditure on non-subsistence items constitutes about one-sixth of the household expenditure in Harobelawadi, and about one-fourth in Marewada. At the household level also, the percentage of expenditure on these items has increased with the level of mechanization in both the villages. In Harobelawadi, these percentages are not only lower than those in Marewada, but also the difference between the non-mechanized and the more mechanized categories is only 3 per cent as against 32 per cent between such categories in Marewada. This implies that in the traditional village, people cannot afford to spend more on the non-subsistence activities, unlike the residents of the mechanized village, which is also true at the macro level.

Changing role of government

Since the two villages are selected from the same hobli (circle), of the same taluka (sub-district), and of the same district in Karnataka state, the government has not played any differential role in their socio-economic changes. Even a comparison of two points of time indicates some improvement in both the villages. For instance, both the villages were electrified before 1961, but the supply of free electrical connections and one free light to poor families under the Bhagyajyothi Scheme was given only in the late 1970s. Similarly, primary and middle schools were started twenty years ago, but free text-books and uniforms, mid-day meals, adult education classes for women and travel passes to college-going students are of recent origin. Thus, the two villages do not show differences attributable to the differential role of government nor has the government discriminated between the mechanized village and the traditional village in providing these facilities. However, due to their better economic status and the consequent political leverage they enjoy, Marewada leaders seem to be approaching the government officials more frequently than the people of Harobelawadi for getting benefits under development programmes. It is interesting to know in this context that the local MLA (Member of the Legislative Assembly) visits Marewada more often because of the financial support he gets from better-off farmers. He does not visit Harobelawadi so often despite the fact that he represents both the villages.

Relationship with marketing and private sector

One clear difference between the mechanized and the non-mechanized households is that in both the villages, small and marginal farmers, who have not yet mechanized all their agricultural operations, do not produce any substantial marketable surplus. Therefore, they have not yet come out of the clutches of exploitative local moneylenders-cum-traders who give crop loans at exorbitant rates of interest. Sometimes, Dharwad-based or Saundatti-based traders make purchases by visiting the villages during the harvesting period. In contrast to this, even the less mechanized, in addition to the more mechanized households in Marewada, which grow a substantial marketable surplus because of two crops per year, have largely come out of the local moneylenders-cum-traders orbit. They sell their produce mainly in regulated markets in Dharwad, Hubli and Saundatti.

Influence in the community

Owing to the increase in employment opportunities, preference for wage labour over cultivating uneconomic landholdings has increased in Marewada. This is reflected in the declining percentage of small and marginal farmers and increasing percentage of agricultural labourers and big farmers in the village. This also indicates that the small farmers have lost their lands to the big farmers who have mechanized most of their agricultural operations.

The improvement in the cash position of the people of Marewada, as revealed in Tables 2.10 and 2.11 has resulted in a gradual replacment of barter by cash transactions. In some cases, this has also been threatening the age-old semifeudal jajmani relations (22) (patron-client relations) between various service households (like washermen and barbers) and big farmers.

Dependency

Dependency may be interpreted as a situation in which some sections of a society depend upon other sections for meeting their socio-economic needs through pre-arranged systems of relations like traditional

jajmani and market mechanisms. Farm mechanization has created new forms of dependency in Marewada though it has reduced some traditional dependency relations. A new form of dependency has come into operation in the case of small and marginal farmers in Marewada, who also work as labourers for the local big farmers. The big farmers depend upon the marginal and small farmers for an assured supply of labour particularly during busy seasons. Marginal and small farmers in turn depend upon the big farmers for the free use of their modern equipment (for example tractors) and even agricultural inputs like pesticides, as it is difficult to maintain draught animals with very small holdings.

In contrast to this, a reduction in dependency has occurred in the case of the traditional occupations of blacksmiths in Marewada who cannot repair the modern agricultural equipment within the ambit of their traditional skills and technology. This is also true of some other jajmani relations like potter-farmer relations. The mechanized farmer does not depend upon the potter so much as the non-mechanized farmer does. His improved financial position has enabled him to use utensils of stainless steel, brass and copper which are more durable than earthen pots. Even in the case of some non-mechanized farmers, plastic substitutes have come to replace the earthen pots. In the case of the barber, farmers go to his house and get their haircut by paying cash. Earlier, the barber used to go to the houses of every farmer under the jajmani system and render his services in exchange for an annual in-kind payment after harvest. Under this change, the jajmani system has been replaced by a money exchange system. However, it should be noted that these changes have been the result of overall technological development as well as of farm mechanization.

SPECIAL PROBLEMS AND ISSUES

Relations to research

After selecting the reference (mechanized) and the control (traditional) villages, field work commenced by contacting leaders of the villages, explaining to them the purpose of the survey and the reasons for selecting their villages. Some of them wanted to know how the study could help them, while others expressed the fear of the collected information being used for ulterior purposes. However, assurances that information would remain confidential and that a copy of the report would be given to the village panchayats satisfied them. Since some of them were interested in knowing the socio-economic conditions and problems of different sections of the people in their own villages, they wanted a copy of the study. Some of them wanted to use the study for pressing the government to provide more community facilities and other collective services.

In the beginning some of the respondents expressed the fear of losing privacy. Some of them pressurized field staff to take down whatever they reported. These respondents went to the extent of assuming that the government had asked the researchers to collect the information with a view to solving their problems. A few of them voluntarily came to the project office in the villages to narrate their problems, others again only explained their problems and did not listen to the questions. They insisted upon a written record of their requirements. This problem occurred in the sample survey also. In that case it was overcome by substituting such households in the sample survey by others for the collection of detailed information.

Special cultural, political, economic and environmental issues

Some problems also cropped up due to cultural, political, economic and environmental factors in the selected villages. Since ritually superior (vegetarian) castes like Lingayats constituted the majority of the population in both the villages, they were particular about the caste and food habits of the field staff.

However, foreseeing such a possibility the field staff were given prior instructions to be evasive about their caste identity, and this helped them to carry out their field work smoothly.

In regard to political factors, in both the villages the researchers observed the operation of Congress and Janata Party political factions. This did not affect the work in Marewada as both the factions were interested in giving a rosy picture of their unity. In Harobelawadi, however, some factional leaders openly told the team not to go to their rivals for the collection of information. This problem was tactfully overcome by assuring them that the team depended upon them for getting the information about the village, while their rival leaders would be approached only for information on their own households.

CONCLUSIONS AND IMPLICATIONS

The analysis of the findings of this study is in broad agreement with the findings of several other studies at the macro level. The two selected villages depend entirely on rainfall as they are located very near to the western hill region. The rainfall is adequate and dependable in this area. The soil is black and reasonably fertile. The soil retains the moisture for a longer time than does alluvial soil or red-sandy soil. It requires deep ploughing before sowing and not multiple ploughings as needed in the case of alluvial and red-sandy soils. Given these agro-climatic conditions, Marewada has got more out of large-size holdings as compared to Harobelawadi. This initial situation seems to have provided an advantage in the sense that the households having large holdings could save and invest in mechanical and agricultural equipment or could raise adequate loans to purchase them. The HYV (high yielding variety) technology is also used by the farmers of Marewada in the sense that the farmers have been using improved seeds in wheat and cotton along with chemical fertilizers. This means that mechanization of farming in Marewada is combined with the use of HYV technology. Mechanization is mostly in the form of tractorization, though some of the households have gone in for modern agricultural equipment for harvesting and threshing. Tractorization has found favour with the Marewada large farmers mainly because of the time factor involved in ploughing the vast area of large-size holdings and sowing them before the moisture content in the soil disappears. Tractorization has been used as a sort of time-saving device in Marewada agriculture. This has enabled the farmers to get two crops in place of formerly one crop. What is more, this additional crop is mostly a form of commercial crop such as potatoes, onions, cotton and sunflowers.

In contrast, such mechanization has not taken place on a large scale in the nearby Harobelawadi village in spite of similar agro-climatic situations, mainly because the size of landholdings there is small, which makes it difficult to raise capital to purchase equipment like tractors. Also there is a lack of enthusiasm for using the tractors for ploughing simply because it has proved uneconomic to do so on such small plots. This is the main reason for Harobelawadi households lagging behind in the mechanization of their agriculture. Although an attempt was made to probe into the reasons for this marked difference in the farming structure in these two selected agro-climatically similar villages, it was not possible to get a satisfactory explanation.

The direct impact of this mechanization has been on the cropping intensity which has increased the output and finally the income of the mechanized households. This direct result is consistent with the economic impact of mechanization observed all over India and for that matter in other parts of the world. The other direct impact of farm mechanization is that because of the increased cropping intensity, the tractorization has not replaced labour but has increased the demand for labour and more employment opportunities have been generated particularly for adult male and female workers in Marewada. However, this increase in employment opportunity has not led to any substantial increase in wage rates as one would have expected, though wage rates in nominal terms have doubled over the last fifteen years. This finding is also consistent with the macro level findings in other parts of India. The third direct impact of farm

mechanization has been that the children of the mechanized households, who otherwise would have been required to assist the elder male and female members in domestic and farming activities, have been encouraged to go to schools with the onset of mechanization. The participation of women in farm work has come down because of the new farming operations and now they do supervisory work in mechanized households. These are some of the direct effects of farm mechanization which are by and large consistent with the macro level findings in India.

In addition to these direct effects, there have been several indirect effects of farm mechanization through a nominal income effect. Increased nominal income has improved the standard of living of the mechanized households and enabled the agricultural labour families to get continuous employment and earn more wage income. And as a result of this, their expenditure level has increased and their nutrition level has also increased, as they have been able to spend more on food as well as on non-food items. What is more, the members of the mechanized households have started appreciating the value of leisure and are increasingly seeking recreation and entertainment facilities, i.e. going to movies, participating in Manila Mandal activities, youth clubs and the like. Their lifestyle has changed. There are also some indications that the traditional beliefs and relations are gradually losing their rigidity and relevance, as for example, youths are becoming prominent in some areas of decision making in the community and in the households. The jajmani system, which was a common feature of feudal rural society, is breaking down which may be considered as an important sociological change. These findings are all consistent with the macro level findings in other parts of India. Therefore, this study can be reasonably taken to represent a much broader sample in the country.

Implications for the family

One important implication for the family is that the literacy rate of the younger generation has improved significantly and it is also evident that the families of mechanized households attach more importance and more value to education and modern mechanical skills. This is evident from the increased habit by the mechanized households of sending their children to schools. The future generation will be more literate and skilled in specific areas to handle and seek independent occupations even outside agriculture.

Second, the role of women will change substantially as they become supervisors in the family which gives them an equality of status. Enhanced economic position and educational status in the family will create an awakening and urge it to think of kinship relations within a family of similar status. Though this may not be desirable from the point of view of society as a whole, the implications of what is happening in the mechanized village cannot be brushed aside.

Third, the status of female children will improve as a result of improved education and modernization of lifestyle since improved education is going to change the outlook of all the members of the family. They are bound to change their own outlook and attitude towards the female children in the house. This is very clear from the fact that the age of marriage of girls is going up and some of these families insist upon marrying their daughters to educated youths settled in urban areas.

Fourth, the families will start diversifying the sources of income from agriculture to several non-agricultural sources by investing their surpluses. As a result, the families will not face the uncertainties of fluctuations of an income solely dependent on agriculture.

Fifth, it is also likely that as education of the younger generation spreads in the mechanized farm families, the young people may leave the village and settle in urban areas. Though the extended family relations may continue for some time, the mechanized farm household ultimately will have to face a situation of the elders managing their own farm. This has two implications: the first implication is that during the transition

period, the elderly people of the mechanized household might have to increasingly depend upon the skilled agricultural labourers to operate machines and manage the farm activities which is a positive implication. But in the next stage of change, it is likely that the aged parents of the educated people who will settle down in urban areas might decide to sell their land to others in the village and leave the village altogether to spend their old-age in the urban areas.

Finally, there is a tendency among the mechanized households to widen their kinship relations by going beyond their traditional relations within and around the village. They look for educated grooms anywhere in the state though within their own caste circle. Similarly, in the next stage they may start looking for educated brides outside their own kinship circle and this process is the beginning of the secularization and cosmopolitizing of family relations.

Implications for the community

The implications of these findings for the village community are very obvious. The first implication is that farm mechanization leading to increased crop intensity and higher income has encouraged the diversification of economic activities of Marewada village. Non-agricultural activities particularly service activities are becoming prominent. This is evident from the increase in the number of petty shops, provision stores, and tea shops (small hotels) in Marewada. If this trend continues, it is likely that the demand for services like modern haircuts, new methods of washing clothes, etc. in the village will increase. The demand for new services like the repair of tractors, machinery and other household durable consumer goods which will flow into the mechanized households will also increase. This means there will be scope for developing such service centres in and around mechanized villages for the benefit of a cluster of villages.

Second, once the main occupation of the village community is mechanized, it will lead to further mechanization of other activities within agriculture and increase the receptivity to technological change, new ideas, new ways of doing things and the like. This is borne out by our study where, after mechanization of ploughing, some of the households have been induced to go in for threshing machines. This tendency may further spread and it is also likely that the neighbouring Harobelawadi people might find out a via media to use mechanized farming either through owning agricultural equipment or by hiring tractors and other machines.

Third, farm mechanization and the resultant increase in income have increased the savings of Marewada people and these savings are partly going into consumption and partly into land and other asset acquisition. We have found in this study that the big farmers are still craving for more land by purchasing the lands of small and marginal farmers on favourable terms. This may be useful from the point of view of the households, but it is not desirable from the point of view of the community and the country. Therefore, it would be appropriate to find ways and means of mobilizing these rural surpluses which are generated in the mechanized households for useful and profitable investment within agriculture in the village or elsewhere.

Fourth, increased farm mechanization and the resultant direct and indirect effects discussed above have encouraged increasing interaction of the village people with the outside world particularly with the state government officials, traders and others in the nearby towns. This encourages the villagers to open up their social and economic interactions to a wider circle thereby improving their horizons and aspirations, which will have a long-term impact on their future. It is also necessary to remember in this context that such an interaction with the outside world particularly through increased monetization and greater extent of purchase of inputs and farm outputs could mean the increasing influence of market forces with their attendant uncertainties and risks. This means in future that the government will be called upon to play an increasing role in the stabilization of farm costs and incomes.

Implications for government

It is clear from the foregoing analysis of the implications of farm mechanization for the family and community that the role of government in providing distress relief will go down as the income of the rural families increases. The government, however, will have to constantly adjust existing administrative arrangements and other institutions to suit the changing rural scene and the changing needs of the village community. For instance, there will be demand for establishing colleges in the bigger towns, technical institutions nearby, better equipped hospitals and so on. In addition to these, the villagers may demand comprehensive crop insurance, guaranteed price schemes, and assured credit facilities, as a matter of right. Though this is already evident, they may become more vocal and tend to project their needs through organized pressure groups.

Second, the increased commercialization of crops resulting from mechanization might in the long run pose a problem for the government in the form of a shortage of food grain. A related issue in this context is the fact that while mechanization may be beneficial from the point of view of the households, too much or extensive mechanization without evaluating the costs and benefits to the society may be a disastrous development. The government is going to face this problem in the near future and this will have important implications for future government policies. Government will also face the problem of the socially desirable use of land in the villages where extensive mechanization has taken place. Such mechanization will only encourage private parties to use the land for profit. The government will have to ensure that available land is not inefficiently used in the village and this will call for appropriate regulatory measures.

Finally, the study has revealed that though the income of the farm mechanized households has increased substantially, wages, particularly real wages have not increased correspondingly. Moreover, while the mechanized farm households are still investing their surpluses in land, small and marginal farmers are losing their land for various reasons. This is indirectly creating some sort of inequality in the rural areas. Such increased inequality in level of assets, ownership and of income will become a potential source of conflict in the rural areas which the government will have to handle. It would be better if the policy makers were aware of this problem from its inception.

Implications for future research

This study is based on two selected villages with a particular type of agro-climatic situation. These villages are mainly rainfed with all other agro-climatic situations being common. It would be useful to study the socio-economic impact of mechanization by different types of irrigation such as canals, tanks and wells. It would be useful to study such impact by different modes of modern technological changes like bio-technology, hydro-technology, etc.

Second, it would be useful and rewarding if this kind of study is made on a continuous basis for selected villages so that changes over a period of time could be observed and analysed. The one-point study like the present one has its own limitations.

NOTES

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13. Dharwad District at a Glance—1983–84. District Statistical Off ice, Dharwad, 1985.
14. Though the two villages appear dis-similar in this respect, the fact that most of the non-cultivating households pursue agricultural labour in Marewada indicates that both the villages are similar in that agriculture is the main occupation of the workforce in both the villages.
15. Proportionately the size of the sample in the less mechanized and non-cultivating categories should be six and twelve respectively. But since we wanted to give importance to the problems of the less mechanized households, we increased the number of households to seven in that category. Consequently, one household was reduced from the category of non-cultivating households. Therefore, the actual sample size of this category has become eleven.
16. According to Census data, there were sixteen and fifteen castes and communites in Marewada and Harobelawadi respectively. In the sample, as many as eleven numerically and socially significant castes were captured.
17. This is the local self-government at the village level.
18. Gazetteer of Bombay State; Dharwad District (revised edition) (Bombay: Government Central Press, 1959, pp. 902–3 and 944–5).
19. Until the legal abolition of inamdari system in Karnataka, main temples of these villages had inam (gift) lands, which had gradually become private properties of priests of these temples. In the inamdari system, an individual or an institution received some lands as inams in return for some service to the kings. The inam holders paid no land tax to the government, but leased the inams to the tenants for cultivation on payment of rent.
20. Though such informal lease is prohibited under law, lands are given by owners to actual cultivators, for which the owner gets usually 50 per cent of the crops as rent on land.
21. At the village level, only 5.1 per cent of the agricultural households have adopted farm mechanization in Harobelawadi, while such households constitution 22.3 per cent in Marewada.
22. In this system, a client (service household) serves a big farmer, for which he is paid remuneration in kind only once a year (usually during or after harvesting).

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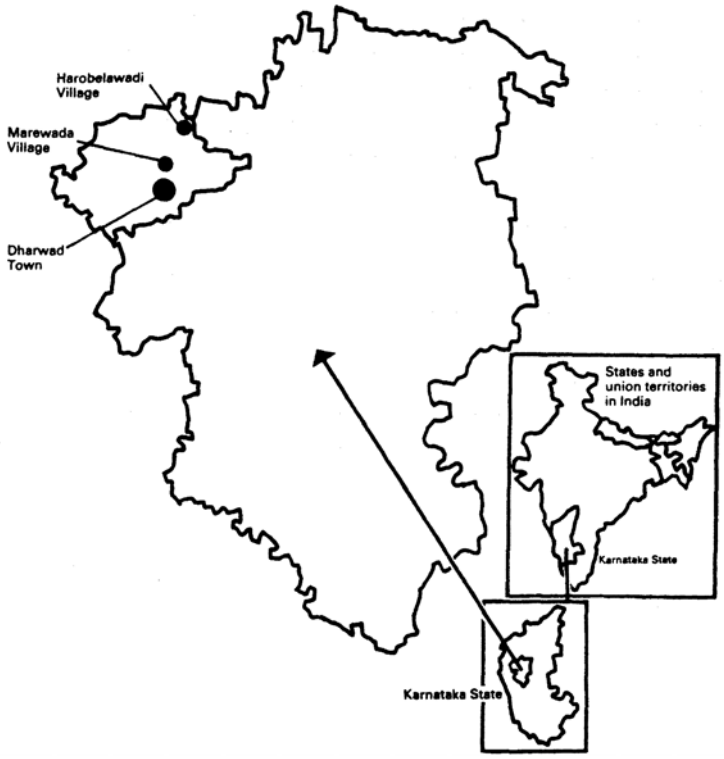
Figure 2.1 Location of Marewada and Harobelawadi villages in Dharwad district



Chapter Three
INDONESIA

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INTRODUCTION

Indonesia is a vast country, with the distance from west to east being 5,110 km and with about 160 million inhabitants in 1986. The crude rate of natural increase of the population was 2.32 per cent according to the census held in that year. The effects of this population growth were felt foremost on the island of Java. The population of this island grew from about five million people in 1900 to about 100 million people in 1986. The basic effect is the ever-decreasing amount of arable land available per capita. To give an impression of the miniscule landholdings on Java, Table 3.1 shows the arable land available in the province of Java in the year 1959.

Table 3.1 Area of arable land per capita in the province of Java in the year 1959

Arable land	Jakarta	West Java	Central Java	Yogya karta	East Java
Irrigated ricefield (ha)	0.009	0.075	0.063	0.032	0.059
Non-irrigated (ha)	0.017	0.091	0.083	0.099	0.092

Source: Statistical Pocket of Indonesia (Jakarta 1959), p.50.

The combined effects of population pressure, modernization of agriculture and the penetration of the money economy into the rural village economy, are increasing the numbers of landless labourers and increasing the differences in the welfare of the people. The percentage of landless labourers, according to the Agricultural Census in 1973, was 3.2 per cent, more than quadrupled to 14.9 per cent according to the 1980 national census. The percentage of peasants owning less than half a hectare grew from 54.7 per cent in 1973 to 63.1 per cent in 1980. The ownership of less than half a hectare of land is most striking on the island of Java. According to the 1980 national census 3.3 million peasants on this island owned less than one-quarter of a hectare and 2.2 million peasants owned land between one-quarter and one-half hectare. (1)

Another effect of the ever-increasing population pressure is the uncontrolled growth of the big cities. The population of Jakarta, the capital city of Indonesia, increased from about one-half million inhabitants in 1941 to almost seven million in 1981. The population of Bandung increased from about one-half million inhabitants in 1941 to almost seven million in 1981. The population of Bogor increased from about 300,000 in 1941 to more than one and a half million in 1981. The city of Surabaya in East Java had a population of about three million in 1981. The result is that sizeable parts of the city population are crowded in a number of urban villages, usually called kampongs. The ranks of unemployed and low-paid people are swelling and

the shortage of drinking water and problems of sanitation and health are receiving more and more attention. There are several estimates about the percentage of people in Indonesia living 'below the poverty line', ranging from 30 per cent to about 60 per cent. (2)

Against this background it can be understood that one major problem is how to feed the ever-increasing population and how to improve the standard of living of the masses. This problem is not new. The island of Java started importing rice in the year 1847. Since that year imports in Java and in Indonesia, in general, gradually increased. The most dramatic increases in rice imports occurred between 1960 and 1980. It can be understood, therefore, that to be self-supporting in rice became one of the major objectives of government policy since the 1960s. A related problem is the growing urbanization as mentioned above. Rural development, including agricultural development, may provide more employment, more food and better living conditions for the people in rural villages and in this way at least limit migration to the cities.

Modernization of agriculture, therefore, has become one of the major objectives of the Indonesian government since the early 1960s and was expressed clearly in the four five-year programmes, 1969–89, as mentioned in the next section. One aspect of the modernization of agriculture is its mechanization. This mechanization, however, is in itself a problem. On the one hand mechanization may increase productivity. On the other hand mechanization may cause an increase in unemployment, and inequality of income distribution.

The Indonesian government commenced introducing new technology into rice cultivation in the 1950s and in an increased way since 1969, when the first national five-year plan started.

Small tractors for mechanized tillage were introduced in the 1970s and in an accelerated way since the second five-year plan (1974–9). The economic impact of mechanized tillage has been the object of a number of studies. This study intends to contribute to a better understanding of the social implications of technology transfer. The study focuses on the impact of the introduction of small hand-tract or s on family life in the northern wet-rice area of West Java.

Hypothesis

Changes in social stucture through the introduction and diffusion of tractors have the following impacts on rural families:

1. Changes in roles of the family.
2. Impacts on children.
3. Impact of rural labour.
4. Changes in occupations and skills.
5. Changes in influence in the community.
6. Changes in mobility.
7. Changes in community relationships.
8. Changes in relationships with other marketing sectors.
9. Changes in aspirations and expectations.
10. Changes in economic base.

Changes in the village with relatively more tractors are ahead of changes in the village with relatively fewer tractors.

Methodology

The basis of the study is a comparison between two villages (kampong or dusun) of comparable size and background, one traditional village and one village with a relatively high number of tractors. In both villages three strata were defined and in each strata husbands and wives of these strata were interviewed.

Questionnaires were used concerning:

1. The socio-economic base of the family.
2. Relationships within the family.
3. Responsibilities within the family.
4. Division of tasks within the family.
5. Responsibilities of the family to the community.
6. Relationships between the family and other social groups: tradesmen, commercial interests, co-operatives, and landless labourers.

In addition some library research was undertaken. Other methods used were observation, and informal talks with the families of the sample mentioned above, and with government officials and local influential residents. Some influential villagers became key informants, such as the heads of the desas and the villages, religious teachers, school teachers, rice merchants and their wives.

The results of the interviews with the sample families were tabulated and tables were composed. A qualitative analysis was made of the results of these interviews, observations and informal talks.

Government people interviewed comprised:

1. An agricutural extension worker in both desas.
2. A senior field extension worker at the subdistrict level.
3. The head of the Bureau of Agriculture (Dinas Pertanian in Karawang).
4. The head of the Division of Mechanization of Agriculture in West Java.
5. The dean of the Faculty of Mechanization of Agriculture at the Institute of Agriculture in Bogor.
6. One research worker at the Survey Agro Ekonomi in Bogor.
7. Two professors in rural sociology at the Institute of Agriculture in Bogor.
8. The head and another researcher at the Sukamandi Research Institute for Food Crops.
9. Several officials of the Ministry of Agriculture in Jakarta.
10. Some technicians working in workshops for the development of new appropriate agricultural tools in Jakarta.

The researchers prepared themselves for the research by an orientation programme in the desas Sirnabaya and Wadas in the subdistrict Teluk Jambe in the regency Karawang in January 1985. Four teachers of the faculty of economics at the Parahyangan university then made a study about the impact of the use of tractors. They stayed in these villages from 21 to 26 January 1985. Their reports, mentioned in the bibliography of this study, gave an initial insight into the theme of the study. No difficulties were experienced in arranging the necessary permits. On the contrary, by arranging these permits the group obtained the full support and every assistance needed from the provincial and local government.

In advance of the actual fieldwork a preparatory seminar of the complete team was organized at the Centre of Development Studies at the Institute of Agriculture in Bogor on 29 October 1985. Most of the members of the research team were female anthropologists, because of the anthropological nature of our study and because the research focused on family life.

The scope and limitations of the study

The study had a very broad scope in a very small area. Besides, the study was done in a relatively short time. The villages were, however, chosen against the background of macro developments. The study focused on changes in the families and on the relations of the families with their environment. The study was definitely not focused on economic aspects. The study may, however, give some picture about developments at the grass roots or rather 'paddy roots' level of areas of wet-rice cultivation on the island of Java. The study may result in suggestions for further research for the well-being and prosperity of farmers' communities in Indonesia.

GOVERNMENT POLICY ON TECHNOLOGY FOR RURAL DEVELOPMENT

Technology for rural development has been increasingly developed and applied since the 1960s. This section selects some information on the role of technology and a short review of technology for rural development. Subsequently it will point to some changes in social structure and value systems, and to some other impacts.

Both government and individuals have applied technology in many fields, including agriculture, transport and communication, health care, education, improvement of housing and sanitation, etc. The focus is the role of technology in agricultural development.

Review of technology in rural development

Technology for rural development is used in a variety of fields, although development of agriculture forms the main focus of rural development.

The following may provide a picture of the broad scope of technology applied for rural development:

1. HYVs, fertilizers and pesticides on a wide scale, mechanized tillage of wet-rice lands, hullers.
2. Technology directly supportive of agricultural development:

    a. irrigation: rehabilitation of old systems and construction of new systems, including large dams, primary, secondary, tertiary and smaller irrigation channels, irrigation-pumps;
    b. roads: rehabilitation and new construction of roads;
    c. building of markets in rural areas;
    d. construction of big chemical fertilizer factories.

3. Communication: roads, motorized transport, television and radio programmes focusing on agriculture and village development; walkie-talkies for communication between village officials and subdistrict offices.
4. Electricity: rural electrification, supporting the use of television, radios, rice processing and rural industries.
5. Sanitary technology and technology for improvement of rural housing.
6. Technology for health programmes, including family planning, mother and child clinics and health clinics.
7. Waterpumps: to provide drinking water.

Review of government policies and programmes on technology for rural development

Information about the objectives of past and current national development shows that agricultural development is a major objective of Indonesian national development. Selected information about resources, programmes and specific projects is provided.

The first Indonesian five-year plan started in 1969. The objectives of three past five-year plans and the current five-year plan are quoted from official sources. (3)

The objectives of the first five-year plan (1969–74) were to improve the level of living of the Indonesian people and to provide a basis for the five-year plans to come.

Targets for national development were: food, clothing, housing, infrastructure, labour employment and spiritual welfare. The main focus was agriculture. The strategy was to fight economic backwardness through innovations in agriculture. The climate, agricultural land and an abundance of labour together with high-yield varieties (HYVs) and new technology made quick progress in agriculture possible. It was anticipated that the development of agriculture would be spearheading the development of other sectors. The development of agriculture would stimulate the production of chemical fertilizers, insecticides, other chemical products and cement.

The objectives of the next five-year plan (1974–79) were again to improve the level of living and the welfare of the Indonesian people and to lay a strong foundation for the following phases of development.

The following targets were formulated:

1. To provide an abundance of food and clothing of better quality and at prices that could be afforded by the masses.
2. Provision of building materials and other facilities especially for the common people.
3. Extension and improvement of infrastructural needs.
4. A more equitable and improved common welfare system.
5. Employment of labour and creation of new jobs.

The objectives of the third five-year plan (1979–84) were to improve the level of living, education and welfare of the Indonesian people and to lay a strong foundation for the following phase of development.

The execution of this five-year plan was based on a synthesis of the following three principles:

1. A more equitable distribution of development and its results to obtain social justice for the whole people.
2. High economic growth.
3. A sound and dynamic national stability.

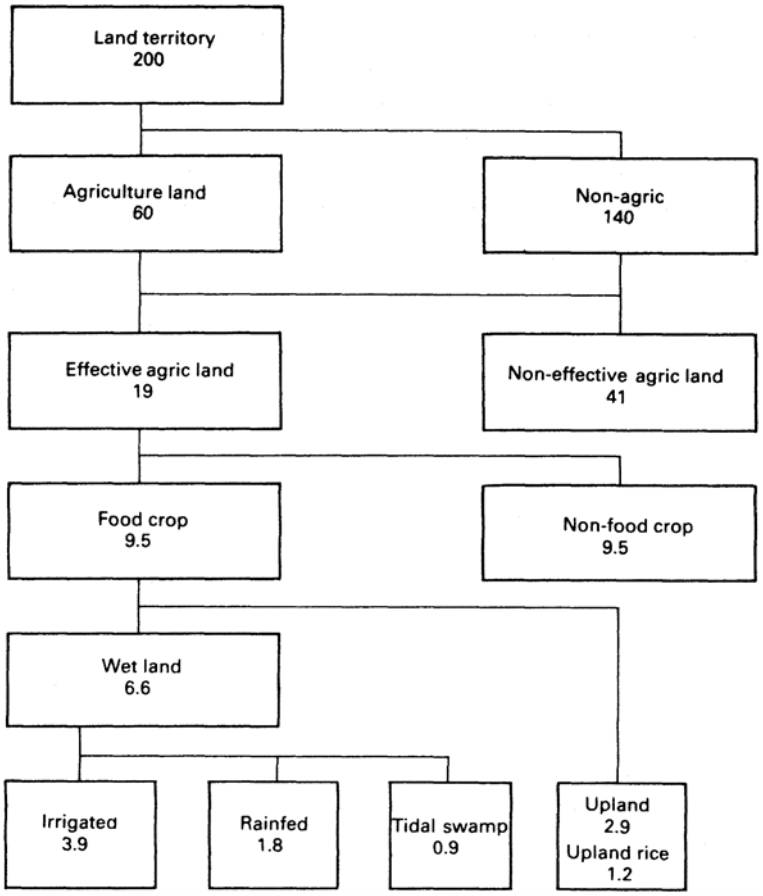
The objective of the current (fourth) five-year plan (1984–9) is to create a firm foundation for further development. Therefore, various policies and programmes will be formulated and executed.

It may be clear from the objectives of these four five-year plans that the development of agriculture is a major objective of Indonesian national development.

Resources for technology for rural development

Indonesia has rich resources at its disposal that can be used for the application of technology for rural development, including human resources, large tracts of land, government structure and funds.

Figure 3.1 Land use in Indonesia (in million hectares)



Source: Sukamandi Research Institute for Food Crops (SURIF).

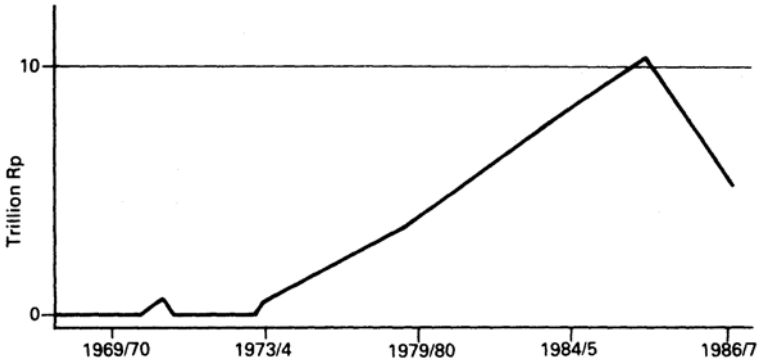
Human resources

More than 100 million Indonesians are living in rural areas. Most of them are small farmers. On the average an Indonesian farmer owns one hectare of land, while on Java the average is about 0.6 hectares. Most of the increase in food production in Indonesia has been produced by small farmers. In addition today Indonesia has many experts in the fields of agriculture and technology.

Available land

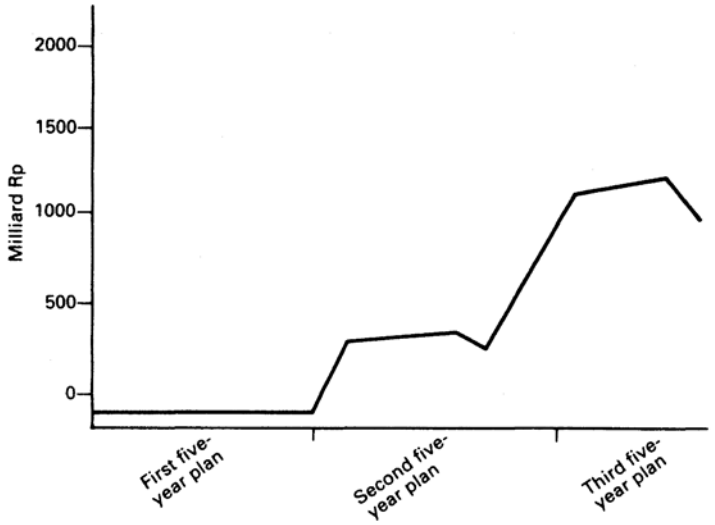
Indonesia has about 60 million hectares of arable land, as can be seen from Figure 3.1. However, irrigated rice lands comprise 3.9 million hectares. These irrigated rice lands, however, are very important for Indonesia's food production. The case study reported later in this chapter concerns two villages within an area of irrigated rice lands.

Figure 3.2 National development budgets 1969/70–1986/7



Source: Kompas, 8 January 1986, p. 1.

Figure 3.3 National development budget sector of agriculture and irrigation



Source: Kompas, 13 January 1986. p. 11.

Funds

The Indonesian government was able to spend large amounts of money for national development, including rural development, from the beginning of the first five-year plan until today, as can be seen in Figure 3.2.

About one-seventh of this national development budget was allocated for the development of agriculture, including irrigation as is shown in Figure 3.3.

For the year 1986–7 a total amount of 1,105.5 milliard Rupiahs has been allocated for the development of agriculture and irrigation, including 233.7 milliard Rupiahs for irrigation and 671.5 milliard Rupiahs for chemical fertilizers.

Project aid and technical assistance are included in the amount in Figure 3.2. The total project aid for the agricultural sector from 1968–84 which forms government debt to donor countries was US$1,851,000,000.

The total aid for estate crops by international bodies has been US$1,235,944,000 or 66.7 per cent of all project aid. (4) The total amount of technical assistance provided from 1968–84, during the three five-year plans, has been US$256 million (Table 3.2).

Table 3.2 Technical co-operation, bilateral and multilateral, in the agricultural sector, 1968–84

No.	Sub-sector and activity	Technical assistance (US$)
1.	Planning and supporting activities	29,334,100
2.	Food crops	52,678,700
3.	Estate crops	6,194,800
4.	Fisheries	36,221,300
5.	Animal husbandry	61,125,900
6.	Agricultural education, training and extension	21,826,100
7.	Agricultural research and development	48,775,500
	Total	256,156,400

Table 3.3 Breakdown based on the five-year development plans

First five-year plan	US$ 77,105,600
Second five-year plan	US$ 68,001,900
Third five-year plan	US$ 111,048,900
Total	US$256,156,400

Source: Ministry of Agriculture, Republic of Indonesia, Selected Aspect of Agricultural Development in Indonesia, Jakarta, 1985, p. 26.

About US$ 56 million or 20.3 per cent of the total assistance budget was used for the food crops sub-sector. Technical assistance was used for the education and training to agricultural extension personnel for the application of modern agricultural technology, for example HYVs, proper fertilizer application and crop protection. Technical assistance was also used for agricultural research and development in related fields. (5)

Programmes

To achieve the objective of making Indonesia self-supporting in food crops, first priority was given to making Indonesia self-supporting in rice. This was done by operational programmes supported by a research programme. Irrigation and road systems were developed forming an important part of the infrastructure for agricultural development. Direct efforts to develop agriculture consisted of intensification, extensification, rehabilitation of arable lands and diversification of food crops.

Irrigation and road systems

The Ministry of Public Works carried out huge works of rehabilitation and a vast extension of irrigation and road systems. Some large dams were constructed, mostly on the island of Java. One of these dams is the irrigation dam of Jatiluhur in West Java, providing water for a few hundred thousand hectares of irrigated rice fields in the northern plain of West Java, preventing floods in the northern plain of West Java, preventing floods in the rainy season and providing an abundance of irrigation water during the dry season.

In this way it became possible to have two rice crops a year in this area since the early 1970s, whereas formerly only one crop was possible.

Intensification, extensification, rehabilitation, diversification

The Ministry of Agriculture carried out programmes of intensification, extensification, rehabilitation of arable lands and diversification of rice cultivation on irrigated rice fields, which comprise only 3.9 million hectares out of the estimated 200 million hectares of the total land territory of Indonesia. The first, experimental start of the intensification of rice cultivation on irrigated fields was made by a Student Social Service Programme of the Institute of Agriculture in Bogor, the Institut Pertanian Bogor. This experiment proved to be successful. Then the programme was gradually developed to 3,900,000 hectares of BIMAS/INMAS, (Bimbingan Massal/Intensifikasi Massal). The difference between BIMAS or Mass Guidance and IN M AS or Intensification is that the IN MAS programme does not provide credit. The BIMAS programme has been operative since 1969 and consists of the so-called 'Panca Usaha' or five main efforts and the provision of agricultural credits to farmers, partly in kind, partly in cash. These five main efforts are:

the provision of HYVs
the provision of chemical fertilizers
the application of pesticides
irrigation
better cultivation

The execution of the BIMAS/INMAS programmes was supported by the assistance of extension workers at the village level directed from the Ministry of Agriculture through its officials on the provincial, regency and subdistrict level. So far Indonesia 'has no consistent policy on farm mechanization—apart from ad hoc policies to support ad hoc needs, such as the policy on the introduction of small tractors for land preparation'. (6)

In a recent report by the Agricultural Department and the provincial government of West Java it was stated that problems in the field of agriculture were caused by labour shortages and a decline in cattle production. Labour shortages were caused as many villagers felt more attracted by non-agricultural jobs. The decline in the cattle population was caused by the slaughtering of many cattle for consumption and by the decrease in grass lands that were converted into wet rice fields.

Labour shortages at the time of land preparation cause delay in planting the rice with the consequence of water shortages, as water distribution is arranged according to a fixed time-schedule. Besides, delayed land preparation and delayed planting cause problems for pest control. Therefore it is necessary to introduce tractors for land preparation, although negative social and economic side effects should be avoided as much as possible. (7)

Research programmes of the Ministry of Agriculture

Both the Ministry of Public Works and the Ministry of Agriculture have their own research organizations to undertake policy-supporting research. We will restrict ourselves, however, to the latter. The Ministry of Agriculture has a special agency for research, called the

Table 3.4 SURIF research programme

Commodity/discipline	Research programme	
Rice	1.	Varietal improvement
	2.	Cultural practice improvement
	3.	Pest control
	4.	Fertilizer efficiency
Water management	1.	Irrigation techniques
	2.	Farming systems for irrigated land
Agricultural technology	1.	Postharvest technology and chemistry
	2.	Agricultural engineering
Plant resources	1.	Hybrid rice
	2.	Wheat
	3.	Corn hybrid development
	4.	Pulses for irrigated land

Source: Publication of SURIF (Sukamandi Research Institute for Food Crops) 1985.

Note: The research team is grateful to Dr Haeruddin Taslim, Director of SURIF, for his explanation of these research activities.

Agricultural Agency of Research and Development (AARD) or Puslitbang. One of its departments is the Pusat Penelitian dan Pengembangan Tanaman Pangan or Centre for Research and Development Institute for Food Crops. This institute heads a number of research institutes located throughout Indonesia, for instance the Sukamandi Research Institute for Food Crops (SURIF), Bogor Research Institute for Food Crops (BORIF), Malang Research Institute for Food Crops (MARIF). Duplication of research efforts is prevented by the formulation of specified research mandates for each of these institutes. The SURIF is the most relevant institute for the present purpose, as it specializes in food crops grown in irrigated and rain-fed fields. This institute has produced several new varieties of rice, soya beans, mung beans, corn, wheat and cassava.

The SUIF Research Programme is illustrated in Table 3.4. This programme is policy supporting: what technology is available, what technology has to be developed? Recently the SURIF started also with action research for extension programmes for the transfer of technology.

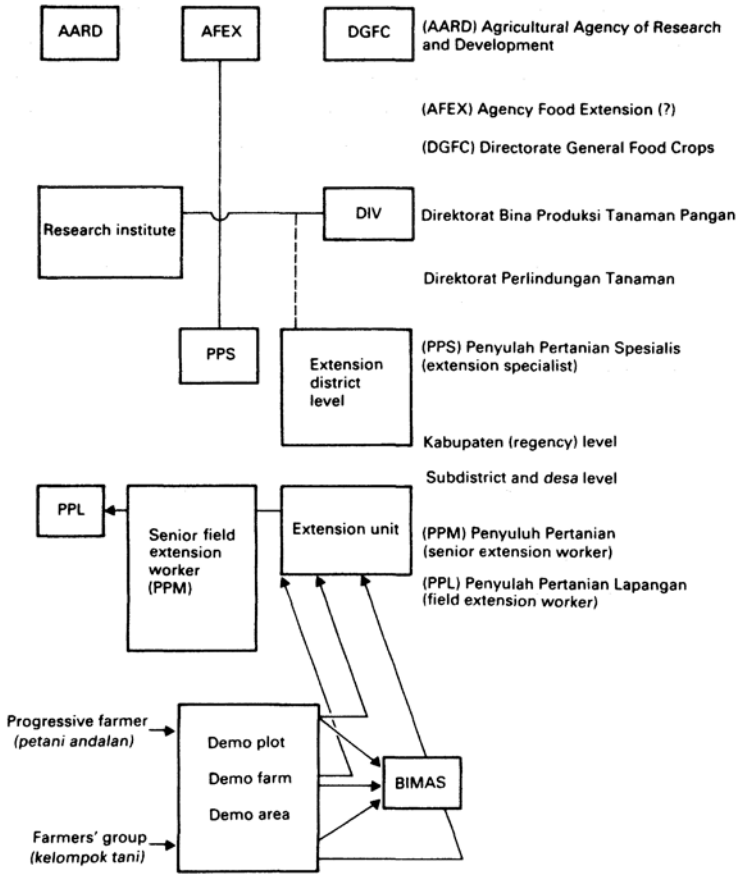
The transfer of technology is based on the following principle: research before extension. Quite a large extension network is functioning for this transfer of technology. Figure 3.4 shows the extension system.

SURIF developed new ideas about demonstration plots, farms and areas: concerning which of these would be more effective. The farmers have a known production system. SURIF established a field laboratory to examine how far a short-cut method could be developed, involving the Field Extension Workers Progressive Farmers and Farmers' Groups. In particular problems of channels of communication from research to verification to productivity were studied.

One field laboratory is located in the desa Cumanggala in the sub-district Cibeber within the regency of Cianjur, West Java. Mr Achmad Fagi related the following 'success story' from this laboratory. Rice grown in the desa Cumanggala is delicious, but has a low productivity and a long life time, five to six months. The farmers were not willing to adopt a new high-yielding rice variety.

SURIF undertook the following experiment. Fourteen varieties of rice were planted, including the local traditional variety. The wives of the farmers cooked these fourteen varieties after harvest and the men were

Figure 3.4 AARD and extension



Notes: 1. BIMAS started in 1969.
2. IN MAS started in the 1970s.
3. Before 1969 there was the programme called SSBM (Self-supporting Bahan Makanan)
4. 1985:3.900.00 ha BIMAS/INMAS
5. Research Institute organizes field days with:
a. DIV dan Ext. District
b. Progressive farmers, PPM, PPI, etc.
6. A field day is a forum of communication
(The research team is grateful to Mr Achmad Fagi of SURIF for his explanation of this system).

invited to sample them and to evaluate the taste, stickiness, colour and flavour of it. The result was that the Galur Harapan variety (GH 14) obtained the highest ranking, while the local traditional variety was the runner up. Then they started asking questions about this GH 14 variety and obtained the following information:

GH 14 variety	Traditional variety
Spacing: 20×20 cm	Spacing: 30×30 cm

Life time: 120 days	Life time: 150 days
Yield: 4.5 tons	Yield: 2.5 tons

Consequently the farmers changed over to the new GH 14 variety. This experience conforms to the common experience that farmers like to see proof (bukti) of an innovation before they adopt it.

Study of farm mechanization

In 1979–80 the International Rice Research Institute (IRRI) initiated a regional study of farm mechanization in Southeast Asia. (8) The mechanization of land preparation for rice cultivation was studied in Indonesia, the Philippines and Thailand using a similar methodology. Dr Rudolf Sinaga co-ordinated the research collaboration between IRRI and AARD in Indonesia. Two areas, West Java and South Sulawesi, were chosen. The study in West Java was done by the Agro Economic Survey team in conjunction with the Rural Dynamics Society.

The following are relevant conclusions from the report of this study (9):

The main problems confronted in the introduction of tractors revolve around the following issues:

1. Credit arrears due to high losses shouldered by tractor owners especially in South Sulawesi.
2. Poor availability of spare parts.
3. Low-realized utilization of tractors per season.
4. Poor skill of tractor operators and owners.
5. Low mobility associated with poor infrastructure.
6. Technically inefficient design with respect to the socio-economic conditions of farmers, especially economy of scale.

All these problems led to a single conclusion, that the introduction of tractors was not supported by adequate policy measures, such as:

1. Testing requirements for the suitability of the design and standardization.
2. Policy to provide training and workshop facilities.
3. Selection of priority areas.
4. Credit and its supervision.

In fact, the capacity of the Ministry of Agriculture to offer adequate support in the development of farm mechanization was considered quite low.

The following recommendations for implementing tractor use were formulated by a workshop on the Consequences of Small Rice Farm Mechanization in West Java, 27–28 July 1983 (10):

In the short run, agricultural mechanization was directed towards problems related to the adoption of tractors. Therefore in implementing tractor use, one must:

1. Limit the types of tractors in the market.
2. Give priority to tractors produced domestically.
3. Select tractors to fit the soil conditions in the region.
4. Give priority for using tractors in regions where labour supply is short.
5. Ensure manufacturers and distributors of the tractors provide spare parts and other services to farmers.

Specific projects

It is considered important to select some specific projects of a technical, economic and social nature to indicate relevant development.

Technical projects

The development of agricultural mechanization has been greatly influenced by the IRRI in the Philippines. In Indonesia the subdirect or ate of mechanization of the Ministry of Agriculture is in charge of a number of technical projects. It organized a workshop for the modification of agricultural tools and machines. This workshop, located in Pasar Minggu Jakarta, developed and tested a number of tools and provided information about a hand-tractor designed by the IRRI. The Centre for Agricultural Mechanization was established at Sukamenanti in West Sumatra in 1955.

This centre developed threshers, a hand-tractor, water pumps, weeding tools, driers and planting tools. The IRRI assisted with the design of a prototype, guidance, training for craftsmen and personnel. (11)

A rotary plough was developed and designed, resulting in a working prototype, as a joint project of the Institute of Agriculture in Bogor and the Institute of Technology in Bandung in co-operation with the Technische Hogeschool Eindhoven and the Landbouwhogeschool Wageningen in the Netherlands.

Economic projects

Government banks provided credits for the purchase of hand-tractors in selected areas, including the northern plain of West Java.

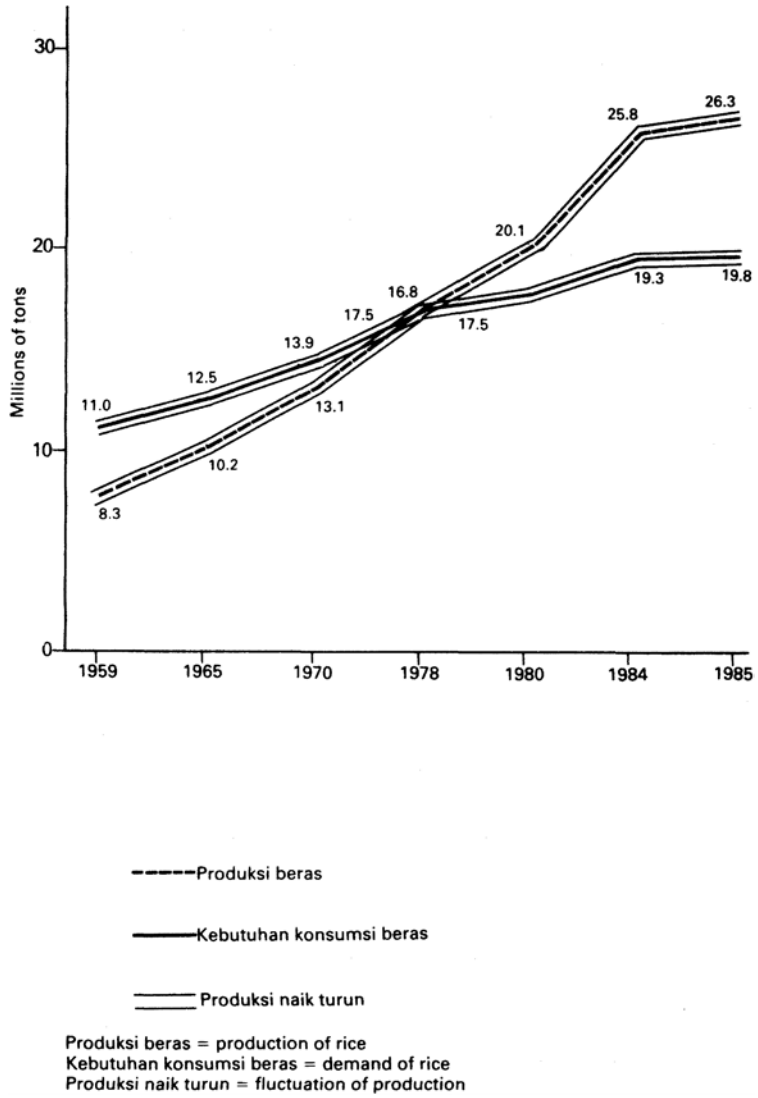
Social projects

In some areas farmers' groups were assisted with credits and guidance in buying and using hand-tractors. One of these projects integrating technical, economic and social aspects was carried out in the desa Gabus Weten in the regency Indramayu in the northern plain of West Java. This project was initiated by H.Sumari and was assisted by the provision of nine hand-tractors from the President of Indonesia (Bantuan President).

Reasons for success

1. A farmers' group for mechanization was established.
2. Spare parts were made in a desa workshop.
3. The members of this farmers' group were assisted in contracting a government bank (BRI) and a dealer.
4. The tractors were rented out for land preparation outside the desa.
5. A workshop for maintenance and repairs was established within the desa. (12)

Figure 3.5 Demand and production of rice in Indonesia, 1959–85 (in millions of tons)



Source: Tempo, 16 November 1985, p. 15.

Changes in rice production

Rice production increased as a result of intensification, including the introduction of mechanized tillage. A few years ago Indonesia was still one of the major rice importing countries in the world. Indonesia became a potential rice exporter in 1985.

Figure 3.5 gives a picture of changes in demand and production of rice in Indonesia between 1959 and 1985.

The increase in rice production has caused serious problems in storing the surplus of millions of tons. In 1985 about 3.5 million tons of rice were stored in government godowns and it can be anticipated that in 1986 even more rice will be stored, creating heavy financial burdens for the government. As a result of the tremendous increases and the surplus in rice production Indonesia stopped imports of rice in 1985. The phasing out of rice imports is shown in Figure 3.6

Changes in structure

As a result of mechanized tillage the owners of rice fields need less labour. One would expect, therefore, a decrease in employment and lower wages for landless labourers and small farmers. However, this seems not to be the case. Prior to, and simultaneously with the introduction of mechanized tillage many of these people found other employment, made possible by a growing economy. Real wages of agricultural labour even showed slight increases, although wages in the construction industry in the cities showed a bigger increase, as shown in Figure 3.7.

Relatively, however, the owners of rice fields were in a better position to profit from the modernization of agriculture particularly from the introduction of mechanized tillage. The result of all this is growing disparities in income between the upper strata and lower strata in rural society. This again resulted in a decline of homogeneity in villages in rice growing areas. Along with these processes the process of concentration of land continued.

Modernization of rice cultivation, including the introduction of tractors, resulted also in the development of commercial relations between landowners and suppliers and markets in the cities. Landowners tended to become more independent of the desa governments. Leadership in the desas showed further differentiation with the ever-increasing role of agricultural extension workers and other government officials engaged in rural development, although the village governments continued to be an important channel for all forms of modernization.

Changes in values

Commercial values and consequently more rational attitudes towards economic change developed. A growing orientation to city life caused a diffusion of city, national and even cosmopolitan culture and values. As a result of all this a decrease in traditional customs and beliefs can be observed. Traditional rice varieties were believed to be provided by the goddess Dewi Sri. But the HYVs have no divine origin and are produced by man in the experimental stations.

Consequently traditional offerings to the goddess Dewi Sri are disappearing. This process is also stimulated by Islamic culture, which is not favourable to folk beliefs connected with Dewi Sri. Instead Islamic religious observation is on the upsurge.

THE CASE STUDY

A case study was organized in two villages: the village Kobak Kendal in the desa Kendal Java where relatively many tractors were available, and the village Sidariwan in the desa Kedung Jaya where relatively few tractors were available. Following a short description of these two villages the process of adoption of technology, the sample of respondents, and the findings of this research are reported, including changes in roles of the family, impact on children, impact on rural labour, changes in occupation and skills, family and relationships with the community as well as with other sectors, influence in the community and family

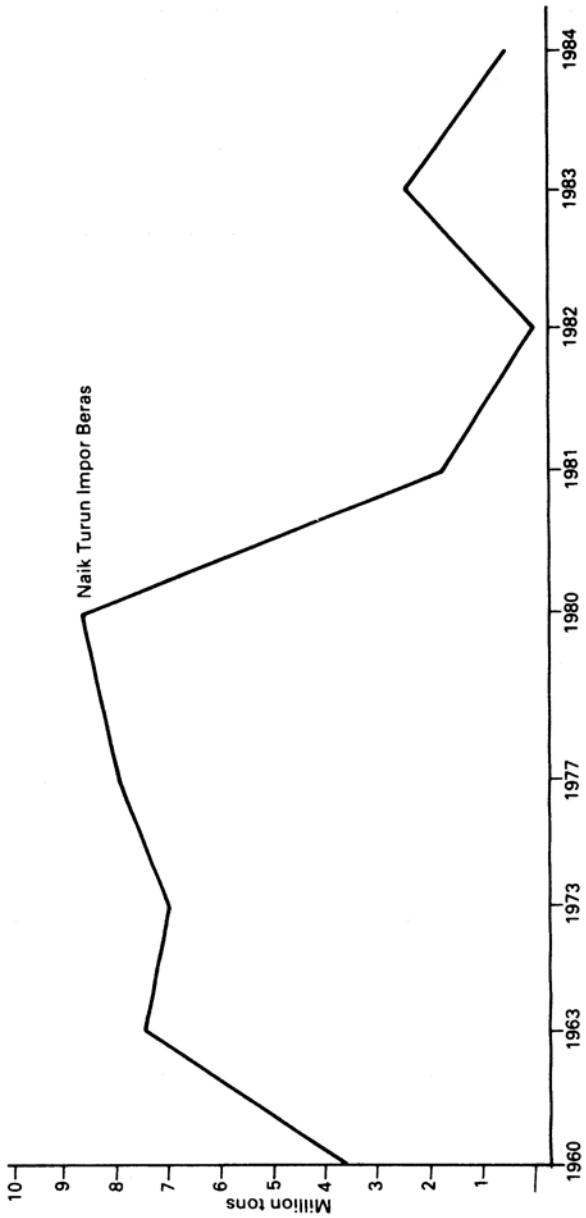


Figure 3.6 Fluatuation of rice imports in Indonesia, 1960–84 (in millions of tons)

Source: Tempo, 16 November 1985, p. 14.

mobility, aspirations and expectations and the economic base. Generally these changes are the result of cumulative effects of education, better health conditions, better communications and, last but not least, of the adoption of new technologies, including the adoption of small handtractors for land preparation.

Figure 3.7 Real wages for casual male labour in agriculture and construction, real price of rice in rural West Java (1973 constant prices) 1976–83

The two villages are situated in the province of West Java, in the regency (Kabupaten) of Karawang. The city Karawang used to belong to the Sundanese kingdom Padjadjaran in West Java until it was conquered by Sultan Agung of the central Javanese kingdom Mataram in the seventeenth century. Mataram constructed several forts in the regency of Karawant to prevent the East India Company from enlarging its territory around Batavia. Sultan Agung of Mataram appointed Adipati Kertabumi IV as Bupati (regent) of the regency Karawang in 1656. This regent was murdered in 1678 by one of his political rivals. His son, Anom Wirasuta, asked Mataram for assistance to restore security in the area, without avail. Then he turned to the East India Company to restore order in the regency. The company appointed him as the first 'Hofdambtenaar' in the regency of Karawang. Not all soldiers of the armies of Mataram who passed through Karawang on the way westwards to Banten or who were assigned to the Karawang area itself returned to Central Java. Many of them settled in the northern plain of West Java and married local women. In this way, it can be explained that in this area, including the regency Karawang, many people are of Central Javanese descent and speak Javanese of a local brand, living among an otherwise Sundanese population. These Javanese brought with them the wet-rice cultivation.

Gandamegara was appointed Bupati of Karawang in 1911. He was instructed to recommend that the people plant sugar cane, because a sugar factory was planned in that area. He refused, however, to do so because of its negative effects for the population. Instead he motivated the people to extend their wet-rice fields. Therefore he was fired by the government, but until today the Karawang area is very well known as 'rice godown'. With this background it can be understood that the population of the villages Kobak Kendal and Sidariwan is partly of Javanese origin and partly of Sundanese origin. The village Kobak Kendal is a village in the desa Kendal Jaya.

Both desas until recently belonged to a bigger desa. The desa Kedal Jaya formerly belonged to the desa Dongkal, which as recently as 1982 was split up by the Indonesian Government into three desas: Dongkal, Lusaka Jaya Selatan and Kendal Jaya. The desa Kedung Jaya used to belong to the desa Cibuaya, but this desa was also split up into three desas: Cimari, Pejaten Jaya Selatan and Cibuaya. In 1979 desa Cibuaya was split again into two desas: Cibuaya and Kedung Jaya. The desa Kedung Jaya itself was split again into two desas in the year 1982: the desas Kedung Jaya and Kedung Jeruk. The name of desa Dongkal has a historical origin. Before the Japanese arrived in Indonesia there lived an old man with this wife in the area. They had a famous stick. One day they planted this stick, which grew out into two trees, a kedongdong tree and a dongkal tree. The kedongdong tree had the form of a keris (sacred weapon), whereas the dongkal tree became a very big tree. The old leaves of this dongkal tree did not fall down to the ground but just vanished so that the villagers never found the old leaves. During the Japanese occupation these two trees fell down when the old man and his wife vanished. The villagers chose the name Dongkal for their desa, because the two trees were holy trees to them.

The meaning of the name Kendal Jaya is: 'although the number of people is small we have a good life without shortages'. The name Kobak Kendal, one of the two villages in the research, was chosen because formerly there was a slough (kobak) and a kendal tree. The name Kedung Jaya refers to a kedung or sedong which is the name of a dreaded (angker) river bend. The word jaya means 'famous'. According to village elders the village of Sidariwan was named after the first villager who settled down there.

Geographical and demographical background

The two villages are situated in the regency Karawang and within the subdistrict Pedes. The village (dusun) Kobak Kendal forms part of the desa Kendal Jaya, whereas the village Sidariwan forms part of the desa Kedung Jaya. Maps of the regency Karawang, the subdistrict Pedes and the desas Kendal Jaya and Kendung Jaya are shown in the Appendices (p. 193) of this chapter.

The desa Kendal Jaya and the desa Kedung Jaya are located respectively about twenty-two kilometres and twenty-eight kilometres north from the city of Karawang and only a few kilometres from the coast of the Java Sea. Both desas can be reached by car, although the last ten kilometres of the road were in a very bad condition in 1985 and the desa Kedung Jaya cannot be reached by car if the road is slippery and muddy. In 1986 road repairs to the coast through the village Kendal Jaya were started. The following data about area, number of inhabitants and density of population are based on data obtained from the administrations of the subdistrict and of the two desas. The subdistrict Pedes comprises an area of 191,368 square kilometres with 110,564 inhabitants or 578 people per square kilometre in 1986. Table 3.5 shows the data for the desas Kendal Jaya and Kendung Jaya in 1985.

Table 3.5 Area, number of inhabitants and density of the population in the desas Kendal Jaya and Kedung Jaya in November 1985

	Kendal Jaya	Kedung Jaya
Area in km^2	3.31	7.27
Number of inhabitants	3,536	3,295
Density of population	1,067	453

The yearly natural increase of the population is estimated at about 2.5 per cent per year. About 42 per cent of the population is younger than 15 years, whereas only about 5 per cent is older than 55 years. The population of the three villages (kampung or dusun) in the desa Kendal Kaya was as follows in November 1985:

Village Pejaten:	535
Village Kobak Kendal:	1,015
Village Dongkal Timur:	1,486

The population of the four villages (kampung or dusun) in the desa Kedung Jaya was as follows in July 1985:

Village Krajan:	1,019
Village Tegal Amba:	980
Village Sidariwan:	967
Village Rawasari:	319

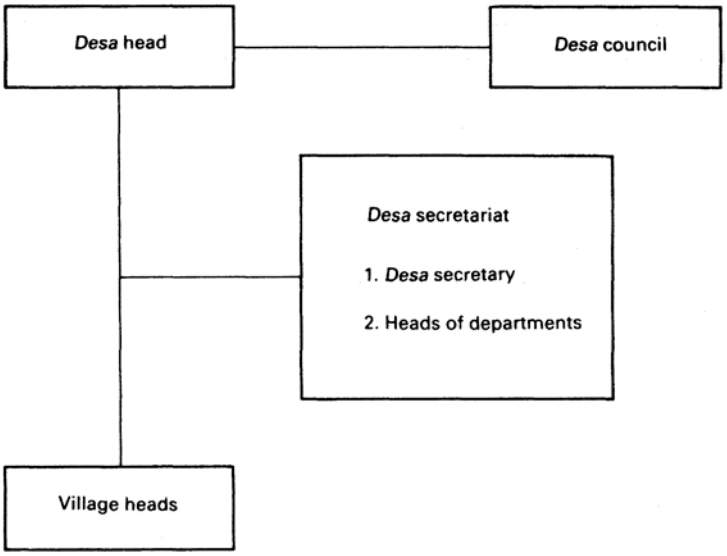
Political

The structure of the government of the two desas is based on the Law (Undang-Undang) No. 5 promulgated in 1979 for the desa government and Provincial Regulations after 1979. The structure of the desa government in the province of West Java and consequently in the desas of the research is shown in Figure 3.8.

The desa head and the desa secretary are ex-officio chairman and secretary of the desa council (Lembaga Musyawarah Desa). Members of the desa council are formal and informal leaders in the desa, including the village heads, leaders of organizations and informal leaders. The desa has the right to arrange its own housekeeping, although the yearly budget has to be approved by the regency. The desa government is implemented by the desa executive together with the desa council, being a legislative body on the desa level. The desa head is assisted by the village heads and the heads of the neighbourhood organizations. These neighbourhood organizations form part of the villages, are organized on a territorial basis and consist of a number of families ranging between fifteen and fifty households.

In addition the desa head is assisted by a second desa council .not belonging to the desa government. The function of this second village council, the LKMD (Lembaga Ketahanan Masyarakat Desa), is to participate in programming, co-ordinating and executing programmes for the development of the desa. Membership of these two village councils in the desas of the field study generally overlapped to a high degree. Meetings between the desa government and representatives of the population were attended by members of both councils. The desa head has two basic functions: firstly as the head of the desa community and secondly to carry out instructions from higher levels of the government. The second function has gained in importance since the beginning of the first five-year plan in 1969. Programmes of a number of ministries for desa head and the desa government. One example of this is desa development are carried out with the assistance of the agricultural extension. Agricultural extension is part of the sectoral development programmes. The field extension worker is working at the desa level and therefore has to co-operate with the desa government.

Figure 3.8 Structure of the desa government



Cultural

The population of the two desas belongs partly to the Javanese and partly to the Sundanese ethnic groups, so that one part of the population is more fluent in Javanese and another part is more fluent in the Sundanese language. There is, however, a cultural homogeneity as far as customs, life cycles and traditional beliefs are concerned. In addition a growing influence of Islamic culture can be observed; for instance the increasing activities of Islamic teaching and gatherings for religious purposes and the influence of Islamic teachings on women's dress. Also a growing influence of city and cosmopolitan culture can be observed, reflected by a growing orientation towards the city, including Jakarta and smaller cities.

Economic

The two desas form part of a large rice-growing area. Consequently economic development is related to the development of rice cultivation. In the 1960s rice cultivation began to change by the gradual diffusion of HYVs, fertilizers, pesticides and better land cultivation. Since the late 1960s agriculture has developed very fast. Irrigation water from the huge Jatiluhur irrigation dam became available, so that gradually the population planted rice twice a year instead of once a year. The BIMAS/INMAS programmes were successful and hullers and small handtractors were introduced. Marshes were also gradually converted into new wet-rice fields. The result was the dramatic expansion of rice production. Recently many people found new or additional work in the brackish fish ponds along the north coast. The rehabilitation and improvement of the road system and the development of motorized transport facilitated communication with urban centres, so that it became easier to sell rice to the cities and to commute to the cities for construction work and other jobs.

Availability of land

Almost all arable land consists of technically irrigated wet-rice fields, with the exception of residential areas, fish ponds, roads, cemetries and marshes. The desa Kendal Java comprises 331 hectares with a population of 3,536 in 1985, the village Kobak Kendal included. The desa Kedung Jaya comprises 727 hectares with 3,295 people living on it in 1985, including the village of Sidariwan. It is estimated that an average nuclear family consists of four to five people. This means that the land available per family in the desa Kendal Java was less than 0.5 per hectare in 1985, whereas in the desa Kedung Java less than 1 hectare per family was available, including wet-rice fields, residential areas, fish ponds, marshes, roads and cemetries.

Land tenure

We can distinguish between landowners, sharecroppers and farmers cultivating pawned land. These three categories are not mutually exclusive.

The pattern of landownership in the two villages is similar. A process of increasing concentration of land in the hands of a few extended families is going on. Both in the village of Kobak Kendal as well as in the village of Sidariwan about five or six of these families were mentioned. As a result of this and of growing population pressure many villagers only have miniscule agricultural plots or own no arable land at all. There were some big landowners in both desas, some of them owning up to about 30 hectares. These big landowners, however, distributed their land among their children and relatives following the implementation of land reform a few years ago. Sharecroppers cultivated land owned by landowners. Some farmers cultivated pawned land. They could gain control over pawned land by lending money and had to return this land to the owner after he had paid back the borrowed money without interest.

Process of adoption of technology

The process of adoption of new technology started in the late 1960s with the introduction of HYVs. All farmers in the village Sidariwan, except for one, planted IRRI varieties in the year 1969. In the same year chemical fertilizer was introduced and the irrigation was improved. Pesticides have been used since 1970. Gradually the farmers planted and harvested rice twice a year instead of once a year. Mechanization of agriculture in West Javanese villages is most visible in the use of small hand-tractors for land preparation and in the use of hullers for rice processing. The history of tractorization in the regency Karawang started in 1963 with a Student Social Service Programme of the Institute of Agriculture (Institut Pertanian Bogor). A study was made, in co-operation with the Food Crops Division (Dinas Pertanian Pangan) in Karawang, of labour available for wet-rice cultivation in the area. It came to the conclusion that there was a shortage of labour that necessitated the introduction of tractors. (13)

The head of the agricultural office in Karawang informed the group that these students were to give a demonstration with two or three ATRA hand-tractors in the subdistrict Pedes in 1963, attended by government officials from Jakarta and Karawang, the subdistrict head of Pedes, desa heads and agricultural extension workers and farmers from the subdistrict Pedes. Until 1968, however, there was no real reaction. After the start of the BIMAS in 1969, however, people became interested in hand-tractors. In 1969 farmers in two other subdistricts, Jatisari and Cilamaya, began to use the tractors. Another demonstration was organized by the agricultural extension service in the subdistrict Pedes in 1968 and a third demonstration was given there in 1973, attended by government officials, progressive farmers and other influential farmers. The agricultural extension service provided incentives for buying a tractor with credits from a

government bank, the BRI. Two people in the subdistrict then purchased a tractor in 1976. From that time on, the use of tractors in the regency Karawang spread with an increasing speed. The first three tractors owned by farmers in the subdistrict Pedes were purchased in 1967. The first two in the desa Kendal Jaya were bought by Haji Hasan and Haji Sidik. In 1978 Haji Sidik purchased a tractor from a dealer in Karawang co-operating with Pertani, a govenmental agricultural institution. Haji Sidik uses this tractor to plough his own wet-rice fields. He also rents it out to other farmers for Rp 30,000 per hectare. He prefers to rent out his tractor directly to farmers using the tractor within the boundaries of the subdistrict Pedes. To rent the tractor out via a middleman would mean running the risk of being cheated.

In 1985 the number of tractors in the desa Kendal Jaya had increased to sixteen, including thirteen tractors in the village Kobak Kendal. In 1986 the number of tractors in this village increased to fifteen. The wet-rice fields of Kendal Jaya were ploughed in November 1985. Most fields were ploughed by tractors, a lot of which were rented from outside the village. The first tractors in desa Kedung Jaya arrived in 1982. Sarti, a tractor owner in the village Sidariwan, explained that he heard about tractors from a rice merchant, who used to travel to the villages to buy rice. He was told that it was faster and cheaper to prepare the rice fields using a tractor.

Although a tractor was an expensive item, the cost could be recouped within a few years. Sarti decided to buy a tractor after gaining the support of his family. His main reason for buying a tractor was that at the time of land preparation it was very difficult to find enough labour (this was due to the fact that all landowners and sharecroppers were ploughing their own fields). Before buying a tractor he studied their use in a nearby village. He observed that with the tractor he could prepare thirty-one hectares within ten days.

After 1982 a spontaneous diffusion of tractors occurred with the result that in 1985 fifteen tractors were in use in the desa Kedung Jaya, although not all were owned by the villagers themselves. One haji in the village Sidariwan explained that it was more profitable to buy land than to buy a tractor. As a consequence he had not bought a tractor to date but hired one to prepare his rice fields. The farmers in the desas Kendal Jaya and Kedung Jaya normally hire tractors through a sponsor. A sponsor is a middleman, usually a young man from the same village, who hires tractors in other areas at distances of up to 100 kilometres way. One sponsor usually organizes the operation of three or four tractors. These sponsors obtain a commission of about Rp 2,000 per prepared hectare (1985).

The main reason for the introduction of small handtractors for mechanized land preparation was shortage of labour. This shortage of labour was mentioned both by farmers and agricultural extension officers. The shortage of labour in the season of land preparation was also stressed in a report by the division of agricultural mechanization in West Java, stating that in the year 1982 in the regency of Karawang 42,887 hectares out of 102,436 hectares of wet-rice fields were not cultivated because of labour shortages. A similar picture was obtained in the whole northern plain of West Java, where according to the same report, a total of 249,782 out of 667,838 hectares of wet-rice fields were not cultivated in that year because of the same reasons. This area could have yielded a production of 749,348 tons of rice, if the rice fields had been ploughed in time. (14)

New technologies in rice production made it necessary to plough the land in about two weeks per season as against thirty to forty days formerly. Since the mid-1970s irrigation water from the Jatiluhur dam has been available, so that the people in the northern plain of West Java could have two rice crops a year compared to one crop formerly. The irrigation water is made available according to a fixed time schedule.

The wet-rice area is divided into a number of blocks and every block receives irrigation according to the time schedule. The land should therefore be prepared simultaneously, synchronized with the time schedule of the distribution of water. Another reason for quick land preparation is that the rice seedlings of the HYVs have to be transplanted within twenty-one days after the seeds are sown. An advantage of simultaneous

planting of the rice seedlings is that rats and mice have less chance to multiply and that pest control becomes easier. The number of carabaos is steadily decreasing because grasslands have been converted into wet-rice fields. Many small farmers and landless labourers prefer to work in the newly developing shrimp culture along the north coast of Java or as construction workers in the cities. All these factors together made it necessary to introduce small hand-tractors for land preparation. Other advantages were mentioned. Many people said that mechanized land preparation is better than manual preparation or making use of carabaos. Last but not least it should be mentioned that land preparation by using hand-tractors is regarded as cheaper than using carabaos or manual labour.

With this background it can be understood why the use of tractors spread quickly. Farmers had seen proof that hand-tractors could do the job quickly and efficiently and that by using tractors they could get a better crop. The experimental phase had now passed. Initially about ten types of tractors were sold in the regency of Karawang. Table 3.6 provides information about tractors sold in 1984 or before.

In 1985, however, the farmers in the villages of Kobak Kendal and Sidariwan preferred to buy only two of these types, the Kubota and Yanmar.

Maintenance and repairs of the hand-tractors caused some problems. In the beginning some damage occurred

Table 3.6 Types of hand-tractors and ways of obtaining tractors in the regency of Karawang in 1984

No.	Type of tractor	Way of obtaining				
Cash	Bank Credit (BRI)	Credit from dealer	Leasing	Total		
1.	Kubota (K.700, K.75, K.120)	214	202	56	–	472
2.	Yanmar (YC.60. YZC.105 ES)	170	73	55	–	298
3.	Satoh K.170	14	15	5	–	34
4.	Iseki	12	4	2	–	18
5.	Kubota Quick	4	1	5	6	16
6.	Bimatsu 7–9	5	–	2	–	7
7.	Dewi Sri	–	–	–	10	10
8.	Mitsubishi	1	–	–	–	1
9.	Daedong	–	26	–	–	26
10.	Honda	9	–	–	–	9
Total		429	321	125	16	891

Source: Division of Food Crops Regency Karawang, cited from Rita Januarita et al., op. cit., p. 26.

because oil was not always changed in time or because drivers were still learning how to handle the hand-tractors. These difficulties occurred most often when the handtractors were rented out. In some cases the axle broke (especially with the Yanmar tractors). However, experience proved a good teacher, and maintenance and repairs quickly improved. Small repairs were often done by an elder son of the tractor owner and if necessary a technician was called out or the hand-tractor was taken to the nearby city Rengasdengklok, where spare parts were available. A technician from Yanmar tractors pays regular visits to the owners of these vehicles to offer service and advice.

The sample

Some problems arose in defining the area sample. It was decided to take this sample in the northern plain in West Java because most tractors are concentrated in this area and it is known as one of the main rice producers in West Java. The first choice was the regency of Subang, because the regency is located half-way between the urban centres of Jakarta and Cirebon. A visit was organized to this regency to locate tractors owned and operated by groups of farmers. According to information obtained during that visit, however, almost all tractors were individually owned, except for a tractor in the subdistrict Pabvaran which was owned by a village co-operative.

A visit to this subdistrict revealed that the co-operative had indeed obtained a tractor some years ago, but owing to mechanical failure it was no longer used. Finally the regency Karawang was examined where many tractors are used. A talk with government officials in Karawang provided the information that one of the latest subdistricts to introduce tractors was the subdistrict Pedes. This subdistrict is situated at a considerable distance from the centre of the regency. The subdistrict Pedes, therefore, was chosen and in this subdistrict the desa Kendal Jaya with the highest number of tractors owned by farmers and the desa Kedung Jaya with only one tractor owned by a farmer were selected. The desa Kendal Jaya is further advanced in the process of tractorization and less isolated than the desa Kedung Jaya where the process of introducing tractors seemed,to be only in the very early stages. The village of Kobak Kendal was chosen as an area sample in the desa Kendal Jaya, as it was the most centrally located in this desa and had most of the tractors. In contrast the village of Sidariwan in the desa Kedung Jaya was chosen because it is the most isolated village in this desa and first investigations showed there was only one tractor in this village. It was assumed, therefore, that Kobak Kendal would be more advanced in socio-economic development than Sidariwan.

The following three strata were defined in both villages:

1. Families controlling more than 0.5 hectares of wet-rice fields.
2. Families controlling 0.25 to 0.5 hectares of wet-rice fields.
3. Families controlling less than 0.25 hectares of wet-rice fields.

In each village the husbands and wives in ten families were interviewed in each of these three strata. This division into strata was made at the suggestion of Dr Pudjiwati Sajogyo of the Social Economic Department of the Institute of Agriculture (IPB) in Bogor. The strata were also used in a study by the Agro Economic Survey (Bogor) in six desas in the river basin of Cimanuk.

Data about land controlled by the families was obtained from the heads of neighbourhood organizations. It appeared, however, that such data was not always reliable. It was especially difficult to find families in stratum 2. In fact it was not possible to find enough families of this stratum in the villages of Kobak Kendal and Sidariwan. It was decided, therefore, to select part of the sample of stratum 2 in a neighbouring village within the same desa, i.e. the village of Pejaten in the desa Kendal Jaya and the village of Tegal Amba in the desa Kedung Jaya.

In addition a number of resource persons in the two desas and the two villages were interviewed: the heads of the desas, religious leaders, traditional midwives, agricultural extension workers and schoolteachers. Some group interviews were also held with the youth of the village of Sidariwan, and in the basic school in the desa Kendal Jaya children in the sixth class wrote a short story about how they dreamed about their own future. In addition the group interviewed a number of government officials at the regency, provincial and national levels to obtain an insight into the processes of linking the role of government institutions with processes in the two villages of our field research.

Structure of family groups

The families in the two villages are all nuclear families, generally consisting of husband, wife and children. Often one or two relatives are living in the same house, for instance, the mother or father of one spouse or a girl working as a housemaid. Here some information is included on the degree of homogeneity in the families, sources of wealth, housing, diet and clothing.

Families within strata 1 and 2, both in the village of Kobak Kendal and in the village of Sidariwan, appeared to be related to each other, because of common descent and frequent inter-marriages. People of stratum 3 generally were not related to families of strata 1 and 2 and in fact, many of them were immigrants in these villages. The families of strata 1 and 2 were homogeneous as far as cultural background and religion are concerned. All were Muslims and most of the families in the village of Kobak Kendal were the offspring of families who came to this village from central Java many years ago. All families of strata 1 and 2 were wet-rice farmers.

These families were knitted together, inter alia, by numerous ceremonial meals and festivities on the occasion of marriages, circumcisions, at the beginning of the season of preparing the rice fields and at harvest time. The families of stratum 3 had the same religious and cultural background as the families of strata 1 and 2, but they did not mix so much with people of higher strata. On the other hand they stuck together in their own quarters of the villages.

Family size of the sample

Most of the families consisted of three to six family members, as is indicated in Table 3.7.

Table 3.7 Family size in the samples examined in the villages of Kobak Kendal and Sidariwan according to the three strata

	Kobak Kendal			Sidariwan		
Family size	1	2	3	1	2	3
1–2	–	–	1	1	2	2
3–4	1	6	5	3	3	2
5–6	3	3	1	3	5	5
7	2	–	–	3	–	–
more than 7	2	1	3	–	–	1
No data	2	–	–	–	–	–
Total	10	10	10	10	10	10

Sources of wealth

The main sources of wealth are wet-rice fields, brackish fishponds and, especially in the village of Kobak Kendal, the preparing and selling of salted fish. Some of the families obtain a considerable income from the buying of rice. Some other families obtain additional income as moneylenders.

All but seven of these families consisted solely of father, mother and children. Five of these seven families belonged to stratum 1.

Housing

In the last few years people have begun building houses using concrete blocks. The process of building concrete houses or transforming half-concrete houses into all concrete started first in Kobak Kendal in 1984, imitating the concrete structures of Jakarta.

All the families were owner-occupiers except for three families of stratum 2 living in Kobak Kendal.

Table 3.8 Type of houses owned by the sample families of Kobak Kendal andSidariwan in 1985

	Kobak Kendal			Sidariwan		
Type of house	1	2	3	1	2	3
Concrete house	3	3	3	2	–	–
Half-concrete house	4	2	–	5	2	1
Wood/bamboo house	3	5	9	3	8	9

Diet

It is a general custom of all strata to have a proper meal only twice a day, at noon and in the afternoon. In addition they take some refreshment, cookies or cassava, in the morning at about ten o'clock. The families of all strata do not pay attention to the nutritional value of the food. On the other hand families of stratum 1 tend to eat better than the other strata. The two full meals per day of the three strata are generally consistent, both in Kodak Kendal as well as in Sidariwan:

Stratum 1: Rice together with salted or fresh fish and some vegetables. Refreshments may consist of bread, fried bananas and coffee.

Stratum 2: Rice and salted fish or fresh fish and once or twice a month vegetables. Refreshments may consist of bread, fried bananas and coffee.

Stratum 3: Rice and some additional food, without vegetables and fruit. Refreshments may consist of fried bananas and coffee.

Clothing

The impression is that all people have enough clothes. Torn clothes are not seen, but the amount of clothing is limited. The women of stratum 3 often wear only a sarong and a brassiere when they are at home or in their compound. Small children often prefer to be naked. In the schools, however,

Table 3.9 Age of the sample of the three strata

		Kobak Kendal						Sidariwan						
		1		2		3		1		2		3		
No.	Age	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Total
1.	15–29	1	4	4	7	2	4	–	1	2	5	4	4	37
2.	30–39	4	4	4	1	3	2	1	3	4	3	2	3	34
3.	40–54	4	2	1	1	5	4	7	6	3	2	3	3	42
4.	55–69	1	–	1	1	–	–	2	–	1	–	1	–	7

		Kobak Kendal						Sidariwan						
		1		2		3		1		2		3		
No.	Age	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Total
	Total	10	10	10	10	10	10	10	10	10	10	10	10	120

all children wear clean uniforms and the women going to the mosque or a religious meeting are generally clothed from top to toe. The families of stratum 1 are fond of going to town to buy expensive clothes, often several times a year. The families of strata 2 and 3, however, buy new clothes only once a year after the harvest.

Age of the sample

It was revealed that a large majority of the people in the sample were younger than 55 the average age of the men being higher than that of the women.

Education of the sample

Only a few of the sample had finished their primary schooling as is shown in Table 3.10.

Findings

The main findings of the research are categorized as follows:

1. Family: changes in roles of the family.
2. Family: impact on children.
3. Family: impact on rural labour.
4. Family and community: changes in occupations and skills.
5. Family and community relationships.
6. Family: relationships with other sectors.
7. Family: influence in the community.
8. Family mobility.
9. Family: changes in aspirations and expectations.
10. Family: changes in economic base.

Family: changes in roles of the family

The focus here is on changes in decision making, changes in responsibilities, the relative importance of sexes, changes in food habits and changes in leisure-time activities.

Table 3.10 Education of the sample of the three strata

		Kobak Kendal						Sidariwan						
		1		2		3		1		2		3		
No.	Education	Men	Women	Men	Women	Men	Women	Men	Women	Men	Men	Women	Women	Total
1.	Never went to school	1	3	2	4	6	6	7	6	7	10	8	8	68
2.	Kindergarten	–	–	1	1	–	–	–	–	–	–	–	–	2
3.	Primary school not finished	6	5	6	4	3	2	3	4	1	–	2	1	37
4.	Primary school finished	3	2	1	1	1	2	–	–	2	–	–	1	13
Total		10	10	10	10	10	10	10	10	10	10	10	10	120

Changes in decision making

The respondents were asked about a wide range of subjects, namely: decision making in agriculture; the use of the rice harvest; food and daily consumption; the house; health; social activities; and recreation.

They were asked whether the respective decisions were taken by the wife, by the husband, or by the wife and the husband together. If they said that decisions were taken together, they were asked whether the wife or the husband was dominant in these decisions or whether both had an equal say. Finally they were asked if they had always made decisions in this way, this was to determine if any changes had taken place in decision making. The following conclusions were arrived at on the basis of these interviews.

Today, as in the past, decisions about land preparation are frequently joint decisions with the husband having the final say in the event of any disagreement. There are still, of course, a number of areas where the husband alone makes decisions. However, compared with the past, the number of wives involved in these decisions is on the increase. This applies to farmers of strata 1 and 2 in both villages. There is a marked difference between the two villages as far as decisions about the phases of rice growing are concerned. In Kobak Kendal in about one-third of the families the decisions are taken by the wives, in another third these decisions are taken by the husbands, whereas joint decisions are taken in the rest of the families with a slight dominance by the husbands. In Sidariwan most decisions are taken by the husbands, but joint decisions with dominance of the husbands are increasing. This is an indication that the wives are increasingly involved in decision making. About one-third of the decisions of families in stratum 1 in Sidariwan are taken by the wives. There is an increase in joint decisions with an equal say by wives and husbands about the use of the rice harvested in both villages in all strata. In stratum 1 in both villages, however, almost half of the wives normally take these decisions.

No changes were observed in decision making about food and daily needs of the family. The wives are clearly in charge of this, although a small part of the decisions is jointly taken with an equal say by husband and wife. It is a general custom that the wives are responsible for the household money. No changes were observed in decisions about clothing. Most decisions in stratum 1 in both villages were taken by the wives, followed by joint decisions with an equal say. Joint decisions are increasing, most decisions taken with an

equal say by both partners. This applies for all strata in both villages. In strata 1 and 2 a change can be observed from decisions being made by the husband only to joint decisions with the dominance of the husband. One-quarter of the decisions taken today are still made by the husbands alone in stratum 1 in both villages and in stratum 3 in Sidariwan. There is a general and increasing trend that decisions about health and recreation are taken jointly with an equal say by both partners in all strata of the two villages. A slight change in decisions about social activities could be observed. A trend is apparent in strata 2 and 3 of both villages where the wives are more involved in these decisions than formerly. Decisions in stratum 1 in both villages are made as frequently by the wives only, as by the husbands only and jointly. Today only two wives of stratum 3 in both villages take decisions alone against only one wife formerly.

The general picture emerging from these observations shows an increase in joint decisions with an equal say of both partners and an increasing role of wives in family decisions.

Changes in cultural decision making

On the occasion of events in the lifecycle, like marriages, births, pregnancies (the seventh month), forty days after birth and circumcisions, festivities and communal meals are held. These are decided upon by the families themselves. Today, however, people generally spend less on these occasions than before. For instance today they often hire recorded music, whereas formerly they more frequently invited a group of musicians and artists. There are also changes in names given to newly born children in Kobak Kendal, influenced by city culture which in turn was influenced by the medium of television. Formerly parents in Kobak Kendal and Kedung Jaya did not think much about what name should be given to their newly born children. They were used to giving names spontaneously, influenced by some sound heard at the moment of birth, and names like Sayem, Painem, Paijah, Sarpin, Munir, Sanawai, Astam, etc. were common.

Today parents in Kobak Kendal discuss at length the names they will give to their baby if it is a boy or a girl. Today they use names like Fenti, Yanti, Deddi, Tedi, Toni, which are names of well-known singers appearing on television. Another change has occurred in the way the younger children address older people, again due to urban influences. Instead of abah they now use the words bapa atua papih for their fathers. Instad of biung atua eneh they now use the words mamah, ibu or mamih for their mothers. These changes have occurred in all strata in Kobak Kendal, whereas in Sidariwan the traditional names are still used.

Changes in responsibilities

Changes in responsibilities are related to changes in decision making, although there may be a difference between the responsibility for the decisions and the responsibility for the execution of the decisions. There is an obvious change, foremost in the village of Kobak Kendal, to more division and differentiation of responsibilities.

Today the wives are clearly in charge of the household money. More men are engaged in trading fish and agricultural produce and are therefore often not in the village. Others are away in the cities or in other villages trying to earn a living. The wife keeps the money and if the husband needs any he often has to ask for it from his wife. Some wives are now able to do simple book-keeping, although they are illiterate. In this case they draw a small circle for Rp 1,000 and other symbols for smaller money.

The wives are, of course, first and foremost responsible for the kitchen, cleaning of house and compound, child care, care of the sick, etc. Husbands have the main responsibility for earning money, house repairs, civil duties and mutual aid duties, for example collective cleaning of irrigation channels and ditches.

Relative importance of sexes

The male sex is still the first sex, and the female sex is the second sex. It is a common opinion that husbands should be richer and should have had a better education than their wives. This was elaborately described in the discussion about aspirations. Yet it becomes clear from the changes in decision making and from changes in responsibilities that the wives are playing an increasingly important role in family life. Developments are in the direction of greater freedorn and greater responsibilities for the wives and towards a higher degree of 'togetherness' of husbands, wives and children. A woman in Sidariwan told about an interesting change in her relationship with her husband. Formerly she always used to walk behind her husband. Today they walk together, the one beside the other. Formerly she would be ashamed to do so.

Changes in food habits

Not many changes in food habits could be observed. Generally it can be said that the people eat more today. Besides, periods of hunger preceding harvest time seem to be over. There are some small changes, especially in Kobak Kendal, foremost in stratum 1.

According to tradition families in Kobak Kendal have a meal twice a day. However, one of the families of stratum 1 said that lately they had begun to eat three times a day. This began after their children who attend school in a nearby city observed that city people ate three times a day.

Families who were used to eating only rice, fish and some vegetables now often eat chicken or other meat and more vegetables that are available in small shops in the village. Formerly every member of the family got a portion of food on the dish. Today everybody can choose his/her food from the dishes on the table. Many people have also started to use spoons, forks and knives. Small children are given rice pap.

In Sidariwan fewer changes were observed. People are still used to eating only rice, fish and vegetables, usually do not use spoons, forks and knives, their portion of food is served on their dish and small children get the same food as adults.

Changes in leisure-time activities

Husbands and wives of strata 1 and 2 declared that they have more leisure time since the introduction of tractors. Formerly four to six weeks were needed for land preparation. This time can now be reduced to one to three days. Formerly the farmers' wives had to cook for their own family and for agricultural labourers working in the fields and to bring food and tea (nganteuran) to them. Today this is not necessary any more, or is restricted to only a few days. Much of the time that has become available in this way is used for new economic activities. Some of the husbands are using this time to run a small shop (warung), to look after a rice huller, or to trade for fish and agricultural produce. Moreover they have more time to visit friends, have a chat with them, or to take some rest. Other men, foremost of stratum 2, join in religious activities, such as religious instruction and services. One of the newest changes in the use of leisure time occurred with the introduction of the television. The first television set entered Kobak Kendal in 1982. Since then the number of televisions has increased to sixteen in this village, mostly owned by families of stratum 1. In Sidariwan only a few families had a television. In the evenings families, sometimes joined by neighbours and relatives, enjoy television shows.

Family; impact on children

The improvement of irrigation and the modernization of agriculture, including diffusion of tractors, the building of new primary schools, the improvement of roads and the introduction of television, have had an impact on children of all strata. More children of all strata go to school. Most of their parents did not finish primary school. Today many children of all strata attend primary school. Even the rate of drop-outs after the third grade has decreased. Formerly very many children dropped out after the third grade because the boys had to help their parents in the fields and the girls were married. An important decrease in drop-outs after the third grade is indicated in Table 3.11, which provides the numbers of boys and girls in the three lowest and the three highest grades of four primary schools in the desa Kendal Jaya and three primary schools in the desa Kedung Jaya. The table also suggests that there are still more boys at school and that the number of drop-outs among girls is higher.

The increasing attendance of children in schools has had an impact on their roles in the families, foremost in the families of strata 1 and 2. Formerly the children used to help their mothers in the morning by doing all kinds of chores in the house. Today it often happens that children get up early and are dressed in their school uniforms and, therefore, have no time or are afraid to become dirty by doing odd jobs in the house. On the contrary they may sometimes ask their father or mother to do something for them. Some parents see this as a sign of 'progress' in their children. Many of the children do not wish any more to

Table 3.11 Number of boys and girls in primary schools in the desas Kendal Jaya and Kedung Jaya in January 1986

Grade	1–3		4–6	
Boys	Girls	Boys	Girls	
Kendal Jaya	280	263	196	161
Kendung Jaya	193	184	209	112
Total	473	447	405	273

Source: Office of the Ministry of Education in Pedes.

become farmers. Today, children may even fail to obey their parents. We heard from families outside the sample that sometimes one of the older sons is in charge of the tractor, whereas another son is engaged in renting out this tractor to other farmers. In Kedung Java some change was observed in the role of boys of the lower strata. Formerly their duties were restricted to cutting grass, herding cattle and cleaning the house. However, after grazing fields had been converted into rice fields and many of the cattle had been sold and slaughtered, they were given the responsibility to share in earning the family income, carrying water for the household, making small repairs to the house and its furniture, civil defence duties and mutual self-help activities and still, although on a smaller scale, to cut grass and to herd cattle. Girls still have a number of the same responsibilities as before; preparation of food, fetching water for cooking purposes and cleaning the house and its compound.

Family; impact on rural labour

As a result of the introduction of tractors less labour was needed for land preparation, so that many farmers' families gained more leisure time. On the other hand the extension and improvement of the irrigation system together with mechanized tillage enabled the farmers to have two crops as against one crop formerly, so that work on the rice fields increased. It is not clear how far the introduction of tractors contributed to growing

unemployment, because many landless labourers found other jobs and sources of income in the rural areas as well as in cities.

Family and community: changes in occupation and skills

An increase in skills can be very clearly seen among the men, foremost in Kobak Kendal. Some men are able to drive the small hand-tract ors, others can drive cars and motorcycles. Usually somebody can be found in the village who can make small repairs to tractors, cars, motorcycles, storage batteries, machines, televisions, radios and sewing machines. This increase in skills is understandable as the number of these goods is also increasing (see Table 3.12 which provides data on Kendal Jaya). More women have become acquainted with sewing machines and many of them have learnt how to cook and wash dishes in a more hygienic way. The women of the village elite are so worried about hygiene that honoured guests from inside and outside the village are given bottled tea to drink. For that purpose some keep a stock of bottled tea in the home. Both men and women have developed skills in calculations concerning income and expenditures and have even learnt to do some simple book-keeping, although most of them still restrict themselves to making calculations based on a single rice season. Only a few of them make calculations for two or more years. For instance, not all tractor owners are able to calculate that after some years they should have enough money to buy a new tractor with the money earned from using and renting out their tractor. An unknown number of agricultural labourers are working in nearby cities as construction workers and odd-jobbers. It can be anticipated that part of the younger generation will look for jobs in the cities after having finished secondary school or even primary school.

Family: Influence in the community

Tractors have become a symbol of prestige. This shows that the influence of tractor owners has increased. In addition the families of strata 1 and 2 were able to use their time for other economic activities generating additional income. Some of them have opened small shops, bought motorcycles

Table 3.12 Capital goods in the desa KendaJ Jaya, 1985

Village	Radios	TV	Sewing machines	Petro max	Bicycles	Tricycles	Cars	Hullers	Tractors	Scales
Pejaten	84	4	6	98	72	3	4	2	3	45
Kobak Kendal	60	16	15	100	50	9	11	7	13	55
Dongkal Timur	134	5	12	169	55	7	–	2	–	40

Source: Desa administration.

or cars, or are engaged in the fish trade. Increased income from agricultural and non-agricultural economic activities raised their social-economic status and contributed to an increasing influence in the community. An already existing elite developed still further, tending to become more influential than the elite of the officials of the desa government. An indirect effect has been the growing influence of school teachers and religious leaders, because more people of the three strata can send their children to school and more people, especially in stratum 2, have time to attend religious meetings or religious classes in the afternoon or in the evenings and more people can attend the prayers in the mosque.

Family mobility

Mobility of the villagers of Kobak Kendal has steadily increased since 1977, caused and facilitated by: improvement of the road from Karawang to Pedes, increasing transport and trade of fish and of agricultural inputs and outputs; the increase in numbers of school-going children; the increase in the number of people working in the cities and in commerce; an increasing availability of motorized transport; and generally an increase in income. The same applies, but to a far lesser degree in Sidariwan. Respondents were questioned about their visits during the five months after the last Lebaran (the feast at the occasion of the end of the Islamic fasting month). It appeared that villagers from Kendal Jaya went as far as Jakarta and Karawang, whereas respondents in Sidariwan did not go further than other villages in the same or in a neighbouring subdistrict.

Mobility is on the increase in both villages and reflects a growing orientation towards the cities. People like to go to the city to buy clothes. It is interesting to note that some of the Sidariwan women went to a beauty salon in a nearby city in order to have a photograph taken of them dressed as brides. They then put this picture somewhere in their homes to be admired by their housemates and visitors.

The wives of the head and of the secretary of the desa Kedung Jaya joined the research fieldworkers on the way back to Bandung to do some sight-seeing in and around this city. A few years ago a group of villagers of Kedung Jaya went on a sight-seeing tour to East Java and visited the grave of the late President Soekarno in Blitar.

Increased mobility and communications with urban centres influenced clothing and ornaments in the two villages.

Changes in clothing and ornaments in Kobak Kendal

Small public buses enable the people of Kobak Kendal to buy clothes in the nearby city Rengasdengklok. They wear the same types of clothes as city people. Until recently the women of Kendal Jaya wore a long dress (kain panjang dan kebaya) with a kind of shawl over the head. Originally they used these shawls to protect themselves against the sun while working in the paddy fields. Later these shawls became part of their daily clothing. Rich people also wore large golden ornaments in the form of an eagle (Garuda), a dragonfly or a chicken. These ornaments were also a form of investment and could be sold if the women needed money. The bigger these ornaments were, the better. The men usually only wore long trousers and a shirt and sometimes a kopeah on their heads.

Today the women, except for the very old ones, wear skirts, use no shawls to cover their heads and have curled hair. Some of the women go regularly to a salon in the nearby city Rengasdengklok for facial treatment. The women no longer wear the golden ornaments as they too readily identify them as village women. Instead, some of the men have begun to wear them. Women of all strata join in gymnastic exercises, wearing relatively short clothing. Some of the women of Kobak Kendal wear clothes when doing these exercises which, according to the Sidariwan women, are practically indecent.

Changes in clothing and ornaments in Sidariwan

Stratum 1

Parents in Sidariwan. There are no big changes in clothing. Formerly the women did not cover their heads. Today, if they attend meetings they use a veil. Formerly only the haji wives wore a veil. Today it is

common for the village women to wear a veil. They use the veil for religious reasons and because of decency. Many of the women wear long skirts down to the ankles. The men still wear black clothes, but in their leisure time they may wear a batik shirt. Formerly both men and women did not use shoes, but today they often wear shoes if they go for visits or leave the village; especially if they intend to use the road. Those rich people who gave up wearing golden ornaments because they identified them as village people now wear gems.

Youngsters in Sidariwan. The girls wear relatively long skirts with a veil and ornaments. Formerly they wore the traditional kebaya. When they do wear a kebaya they wear one of expensive cloth, just as their mothers do. The clothing of boys differs from traditional clothing. Formerly they wore dark shirts. Today they wear shirts like the people in the cities. They also often wear necklaces and sunglasses. They often wear expensive clothing depending on the opinion of adults. Little attention is paid to the clothing of small children, maybe because of the warm climate. Small children are often happiest going around naked.

Stratum 2

Parents in Sidariwan. Their clothing is similar to the clothing of those in stratum 1, only less expensive. They wear glittering imitation gold and gem ornaments. If somebody buys clothing of a particularly interesting colour then the others will all copy her. They save their best clothes for special occasions. For daily use they are content to wear only a brassiere and sarong. They seldom wear long skirts, but they do wear long dresses (kain panjang and kebaya). They buy new clothes for themselves after the harvest while clothes for the children are bought at the beginning of the school year. They buy clothes from merchants who visit the villages. They pay for the clothes in instalments which often works out to be very expensive. Everyone takes a great deal of interest in the clothes of their neighbours and if someone does not buy anything new after the harvest a great deal of gossip results. Because the women copy the clothes of their neighbours merchants know to bring a selection of sizes in the same colour and design.

Youngsters in Sidariwan. Girls in only the fourth year of basic school are already starting to use cosmetics in the afternoons. Clothing of the boys is almost the same as in stratum 1, many of them wear blue jeans. The boys in this stratum do not wear necklaces. If they go to the mosque they wear a sarong and kopeah, the same as the adult men.

Family and community relationships

Slight changes were observed in the role of the government, certain ceremonies and the role of village elders.

Changing role of government

The introduction and diffusion of small hand-tractors did not result in basic changes in the role of the government. The role of the government, however, has changed much since the early 1970s with the first five-year plan. The role of central government agencies for village development has increased, whereas the heads of the desas have, more and more, become tools in the hands of the central and provincial government for the execution of projects for rural development. The role of the agricultural field extension workers in the desas and villages of our research has already been explained. The same pattern has continued and been used in the process of diffusion of tractors. Some slight changes could, however, be observed in the desa Kendal Java. It seemed that more initiative was coming from the villagers themselves

applying tractors on an ever-increasing scale and in developing the fish trade. With this development a relative decrease in the importance of the desa government compared with the influence of the richer farmers and entrepreneurs could be observed.

Community ceremonies related to rice growing

Traditionally ceremonies are held at several phases of the rice growing: at the beginning of land preparation, planting and harvesting. Decisions about the date of these ceremonies are taken by village elders. These customs declined very rapidly after the introduction of new rice varieties in the late 1960s. It was reported in Sidariwan that only one farmer still practises these ceremonies.

Islamic ceremonies

Islamic ceremonies and festivities are held on the occasion of the birth of the Holy Prophet Muhammed (Maulud), and on the occasion of his voyage to the Al-Aqsa mosques in Darussalam (Miraj) and Idul Adha. Decisions about these ceremonies are generally taken by the religious leaders, often together with the head of the desa. Attendance of villagers at these ceremonies is increasing.

National ceremonies

National ceremonies are generally held in the central village of the subdistrict. Groups of youths, women and schoolchildren along with the civil defence forces and the village governments join these ceremonies. The ceremonies are decided upon by the national government, whereas the local organization is in the hands of the government of the subdistrict together with the village governments. Ceremonies and festivities are held on the occasion of the national Independence Day, the armed forces day, the commemoration of Kartini and Dewi Sartika (who are symbols of women's emancipation), the commemoration of the oath of the youth (Sumpah Pemuda) and on several other occasions.

Communal improvements of roads and irrigation channels

Every year the men of the villages are mobilized for the communal improvement of roads and irrigation channels. Decisions about the dates of these improvements are taken by the desa governments together with the village heads.

Calculations by village elders

Traditionally the villagers like to go to one of the older people in the village to ask him to calculate the best day for the construction of a house, for a marriage or circumcision, for going to the city, etc. This custom is still observed, except for decisions in the field of agriculture.

Decision making by village elders

Decision making by village elders is gradually being phased out, whereas cultural decision making by governments of subdistricts and desas as well as of religious leaders is increasing.

Family: relationships with marketing and other sectors

The introduction and diffusion of tractors went hand in hand with developing relationships with the private and marketing sectors. This development was more rapid in Kobak Kendal than in Sidariwan, as can be seen from the difference in frequency of tractor use and the status of the tractor used. This development affected stratum 1 in the first instance. Table 3.13 shows that relatively more tractors were used by the families in the sample in the village of Kobak Kendal than by the families of Sidariwan. The same table shows that tractors were used more often by farmers of stratum 1 than of strata 2 and 3.

Table 3.13 Use of tractors and cattle by farmers of the sample of the three strata

	Kobak Kendal			Sidariwan			
Tractors and cattle	1	2	3	1	2	3	Total
Tractor	10	8	–	6	4	1	29
Cattle/manual	–	2	–	4	6	–	12
No tractors/cattle	–	–	10	–	–	9	19
Total	10	10	10	10	10	10	60

Table 3.14 shows that almost all tractors used by the families of the sample were rented or borrowed in or outside the village.

It is clear that the buying, renting and borrowing of tractors has resulted in new relationships inside and outside the village. Tractors can be bought in the nearby city of Rengasdengklok and in the city of Karawang. Sometimes the tractor owner has to contact a repair shop in one of these two cities. Moreover the selling of rice to markets in Karawang and other cities resulted in increasing relationships with the private sector.

Table 3.14 Status of tractors used by farmers of the sample of the three strata

	Kobak Kendal			Sidariwan			
	1	2	3	1	2	3	Total
Status of tractor							
Own property	1	–	–	–	–	–	1
Rented within the desa	3	3	–	1	–	–	7
Rented from outside the desa	2	2	–	5	4	–	13
Borrowed	4	2	–	–	–	–	6
Total	10	7	–	6	4	–	27

Dependency

The diffusion of tractors has contributed to the greater dependency of farmers on the outside world. This has been the result of the farmer's need to buy or rent tractors outside his own village. The dependency between landowners and sharecroppers has remained. A number of the farmers cultivated land on a sharecropping basis or cultivated pawned land, as is shown in Table 3.15.

Sharecroppers were mostly found among stratum 2, although some families of stratum 1 were also sharecroppers. It happened sometimes that a sharecropper had to borrow additional money with high

interest from the landowner to be able to till the land. Some of the families of stratum 3 remained dependent on families of strata 1 and 2 as landless labourers. In addition, however, both men and women found additional work in nearby fish ponds or in Jakarta or other cities. In this way they became less dependent on the farmers but more dependent on new masters outside their villages.

Table 3.15 Kind of land control of the sample families of the three strata

	Kobak Kendal			Sidariwan			
Status of land	1	2	3	1	2	3	Total
Land owned	8	–	–	6	4	3	21
Pawned land	1	4	–	1	2	2	10
Sharecropping	1	2	–	3	4	1	11
No control of land	–	4	10	–	–	4	18
Total	10	10	10	10	10	10	60

Family: changes in aspirations and expectations

Obviously children of today are the adults of tomorrow. Therefore the research has focused on the aspirations of the parents for their children and on the aspirations formulated by the youngsters themselves. In both villages information was collected from the parents by listening to spontaneous conversations and by asking questions before and after the formal interviews and at occasional meetings. Direct information from the youngsters themselves was obtained in a different way in the two villages. In Sidariwan a group discussion was held and recorded with a group of children in the age group 10 to 17.

In Kobak Kendal a sample of children from the three strata, as shown in Table 3.16, wrote an essay about their aspirations concerning education, work, residence, companionship between boys and girls and in regard to family life.

The children of the primary school were selected from the fifth and the sixth class. Children of this age are almost adults according to village norms (formerly children of this age were already preparing for marriage), their writing is readable and these children are already able to formulate their opinions and feelings. These children were classified by asking them about the land cultivated by their parents and whether their parents were merchants or peddlers.

Table 3.16 Sample of children in Kobak Kendal

Stratum		Boys	Girls	Total
1	(Primary school)	10	9	19
1	(Junior high school)	7	2	9
2	(Primary school)	9	9	18
3	(Primary school)	8	7	15
Total		34	27	61

The following are the findings of their aspirations concerning education, work, place of residence, companionship between boys and girls, family life and their expectations.

Aspirations in regard to education, work and place of residence

Boys and girls of strata 1 and 2 in both villages hope to be able to obtain religious education or to go to public schools and to enjoy education at as high a level as possible. This aspiration is stronger in the village of Kobak Kendal and is higher among the boys than among the girls. The highest education aspired to among the youth of stratum 3 in Kobak Kendal is in teacher training, whereas in the village of Sidariwan secondary education was not mentioned at all by youth of stratum 3. The aspiration to go to public schools is related to the level of communication between parents and the outside world. Boys of stratum 1 in both villages hope to find pleasant work such as teaching or engineering or they hope to become farmers. Boys of strata 2 and 3 mentioned more frequently that they would like to become farmers. Others would like to become soldiers or engineers or doctors.

A number of the boys would like to move to a big city. Others would like to remain in their own village. The girls on the other hand generally would like to stay in their own village or move to a nearby village.

Table 3.17 Net incomes in rupiah of respondents in 1985

		Net incomes Stratum		
Village		1	2	3
Kobak Kendal	Highest	4,560,000	1,080,000	570,000
Lowest	1,320,000	180,000	210,000	
Average	2,160,000	900,000	360,000	
Sidariwan	Highest	3,360,000	900,000	480,000
Lowest	1,200,000	300,000	240,000	
Average	2,040,000	720,000	360,000	

Family: changes in economic base

The modernization of agriculture, including the introduction of hand-tractors, together with new employment opportunities have resulted in an increase in real income in the desas and villages of the research.

Some of the richer farmers have become active in the brackish fishponds and in the shrimp and crab culture. Some others are engaged in the buying and selling of rice, fish and in transportation. A number of families in strata 2 and 3 in Kobak Kendal have obtained a new source of income by salting and selling fish. Others from Kobak Kendal and Sidariwan have obtained new sources of income by becoming petty traders, construction workers in the cities, engaging in transport, etc.

Average rice production has increased to about 4 to 5 tons per hectare. Since about 1975 rice has been planted twice a year. A crop failure in 1977 became a challenge to develop agriculture and to look for other sources of income. The resulting increase in income from agriculture, however, benefited foremost the landowners and to a lesser degree the sharecroppers. It is difficult to estimate the real income of farm hands and those who have their income from non-agricultural sources, but there is no reason to conclude that their real incomes went down.

Table 3.17 provides data about the highest, lowest and average net incomes of the sample in 1985, calculated from

Table 3.18 Net expenditures in rupiah of respondents in 1985

		Net expenditures Stratum		
Village		1	2	3
Kobak Kendal	Highest	4,200,000	1,080,000	570,000
Lowest	1,200,000	180,000	210,000	
Average	2,040,000	720,000	360,000	
Sidariwan	Highest	3,120,000	900,000	480,000
Lowest	1,080,000	300,000	240,000	
Average	1,800,000	600,000	360,000	

the results of the interviews.

Additional income of the respondents is not included in Table 3.17. Some respondents of stratum 1 in Kobak Kendal obtained additional income from trading rice and fish. Some respondents in Sidariwan had an additional income from fish ponds and from trading. A number of respondents from strata 2 and 3 obtained an additional income from catching fish and collecting firewood and from gifts from their children or relatives.

Table 3.18 provides data about the highest, lowest, and average net expenditures of the sample in 1985, calculated from the results of the interviews

Not included in the date of Table 3.18 are:

Stratum 1:	Expenditures for education of children going to school outside their desa.
Stratum 2:	Expenditures for education of children going to school within their own desa.
Stratum 3:	Expenditures for clothes.

These expenditures, however, are probably met from additional income not yet included in the data of Table 3.17.

The highest, lowest and average expenditures per month and for the year 1985 (twelve months) are included in Table 3.19.

Expenditures for food as reported in Table 3.19 were calculated from the data obtained in interviews with the sample families. These data suggest that almost all income

Table 3.19 Expenditures in rupiah for goods by the sample families in 1985

		Expenditures Stratum		
Village		1	2	3
Kobak Kendal	Highest	2,160,000	960,000	540,000
Lowest	900,000	180,000	180,000	
Average	1,440,000	720,000	360,000	
Sidariwan	Highest	2,160,000	840,000	480,000
Lowest	900,000	300,000	216,000	
Average	1,440,000	540,000	360,000	

of strata 2 and 3 is used for food. There are doubts about the exactness of these data, although the female respondents, who provided the data about expenditures for food, know exactly the food prices and answered questions without much hesitation. On the other hand these data show that the families of strata 2 and 3 have a very small margin or no margin at all for other expenditures, except if they have some small additional income. It may also mean that these families sometimes eat less than usual. These data mean also that these families easily run into debts or are assisted by other families if there is unexpected expenditure.

CONCLUSION AND IMPLICATIONS

Some general conclusions

Rapid increases in Indonesia in rice production since 1969 were made possible by a combination of the following factors:

1. Panca Usaha or the five efforts (HYVs, fertilizers, pesticides, improved cultivation, irrigation).
2. Mechanization of agriculture, including the introduction of small hand-tractors.
3. Agricultural extension.
4. Co-operation and co-ordination of agricultural extension with national and local government.

Rapid diffusion of small hand-tractors in the village Kobak Kendal has occurred since 1982, and slow diffusion of handtractors has occurred in the village Sidariwan since 1984. Key informants with a good knowledge of the village communities Kobak Kendal and Sidariwan are of the opinion that the diffusion of small hand-tractors had a bigger impact on these communities than other innovations in agriculture.

Only the following changes are directly due to the introduction and diffusion of small hand-tractors in Kobak Kendal and Sidariwan:

1. Time needed for land preparation was reduced from four to six weeks to one to three days.
2. The wives of the farmers obtained much more free time than they ever had before, because formerly they had to cook for the workers in the field during a rather long period of land preparation.
3. The problem of labour shortages at the time of land preparation was solved.
4. There occurred a displacement of farm labour; on the other hand the change to two crops per year created new work opportunities in agriculture.

Changes in social structure

The following changes in social structure were observed in the two villages of our field research:

1. A growing dependency of the desa government on the national and the provincial government.
2. A growing gap between families of higher social strata and families of lower social strata.
3. A growing orientation on the city together with growing commercialization in families of the higher strata.
4. Growing independence of the families of the higher strata from the village government; a new economic elite is emerging.
5. A growing dependency of lower strata on the cities for jobs and for earning their income.
6. A growing interdependence between all strata of the villages and the cities.

7. A decrease in participation in traditional community ceremonies, gatherings and mutual help activities reflected the changes just mentioned.
8. A trend that the families spend less today on the occasions of festivities and family events.

Conclusions about impact on the family

The following impacts on the family were observed: changes in the roles of the family, impact on children, impact on rural labour, changes in occupation and skills, relationships with the community and with the marketing sector, influence in the community, mobility, changes in aspirations and expectations and in the economic base. The impacts on family life are due to the cumulative effects of the modernization of agriculture (including mechanization), changes in social structure, education, improvement of health and communications, democratization and modernization in general. The impacts mentioned below were observed in both villages, except when indicated otherwise. Many of these impacts, however, were stronger in Kobak Kendal than in Sidariwan.

Family: changes in roles of the family

1. A growing degree of psychological 'togetherness' of husband, wife and children.
2 Greater freedom and more responsibilities for women: the role of women is gaining in importance, especially among strata 1 and 2.
3. Improvements could be observed in hygiene, including sanitation and food consumption, mainly due to the role of women.
4. Family decisions are increasingly made jointly by husband and wife, especially about land preparation, use of the rice harvest, health and recreation.
5. Only in the village of Kobak Kendal: influence of city culture on names given to newly-born children and on names used in addressing older people.
6. The families have more leisure time.

Family: impact on children

1. An increasing number of children are attending primary and secondary schools and a decrease in drop-outs can be observed. As a result there is a change in the aspirations of these children.

Family: impact on rural labour

1. The problem of labour shortages at the time of land preparation was solved.
2. There occurred some labour displacement, but on the other hand new job opportunities were created by more intensive cultivation, including a change from one to two rice crops per year, and many people found new jobs both in rural and in urban areas.

Family: changes in occupation and skills

1. There occurred a differentiation of skills in agriculture.

2. A number of the farmers found new work in the newly developing shrimp and crab culture along the coast or became employed as construction workers in cities.

Family: influence in the community

1. Tractor-owners and 'rich farmers' are becoming increasingly influential alongside school teachers and teachers of religion.

Family: mobility

1. The villagers travel over increasingly longer distances for family visits, education, health care, shopping, and to find alternative job opportunities.
2. Orientation on city life is becoming more and more manifest.

Family and community relationships

1. A differentiation of elites could be observed into a political, an economic and a religious elite.
2. A decrease in participation in traditional ceremonies connected with rice cultivation.
3. An increase in attendance at national ceremonies, often not in the village but in the desa or subdistrict.
4. An increase in attendance at religious Islamic ceremonies.
5. A decrease in cultural decision making by government officials at desa and subdistrict level and for religious activities by religious leaders.

Family relationships with marketing and other sectors

1. Relationships with markets and urban centres developed: surplus rice was sold and agricultural inputs had to be bought.
2. Clothes, books, televisions, radios, medicines are increasingly bought at markets and in urban centres.

Family: changes in aspirations and expectations

1. There is a general longing for a better life, especially by the children, including better houses, education, health, water, work conditions, etc.
2. There is a strong trend that boys do not like standing in the mud preparing the rice fields any more; instead many of them would like to move to the cities, do a pleasant job and receive a monthly salary.
3. Several of the boys of stratum 2 hope to go to a religious school (pesantren) then return to their villages to till the land and eventually buy new land.
4. There is a clear trend that boys and girls hope to marry later than was the custom and that the number of divorces will decrease.
5. There is a trend that boys and girls of strata 1 and 2 do not wish to have a large number of children.
6. Adults expect improvements and better maintenance of roads and of the irrigation system.

Family: changes in economic base

1. A process of diversification of sources of income was observed.
2. Income in stratum 1 increased considerably.
3. A slight increase of income could be observed in stratum 2.
4. It was difficult to obtain a clear picture about changes of income in stratum 3: the general impression was that incomes in stratum 3 did not change. However, some families complained that their incomes had gone down.
5. Nationwide slight increases in agricultural wages were reported, but wages in the construction industry showed bigger increases.

Comparison between Kobak Kendal and Sidariwan

1. Changes in Kobak Kendal and Sidariwan are very similar.
2. All changes and impacts on the family in Kobak Kendal are ahead of changes in Sidariwan, as is shown in the summary below:

Table 3.20 Changes in Kobak Kendal and Sidariwan

Changes	Kobal Kendal	Sidariwan
Road transportation	Frequently	Far less
Hand-tractors in 198.5	Fifteen	One only
Rapid diffusion of handtractors	Since 1982	–
Mechanized tillage	More	Less
Commerce	More	Less
Initiatives in the economic field	More	Less
Decrease in share cropping	Quicker	Slower
Number of televisions, etc.	More	Less
Number of permanent houses	More	Less

Table 3.21 Impacts on the family in Kobak Kendal and Sidariwan

Impacts on the family	Kobak Kendal	Sidariwan
Increasing role of women	More	Less
Increase in joint decisions by husband and wife	More	Less
Division and differentiation of responsibilities	More	Less
Small changes in food habits	More	Less
Differentiation of clothing	More	Less
Names given to newly-born children	Traditional and ‘urban’	Traditional
Addressing of older people	City influenced	Traditional
Percentage of school-going children	Higher	Lower
Differentiation of skills	More	Less
Increase in family mobility	More	Less
Development of economic elite	More	Less

Impacts on the family	Kobak Kendal	Sidariwan
Development of relations with marketing sector	Quicker	Slower
Aspirations for advanced education	More	Less
Companionship between boys and girls	More	Less
Desire for boys to choose their wives themselves	Stronger	Weaker
Desire to have fewer children than their parents	Stronger	Weaker
Differentiation of sources of income	More	Less
Increasing differentiation in income	More	Less

Implications

The following are some implications for the family, the community, the government and for further research.

Implications for the family

1. Greater orientation on the cities.
2. Later marriages for the children, more and higher education and a bigger role in the choice of spouse.
3. Increasing importance of role of wives in family life and in economic, social and religious activities.
4. Increasing division of responsibilities and more joint decisions between husband and wife.
5. Improvements in housing, sanitation, clothing, health and food.

Implications for the desa community

1. Desa governments to give support to development programmes adapting them to local conditions.
2. Religious community to provide religious education and moral teaching related to development.
3. Local schools to emphasize civic responsibility and a better lifestyle.
4 Desa governments to develop local programmes of development, through desa community council.

Implications for government

1. Special attention to post-harvest problems, pricing policies and diversification of agriculture.
2. Priority to services to rural areas including new job opportunities, formal and non-formal education, housing, recreation, sport and transport, including construction and maintenance of roads.
3. Monitoring and maintenance of irrigation systems.

Areas for further research

The following areas for further research are suggested:

1. Alternative patterns of tractorization.
2. The organization of the irrigation system.

3. Agrobased industries.
4. Development communication: effectiveness of the two-way communication between government authorities and the village population.
5. Changes in patron-client relations.
6. Impact of modernization of agriculture on rural labour.
7. Changes in leisure-time activities.
8. The use of house-compounds and the cultivation of secondary crops.
9. The contribution of pesantren (religious) education for agricultural development.

Reactions to research

No opposition to the research was observed. On the contrary the permission of the government caused maximal co-operation from the desa governments. The villagers moreover were very charmed by the ladies in the team who performed most of the research work in the villages.

Selected rural issues

Changes in agriculture and the resulting surplus of rice caused the following challenges to the government and the farmers in the villages:

1. The first harvest every year is in the months February-March, when it is very difficult to dry the rice. Moreover a number of villages are not accessible in rainy weather because of the bad condition of the village roads. These two factors resulted in a sharp fall in the rice prices in some areas in February-March 1985.
2. To cope with the problems of wet rice, rice dryers have been designed and are being introduced.
3. To improve the quality of rice, new rice milling units are being installed so that this rice eventually can be exported.
4. Difficulties in exporting rice can be understood if it is appreciated that Thailand has a stock of about 9 million tonnes of rice.
5. The government is hardly able to store the surplus of rice. In November 1985 the BULOG had stored about 3.5 million tonnes of rice in Indonesia and had difficulties in channelling this rice to the market because of oversupply.
6. Pesantren education: pesantrens are Islamic religious schools, generally located in rural areas. Generally people are of the opinion that pesantren education only prepares its pupils for religious observance. Further discussions, however, revealed that pesantren education supports the development of skills related to agriculture in an indirect way. The general pattern is that pupils in the pesantren cultivate the wet-rice fields of the leader of the pesantren. In this way they develop skills and attitudes related to agriculture and a feeling for village life without being very conscious about it.

Further study of this issue may be valuable for the development of agriculture and village society.

NOTES

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Map 3.1 Regencies of West Java (scale 1:2,250,000)

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Map 3.2 Subdistrict (Kecamatan) Pedes (scale 1:100,000)

Chapter Four
KOREA

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INTRODUCTION

Rural communities in Korea were traditionally characterized by a deeply rooted 'vicious circle of poverty', rural unemployment and underemployment, a large illiterate population, little experience in modern organization, little access to modern technology and a fatalistic view of the natural and social environment. (1)

For two decades of rapid industrialization and urbanization the Korean government's major goals for the agricultural sector have been national food security, income equity for rural families, price stability, and rural welfare. The government has pursued these objectives through policies and strategies that have resulted in high levels of self-sufficiency in most foodstuffs produced domestically, virtual equality of farm and non-farm household incomes, and minimal seasonal variations in producer and consumer prices for agricultural products.

Korean agriculture has flourished in this supportive and increasingly protective environment. Over the past two decades rapid increases in the use of farm chemicals and machinery and improvements in the quality of farm land— through irrigation, drainage and land development—have increased yields and labour productivity. Productive yields for most crops are high by international standards. Except for wheat, corn, soya beans and beef, self-sufficiency ratios for the main crop and livestock products are 90 per cent or over due to using new technologies. Local agriculture provides consumers with ample supplies of staple grains and a good selection of other food products. Farm families have income levels about equal to urban workers and can afford the amenities of modern life at levels similar to urban families. For both producers and consumers, seasonal price fluctuations for agricultural products have been reduced substantially compared to those of the early and mid-1970s.

Another important government objective that is not strictly agricultural but which affects policies for that sector is maintenance of population dispersion throughout the nation. Although there has been a large migration to the two major metropolitan areas of Seoul and Busan, 40 per cent of the Korean population still lives in rural areas and urban centres with populations of less than 100,000. (2)

The government's basic objectives for agriculture are unlikely to change much in the foreseeable future and there is no reason why they should. However, changing conditions of the economy, nationwide, and in agriculture suggest a need for policy changes and for decisions on the desired character and role of the sector in the future. The present small-farm, labour-intensive agriculture with most rural families relying on farm earnings as their primary income source cannot be sustained if the basic objectives are to be met without introducing serious economic inefficiencies. The overall set of government policies and programmes that was so successful in the past is unlikely to be either feasible or desirable in the future.

The fundamental problem for rural areas for the future arises from the success that has been achieved in the 1960s and 1970s. Development of irrigation and adoption of improved technology over the past twenty-five years have essentially solved the agricultural supply problem. Of the commodities suitable for domestic production, Korean farmers now produce as much as their markets will absorb. And given the relatively high average income and consumption levels nationally, overall demand for agricultural products is unlikely to expand much faster than the population growth rate, i.e. about 1.6 per cent per annum. Because Korea has little potential to compete in agricultural export markets, this effectively sets a limit on the rate of growth of the real value of agricultural output and farm incomes that is substantially below 5–7 per cent per annum, increases expected in manufacturing and other non-agricultural sectors.

Continuing the past policies and strategies stressing resource development with technology would almost certainly lead to persistent agricultural surpluses, particularly of rice, that could be disposed of in export markets only at very substantial financial losses. Moreover, because the most attractive and least costly investments have already been undertaken, this strategy would entail more cost and lower return resource development. Therefore, rural development in Korea should be viewed as a complex process of changes in rural sub-systems and their interaction, leading to desired improvements in rural income, employment opportunities, income distribution, rural welfare, and other aspects of rural living. Particularly, identifying appropriate technical inputs needed to stimulate rural development in Korea should be given priority in rural development planning.

The objective of this study is to investigate the social impact of the new technology on the Korean rural community. First, the paper analyses the policy impacts on the agricultural sector through the first, second, third, fourth and fifth five-year economic and social development plans. The Korean government has implemented and transformed several policies on technology in rural development with new yield varieties of seed, agricultural machinery, chemical fertilizers, land development and new management techniques. In particular the rural integrated development programme which was started in the early 1970s, has influenced the improvement of rural communities not only in the rural infrastructure but also in the values and attitudes of rural farmers. The Korean government has recently focused heavily on the introduction of agricultural machinery. This section also seeks to analyse the impact on the rural integrated development programme.

Second, the study seeks, through a field survey in rural villages, to evaluate the policy impact on the technology for rural development. Rural development is viewed as a deliberate process in which different kinds of action agents and personnel are mobilized to bring about fundamental changes in various aspects of rural villages, ranging from individual farmers to organizations and the environment. It provides an analysis of the family unit of production and then discusses those aspects of rural communities which are relevant to the identification of changes in the context of rural development in Korea. Rural development often requires far-reaching change in the values and attitudes of community people toward their life and society. (3)

The field survey assesses and evaluates the impact of macro-policy analysis in the agricultural sector in Korea. The survey comprised an examination of two rural villages of An-Seong county, Gyeong-Gi province, in October 1985. The methods for analysing rural communities include a field survey, interviews, a content analysis, in addition to a document analysis and literature survey. They include an analysis of the socio-economic background of rural farmers, changes in family relationships, changes in community relationships, changes in expectations, changes in mobility, changes in the economic base for the family, and in the management of agricultural machinery. These data were collected through interviews with rural farmers of two villages selected through random sampling. The total number of farmers in these villages was 198. This survey provided additional information for comparative analysis between developed and underdeveloped villages.

Finally, this study will, it is hoped, suggest policy implications and future research.

GOVERNMENT POLICY ON TECHNOLOGY FOR RURAL DEVELOPMENT

The role and review of technology in rural development

The country of Korea has a land area of 98,000 sq km and a population of about 41 million. As most of the country is mountainous only 22 per cent of the total land area is cultivable. The population density of 400 per sq km and 18.2 per hectare of farmland is one of the world's highest. Because of high population pressure, the land available for agriculture is intensively developed and makes considerable use of agricultural technology.

The fundamental role of technology in rural development is to upgrade the welfare and increase the production of the small—and medium-scale farmer. Identifying appropriate technical inputs, therefore, needed to stimulate rural development should be given priority in integrated development planning. Technology embraces a range of definitions, a vast spectrum of 'tools', 'software', and 'hardware' components, social organization and production machinery. To maximize benefits, modern technologies must be properly located in an articulated spatial system and complemented at different levels in a spatial hierarchy by metropolitan, intermediate and village-level technologies. A variety of technologies must be made available to Korea that is appropriate to her physical and socio-cultural environment.

Many agricultural research projects under way in Korea during the last two decades were directed toward discovering new and better ways to grow crops, to manufacture more efficient tractors and farm machinery, to produce superior livestock and more effectively to communicate and manage agricultural information. (4) Considering the wide range of technologies now under development, there are many ways available to increase crop productivity. There is widespread recognition within the agricultural research community of the problems associated with new yield varieties, soil erosion, water availability, farm machinery, and loss of farmland for non-farm purposes. Technology acceptance by the farmer will ultimately depend upon its impact on overall profitability. Improved seed treatments will simplify and reduce the cost of applying chemicals to field crops. A more sophisticated treatment of chemicals needs to be developed that will adhere better to seeds and provide longer-term protection. The farmer will concentrate heavily on the efficiency of resource use, not just total production output. The farmer's ability to deduce risks associated with crop production, both in terms of crop yields and price fluctuations, will be an important determinant of success.

Water management is one of the important technologies in Korean rural communities. Water conservation technologies, such as drip or trickle irrigation, will be increasingly used on high-value speciality crops. Improved water usage efficiency will come from improved irrigation practices. (5) The Korean climate is temperate and rainfall, averaging 1,200 mm, is adequate for the high production of most suitable upland crops. Crop husbandry in Korea is generally excellent with a high use of improved seeds, inorganic fertilizers and other chemical inputs.

The Green Revolution in Korea demonstrated that a spatially-linked network of technologies is needed to make the introduction of new high-yield seed varieties successful, with technical inputs coming from both urban centres and rural areas. The components, equipment and skilled manpower needed to test new seeds, construct irrigation systems, and operate new equipment are likely to be drawn, in Korea, from urban centres. Green Revolution hybrids must be manufactured using chemicals and petroleum products imported through the large cities; their distribution to farmers depends on the existence of transportation networks between urban and rural areas and within rural regions and on the extension of urban services and facilities to fertilizer production sites. (6)

In agricultural machinery, the farmer generally gains many benefits from greater automated tillage and harvesting systems. Because the equipment will generally be more expensive and complex, its rate of adoption will depend upon its ability to increase the crop producer's efficiency by: (i) reducing time and labour in the field; (ii) increasing crop yields or reducing crop losses; (iii) improving crop quality, thus commanding a higher price; (iv) reducing fuel and crop drying costs; or (v) reducing the quantity of fertilizers and pesticides by a more precisely controlled application. Farmers will have to evaluate the costs/benefits of more automated systems based upon their own economic situation. A major constraint on implementing rural development strategies is the difficulty of determining the most effective combination of technology inputs for promoting rural growth.

Rondinelli and Ruddle consider that new technology introduced into rural areas must be adaptable to local conditions, problems and needs. Among basic criteria for choosing appropriate rural technologies should be their suitability in terms of: (i) capital expenditure in relationship to what area residents can afford; (ii) labour-extensive potential-technologies transferred and adapted by rural people should increase the amount of labour used or improve its productivity; (iii) smallness of scale, in that the production from new technology does not oversaturate a limited domestic market and inhibit other entrepreneurial activities; (iv) low-level skill requirements—that is, technologies transferred to rural areas should not have high skill requirements nor should it be assumed that large numbers of technically competent people will be available to operate them; (v) input requirements that use domestically or locally available materials; and (vi) market-orientated product characteristics, in that products developed should be useful to local residents, relatively inexpensive, durable, versatile, and not cater exclusively to the demands of the wealthy. To stimulate rural development, a balance must be struck between traditional and modern technologies, each having its appropriate functions at different levels of the spatial hierarchy for communities at different levels of economic development and social change. (7)

A strategy of rural modernization must deal with the multiple and interlocking forces that influence rural life. (8) Taking ecological, cultural and social conditions into account, rural development projects must be designed to strengthen productive enterprises and social services in rural areas. The rural policy in Korea contends that agricultural technology must be adapted to local conditions, institutional and social changes must be induced to transform existing behaviour patterns, and new political and administrative mechanisms must be designed to implement rural programmes. It is suggested that advocates of village technology assume that innovation should begin at the current level of village technical competence, materials should be available locally at relatively low cost, and the technology should be capable of operating under the local maintenance and repair system. Village technology in Korea, therefore, will seek to reduce bottlenecks and constraints in production systems.

A review of government policies and programmes on technology for rural development

The importance of agriculture in the economic development of Korea has come to be recognized increasingly in recent years. A number of causes have contributed to this change. Rapid population growth has focused attention on the need to expand food production. At the same time, the success that has been achieved in obtaining dramatic increases in crop yields through the use of new agricultural technology has demonstrated that agriculture offers excellent investment opportunities.

The Korean government has implemented a variety of technologies, appropriate to the different social, economic, technical, and administrative capacities of communities of different sizes and stages of development. Technology— equipment, procedures, and methods of production—must be integrated

spatially and functionally, since no single technological innovation will promote social and economic transformation in Korea unless it is appropriate to local needs and conditions and linked to both higher and lower levels of technology and related inputs. The first, second, third, fourth and fifth five-year social and economic development plans and the Saemaul movement provide the basis for analysing the government policy on technology for rural development in Korea.

Review of the five-year social and economic development plans

The first five-year development plan for economic growth was implemented during 1962–6. The basic goal of the plan was to build a foundation on which to attain a self-sustaining economic growth through establishing a set of pre-conditions. The agricultural policies were focused on economic goals and included as: (i) development of viable farm units through regional farm development; (ii) expansion of arable land and pastures; (iii) maintenance of the prices of farm products at 'reasonable' levels; (iv) promotion of the livestock industry; (v) development of forestry resources; and (vi) fostering of farm organizations at various levels. (9)

The government launched various programmes to boost agricultural production, including the expansion of irrigation facilities, slopeland reclamation by bench-terracing methods, increased supply of fertilizers and pesticides and the strengthening of agricultural credit. A total of ten billion won or 22.3 per cent of total agricultural investment was allocated for expanding and improving irrigation facilities, and 53,000 hectares of paddy land were brought under irrigation during the plan period. Paddy consolidation projects involved consolidation of small irregularly shaped paddies into single, larger units of uniform shape. The effort was to include improvements of irrigation and drainage ditches, installation of on-farm water control structures, and construction of feeder roads to provide better access to the fields. Tideland development and slopeland development projects were also intensively carried out during the pre-condition stage.

The government spent about two billion won or 4.4 per cent of total agricultural investment outlays in the agricultural research at the time. A total of 125,000 m/t of improved seeds of various crops, such as rice, barley, soyabeans, and corn were distributed to local farmers: 100,500 demonstration plots by 14,000 efficient farmers were established to disseminate improved fertilizer application and improved farming techniques; and emphasis was also placed on training local volunteer leaders and rural youth through 4-H Club activities.

As a measure to attain self-sufficiency in fertilizers, the government stepped up the building of fertilizer plants during the first plan period. Moreover, the government sold fertilizers available for farmers at subsidized prices, lower than those on the international market, and extended credit for the purchase of fertilizers at relatively low interest rates. The other new technology for farming in this period was in the area of blight control. Until the beginning of the 1960s, agricultural chemicals had been used almost entirely for cultivation of fruits and vegetables. The law on prevention of epidemics in agriculture, enacted in December 1961, marked a turning point for insect and disease control in Korean agriculture, and annual consumption of agricultural chemicals of various kinds increased from 7,400 m/t in 1962 to 12,600 m/t in 1966, approximately a 70 per cent increase during the first five-year plan period.

In the farm mechanization programme related to technology policy, the major attention of the government was directed to lower-level technology such as water pumps and powered sprayers and dusters together with such hand-driven equipment as deep ploughs and hand carts. Total investment and loans for this programme amounted to 757 million won during the period, of which about 310 million won, or 40 per cent, was spent to subsidize the price of water pumps. Successive crop failures in 1962 and 1963 due to

drought and plant diseases were major reasons for this government's concentration on the distribution of water pumps and powered sprayers and dusters.

These policies and strategies of the first plan, however, were not implemented in full. The creation of optimum farm units was stalled because such a comprehensive programme could not be undertaken with an average farm holding of less than one hectare. The idea of abolishing the ownership ceiling of three hectares was intermittently suggested with a view to expanding the scale of farming, but was never enforced. Specific policy was not implemented to develop large-scale commercial livestock farms, due to limited feed resources and a lack of transportation, processing and marketing facilities.

The second five-year economic plan (1967–71) was designed to achieve the modernization of industrial structure and acceleration of economic growth so as to attain a self-sustaining economy. Agricultural production was planned to grow at an annual rate of 5 per cent over the plan period, and the basic objective of the agricultural sector was an adequate supply of food. The government was to focus on agricultural development strategies including: (i) increased food-grain production and attainment of self-sufficiency in staple food by 1971; (ii) development of intensive farming areas under the principle of suitable-crop-for-suitable-area; (iii) farm price supports to provide greater incentives for increased production; (iv) promotion of the livestock industry through a stable supply of food; and (v) increased agricultural exports through promotion of exportable farm products.

The investment and loans for the agricultural sector were substantially expanded to improve the product base. The highest priority was given to the development of land and water resource projects. Construction and improvement of small irrigation systems was by far the largest programme, accounting for about 70–80 per cent of the total investment and loans in land and water development programmes in most years during the plan period. Government support was given to paddy consolidation, upland reclamation, and tideland development projects. A total of 95,000 hectares of paddy land was rearranged, 42,000 hectares of hillside land reclaimed, and 1,200 hectares of tideland developed into paddy land during 1967– 71. (10)

A seed improvement programme for such crops as rice, barley, and soya beans was expanded intensively during the plan period. Agricultural research was continuously expanded to improve farming technology, particularly to improve the efficient application of fertilizers and pesticides. The increase in fertilizer use was due in part to the government policy of making sufficient supplies available to farmers at full subsidy in an attempt to correct soil acidity, and the use of agricultural lime has increased from 175,000 m/t in 1966 to almost 500,000 m/t in 1971.

Farm mechanization was a very important strategy in this period aimed at enhancing the agricultural product. Rapid industrial and urban growth during the 1960s stimulated off-farm migration at a pace that resulted in a decline in both farm population and labour, and motivated the government to promote much greater mechanization. The government established a unified machinery inspection programme in 1966 to test manufactured and imported machinery for compliance with government specifications. The Korean government provided direct subsidies of grants and credit to farmers for machine purchase in rural areas. A total of twelve billion won was spent on farm machinery during the plan period, of which approximately nine billion were spent by the government in the form of subsidies and credit loans. Of the total spending on farm machines, the government subsidized about 39.5 per cent, which compared with 44.4 per cent during the first five-year plan period.

During the second plan, the government emphasized small-scale irrigation projects, such as the construction of weirs, pumping stations, and tube well irrigation, but the third five-year economic development plan shifted its emphasis to the larger-scale development projects. Development strategies for the rural sector in the third five-year economic development plan (1972–6) were laid down within the framework of the basic objective of a balanced development between agriculture and industry. The policy

included: (i) the achievement of a more equitable income distribution and improved rural infrastructure through rural electrification, farm road construction, and housing improvement; (ii) accelerated expansion of foodgrain production and the achievement of self-sufficiency in rice; (iii) development of land and water resources in order to achieve all-weather farming; (iv) accelerated farm mechanization through increased mechanization; and (v) improved marketing, storage, and processing facilities to provide the necessary services required by commercialized agriculture.

The integrated plan for Four Major River Basins development was set out in 1971 and included the construction of thirteen dams and power plants. The afforestation and erosion control projects on watershed areas of the four rivers were planned. The government planned to invest 560 billion won for these projects during 1971–81, of which 165 billion won were earmarked for agricultural projects on areas of 215,000 hectares. In addition, paddy consolidation projects continued to be promoted to facilitate farm mechanization and increased farming efficiency. The total area of paddy fields rearranged under this programme amounted to 251,000 hectares by 1976.

Farm mechanization was emphasized for adoption by the majority of rural communities in the plan period due to rising rural wage rates and labour shortages during the peak season. In spite of significant increases in the use of powered farm equipment during the second plan period, the absolute level of mechanization was still low. There were only 16,842 power tillers in use in 1971, an average of one tiller for 147 farm households. Although the use of power-driven threshers, water pumps, sprayers and dusters was relatively widespread, there was still only one thresher for thirty-nine farm households, one water pump for forty-three farm households, and one power-driven sprayer for thirty-six households.

The third plan called for an increase of 90,000 power tillers during 1972–6. The target increase for power threshers was 60,000 and that for power sprayers 53,500. Power tillers in use increased to 85,722, more than five times the level in 1971, or an average of one power tiller per twenty-nine farm households. There were 65,993 water pumps, an average of one pump per thirty-eight households, 137,698 power-driven sprayers and dusters or one per eighteen farm households, and 127,105 power threshers or one per twenty farm households.

Total government outlays for farm mechanization during 1972–6 amounted to 8.5 billion won, of which 1.5 billion were provided as direct subsidy and 2.3 billion as loans for purchase of farm equipment.

Farmers could apply for loans up to 70 per cent of the purchase price of power tillers and 50 per cent of the cost of other equipment. The subsidy component in farm equipment purchases, which averaged 30 to 50 per cent of the purchase price during most of the 1960s, was reduced to 10 per cent or even less during the third plan period except for water pumps, which continued to receive a higher subsidy. (11)

A major step forward in production was the development of a new rice variety IR 667 (Tongil) which yielded on the average 25 to 30 per cent more than traditional varieties when grown on well-irrigated paddy and accompanied by improved cultural practices. The average area planted to this variety rapidly increased from 200,000 hectares in 1972 to 306,000 hectares in 1975. The primary sector attained the relatively high rate of growth of 5 per cent per annum during the third plan period. This was made possible mainly through maintenance of the high grain price policy instituted in the late 1960s, through development of new varieties such as Tongil rice and through expansion of investments for agricultural development.

The impact of the third plan was to improve the agricultural marketing service systems. There was considerable public and private investment in marketing facilities, but inadequacies were found in facilities for storage, processing, and distribution. An investment of forty-two billion won was allocated during the plan period, with most of the proposed investment going to the agricultural co-operatives for the government's grain supply management and for the buffer-stock operation of selected farm products.

The most notable effort in the field of rural development during the plan period was the rural integrated development programme (Saemaul Movement) which became an important national-level strategy in 1973.

Two major objectives of government agriculture policy expressed in the fourth five-year social and economic development plan (1977–81) were to increase economic self-sufficiency and to improve the welfare of all sections of the community, especially rural dwellers. The first implied continuous investment in agricultural production to use new technology. The second implied improvements in education, rural electrification, roads, telecommunications, housing, water supply, public health and social security.

One of the specific strategies for the plan was sustained growth of agriculture and fishing to ensure a growing domestic supply of food. This objective was to be attained by increased irrigation, drainage, agricultural mechanization, and land consolidation and reclamation; the use of high-yielding varieties such as Tongil, Yushin and Milyang and an increase in livestock production. The other strategy increased household income from farming and fishing. This was to be attained as a result of agriculture's sustained growth, the development of rural industry, and the improvement of the agricultural marketing system. The third strategy was to enhance the rural living environment. This was to be achieved through rural infrastructure activities ranging from small-scale improvements to village drains to sophisticated large-scale utility or irrigation projects.

The expenditure associated heavily with the rural integrated development programme was for community centres, common workshops, warehouses, village roads and bridges.

The basic change between the third and the fourth plans was the substantial increase in mechanization not only in quality but also in quantity. A very important issue in this period was to produce a power tiller that could increase the rate of tillage and theoretically reduce labour demand during peak periods. If power tillers were to reduce labour requirements in peak seasons and increase the rate of tillage, lighter machines had to be developed and marketed. Moreover, if lighter machines could not be used for transport, they were required to be much cheaper than existing models because the hours of field work would be insufficient to make their use financially attractive to farmers. The models of the 1970s had the capacity to farm 3.5 to 5 hectares. The average farm size was only 0.9 hectares, and the legal limit on paddy land was three hectares. A smaller, even slower, tiller might then be more suitable for the conditions in the rural areas. Four-wheel tractors were uncommon in Korea—there were only 790 in 1976—and unlikely to be economical on terraces because most paddy fields were small. Reclaimed tidal land could be laid out to facilitate the operation of tractors. But even on the plains, it would be uneconomical for a farmer to own a tractor for use on a farm legally limited to three hectares. Research therefore was needed to determine appropriate means of leasing or contracting tractor services on a co-operative basis.

The fifth five-year social and economic development plan (1982–6) was formulated to balance development between urban and rural areas. One of the major goals of agricultural policy pointed out in the fifth plan was to increase agricultural and fisheries productivity and the incomes of farmers and fishermen. In order to enhance agricultural productivity, the Korean government decided to concentrate on a structural adjustment of agriculture and an improvement in the rural infrastructure. In the fifth plan the proposed investment in agriculture was 6,300 billion won or 8.7 per cent of total investment. Agricultural investment in strategic areas such as upland crops, agricultural mechanization, agricultural research and development, and agricultural marketing expansion, which in the past have been less emphasized due to heavy investment in the expansion of rice production, now receives high policy priority. The projects focused on paddy fanning included as large—and medium-scale projects for integrated agricultural development during 1982–6. The development of agricultural technology has been researched and implemented to enhance agricultural productivity such as the development of new varieties in rice, fruits and vegetables, and in soil conservation.

The target of the farm mechanization programme, which is to fully mechanize open-field farming by 1987, will be directed towards increasing the supply of transplanters and harvesting machines. The strategy of mechanized farming, which started to expand at the beginning of the 1970s has been applied to the tasks of tilling, soil-preparation, insecticide spraying, and threshing in rice production. The extent of mechanization will be expanded and applied to planting, harvesting, and other farming operations during peak seasons, thereby strengthening the base for integrated mechanization. The plan provides for about 70 per cent of tilling and soil-preparation tasks to be mechanized through the supply of an additional 300,000 power tillers. A series of farming operations will be mechanized in large-scale rice production areas, livestock production areas and in reclaimed land through the supply of tractors, harvesters and other power instruments. The mechanization policy has emphasized the supply of repair service systems for agricultural mechanization in rural areas. The policy has also focused on the use of co-operative mechanization systems for rural farmers.

The goal of the fifth plan was to achieve further economic growth with social equity and improve the quality of living standards by various development strategies such as social insurance, public housing and education. In order to continue the social equity in Korea, the government made a plan to improve primary income distribution by creating new jobs and strengthening education, health care, and vocational training programmes in both urban and rural sectors. The fifth plan also sought to improve the rural environment through electrification, sanitation, water supplies, insurance for agricultural productivity and housing improvements. (12)

The continued growth of the Korean economy will be dependent on technological innovation in agriculture and industry and through continued export expansion. Considerable improvements in agricultural technology have been achieved in Korea over the past twenty-five years. Initially the emphasis was on cash crops, irrigation and on the expansion of arable land. Of particular importance has been the breeding of high-yielding rice varieties. Cultivation practices have been greatly improved and there has been wide acceptance of chemical fertilizers, pesticides and herbicides, often specifically developed for particular crops in environmental conditions. The policy has also included agricultural mechanization and marketing systems.

Future plans should provide for the systematic promotion of social development which will in turn increase the long-term growth potential of the economy. To increase equity in income distribution, the distributive function of the market economy will be complemented by new social development measures including government expenditures on education, health, housing and environmental improvements.

Review of the Saemaul movement

The Saemaul movement was initiated to extend the growth effort to rural areas. It is understood as a movement for ‘better living’ through the improvement of living environments and increasing income accompanied by building up better work ethics among farmers, such as greater industriousness, greater self-reliance, greater co-operation, frugality and a positive attitude toward self-improvement. (13) During the first and the second five-year economic development plans extending from 1962–71, the economy grew at an annual compound rate of slightly less than 10 per cent. The high rate of growth performance was achieved by export-oriented industrialization. The growth of agriculture has lagged compared to that of the non-agricultural sector. Furthermore, there existed a significant disparity in income levels between the rural and urban sectors. The average farm household income was 65 per cent of an urban wage earner’s household income in 1969 and 80 per cent in 1971.

Low labour productivity, the low income in the rural sector relative to the urban sector, the disparity in incomes between the rural and urban sectors and high rates of open unemployment and under-employment in the rural sector have become important social, economic and political issues for national policy-makers. To improve the imbalance of development between the urban and the rural sectors, the national policy goals include the achievement of full employment and a more equal distribution of income through raising the income level of farmers. To achieve these goals an ambitious programme called the Saemaul movement was launched in 1971 based on pilot projects carried out in 1970.

The implementation of the rural integrated development programme was fraught with many problems and required a multi-disciplinary and, in many ways, an innovative approach. (14) It required a nationwide mobilization of relevant talent and energy, efficient largescale management and the co-ordination of conflicting interests and forces among various sectors of the population. Deliberate government efforts were necessary to provide the required financial, technical and organizational inputs essential for the effective implementation of integrated rural development programmes.

The Saemaul movement was implemented in several stages from pilot to regional project stage. The pilot stage is the beginning period. Based on the experimentation of 1971, the Saemaul movement was systematically organized in 1972, with major emphasis on: (i) improvement of the living environment, (ii) spiritual enlightenment, and (iii) an increase in farm income. In total, 16,600 villages were selected as having shown a self-help spirit during the 1971 project period, and each was provided with an additional 500 bags of cement and one ton of steel rods to encourage them to choose and carry out further projects requiring community co-operation. In 1972, a formal organization to promote the Saemaul movement was established, charged with the overall planning and co-ordination of all related activities.

The Saemaul Movement Central Consultative Council was organized under the chairmanship of the Minister of Home Affairs. Similar organizations were established at each successive level, i.e. province, county, township, and village. A Saemaul leader training institute was also opened.

In 1973, the Saemaul movement became a nation-wide movement in which all the nation's 34,665 villages participated. All villages in the country were classified into three categories by government standard: underdeveloped villages (18,415), developing villages (13,943), and developed villages (2,307). Underdeveloped villages were required to make an improvement in living conditions. Developing villages were to emphasize infrastructure building projects. Developed villages undertook income-generating projects.

The target for 1974–6 was set as the promotion of self-development. The specific emphasis in 1974 was on income-generating projects. The priority for income-generating activities was given to: (i) activities for increased food production; (ii) activities to promote regional specialization in crops; and (iii) activities to promote co-operative production and marketing.

For this purpose, intensive support was given to 4,000 selected 'self-help' villages which were ready to accept such support. In 1975, all villages were encouraged to organize 'Saemaul production units' for joint-farming activities. Double-cropping was specially emphasized on all cultivated land. Partly due to such efforts, food production in 1975 increased about 15 per cent over the average year, and rice yield per hectare rose to 3,830 kg, compared to 3,410 in the average year.

The plan for 1977–9 included regional projects and income-generating projects, in which emphasis was laid on fully utilizing every potential resource not only in physical but also in human terms. Community planning was to take place on a regional basis rather than through a village approach in order to expand the geographical boundaries of each community and to create spatial linkages between villages and service centres. An income-generating project requires an extension of regional boundaries as well as an intensive exploration of non-farm -income sources, including small-scale rural industries.

The Saemaul movement consists of a variety of development projects planned and implemented at the village level. Saemaul projects are typically planned and organized by village people although sometimes initiated by Saemaul leaders or local governmental officials. The Saemaul programme comprises three types of projects: living environment projects, income-generating projects and an individual's spirit projects.

Living environment programmes range from projects for improvement in physical environment such as farm roads, village entrance roads, sanitary water systems, rural electrification, village halls, construction of small bridges and small-scale irrigation systems. Income generating programmes focused on special crops, livestock and marketing arrangements.

The Saemaul programmes also emphasize the change of farmers' values, attitudes and motivation. Some of the values and attitudes required for the profound changes in villages toward self-reliant development are related to a self-help spirit, hard work, motivation, actual commitment to the community through positive participation in the decision-making process, co-operation, an orientation to the future and confidence in innovation. (15) In order to inculcate values, attitudes and perceptions of individuals, the government utilizes special education programmes. A wide range of social education and communication activities either sponsored by voluntary organizations or encouraged by the government has provided opportunities for introducing change in the way of thinking of the rural people. Technical training for rural farmers, arranged through agricultural extension projects or by other types of community workers, would often influence their behavioural change with respect to new seeds and technology, mode of co-operative action among farmers, rural co-operatives and institutions. It is said that such changes take place only when they are connected with learning of new farming methods and other developmental activities. (16)

The impact of technology on the rural community

The rapid economic growth of Korea, based heavily on industrial development and the urban sector, has brought about side effects in the agricultural sector. Despite agriculture's declining significance in the economy, it continues to play a crucial role in providing the main source of income for the rural population and in providing food for the growing and increasingly affluent population during industrialization and urbanization.

The proportion of Koreans living in villages fell steadily from 55 per cent in 1965 to 22.2 per cent in 1984; the rural population peaked at 16.7 million in 1964 and declined to 9.0 million in 1984. 25.9 per cent of the country's labour force of 3.7 million was employed in agriculture in 1984, a considerable decline from 58 per cent in 1963 (see Appendix 4.1).

The relative importance of agriculture, which includes forestry and fishing, has been declining steadily. Its contribution to GNP fell from 44 per cent in 1961 to 12 per cent in 1985. Its contribution to export earnings also declined from 30 per cent in 1964 to about 7 per cent in 1985, in spite of the fact that the growth of value in the entire sector averaged a respectable 4 per cent a year for the 1966–85 period. Value added in agriculture grew at about 2.5 per cent a year over the same period. Much of this growth was the result of two changes: a shift in sectoral composition from barley, wheat and potatoes to higher value rice; and the increased share of high-value, labour-intensive fruits and vegetables. The principal grain in the Korean diet is rice, which accounted for 43 per cent of total food consumption by weight in 1984. Barley accounted for 21 per cent and wheat 19 per cent. Livestock production accounted for about 6 per cent of value added in the agricultural sector. It declined substantially in 1984 because of the rapid escalation in the cost of imported feedstuffs, but recovered somewhat in 1984. (17)

Korea averages sixteen persons per hectare of farmland. Population pressure has led to intensive land development, including irrigation, drainage and consolidation. The greatest cropping potential of cultivable

land is the use of irrigation. Population pressure has also led to the annual loss of about 11,000 hectares of cultivable land to urban growth, factories and roads. The conversion of upland to paddy land and the reclamation of agricultural land from forests and tidal flats, however, have more than offset these losses through the impact of government policy (see Appendix 4.2 and Appendix 4.3).

The total area cultivated, albeit of declining quality, increased from 2 million hectares in 1960 to 2.17 million hectares in 1983. Taking double-cropping into account, the total area under crops in 1983 was 3.1 million hectares. The government policy has encouraged the double-cropping of agricultural land in the rural areas. Double-cropping creates peaks in labour demand, especially for areas sown to rice and barley. Technological improvements, particularly the development of earlier maturing rice varieties and the rearrangement of paddy fields to permit better access and water control, have substantially increased cropping on paddy land during the winter. The cropping intensity on paddy land rose from 146 per cent in 1966 to 163 per cent in 1984.

The other impact of technological improvement concerns the use of high-yield varieties. Korea has the second highest average rice yield in Asia. The average yield of polished rice was 3.9 tons per hectare in 1975 and 4.8 tons per hectare in 1984. These may have been abnormally good years, but the new seed has contributed to rice productivity. By 1990, it is expected that the new Yushin and Milyang varieties will replace the lower yielding Tongil variety and that the area under improved varieties will continue to expand beyond the present area planted with Tongil and Yushin. Average rice yields are assumed to grow at 1.5 per cent per year and in 1990 will reach about 4 to 5 tons per hectare. Because of the effect of land improvement, average yields should tend to reach higher levels. For barley and wheat, base yields of 2.4 and 2.2 tons per hectare respectively are assumed. Barley yields are assumed to increase at 0.9 per cent per year and wheat yields at 1 per cent per year.

One of the impacts in technological improvement has been an increase in agricultural machinery. The percentage increases in the number of power tillers, farm tractors, combines, and power threshers have been spectacular (see Appendix 4.4 and Appendix 4.5). Power tillers have increased from 153,535 in 1977 to 538, 273 in 1984. Farm tractors have also increased in this period from 1,121 to 9,684. Binders have increased from only 122 in 1977 to 22,635 in 1984. The increasing use of farm machinery has decreased the rate of farm households per unit of machine as shown in Appendix 4.6. Farm households per unit of power tillers have decreased from 11.4 in 1977 to 3.7 in 1984. Farm tractors also decreased rapidly in this period from 1, 389 to 203.8. Binders have decreased from 637.7 in 1977 to 87.2 in 1984. Mechanization, therefore, has had an impact on the number of workers employed in agriculture since 1980.

Because of the need to reduce seasonal labour peaks while maintaining a substantial rural work force during the other ten months of the year, however, mechanization is required to focus on machines that reduce the requirements for labour during peak seasons. Examples of such mechanization are harvesters, transplanters, driers and machines that speed land preparation and handle the straw left by the previous crop. These machines greatly increase labour productivity during peak periods, but one notable problem is that they can be used for only ten or twenty days a year.

The other negative aspect of machinery in the rural sector shows that power tillers seem, for example, to be used mostly for transport. When they are used for tilling they require, because of their weight, two or three men to operate them over a twelve hour day. One man can work all day with a draught animal. Thus, although the power tiller is somewhat faster, it actually increases the demand for labour and its net effect on labour input may be small. Mechanization has had little impact upon the participation of women employed in the agricultural labour force. The proportion of women in the agricultural labour force in fact has been increasing; it rose from 38 per cent in 1963 to 53 per cent in 1984.

Long-range forecasts of the supply of agricultural labour, based on high growth rates for industry and manufacturing, indicate that the supply will increase slowly until the late 1980s. Towards the end of the 1990s, the supply of labour will decline. In order to examine the labour availability and its potential to pose a serious constraint on agricultural outputs during the 1980s and 1990s, labour requirements have been estimated by taking into account the seasonal needs of each crop and the changing pattern of crop plantings. In the long run, the demand in 1990 is based on the assumption that the use of light power tillers, combines, binders, chemical pesticides, and harvesters will be widespread.

The growth in per capita income will bring about an increase in human food consumption and an accompanying structural change. Accordingly extension and utilization of farm land will be indispensable to meet the increasing demand for agricultural products. Considering the reduction of rural labour due to the migration of youth to the cities and the enhanced demand for a labour force to satisfy the increased need for food consumption, Korea has no alternative but to seek agricultural mechanization which will enhance labour efficiency and agricultural production. For solving this aspect, adjustment of agricultural land systems to the general agricultural structure is indispensable for implementing agricultural mechanization. There is evidence to suggest that the three hectare limit on households has become the obstacle to implementing agricultural mechanization.

The future strategy for the rural sectors requires a reduction in the rural and urban income gap. It is desirable to expand non-farm income opportunity in the future. Mechanical and managerial technology should increase technical and economic efficiency. Rises in economic development and growth can bring agricultural structure advancement. Despite demands, however, limitations of agricultural product markets and input markets create obstacles to improvements in productivity that can increase farm household income.

Table 4.1 Accomplishments of major projects by the Saemaul movement, 1970–9

Description	Unit	Plan (A)	Completed by 1979 (B)	B/A (%)
Rural roads				
Village roads	km	26,266	43,333	164
Farm feeder roads	km	49,167	43,966	89
Bridge construction	no.	76,749	73,119	95
Small bridges on farm feeder roads	no.	2,380	1,781	74
Irrigation facilities				
Small reservoirs	no.	10,122	10,742	106
Traditional small irrigation channels	no.	22,787	28,352	124
Raceways	km	4,043	4,442	109
Embankment of rivers	km	17,239	9,180	53
Communal facilities				
Village halls	bldgs	35,608	35,950	101
Public warehouses	bldgs	34,665	18,656	53
Public workshops	bldgs	34,665	4,671	13
Public compost pits	no.	138,936	70,055	50
Common-use barns	bldgs	32,729	4,018	12
Rural electrification and communication				

Description	Unit	Plan (A)	Completed by 1979 (B)	B/A (%)
Networks rural electrification	1,000 households	2,808	2,778	98.9
Communication networks				
Telephones	villages	18,633	18,633 345,240	100
Rural industry Saemaul				
Factories	establishment	950	661	70

Description	Unit	Plan (A)	Completed by 1979 (B)	B/A (%)
Reafforestation				
Reafforestation	ha	744,354	347,153	47
Post management	1,000 ha	6,064	2,138	47
Nursery stock cultivation	mill-tree	1,828	1,032	56
Fuel hole repairs	1,000	6,500	6,297	79
Housing and environmental improvement				
Improvement of roofs*	1,000 bldgs	2,428	2,372	98
Rural standard housing	bldgs	540,000	186,611	34.6
Improvement of ditches*		33,569	19,822	59
Rural water supplies and sanitary improvements				
Water supply	no.	37,584	18,016	63
Public wells	no.	1,091,663	120,361	11
Public bath houses	bldgs	36,143	7,017	19
Public laundry places	no.	71,020	66,445	93
National beautification				
Beautification of national roads	km	8,288	5,802	70
Beautification of express highway*	km	1,217	1,217	100
Beautification of railroads	km	3,121	1,784	72
Beautification of towns	town	1,533	758	50
Rural saving programme	billion won	1,093	948	87

Description	Unit	Plan (A)	Completed by 1979 (B)	B/A (%)
Samaeul educational programmes				
Education for village leaders	persons	112,983		
(in central training centre)	persons	23,787		
(In local training centre)	persons	89,196		

Description	Unit	Plan (A)	Completed by 1979 (B)	B/A (%)
Education for social leaders	persons	82,808		
(In central training centre)	persons	17,129		
(In local training centre)	persons	65,679		
Education for civil servants	persons	377,538		
Education for villagers	1,000 persons	512,830		

* Completed by 1977

Source: Ban, Sung-Hwan, 'Saemaul Undong', presented at seminar on 'Integrated Rural/Area Development Regional Planning Approaches', Arusha, Tanzania, 9–15 March 1980, pp. 18–20.

Changes in the village structure

The evaluation of the impact of rural integrated development programmes and agricultural technology policies is required in relation to its actual performance over the twenty-five years from its inception to the present time in terms of the expansion and accomplishments of the numerous activities and programmes.

The government investment in Saemaul projects has induced a greater mobilization of labour and funds as well as the voluntary participation of the village people in rural development. During the early stage of the rural integrated development programme, the investment in physical infrastructure was emphasized. However, the changing pattern of fund allocation shows that since the mid-1970s the emphasis has shifted to projects aimed at increasing rural incomes and rural housing, and more recently, the emphasis on off-farm income and agricultural machinery projects has also increased. As a result, significant changes have taken place in various infrastucture aspects of Korean rural communities such as farm roads, small-scale bridges, agricultural production facilities, agricultural mechanization, marketing and transportation, co-operative farming, rural housing and rural electrification (see Table 4.1). (18)

The number of participating villages in the Saemaul movement increased from 33,267 in 1971 to 36,623 villages in 1974. Projects numbered only 385,000 in 1971, but by 1978 the number had increased to 2,667,000. In the scale of investments as well, there was significant growth. The total investment in 1971 was 12.2 billion won but by 1984 it had reached 1,002.9 billion won. Such a drastic expansion of the Saemaul movement indicates the extensive support it has commanded as well as the strategic emphasis of the government on the rural development effort.

The Saemaul movement has been widely expanded in terms of numbers of participating villages, mobilized manpower, and the amount of the total investment in the projects. During the period 1971–85, about 2,800 billion won was invested in Saemaul projects, out of which 32 per cent was supported by the government and 68 per cent was contributed by the village people. (19) Due to the increasing level of people's commitment to rural development, the portion of government financing of Saemaul projects tended to fall. The more successful the Saemaul movement at the village level, the more rapidly the village economy grew in terms of farm household income. Particularly, the income-increasing projects have been boosted by the high rice price policy and also by the technological breakthrough in the form of the diffusion of high-yielding varieties of rice.

According to In-Jeong Whang's analysis of the Saemaul movement, the economic achievement of the movement is the promotion of capital formation, and the increase in employment opportunities in the rural sector. (20) It is notable that technical learning classes as part of vocational training activities were organized by the Saemaul movement with a view to improving agricultural productivity as well as improving villagers' employment opportunities in the industrial sector. (21)

It is said that the rural integrated development programme has been an instrument for the ignition of the people's will for rural development from the beginning. Through their self-help efforts and by voluntarily organizing Saemaul projects, rural farmers have mobilized their resources and energy to the maximum extent possible for an increase in their income.

The technology policy and rural integrated development programme during the last two decades have ensured that the rural economy was an integral part of the national economy and enabled it to perform its strategic role in the process of economic and social development. In view of the changing environment of Korean rural communities, reducing the spatial and economic disparities between urban and rural in Korea can only be achieved through a deliberate policy of economic intervention and spatial planning of investment. An integrated spatial network of central places, functioning as linked village markets in a national system of exchange, must be deliberately created in Korea. (22)

The future investments should be concerned more with large-scale physical infrastructures which require co-operation between several villages for a more efficient production and marketing network and also with an improvement in the quality of life in the rural sector. They may include farm mechanization, marketing arrangements, rural industrialization, agricultural insurance, spatial linkages between urban and rural sectors and regionally based welfare centres.

Changes in the value systems

The continued implementation of the rural integrated development programmes over the past two decades in rural areas has brought about significant changes in rural communities at the individual as well as the organizational levels. It is found that a considerable number of farmers are now change-oriented and that they tend to be more positive toward rural innovations, new varieties of crops and new technology. Their change orientation seems to have become more marked since the rural integrated development programme was initiated. It is also found that a large number of farmers are future-oriented in their value system and tend to be more forward-looking in these days than in the early stage of the rural integrated development programme. (23)

The changes in values and perceptions of individual farmers as such seem to be a significant phenomenon in rural communities from the development point of view. The Saemaul movement initiated the organizational changes that are reflected both in village leadership and in the participatory behaviour of village people. (24) The movement has contributed to fostering community-based village leadership which can efficiently play the role of development agent in the rural transformation process.

One of the impacts of the rural integrated development programme has been the increased role of volunteer leaders in rural villages. The Saemaul leaders played a significant role in organizing and implementing the Saemaul movement at the village level as initiators, promoters, co-ordinators, educators, advocators or implementors of Saemaul projects. (25) The Saemaul movement contributed significantly to the identification and fostering of village leadership as the source of self-reliant development in rural communities.

The projects also promoted a participatory pattern of interaction between village members for decision making, planning and the implementation of village level projects. Their positive participation in the

decision making process at the village level led to close co-operation in the implementation of projects. The people's participation in decision making has been further extended to the governmental decision making at the township, county and provincial levels with respect to Saemaul projects. The Saemaul movement has contributed to the development of 'grass-roots' democracy in Korean society. It is found that the Saemaul movement has made an enormous impact upon villages in Korea, at three levels: changes in values and perceptions of rural farmers toward development values; modes of village organization and development of com m unity-based leadership; and improvements in rural infrastructures and village economies. (26)

The changes in values and perceptions of individual farmers as such seem to be a significant phenomenon in rural communities from the 1970s. There is not enough evidence to analyse that the changes of rural farmers' values have resulted solely from the implementation of the rural integrated development programme and special training programme. However, it is obvious that the technology of rural development and its projects has at least partly influenced and reinforced these changes in the people's values.

THE CASE STUDIES

Analytical framework for the case studies

Traditionally, Korean rural society, like that of other Asian countries, has been family or clan-oriented, conservative, traditional and isolated. The small size of land holdings (0.9 hectare per farmer), lack of farm roads conducive to mechanization, shortage of labour, and little marketable surplus did not readily inspire active change among the rural population. The recent economic growth of Korea based on industrial development, however, brought about favourable side effects in the rural sector.

The successful implementation of land reforms during 1949–53 made a significant impact on rural communities. With the education of rural youngsters, widespread and far-reaching change has been manifested in the rural sector since 1945. The introduction of free and compulsory elementary education was accompanied by a vast expansion of the secondary school system and further, by a spectacular increase in higher education. The immensity of the social input in education has brought about a significant improvement in the educational level as well as a dramatic increase in the number of literate people in the rural sector. The impact of this educational input has been very significant in terms of the motivation of farmers to participate in community activity and improvements through the adoption of new technology.

The successful implementation of the first, second, third, fourth, and fifth five-year social and economic development plans facilitated rapid economic growth and accelerated the industrialization and urbanization process in Korea. The average annual growth of GNP during the period of 1962–85 was approximately 9 per cent. The average annual growth rate of mining and industry sector during the same period was approximately 20 per cent while that of the agriculture and fishery sector was approximately 4 per cent. The extent of industrialization has rapidly influenced the rural village, agricultural sector, and spatial linkage between urban and rural areas.

Throughout the 1960s, the Korean government gave priority to industrialization and therefore could not pay equal attention to agriculture. The third five-year economic development plan (1972–6), however, emphasized a balanced growth between industry and agriculture and in particular the development of the rural environment. During this period, the government planned to invest nearly $2 billion in rural development. In order to maximize the efficiency of the investment, the rural sector, particularly the farmers, needed preparation to utilize the heavy investment planned. To ensure this the government initiated the rural integrated development programme or Saemaul movement. This movement made positive contributions to self-reliant rural development in Korea during the 1970s. The movement included the

introduction of several new technologies for rural development. The most important objective of the movement was to change farmers' values and perceptions toward developmental values such as self-help, diligence, and co-operation.

The technology impact of the rural integrated development programme, agricultural development policy, and industrial development policy has contributed to the improvement of rural villages not only for the village infrastructure but also in changing individual values and attitudes during the last decade. Although it is difficult to measure the extent to which the government policy has contributed to the stimulation of the rural community, this micro-study has tried to evaluate the adoption of new technology and its social impacts at the village level in Korea.

Background to the case studies

An-Seong county is one of the richest counties in the rural area of Korea. The economic structure and base of An-Seong is heavily dependent upon agricultural production. The county has also the largest percentage of rice production in Korea. The region is located to the south of Seoul, capital of the nation, and is about one hour by express-bus from the city.

The local government system in Korea comprises a three-tier system of province, city or county, and township or myeon. The myeon is generally situated in the rural areas. The villages in the sampling are one in Lil-Juk myeon and others in the Kum-Gwang and Bo-Gye myeons. The headquarters of the county are located in An-Seong township. The township is well linked to the myeons not only by the transportation system but also through governmental institutional linkage (see Maps 4.1 and 4.2).

Strategies for efficient support towards self-reliant development of rural villages may be analysed in terms of the standards of operation in rural support administration, methods and criteria for the allocation of available resources, and technology related to stimulation and inducement. For the rural integrated development programme the Korean government has classified rural villages into three categories on the basis of their degree of development: underdeveloped, developing and developed villages. The classification provides a psychological basis for competition between villages in promoting their village improvements. It also provides a criterion by which government may apply different packages of support and assistance to villages depending on their level of development (see Appendix 4.4).

According to the criteria, Lil-Juk village was classified as a developed village, and Kum-Gwang and Bo-Gye villages as developing villages in the 1970s. Kum-Gwang village is located in the neighbourhood of Bo-Gye village. Both villages have the same social and economic characteristics. Therefore, the two villages are in the same sampling. The two samples indicate the development impacts between developed and developing villages. It is impossible to find a non-mechanized village in Korea because of the rate of expansion of farm mechanization. Both samples have used new technology including new yield-varieties of seed, water management, farm mechanization and management techniques. The availability of land in the two samples is heavily dependent on rice-paddy fields and is comparable with other Korean rural villages.

An attempt is made in this section to analyse the farmer's socio-economic background as well as his values and perception. Analysis of the socio-economic background of farmers is by age, educational level, income level and their life expectancies.

The average age of farmers was 50. A majority of farmers were between 50 and 59. The next group (29.3 per cent) was comprised of individuals between 40 and 49, while

Table 4.3 Age distribution (unit: person (%))

Age group	Developed village		Developing village		Total	
20–29	3	(3.0)	5	(4.9)	8	(4.0)
30–39	12	(12.6)	17	(16.5)	29	(14.6)
40–49	28	(29.4)	30	(29.1)	58	(29.3)
50–59	45	(47.3)	48	(46.6)	93	(46.9)
over 60	7	(7.5)	3	(3.9)	10	(5.2)
Total	95	(100.0)	103	(100.0)	198	(100.0)

14.6 per cent of the farmers belonged to age group 30–39; and 4 per cent 20 to 29. This indicates that younger age groups do not live in the rural regions now due to migration.

Only 5 per cent out of the total of 198 rural farmers were high school or college graduates. Out of the total of 198, 23.6 per cent were illiterate, 40 per cent were elementary school and 23.4 per cent were middle-school graduates. The fact that older groups in rural areas were educated at a level beyond elementary school demonstrates the overall enhancement of the educational level of the people. It is also found that in spite of the elementary school level of parents, sons and daughters of farmers attend high school.

Income level has a decisive impact on the mode of thinking among people and their attitudes since it forms one's perception of personal status, especially in the less-differentiated rural communities. An important indicator in this regard was obtained by requesting the farmers to evaluate their own financial status in terms of low-medium-high levels, although this method runs the risk of being subjective.

As shown in Table 4.5, 31.2 per cent of the sampled 198 people belonged to the below 3 million won income bracket while only 7.1 per cent belonged to the above 8 million won bracket. The gross income of farm households throughout the nation in 1984 was 5.1 million won.

The promulgation of the Land Reform Act of 1950 provided the Korean government with the legal basis to

Table 4.4 Educational level (unit: person (%))

Level of education	Developed village		Developing village		Total	
Illiterate	27	(28.4)	20	(19.4)	47	(23.6)
Under elementary school	35	(36.8)	44	(42.7)	79	(40.0)
Under middle school	21	(22.1)	25	(24.3)	46	(23.4)
Under high school	8	(8.4)	8	(7.8)	16	(8.0)
Above college or university	4	(4.3)	6	(6.8)	10	(5.0)
Total	95	(100.0)	103	(100.0)	198	(100.0)

purchase all of a landowner's farm land in excess of 3 hectares and distribute it to farmers who had cultivated those particular pieces of land as tenants. The successful implementation of land reform in Korea brought about significant changes in the economic as well as the social aspect of rural communities. The 3-hectare ceiling on land ownership per farm household helped to stardardize farm sizes as shown in Table 4.6, and in so doing helped the delay of agricultural modernization in terms of rural productivity and mechanization. The average size of land owned per farm household across the nation has remained almost at the same level of one hectare for the last three decades. According to In-Jeong Whang's paper, the land reform made most Korean farmers remain primarily at subsistence level as far as the economic benefits of

farm size are concerned. (27) Singer and Baster have said that the land reform provided more or less equal access to production assets and, therefore, motivated farmers to work hard. (28) In fact, it is a very important fact that the land reform promoted egalitarianism in rural communities in terms of land ownership and thus facilitated the disappearance of class consciousness between landlords and tenants.

Table 4.5 Self-estimates of gross income (unit: person (%))

Gross income during 1984	Developed village		Developing village		Total	
Less than 3 million won	26	(27.4)	35	(34.7)	61	(31.2)
Between 3–4 million won	10	(10.5)	13	(12.9)	23	(11.7)
Between 4–5 million won	11	(11.6)	14	(13.9)	25	(12.8)
Between 5–6 million won	9	(9.5)	5	(5.0)	14	(7.1)
Between 6–7 million won	4	(4.2)	7	(6.9)	11	(5.6)
Between 7–8 million won	5	(2.3)	0	(0.0)	5	(2.6)
Above 8 million won	12	(12.8)	2	(2.0)	14	(7.1)
No response	18	(18.9)	27	(24.8)	43	(21.8)
Total	95	(100.0)	103	(100.0)	198	(21.8)

Table 4.6 indicates the land ownership scale in relation to income level. Those among the rural people who have more than the national average of one hectare comprised 37.9 per cent, while among the farmers 56 per cent had less than one hectare.

Apart from the social mobility observed among farmers, geographical mobility is another important aspect in analysis of their background. It was found that almost 70 per cent of the rural farmers in the sample had been members of their own villages since their grandfathers' generation while only 3 per cent of the village people were first generation (see Table 4.7).

According to that interpretation the length of geographical affiliation with their own villages can probably be viewed as a low geographical mobility. This may indicate that they have a greater affection for their village which might spur their zeal for village development. McClelland has suggested that the higher one's geographical mobility the higher is the change-orientation and motivational level

Table 4.6 Ownership of farm land (unit: person (%))

Land ownership	Developed village		Developing village		Total	
None	8	(8.4)	15	(14.6)	23	(11.6)
Less than 0.5 ha	18	(18.9)	23	(22.3)	23	(20.7)
Between 0.5 and 1.0 ha	25	(26.3)	22	(21.4)	47	(23.7)
Between 1.0 and 1.5 ha	20	(21.1)	19	(18.4)	39	(19.7)
Between 1.5 and 2.0 ha	10	(10.5)	13	(12.6)	23	(11.6)
Above 2 ha	7	(7.4)	6	(5.8)	13	(6.6)
No response	7	(7.4)	5	(4.9)	12	(6.1)
Total	95	(100.0)	103	(100.0)	198	(100.0)

Table 4.7 Duration of village life (unit: person (%))

Period	Total	
Before grandfathers' generation	139	(70.0)
Since parents' generation	46	(23.0)
In his generation	6	(3.0)
Temporary residence	1	(1.0)
No response	6	(3.0)
Total	198	(100.0)

in general terms for development. (29) However, an actual field survey showed the opposite result.

The socio-economic background of the farmers was analysed by studying their age, educational level, residence history and income level. Most farmers have been living in the same villages since their grandfathers' or fathers' generations. They were all engaged in farming because other income sources were limited in their village environment. Government priority should be given to policies and projects related to off-farm income including the spatial linkage between urban and rural and the creation of opportunities for non-farm employment by rural people. The farmers of the sample villages were within the 50–9 age group. In both educational and income levels, the farmers had similar backgrounds.

After the liberation from Japanese colonial rule in , the ideology of educational opportunity became the important motive for introducing a massive educational drive in Korean society. The drive began in 1948 in the form of free and compulsory education at the primary-school level. It was found that none was more widespread or far-reaching than the education of rural youngsters at sample villages.

The extent of people's participation in community decision making will depend on their level of education and motivation as well as the organizational characteristics of the rural community. The higher the educational level of community people, the more extensive their participation in decision making with respect to community activities is likely to be. The improvement in educational levels as well as the increase in the number of literate people in the sample villages provides the motivation for rural farmers to become active participants in community decision-making processes.

In the present situation, however, agrarian reform of land ownership and the village power structure will also require a long gestation period if it is ever to be effective in encouraging wider participation. A field survey showed the same result. In fact, in most Asian villages there are likely to be tensions and conflicts between landowners, tenants and labourers resulting from differences in their wealth, status, power and economic interests. (30) Because of its social and political as well as ideological implications, agrarian reform may be difficult to implement in some Asian countries within a short period of time. In Korea, however, it seems fortunate that the success in implementing the land reform of 1949–52 has provided a different basis for rural development from those of a number of other Asian countries. The massive drive for education and land reform has contributed to the social changes in Korean rural communities.

Change in family relationships

Rural villages in Korea have been characterized by the extended family system which is based on Confucian ethics and by an agrarian society which primarily depends on rice cultivation. Under these circumstances, rural Korean villages have developed and been organized quite naturally into the primary community units of rural Korea, bound together through both kinship and territorial boundaries. In this situation, husbands have always had the dominant role to decide the household's work.

In an analysis of people's participation, it is valuable to look into some particular aspects of women's participation and their role in the rural development of Korea. It is generally accepted that the more modernized a country, the more important is the status and role of women in its society.

To what extent do Korean women participate in rural development and what roles did they play in rural change? In view of the historical and cultural context of women's status in Korea, organizational aspects should be the prime concern in any analysis of women's participation. In Korea's past, the women's role was perceived as strictly limited to housekeeping affairs. Women were treated rather as limited personalities and prohibited from participating in any public or social activities. Even within the family major decisions were beyond the scope of women's involvement.

Significant female participation in rural developmental activities was realized only early in the 1970s. Initially, women in the rural sector participated in village bank programmes, non-formal education programmes, and the agricultural extension programme. In order to promote women's participation in the rural integrated development programme, from 1972 the government promoted a women leaders' training programme operated by the leader training institute. The training programme included courses such as better home management, family planning and the use of new technology. As a result of both formal and informal training, women leaders have become more confident in their role performance, more motivated to participate in the campaign for village improvement and more skilful in exercising leadership. (31)

At the initial stage of the Saemaul movement, rural women were more excited and enthusiastic than the men. As Professor Park pointed out:

> rural housewives seemed to know better than their husbands the real causes of the poverty of their families: namely the laziness, gambling and drinking habits of their husbands who used to blame their poverty on the poor policies of government and/or on the failure of their ancestors. The members of Saemaul Women's Association initiated a campaign for burning up the playing cards with which their husbands gambled during the off-season. The women's associations also organized a campaign for closing down the liquor stores within their villages where their husbands used to drink and thus add more hardship to their pains of poverty-stricken housekeeping. The habits of gambling and presence of drunkards in villages have thus been reduced through the Saemaul Movement during the 1970s. (32)

Saemaul women's associations undertook several projects including the rice savings project, village co-operation stores, the village kitchen project, the operation of daycare centres, and the collection of waste and used goods such as empty bottles, papers, furniture and so forth.

Dr Whang has suggested that women in rural villages played very important roles in the process of rural development through loosely organized associations and especially in:

1. Facilitating communication of various innovative ideas.
2. Adopting and initiating change in the rural lifestyle.
3. Implementing community development projects.
4. Contributing immeasurably toward women's equality through asserting their voices in the community affairs of formerly tradition-bound rural areas. (33)

Today the role of Saemaul women's associations has decreased in rural activity in comparison with the 1970s. The reason is that the Saemaul movement has reduced political and administrative support for the associations since 1979.

According to an interview during the survey, most respondents regarded the contribution of women as a positive one for rural development. From the survey it seems the husband generally attends the village monthly meeting (see Table 4.8). It indicates that the official role of home leader is performed by the husband, the informal role,

however, is operated by women. The decisions about home activity are wholly dependent on the husband, but the women's status has slowly increased through their role in economic and social activity in rural areas. It is found that the sons and daughters of farmers do not generally cultivate crops in the village. They also do not participate directly in the rural development projects. This situation indicates that either the younger group attends the school or the group gets work in urban areas.

Table 4.8 Attendance at village meetings (unit: person (%))

Attendance	Developed village		Developing village		Total	
Husband	78	(82.1)	92	(92.5)	170	(86.1)
Wife	6	(6.3)	2	(1.0)	8	(4.1)
Children	11	(11.6)	5	(5.1)	16	(8.3)
No response	0		3		3	
Total	95	(100.0)	102	(100.0)	197	(100.0)

Change in family/community relationships

The traditional relationship between government officials and the people in Korea was characterized by a 'bureaucratic' subculture in which officials were superior to peasants. (34) People used to be reluctant to visit the government office to request assistance. They preferred rather to follow passively the orders from the government.

However, the rural integrated development programme has brought about a change in this relationship. Due to the devoted efforts of local government and the reformed service of central government, mutual co-operation and credibility on both sides has been revitalized and accordingly government service and guidance functions have been reinforced. (35) In reality, the relationship between the rural people and local government officials is a very important factor in the process of rural development projects. Local government officials play an important role in establishing a channel which links the central government with the rural people. The change in mutual perceptions has come about as a result of frequent dialogues between the people and local officials and positive support from the government through direct contact brought about through the rural development projects. The decisions concerning the adoption or rejection of new technologies from the outside for village projects are made through the close interaction between rural people and the com m unity-based leadership. Village development projects, including co-operation of agricultural machinery based upon the basic guidelines communicated from the outside, have been organized and planned by the village development committee and approved by the general assembly of the village.

A positive approach to confirm innovation in rural development is necessary for its continuance. Since rural development from the 1970s has aimed at building up a system for self-reliant development, continued adoption of innovation is an important prerequisite. Because some rural development projects proposed by the government are communicated to rural villages through village leaders, it is inevitable for local administration to get involved in the rural development. It is found that local governments and public institutions stimulate rural innovation by setting down guidelines for collective decision-making at the

village level (see Table 4.9). They also integrate various kinds of development projects for the purpose of providing development assistance. Table 4.9 shows responses to the question: 'Which institution played important roles in explaining the objectives of and necessity for, implementing successful rural development projects in your village? Please check at least three institutions.' Of the 517 respondents, 155 or 30.0 per cent answered that the agricultural co-operative committee did that job. About 28.2 per cent responded that the work was done by the government field office. This confirms the argument that for the success of rural development at village level, it is essential for government field offices to help keep farmers informed and make them understand the background, purpose and methods of the agricultural technologies such as new seed, water management, land development, agricultural credit and agricultural machinery. In fact, the response shows that government systems play an important role in stimulating rural innovation at the local level.

Rogers suggests that diffusion of innovation is subsumed in the process of rural development. Crucial

Table 4.9 Which institutions play an important role in your village? (unit: person (%))

Institution	Developed village		Developing village		Total	
Agricultural co-operative committee	69	(28.0)	86	(31.7)	155	(30.0)
Myeon office	65	(26.4)	81	(29.9)	146	(28.2)
Police station	18	(7.3)	17	(6.3)	35	(6.8)
School	10	(4.1)	9	(3.3)	19	(3.7)
4-H club	29	(11.8)	23	(8.5)	52	(10.1)
Women's committee	22	(8.9)	24	(8.9)	46	(8.9)
Older group committee	8	(3.3)	18	(6.6)	26	(5.0)
Other institution	15	(6.1)	10	(3.7)	25	(4.8)
No response	10	(4.1)	3	(1.1)	13	(2.5)
Total	246	(100.0)	271	(100.0)	517	(100.0)

elements in the diffusion of new technologies are: (i) the innovation; (ii) which is communicated; (iii) through certain channels; (iv) among the members of a social system. (36) Innovation and advocation are indeed the major philosophies underlying rural development and they take the form of various projects in Korean rural communities. It is shown that these project ideas are communicated through local governmental channels over a short period of time among members of rural communities. According to an interview during the survey, the innovation decision is the mental process through which steps are taken from the knowledge of an innovation to a decision either to adopt or reject it, through to the final confirmation of this decision. Farmers generally supported the governmental channel to adopt the new knowledge.

It was generally understood that Korean villages lacked a coherent set of co-operative attitudes before the rural integrated development programme was introduced. The

Table 4.10 The attendance ratio of village meetings (unit: person (%))

The ratio	Developed village		Developing village		Total	
Every month	43	(45.3)	67	(66.3)	110	(56.1)
Once every two months	20	(21.1)	21	(20.8)	41	(20.9)
Once about three months	11	(11.6)	6	(5.9)	17	(8.7)

The ratio	Developed village		Developing village		Total	
Once about six months	16	(16.8)	4	(3.7)	20	(10.2)
Never attend	5	(5.3)	5	(4.3)	10	(4.1)
Total	95	(100.0)	103	(100.0)	198	(100.0)

three major targets of the spiritual revolution through the rural integrated development stimulated the promotion of co-operative attitudes. Therefore, the policy has been to carry out projects over the past decade that emphasized co-operation and solidarity among rural people.

In order to find out their sense of solidarity, two questions were asked of a sample of rural people. 'In the case of village monthly meetings, do you attend meetings regularly?' and 'Would you support your neighbourhood if it were placed in a crucial situation?'. According to Table 4.10 which analysed the result of the question, 110 persons or 56.1 per cent out of a total of 198 said they attended the monthly meeting every month. About 20.9 per cent said that they attended the meeting every two months.

Rural villages also showed co-operative attitudes and solidarity among rural people as shown in Table 4.11. In response to the question 'Would you assist the neighbourhood in times of crises?', 111 persons or 56.1 per cent said that they would assist. Eighty persons or 40.4 per cent said that they would help neighbours as soon as possible. Only seven persons or 3.5 per cent said that they would not be interested in such an event.

It can be concluded, however, that the co-operative attitudes and solidarity of the rural people have been reinforced by the rural integrated development programme,

Table 4.11 Thoughts about the neighbourhood (unit: person (%))

Item	Developed village		Developing village		Total	
Support as my duty	46	(48.4)	65	(63.1)	111	(56.1)
Support if it is possible	44	(46.3)	36	(34.9)	80	(40.4)
Not interested	5	(5.3)	2	(2.0)	7	(3.5)
No response	0		0		0	
Total	95	(100.0)	103	(100.0)	198	(100.0)

as compared to attitudes earlier during the early 1970s. The participants of village meetings contribute their own ideas in both reviewing past activities and building future goals.

It is also noted that an important role of a village leader is to co-ordinate people when there is a conflict of interests so as to gain their mutual co-operation. How well do village leaders play their roles as co-ordinators in the village's work? Table 4.12 shows responses to the question— 'Who has promoted co-operation and unity among the people during the village's co-operative work?'. It is found that people rated the village chief as more active than the Saemaul leaders in playing the role of co-ordinator. In terms of percentage, the role of co-ordinator was played mostly by the village chief (59.3 per cent), Saemaul leader (14.0 per cent), and others. During the 1970s, Saemaul leaders tended to carry out development projects in a democratic manner and maintain a smooth co-operative relationship with the village head. Saemaul leaders also performed such roles as project planners, educators, executors and co-ordinators in rural development. (37) But, the role of Saemaul leader has rapidly decreased in rural society as compared to the 1970s. This situation indicates that the development strategies of the Saemaul movement cannot support the rural farmer without transforming the changing rural environment.

It is said that adoption of new technology projects may be viewed as a process of innovation that takes place mostly in the form of co-operative decisions between farmer,

Table 4.12 Who plays the important roles in the village? (unit: person (%))

Person	Developed village		Developing village		Total	
Village chief	65	(52.8)	88	(60.7)	153	(59.3)
Saemaul leader	19	(15.4)	17	(11.7)	36	(14.0)
Public official	4	(3.3)	2	(1.4)	6	(4.1)
Teacher	1	(0.8)	1	(0.8)	2	(1.6)
Older persons	5	(4.1)	6	(4.1)	11	(7.6)
Chief of women's committee	7	(5.7)	11	(7.6)	18	(7.0)
Chief of 4-H club	6	(4.9)	14	(9.7)	20	(7.8)
Other	6	(4.9)	6	(4.2)	12	(4.7)
No response	10	(8.1)	0		10	(7.1)
Total	123	(100.0)	145	(100.0)	268	(100.0)

village leader and local official. Therefore, co-operative decisions are those which individuals in the social system agree upon by consensus.

It is suggested that since both motivation as well as participation on the part of rural people in rural development are the prerequisites for diffusion of innovation, organizational strategies are of great importance for self-reliant rural development.

Change in expectations

Despite the rapid migration of rural people with high educational levels into the urban sector in the 1960s due to urbanization and industrialization, the general level of education in the rural sector has greatly increased during the 1970s. The educational level of householders in rural villages has rapidly increased during the last decade. The percentage of householders who received more than six years of formal education was more than 45 per cent in 1985, while it was 12 per cent in 1969. The percentage of

Table 4.13 Necessity of new technology development (unit: person (%))

Response	Developed village		Developing village		Total	
Should develop continuously	43	(45.3)	53	(51.3)	96	(48.5)
May have to develop	40	(42.1)	48	(46.6)	88	(44.4)
No need at all	10	(10.5)	17	(16.5)	27	(13.6)
No response	2	(2.1)	5	(5.5)	7	(3.5)
Total	95	(100.0)	103	(100.0)	198	(100.0)

students enrolled at the college and university level in the rural sector, however, is lower than that of the urban sector although it has increased since 1970. According to the interview in sample villages, farmers want to educate their children toward the higher school level if they can get financial support. Farmers state that a higher level of education for their children is the most important thing in their life.

Changes in mobility

Rural development requires changes in internalized values of individual members of a rural community. In any analysis, not only the content of changes but also change procedures themselves must be considered. Change-orientation refers to the criteria by which an individual tends to accept new ideas, technologically innovative or new living modes in a social system. It means the internalized criteria by which an individual chooses a certain course of action in favour of changes in his environment or adapts himself to the environmental changes around him.

To study change-orientation in rural people, this study questioned people on whether they 'feel a necessity for the improvement of new techniques of agricultural productivity' and on their acceptability of a new technology, if it is developed. As shown in Table 4.13, 48.5 per cent of the total

Table 4.14 Necessity for technical improvement (unit: person (%))

Response	Developed village		Developing village		Total	
Considerable improvement needed	43	(45.3)	52	(50.5)	95	(48.0)
A little improvement needed	35	(36.8)	31	(30.1)	66	(33.3)
No need at all	12	(12.6)	20	(19.4)	32	(16.2)
No response	5	(5.3)	0	(0.0)	5	(0.0)
Total	95	(100.0)	103	(100.0)	198	(100.0)

answered that development of new techniques should continue while only 13.6 per cent said they did not feel any necessity or there was no need to develop new techniques. Therefore, it may be concluded that change-orientation toward technological innovation in agriculture is very high.

There was no conspicuous difference in regard to the necessity for technical improvement between developed and developing villages (see Table 4.14). This may indicate that change-orientation, as far as new varieties are concerned, has been highly inculcated since the development of new technologies and was widely advertised to promote their dissemination from the beginning of the 1970s.

Achievement motivation means a person's desire to do better for his own personal satisfaction not for the sake of social recognition or prestige. The achievement motivation of rural people is generally regarded as a prerequisite for rapid development and change in a country. It influences characteristically economic development in the next generation rather than the immediate one.

In this study, the level of achievement motivation among rural people was indirectly measured by asking people's views about perceptions of their own life five to ten years in the future. The question appears simple but it is designed to reflect the hopes and desires of the people sampled. According to Table 4.15, 27. 8 per cent of the

Table 4.15 Prospect of farmer's future life unit: person (%)

Response	Developed village		Developing village		Total	
Much better off	28	(29.5)	27	(26.2)	55	(27.8)
Getting a little better	36	(37.9)	40	(38.8)	76	(38.4)
Almost no change	18	(18.9)	20	(19.9)	38	(19.2)
Getting worse	10	(10.5)	13	(12.6)	23	(11.6)
No response	3	(3.2)	3	(3.5)	6	(3.0)
Total	95	(100.0)	103	(100.0)	198	(100.0)

sampled people thought that they 'will be much better off than now', while 38.4 per cent felt that they 'will be little better off than now', while only 30.8 per cent viewed that they 'will be almost the same as now or worse'. This response supports the hypothesis that rural people have a very high achievement motivation for future advancement.

Table 4.15 shows that there was no significant difference between developed and developing villages on this matter. This may reflect the pessimistic attitudes of the farmers at the time although the question was dealing with the future. Thus, the widespread dissatisfaction among farmers at the time of the survey might have influenced their reaction to the question even though they have been highly motivated since the late 1970s.

Nowadays, the farmers are complaining about the liberalization of agricultural product importation by the government and the instability of agricultural production prices, particularly livestock.

Changes in the economic base of the family

The rural development programme instituted by government has made a significant contribution to the village economy. It is accepted that the rural integrated development programme has made a positive contribution to the increase of gross village income, changes in the village production patterns, improvement in village infrastructures and social

Table 4.16 Composition of farm household income

Income source	Developed village %	Developing village %
Agricultural income	87	82
Crop income	78	74
Livestock income	9	8
Off-farm income	13	18
Total	100	100

development at the village level.

It is found that the more successful the rural integrated development programme is at the village level, the more rapidly the village economy grows because of the increase in farm household income, diversification of income sources and increased opportunities for non-farm income. The rural integrated development programme and new technology contributed to the growth of the village economy in the view of the average farm household across the nation. The new technology and rural integrated development programme, however, have contributed little to the village economy. Table 4.16 indicates that 87 per cent of farm household income originated from agricultural products in the developed village and 82 per cent in the developing village.

In 1985, 70 per cent of farm household income in the nation originated from grain products, 14 per cent from non-farm income sources, 12 per cent from vegetables and 6 per cent from livestock farming. The major sources of farm household income were diversified and have changed during the 1980s as a result of government policy.

According to official records in the county headquarters the contribution of vegetable and livestock income has slowly increased in the sample villages while that of grains and non-farm income has decreased.

It is implied that rural development should be concerned not only with agricultural productivity technology but also with non-farm income sources.

The extent of household electrical appliances purchased

Table 4.17 Domestic electrical appliances adopted by two sample villages

Items	Developed village %	Developing village %
TV sets	63.2	60.1
Electric fans	43.1	34.9
Electric rice cookers	45.8	43.7
Tape recorders	34.3	28.7
Audio sets	23.7	18.7
Refrigerators	18.7	16.4

Table 4.18 When did you begin utilizing agricultural machinery? (unit: person (%))

Beginning time	Developed village		Developing village		Total	
More than 15 years ago	7	(8.5)	6	(6.1)	13	(7.2)
More than 10 years ago	28	(34.1)	35	(35.4)	63	(34.8)
More than 5 years ago	19	(23.2)	36	(36.4)	55	(30.4)
Recently	19	(23.2)	17	(17.2)	36	(19.9)
No response	9	(10.5)	5	(5.1)	14	(7.7)
Total	82	(100.0)	99	(100.0)	181	(100.0)

at the village level has rapidly increased, aided by the increase in farm household income and rural electrification. According to government statistical reports, the number of TV sets purchased in the rural sector in 1985 increased by about six times the 1975 level. As shown in Table 4.17, the extent of household electrical appliance ownership in households in the developed village was more than that of developing village households.

Table 4.19 Major crop tools (unit: person (%))

Tool	Developed village		Developing village		Total	
Livestock	7	(7.3)	3	(3.1)	10	(5.2)
Agricultural machinery	66	(68.8)	76	(77.6)	142	(73.2)
Manual	22	(24.0)	19	(19.4)	41	(21.6)
Total	95	(100.0)	98	(100.0)	194	(100.0)

Changes in agricultural machinery

The rural development projects have introduced changes in the pattern of agricultural production and technology, through farm mechanization, the product mix of agricultural crops and the pattern of land utilization. The rural development projects have promoted farm mechanization through the distribution of agricultural machinery and technical training for its operation. Mechanization can provide a powerful

impetus for agricultural growth when it makes a new method or crop more profitable. Mechanization, therefore, leads to direct yield increases only in special cases, for example the application of seeds, pesticides and fertilizers. Thus, higher levels of mechanization are mainly a substitute for labour, or—where they are already in use—for animals.

Because of government policy, the amount of agricultural machinery in the rural sector rapidly increased during the period 1975–85 (see Table 4.18).

As shown in Table 4.19, 73.2 per cent of the total sample said that they were heavily dependent upon the use of agricultural machinery.

Rural farmers in sample villages have made use of a range of machinery (see Table 4.20).

Mechanization led to direct yield increases in the sample villages as shown in Table 4.21. Fifty-nine per cent of the total responded that they had increased their income level after using mechanization.

Mechanization requires explicit or implicit subsidies in

Table 4.20 Farmers use of agricultural mechanization in sample villages (unit: person (%))

Kind of machine	Developed village		Developing village		Total	
Farm tractor	2	(0.7)	2	(0.8)	4	(0.8)
Power tiller	77	(28.8)	73	(29.4)	150	(29.1)
Automobile	2	(0.7)	2	(0.8)	4	(1.6)
Rice transplanter	9	(3.4)	19	(7.7)	28	(5.4)
Binder	16	(7.1)	9	(3.6)	25	(4.9)
Threshing machinery	51	(19.1)	46	(18.5)	97	(18.9)
Mist and duster	35	(13.1)	34	(13.7)	69	(13.4)
Water pump	73	(27.3)	59	(23.8)	132	(25.6)
Other	2	(0.7)	4	(1.6)	6	(1.2)
Total	267	(100.0)	248	(100.0)	515	(100.0)

Table 4.21 Increases in the income level after the use of mechanization (unit: person (%))

Response	Developed village		Developing village		Total	
Increasing more than three times	3	(3.5)	4	(3.9)	7	(3.7)
Increasing more than two times	19	(22.4)	15	(14.6)	34	(18.1)
Doubled	30	(35.3)	40	(38.8)	70	(37.2)
The same as before	18	(21.1)	36	(35.0)	54	(28.7)
Decreasing since use	1	(1.2)	0		1	(0.5)
No response	14	(16.5)	8	(7.8)	22	(11.7)
Total	85	(100.0)	103	(100.0)	188	(100.0)

Table 4.22 Funding source for buying mechanization (unit: person (%))

Fund source	Developed village		Developing village		Total	
Their own money	15	(18.5)	15	(15.3)	30	(15.9)
Borrow from others	6	(7.4)	3	(3.1)	9	(4.8)

Fund source	Developed village		Developing village		Total	
Loan from government	49	(60.5)	72	(73.5)	121	(64.0)
Co-operation with somebody	6	(7.4)	2	(2.0)	8	(4.2)
No response	5	(6.1)	6	(6.1)	11	(5.8)
Total	89	(100.0)	98	(100.0)	189	(100.0)

Table 4.23 The reasons delaying mechanization (unit: person (%))

Reason	Developed village		Developing village		Total	
High capital cost for buying	35	(46.1)	43	(52.4)	78	(49.4)
Higher operational cost for using	27	(35.5)	14	(17.1)	41	(25.9)
Lack of land consolidation	7	(9.2)	13	(15.9)	20	(12.7)
Not necessary	5	(6.6)	10	(12.2)	15	(9.5)
No response	2	(2.6)	2	(2.4)	4	(2.5)
Total	76	(100.0)	82	(100.0)	158	(100.0)

the form of credit, special tax assistance and tariffs. Concerning government subsidies in support of mechanization responses to the question 'which source of funds did you use for the agricultural machinery?', 64 per cent of the total said that they bought the machinery by

Table 4.24 Perception of repair service system for mechanization (unit: person (%))

Response	Developed village		Developing village		Total	
Very good	9	(12.0)	13	(13.8)	22	(13.0)
Good	22	(29.3)	15	(16.0)	37	(21.9)
Bad	28	(37.3)	23	(24.5)	51	(30.2)
Very bad	11	(14.7)	33	(35.1)	44	(26.0)
No response	5	(6.7)	10	(10.6)	15	(8.9)
Total	75	(100.0)	94	(100.0)	169	(100.0)

government subsidy while only 15.9 per cent of the total responded that they bought it with their own money (see Table 4.22).

In response to the question 'why did you not make full use of mechanization earlier?' the sample quoted high capital costs for buying (49.4 per cent), high operational costs for using (25.9 per cent), and land consolidation (12.7 per cent) as the main inhibitions (see Table 4.23).

In order to make full use of agricultural machinery, the repair service system needs to improve in rural areas. According to Table 4.24, 56.2 per cent of the total respondents complained of the repair service system while only 13.0 per cent considered that the system was very good.

The mechanization of power-intensive processing and pumping operations always precedes the mechanization of harvesting and crop husbandry operations, and can be profitable at low wages. Farmers in the sample villages believed that agricultural machinery had contributed to an increase in agricultural productivity and income level, and improved the labour force in rural regions. Farmers want to extend farm mechanization by the increased use of power tillers, mist and dusters, threshing machinery and farm tractors as soon as possible.

SPECIAL PROBLEMS AND ISSUES

The rural integrated development programme and the promotion of new technology for rural development have contributed to the development of rural villages. The analysis indicates that the achievement motivation of rural people is considerably higher as a result of not only rural development but also economic development projects. It is impossible to measure the extent to which the rural development projects have contributed to value changes among the rural people. Nevertheless, as the rural development projects have worked for the establishment of 'well-to-do villages', it seems obvious that they have stimulated rural people's achievement motivation throughout.

The analysis shows that there is a very important role of government institutions at the village level to explain and motivate the rural people to the ideas and objectives behind rural development and new technology. In the case of agricultural technology, the stimulation for new ideas occurs mostly outside the rural village. Initiation of the new technology in the rural village is made through change agents, namely village leaders who work in close collaboration with local officials.

This analysis also shows that co-operative attitudes and solidarity among people have grown stronger over time in rural areas. There was no conspicuous difference in the level of solidarity found between the people of the developed and the developing villages. Economic development, however, tends to increase people's awareness of economic rationality, income and monetary values. Consequently, co-operative attitudes and solidarity among people are apt to be distorted by economic factors such as price and income. Despite the fact that new technology has contributed to the growth of the village economy in view of the average farm household, the non-farm income source is greatly limited in both villages. It is important that the villages should extend the diversification of income sources if living standards are to rise.

It is said that technologies such as high-yield varieties, water management and the use of fertilizers have contributed to the improvement of the economic and social structure in the two villages during the last two decades. Mechanization, and other technologies, should be used to contribute to increasingly agricultural productivity in the future. High capital costs retard mechanization in rural villages. The rural farmer believes that mechanization is most profitable and contributes most to growth where labour is scarce relative to the land usage and where labour is being rapidly absorbed into the non-agricultural sector.

Government subsidies may speed up mechanization. Repair services for farm machinery and the co-operative management of machinery in rural villages are both required to take advantage of the new technology. It is very important to adopt further land consolidation measures for enhancing farm mechanization. It is desirable to allow flexibility in the operation ownership ceiling so that farmers, if they want, can extend their farm size.

The analysis also indicates that the Saemaul movement has contributed to development and change in the rural village during the 1970s not only in the social structure but also in its physical structure. The output of the Saemaul movement, however, has decreased in policy impact since the early 1980s. Finally, the rural integrated development programme may require a change of strategy in order to adapt to the changing environment of the village. The policy will focus on agricultural machinery, the rural marketing system and lifestyle of rural villages.

In the course of conducting the case study for this research, the research team encountered certain problems. First, in the course of its field work, the research team observed that some of the respondents feared a loss of privacy and some of them pressurized the field investigators not to take down whatever information they reported. It was necessary for the chief researcher to intervene and convince them about the usefulness of providing reliable information.

Second, some of the respondents tried to persuade the field staff to solve some of the rural issues such as farmers' debts and government rural policy.

Third, the researcher faced a problem in attempting to obtain reliable answers to the questions relating to farmers' income, educational background and private life.

Fourth, there was a clear indication that the respondents were under-estimating their incomes and over-estimating their expenditure. There was also some over-estimation of the costs of cultivation.

Fifth, the field research showed that many respondents may not have performed well because they did not know what was expected of them and because interviewers did not give them appropriate briefing on what was expected.

CONCLUSION AND IMPLICATIONS

The future course of rural development depends heavily on the fundamental planning of Korea's development strategies during the 1990s. In view of the present magnitude of the national economy as well as the speed of its economic growth and social change over the past two decades, the future of Korea in the 1990s should not be viewed as a simple extension of the development pattern of the past. (38) The government's development strategies for the 1990s should be reviewed and adjusted to cope with the changing needs of the country despite the fact that the government strategies have thus far been effective in the 1960s and 1970s.

Due to its rapid economic growth during the past twenty-five years, Korea is now on the threshold of entering a new stage of development, one which requires a development strategy based on the diffusion of growth and development between both the urban and the rural sectors. This reorientation of strategy implies the need for a change in direction in respect of goals, policies, organizations and management behaviour in the public sector. The change includes reorientation of development goals towards a better quality of living as measured in terms of other than economic growth and the readjustment of growth targets to an optimal level as opposed to simply pursuing excessively rapid growth.

According to the Korean Development Institute's report on the Korean economy in the year 2000, Korea will move toward an industrialized, welfare state in which further emphasis will be placed on social development as well as regional development to improve the quality of both urban and rural life. (39)

The agricultural sector now contributes less than one-quarter of GNP and is allocated less than 11 per cent of total investment. In the long run these ratios are likely to fall even more. The contribution of agriculture to aggregate GNP will probably be less than 10 per cent in the 1990s. The sector nevertheless has and will continue to have, considerable social importance. Currently, about 20 per cent of the labour force is employed in agriculture; the ratio is likely to be about 20 per cent even in 1990, assuming the economy grows at more than 9 per cent a year.

In relation to agricultural technology, the technical efficiency of agricultural practices is not a major issue in Korea. Rice yields already are among the highest in Asia, with the introduction of new high-yielding varieties and average yields are continuing to increase. In general, the research and extension network performs well, and Korean farmers make good use of modern inputs and expertise. Agricultural mechanization has become an important technical issue due to a shortage in the rural labour force and the high capital costs of agricultural machinery.

Increase in income may change the pattern of agricultural production. Per capita rice consumption was projected to rise until the late 1970s, mostly because of the relaxation of administrative restraints on rice production, and then decline as demand shifted to fruits, vegetables and livestock products. This shift would significantly increase the intake of high-quality protein. Taking population growth and the changes in demographic composition into account, total consumption is projected to change by 1990.

According to a government report, the number of persons available for employment in agriculture is unlikely to decline significantly after the mid-1980s; the projected level for 1990 is only 3 to 4 per cent lower than the mid-1970s level, even assuming a relatively high rate of economic growth. Beyond 1990, however, the availability of labour might well pose a constraint. That is sufficiently far in the future to allow a reassessment of the potential for mechanization and other agricultural investment at the end of the sixth social and economic development plan.

There are four principal issues in the agricultural sector: the extent to which domestic production can meet the growing demand for foodgrains; the economic efficiency of investment required to achieve further increases in grain production; the availability of technology for rural activities; and the likely trends of productivity and per capita incomes in agriculture, particularly in relation to the growth of urban incomes.

The facts suggest that the level of investment for land development projected in the agricultural plan is substantially higher than is either required for assuring rice self-sufficiency or justified by considerations of economic costs and benefits. Agricultural machinery planning needs to spell out the long-term objectives of the agricultural sector and to prepare a development plan to meet an increasing demand for agricultural products.

Experience with rural development programmes and projects over the past two decades clearly demonstrates that a single programme or even a portfolio of projects aimed at ameliorating problems of poverty and inequity alone will have little effect. Success depends on the ability of the national government to orient, clearly and deliberately, all of its major policies toward the goal of economic growth with social equity, considering the impact of each policy on rural productivity, income distribution and human welfare and a strengthening of the linkages between urban and rural sectors. National economic, social, technical and financial policies must provide direct and continuous support for the goals of rural development in order for individual programmes and projects to bring about the structural change of the Korean rural community needed to attain those goals. (40)

An integrated ‘package’ of technical inputs and services is needed to increase agricultural productivity in Korea. A closely-related set of agricultural services, physical infrastructure, public and social services, marketing, credit and financial institutions, and other inputs are needed to create preconditions in rural areas for private investment, and these must be located at, or delivered to, appropriate settlements in rural regions to transform existing communities into more productive and interdependent units in the national spatial system. Due to the industrialization, urbanization and rural integrated development programmes, a more balanced spatial system can be achieved in Korea by building from the ‘bottom up’, by stimulating increased production, employment and demand in rural areas, and by extending to smaller settlements the services and facilities that will encourage increased productivity and by the consolidation of the rural population into larger economic centres. (41)

In view of the extent of Korea’s industrialization and urbanization, the objectives of rural development in the 1990s should be linked to the national spatial system between the urban centre and the rural village. In pursuit of these goals, the government should consider implementing policy strategies in rural villages as follows:

1. Investment incentives to promote small and intermediate-sized industry, crafts and labour-intensive manufacturing and processing in rural areas in order to absorb labour, while at the same time assisting those large industries that produce the intermediate and capital goods forming the economic base of most large cities.
2. Price supports for essential agricultural commodities that provide incentives for individual farmers to increase agricultural output, to experiment with new methods and techniques, and to adapt improved

practices and higher-yielding seed varieties without fear of catastrophic losses in income owing to drastic price fluctuations. (42)

3. A public work and social services investment policy that provides basic levels of health, education and other services appropriate for rural and urban populations and that ensures the adequate physical infrastructure necessary to encourage and facilitate rural production.
4. Policies should be determined for agricultural modernization in order to make the rural sector comparable to the more efficient industries in the coming decades. This might include projects related to a structural policy which encourages the enlargement of cultivating land through changes in farm organization and the promotion of the mechanization of farming. Policies and strategies for the rural village should be heavily focused on costs, subsidies, co-operative management and effective repair services for agricultural machinery.
5. Emphasis should be given to policies and projects related to off-farm income, including the relocation of industrial areas, the creation of opportunities for non-farm employment by rural people through the impact of urbanization, and training as well as social insurance for employment in industries. Greater attention should be paid to improving agricultural marketing systems and flow channels for rural products since these are closely related to increasing rural income. (43)
6. Positive participation and development for the use of women should be encouraged in order to promote better utilization of human resources such as women and children. Emphasis should be placed on children and youth development in the rural sector for self-sustained development of rural communities and for better distribution of income and development benefits between urban and rural sectors.

Future research

In terms of rural development, research projects should be focused on the management of farm machinery, off-farm income sources, agricultural marketing systems and the spatial linkages between urban and rural regions. The spatial linkage between urban centres and rural villages is particularly significant in the Korean context and an important issue in order to implement successfully the technology policy for rural regions.

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Appendix 4.1 Status of agriculture in national economy

Unit	1973	1974	1975	1976	1977	1978
Total population (1,000 person)	34,103	34,692	34,679	35,860	36,436	37,019
Farm population (1,000 person)	14,645	13,459	13,244	12,785	12,309	11,527
As a percentage of the total population (%)	42.90	38.80	38.20	35.70	33.80	31.10
Total area (1,000 ha)	9,876	9,876	9,881	9,880	9,886	9,896
Area of farmland (1,000 ha)	2,241	2,238	2,240	2,283	2,231	2,221
As a percentage of the total area (%)	22.70	22.70	22.70	22.70	22.60	22.50
Total employed population (1,000 person)	11,139	11,586	11,830	12,556	12,926	13,490
Percentage of population employed in agriculture and forestry (%)	47.2	45.8	43.3	42.4	40.0	36.5

	1979	1980	1981	1982	1983	1984
Total population (1,000 person)	37,605	38,124	38,723	39,331	39,951	40,578
Farm population (1,000 person)	10,883	10,826	9,999	9,688	9,475	9,015
As a percentage of the total population (%)	28.9	28.9	25.8	24.6	23.7	22.2
Total area (1,000 ha)	9,897	9,899	9,902	9,902	9,909	9,909
Area of farmland (1,000ha)	2,207	2,196	2,188	2,180	2,167	2,152
As a percentage of the total area (%)	22.3	22.2	22.1	22.0	21.9	21.7
Total employed population (1.000 person)	13,664	13,706	14,048	14,424	14,515	14,417
Percentage of population employed in agriculture and forestry (%)	34.0	32.3	32.5	30.0	27.9	25.9

	1973	1974	1975	1976	1977	1978
Gross national products (billion won)	5,238.30	7,332.50	9,792.85	13,272.59	17,021.37	22,917.60
Percent of agricultural and forestry products for gross national products (%)	22.6	23.0	23.0	21.8	20.6	19.6
Gross domestic fixed capital formation (billion won)	1,255.64	1,870.56	2,543.95	3,152.37	4,420.88	7,023.07
Percent of gross fixed formation of agriculture, forestry and fisheries for gross domestic fixed capital formation (%)	9.7	11.8	9.0	9.4	9.1	8.1

	1979	1980	1981	1982	1983	1984
Gross national products (billion won)	29,553.68	34,321.55	42,397.12	48,088.26	58,428.40	65,344.95
Percent of agricultural and forestry products for gross national products (%)	18.3	14.6	15.9	14.7	12.6	12.5

	1979	1980	1981	1982	1983	1984
Gross domestic fixed capital formation (billion won)	9,344.50	11,240.03	12,240.03	14,139.97	18,604.77	
Percent of gross fixed formation of agriculture, forestry and fisheries for gross domestic fixed capital formation (%)	6.8	6.8	7.8	8.3	6.1	

Source: Ministry of Agriculture and Fishery, Agricultural Machinery Statistical Yearbook, 1985, Seoul, Korea, 1985.

Appendix 4.2 Utilization of national land, 1973–83

Year	Item total %	Cultivated land %	Paddy field %	Upland %
1973	9,875,769.0 (100.0)	2,241,252.8 (22.7)	1,262,637.2 (12.8)	978,615.8 (9.9)
1974	9,875,769.0 (100.0)	2,238,431.9 (22.7)	1,268,949.8 (12.9)	969,482.1 (9.8)
1975	9,880,696.0 (100.0)	2,239,691.5 (22.7)	1,276,599.0 (12.9)	963,092.5 (9.8)
1976	9,879,907.0 (100.0)	2,238,218.7 (22.7)	1,290,000.5 (13.1)	948,218.2 (9.6)
1977	9,885,851.0 (100.0)	2,231,196.3 (22.6)	1,303,161.0 (13.2)	928,035.3 (9.4)
1978	9,896,292.0 (100.0)	2,221,918.2 (22.5)	1,311,959.3 (13.3)	909,958.9 (9.2)
1979	9,896,624,0 (100.0)	2,207,071.0 (22.3)	1,310,969.8 (13.2)	896,101.2 (9.1)
1980	9,899,234.0 (100.0)	2,195,822.1 (22.2)	1,306,789.0 (13.2)	889,033.1 (9.0)
1981	9,901,599.0 (100.0)	2,188,268.0 (22.1)	1,308,053.0 (13.2)	880,215.0 (8.9)
1982	9,902,244.0 (100.0)	2,180,084.0 (22.0)	1,311,512.0 (13.2)	868,572.0 (8.8)
1983	9,908,720.0 (100.0)	2,166,636.0 (21.9)	1,315,933.0 (13.3)	850,703.0 (8.6)

Year	Forest	Wooded	Denuded	Innumerated	Others
1973	6,586,185.0 (66.7)	5,741,531.0 (58.1)	799,405.0 (8.1)	45,249.0 (0.5)	1,048,331.2 (10.6)
1974	6,640,839.0 (67.2)	5,930,423.0 (60.0)	702,633.0 (7.1)	7,783.0 (0.1)	996,498.1 (10.1)
1975	6,635,352.0 (67.1)	5,980,693.0 (60.5)	646,876.0 (6.5)	7,783.0 (0.1)	1,005,652.5 (10.2)
1976	6,613,455.0 (66.9)	6,017,099.0 (60.9)	588,573.0 (5.9)	7,783.0 (0.1)	1,028,233.3 (10.4)
1977	6,593,069.0 (66.7)	6,057,494.0 (61.6)	527,792.0 (5.3)	7,783.0 (0.1)	1,061,585.7 (10.7)
1978	6,578,322.0	6,092,111.0	478,428.0	7,783.0	1,096,051.8

Year	Forest	Wooded	Denuded	Innumerated	Others
	(66.5)	(61.6)	(4.8)	(0.1)	(11.0)
1979	6,570,663.0 (66.4)	6,117,165.0 (61.8)	445,715.0 (4.5)	7,783.0 (0.1)	1,118,890.0 (11.3)
1980	6,567,722.0 (66.3)	6,301,716.0 (61.7)	241,262.0 (2.4)	24,794.0 (0.2)	1,135,639.9 (11.5)
1981	6,562,885.0 (66.3)	6,292,366.0 (63.5)	245,725.0 (2.5)	24,794.0 (0.3)	1,150,456.0 (11.6)
1982	6,553,713.0 (66.2)	6,283,817.0 (63.5)	245,265.0 (2.5)	24,631.0 (0.2)	1,168,447.0 (11.8)
1983	6,546,829.0 (66.1)	6,282,598.0 (63.4)	239,600.0 (2.4)	24,631.0 (0.3)	1,195,255.0 (12.0)

Appendix 4.3 Trend of farm population and cultivated land, 1966–84

Item	1966	1967	1968	1969
Household				
Total household	5,057,030	5,101,040	5,233,958	5,415,516
Farm household	2,540,274	2,586,864	2,578,526	2,546,244
(%)	(50.2)	(50.7)	(49.3)	(47.0)
Population				
Total population	29,160,000	30,131,000	30,838,000	31,544,000
Farm population	15,780,706	16,078,086	15,907,664	15,588,912
(%)	(54.1)	(53.4)	(51.6)	(49.4)
Farm population per household (%)	(6.21)	(6.22)	(6.17)	(6.12)
Area of cultivated land (ha)				
Paddy field	1,287,117.8	1,290,523.9	1,289,323.3	1,283,023.0
Upland	1,005,970.5	1,021,397.4	1,029,452.7	1,028,146.5
Total	2,293,088.3	2,311,921.3	2,318,776.0	2.311.169.5
Area of cultivated land per farm household (ha)				
Paddy field	5.07	4.99	5.00	5.04
Upland	3.95	3.95	3.95	4.03
Total	9.02	8.94	9.00	9.07
Area of cultivated land per farmer (ha)				
Paddy field	0.82	0.80	0.81	0.82
Upland	0.64	0.64	0.81	0.82
Total	1.46	1.44	1.46	1.48

Item	1970	1971	1972	1973	1974
Household					
Total household	5,863,440	5,864,339	5,944,922	6,056,239	6,295,918
Farm household	2,483,318	2,481,525	2,451,844	2,056,239	2,381,200
(%)	(42.4)	(42.3)	(41.2)	(40.5)	(37.8)

Item	1970	1971	1972	1973	1974
Population					
Total population	31,435,000	32,883,000	33,505,000	34,103,000	34,692,000
Farm population	14,421,730	14,711,828	14,676,944	14,644,566	13,459,195
(%)	(45.9)	(44.7)	(43.8)	(42.9)	(38.8)
Farm population per household (%)	(5.81)	(5.93)	(5.99)	(5.98)	(5.65)
Area of cultivated land (ha)					
Paddy field	1,194,733.6	1,264,840.4	1,259,441.6	1,259,441.6	1,268,949.8
Upland	923,534.0	1,006,466.9	982,848.8	978,615.8	969,482.1
Total	2,118,276.6	2,271,307.3	2,242,290.4	2,241,252.8	2,238,431.9
Area of cultivated land per farm household (ha)					
Paddy field	5.13(4.81)	5.10	5.14	5.15	5.33
Upland	4.12(3.72)	4.05	4.00	4.00	4.07
Total	9.25(8.53)	9.15	9.14	9.15	9.40
Area of cultivated land per farmer (ha)					
Paddy field	0.88(0.83)	0.86	0.86	0.86	0.94
Upland	0.71(0.64)	0,68	0.67	0.67	0.72
Total	1.59(1.47)	1.54	1.53	1.53	1.66

Item	1973	1976	1977	1978	1979
Household					
Total household	6,791,239	6,832,605	7,008,323	7,256,095	7,969,201
Farm household	2,379,058	2,335,856	2,303,930	2,223,807	2,161,821
(%)	(35.0)	(34.2)	(32.9)	(30.6)	(28.7)
Population					
Total population	34,681,000	35,860,000	36,436,000	37,019,000	37,605,000
Farm population	13,244,021	12,785,456	12,308,834	11,527,459	10,883,422
(%)	(38.2)	(35.7)	(33.8)	(31.1)	(28.9)
Farm population per household	(5.57)	(5.47)	(5.34)	(5.18)	(5.03)
Area of cultivated land (ha)					
Paddy field	1,276,599.0	1,290,000.5	1,303,161.0	1,311,959.3	1,310,969.8
Upland	963,092.5	948,218.2	928,035.3	909,958.9	896,101.2
Total	2,239,691.5	2,238,218.7	2,231,196.3	2,221,918.2	2,207,071.0
Area of cultivated land per farm household (ha)					
Paddy field	5.36	5.52	5.65	5.90	6.06
Upland	4.05	4.06	4.03	4.09	4.15
Total	9.41	9.58	9.68	9.99	10.21
Area of cultivated land per farmer (ha)					
Paddy field	0.96	1.01	1.06	1.14	1.20
Upland	0.73	0.74	0.75	0.79	0.83
Total	1.69	1.75	1.81	1.93	2.03

Item	1980	1981	1982	1983	1984
Household					
Total household	7,969,201	–	–	–	–
Farm household	2,155,073	2,029,626	1,995,769	2,000,000	1,973,539
(%)	(27.0)	–	–	–	–
Population					
Total population	38,124,000	38,723,000	39,331,000	39,951,000	40,578,000
Farm population	10,826,748	9,998,651	9,688,222	9,475,000	9,014,745
%	(28.9)	(25.8)	(24.6)	(23.7)	(22.2)
Farm population per household (%)	(5.2)	(4.93)	(4.85)	(4.74)	(4.57)
Area of cultivated land (ha)					
Paddy field	1,306,789.0	1,303,053.0	1,311,512.0	1,316,000.0	1,319,903.0
Upland	889,033.1	880,215.0	868,572.0	851,000.0	832,454.0
Total	2,195,822.1	2.188,268.0	2,180,084.0	2,167,000.0	2,152,357.0
Area of cultivated land per farm household (ha)					
Paddy field	6.06	6.44	6.57	6.58	6.69
Upland	4.12	4.34	4.35	4.26	4.22
Total	10.18	10.78	10.92	10.84	10.91
Area of cultivated land per farmer (ha)					
Paddy field	1.21	1.31	1.35	1.39	1.46
Upland	0.82	0.88	0.90	0.90	0.92
Total	2.03	2.19	2.25	2.29	2.39

Source: Ministry of Agriculture and Fishery, Agricultural Statistical Yearbook, 1984, Seoul, Korea, 1985.

Appendix 4.4 Ownership of major items of agricultural machinery (1), 1977–84

Year		Item tillage machinery			Spraying and dusting equipment		
Power tiller	Farm tractor	Manual	Duster	Sprayer			
1977	154,656	153,535	1,121	1,098,165	903,837	37,350	866,487
1978	196,381	194,780	1,601	1,07,862	871,868	35,030	836,838
1979	237,944	235,909	2,035	1,154,867	863,806	19,427	844,379
1980	292,443	289,779	2,664	1,187,008	855,096	16,734	838,362
1981	354,324	350,462	3,862	1,185,211	820,523	20,944	799,579
1982	427,581	422,006	5,575	1,148,736	744,154	14,052	730,102
1983	496,765	489,296	7,469	1,168,426	729,525	10,578	718,947
1984	547,957	538,273	9,684	1,192,084	718,583	9,331	709,252

Year		Spraying and dusting equipment Power driven Speed sprayer				
		Total	For orchards	For paddy field	Mist and duster	Power sprayer
1977	194,328	–	–	–	141,224	53,104

Year	Item tillage machinery			Spraying and dusting equipment	
Power tiller	Farm tractor	Manual	Duster	Sprayer		
1978	235,994	769	769	–	169,652	65,573
1979	291,061	1,287	1,287	–	207,473	82,301
1980	331,912	1,249	1,249	–	222,031	108,632
1981	364,688	2,868	1,308	1,560	219,217	142,603
1982	404,582	929	397	532	232,160	171,493
1983	438,901	1,059	460	599	229,592	208,250
1984	473,501	1,316	549	767	227,383	244,802

		Agricultural prime mover				
		Engine		Electric motor		
Year	Unit	Hp	Unit	Hp	Unit	Hp
1977	129,563	817,824.0	93,539	625,336.0	36,024	192,448.0
1978	189,121	945,896.2	118,600	741,696.5	70,521	204,199.7
1979	191,704	915,209.4	106,868	689.986.4	84,836	225,223.0
1980	173,515	894,835.9	87,677	656,712.5	85,838	238,123.4
1981	193,175	796,622.7	79,503	544,397.5	113,672	252,225.2
1982	260,622	866,577.6	94,227	586,720.6	166,395	279,857.0
1983	300,636	924,140.0	94,436	597,247.0	206,200	326,893.0
1984	327,950	958,504.0	90,975	578,410.8	236,975	380,094.0

		Straw processing machinery			
		Straw rope machine		Straw bag machine	
Year		Manual	Powered		Manual
1977	162,323	144,229	18,094	225,950	217,770
1978	165,920	145,352	20,568	184,175	175,602
1979	161,401	139,080	22,321	149,064	140,556
1980	150.391	127,514	22,877	118,836	111,232
1981	139,675	116,614	23,061	92,318	85,692
1982	124,397	102,107	22,290	69,320	63,377
1993	109,625	88,601	21,024	50,718	46,018
1984	96,769	76,920	19,849	39,332	35,199

Source: Ministry of Agriculture and Fishery, Agricultural Machinery Statistical Yearbook, 1985, Seoul, Korea, 1985.

Appendix 4.5 Ownership of major items of agricultural machinery (2), 1977–84 Harvesting and threshing machinery

	Harvesting and threshing machinery											
Year	Powered	Power reaper	Binder	Threading	Powered	Semi-automatic	Automatic	Combine	Rice transplanter	Seed planter	Water pump
1977	8,180	236	114	122	370,579	161,092	108,511	52,581	77	121	3,118	119,956
1978	8,573	3,703	216	3,487	321,650	185,947	118,482	67,465	134	531	4,468	180,660
1979	8,508	12,030	913	11,117	276,285	203,081	118,478	84,603	505	2,416	3,773	187,608
1980	7,604	15,628	1,976	13,652	245,692	219,896	115,577	104,319	1,211	11,061	3,479	193,943
1981	6,626	17,679	2,099	15,580	199,498	238,633	112,474	126,159	2,130	15,271	3,219	209,189
1982	5,943	19,744	2,450	17,294	164,445	253,552	110,919	142,633	3,509	19,660	3,053	245,794
1983	4,700	23,419	3,603	19,816	135,881	269,753	107,182	162,571	5,689	24,818	3,124	262,608
1984	4,133	26,821	4,186	22,635	119,358	286,647	105,822	180,825	8,417	30,893	3,466	273,329

									Grain processing machinery		
Year	Weeder	Manual	Powered	Forage cutter	Grain dryer	Batch	Circulating type		Rice huller	Rice polishing machine	Barley polishing machine	Flour milling machine
1977	375,965	375,885	80	5.581	687	339	348	96,825	22,316	29,925	24,584	20,000
1978	148	–	148	7,837	962	379	583	92,955	22,174	27,974	23,624	19,183
1979	323	–	323	10,516	1,143	412	731	88,764	21,697	26,573	22,752	17,742
1980	604	–	604	14,694	1,616	630	986	84,276	21,051	25,235	21,323	16,667
1981	713	–	21,488	21,488	2,143	746	1,397	79,906	20,181	24,027	20,128	15,570
1982	843	–	843	43,105	2,816	724	1,522	76,165	19,822	23,475	18,645	14,223
1983	1,099	–	1,099	104,748	2,816	777	2,039	74,098	19,599	23,211	17,777	13,502
1984	1,353	–	1,353	168,098	3,681	1,025	2,656	72,246	19,377	22,727	17,040	13,102

Source: Ministry of Agriculture and Fishery, Agricultural Machinery Statistical Yearbook, 1985, Seoul, Korea, 1985.

Appendix 4.6 Farm households and area per unit of machine, 1978–84

Year	Power tiller	Farm tractor	Rice transplanter	Binder	Combine	Power threshing machinery
1978	11.4 1	1,389.0	4,188.0	637.7	16,595.6	12.0
1979	9.2 1	1 . 062 . 3	894.8	194.5	4,280.8	10.6
1980	7.4	809.0	194.8	157.9	1,779.6	9.8
1981	5.8	525.5	132.9	130.3	952.9	8.5
1982	4.7	358.0	101.5	115.4	568.8	7.9
1983	4.1	267.8	80.6	100.9	351.6	7.4
1984	3.7	203.8	63.9	87.2	234.5	6.9

Year	Power Sprayer	Mist and duster	Seed sprayer	Seed planter	Water pump	Grain dryer	Forage cutter
1978	33.9	13.1	2,891.8	497.7	12.3	2,311.6	283.8
1979	26.3	10.4	1,679.7	573.0	11.5	1,891.4	205.6
1980	19.8	9.7	1,725.4	619.5	11.1	1,333.6	146.7
1981	14.2	9.3	707.7	630.5	9.7	947.1	94.5
1982	11.6	8.6	2,148.3	653.7	8.1	888.6	46.3
1983	9.6	8.7	1,888.6	640.2	7.6	710.2	19.1
1984	9.5	8.7	1,500.0	569.5	7.2	536.3	11.7

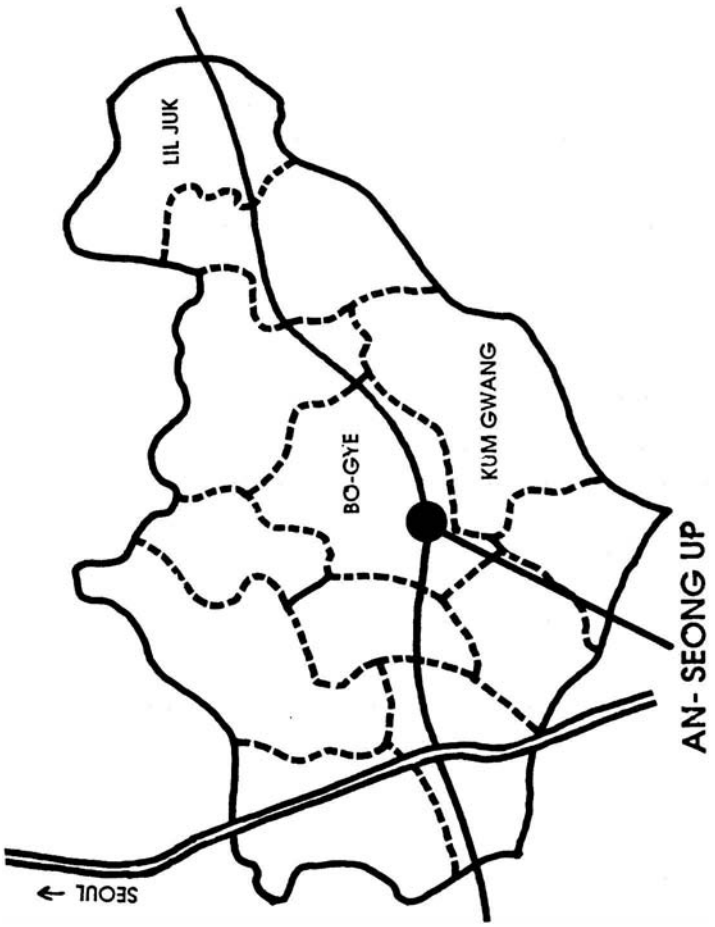
Source: Ministry of Agriculture and Fishery, Agricultural Machinery Statistical Yearbook, 1985, Seoul, Korea, 1985.

Appendix 4.7 Requirements for village reclassification

Project	Promotion from underdeveloped village to developing village	Promotion from developing village to developed village
Village road	Completion of main road	Completion of main and feeder roads
Farm road	Feeder farm road into the village	Main farm road to the village
Bridges	Small bridges (10m or more)	Small bridges (20m or more)
River control	Small streams passing through the village	Small rivers near the village
Community	Village hall, storehouse	Small rivers near the village
Facilities	Workshop, etc.: more than one	Workshop, etc.: more than two
Roof improvement	50% of all houses	80% of all houses
Saemaul fund	Over 300,000 won	Over 500,000 won
Savings in Saemaul fund per household	Over 10,000 won	Over 20,000 won
Annual income per household	Over 700,000 won	Over 900,000 won

Source: Ministry of Home Affairs, Ten Years History of the Saemaul Undong, vol. 2 (1980, pp. 23–4).

Map 4.1 Location of cities in Korea



Map 4.2 An-Seong country

Chapter Five
NEPAL

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INTRODUCTION

Nepal is one of the least developed countries of the world. Many factors such as being landlocked, an unfavourable topography and an inadequate infrastructure base have been the major hindrances to the development of Nepal.

The socio-economic situation in rural areas of Nepal is still deplorable. Traditional values and beliefs predominate in the societies of the rural people. The agricultural sector on which they largely depend is backward. The employment opportunities outside agriculture are limited. Moreover, the ever-increasing deterioration of the ecological environment in rural areas due to various natural, social and economic factors has kept the living standards extremely low in rural areas of the country. The development of rural areas therefore has been seen as a major factor for bringing the country out of poverty and underdevelopment.

The introduction and adoption of new technologies in rural areas have always been a sign of hope for both the development planners and the poverty-stricken people. Some efforts have also been made on the part of the Nepalese government to introduce new technologies to persuade the rural communities to adopt these technologies.

There are however, several questions regarding the technology needed for rural development in a country like Nepal. What is the impact of new technologies so far adopted upon the rural communities? Have they been able to bring positive changes to the rural socio-economic environment? Studies are still needed to answer these sorts of questions. The present study sets out to examine the social impact of the adoption of new technology upon the rural communities of Nepal, taking as its focus the impact of the adoption of mechanical tillage as an example of new technology.

The basic assumptions on which the study is based are that the modern technologies will bring certain changes in the existing social structures and have a direct impact upon the socio-psychological aspects of the society. These changes, in turn, affect the social behaviour of rural communities and families. Consequently they will bring implications to families, communities, governments and other institutions.

The study has aimed at examining the changes in social process and institutional structures and analysing the socio-economic impacts as well as implications related to the introduction of mechanical tillage and its related technology. It highlights the past and present efforts of the government—His Majesty's Government of Nepal—in introducing new technologies in rural areas and also highlights some of their socio-economic impacts.

The micro-aspect of the study has analysed the information collected from two villages—one relatively mechanized and the other less mechanized—through a household questionnaire survey. Besides information from households, the heads of local institutions, such as high schools and non-governmental organizations,

were contacted for in-depth interviews. The interviews, however, were not strictly structured. In addition to these, the intellectuals and elites were asked to provide responses to some of the statements concerned with the socio-economic changes related to mechanical tillage.

The information collected has been analysed with the help of tables and interpretation of the tables. The conclusion derived from one set of information is compared with the findings from other sources. For instance the information provided by households has been compared with information collected from institutions such as Sajha (the local term for co-operatives), high schools, etc.

GOVERNMENT POLICY ON TECHNOLOGY FOR RURAL DEVELOPMENT

Role of technology in rural development

Technology is skills, knowledge and procedures for making, using and doing useful things (Merrill, 1968). (1) It has been identified as one of the important factors in bringing about social change. In the words of Ogburn, 'technology changes society by changing our environment and the adjustment we make to the changes often modifies customs and social institutions'. (2)

Various types of technologies exist for doing the same thing. Some technologies are traditional whereas some others are modern and sophisticated. In between these two extremes there are various intermediate technologies. The set of technologies exhibit the stage of development of a particular community possessing it. This set of technologies further pushes the community to change in a certain direction.

Rural areas of the developing countries, such as Nepal, need better technology for their development. The agricultural productivity in Nepal is low due to the predominance of traditional technologies in agriculture (2020 kg per hectare of paddy in 1985–86). (3) So the adoption of new technologies for the development of agriculture, and through it for the development of rural areas, is crucial. Likewise the introduction of new technologies to develop the rural industrial sector and rural services seems to be a vital part of the process.

The choice of technology, however, is a question of appropriateness, in the sense that something new may not be the best or even any better than the old, in terms of the actual rural situations. Any technology, if it is more productive, should be favourable to existing economic, social and environmental conditions. Appropriate technology has been a catchword in technology-related literature for some time. The question of appropriateness seems to be particularly relevant to the problems of rural development.

If rural development is concerned with improvement in the lives of rural people, the predominant sectors such as agriculture, cottage industry and rural services should be improved. To this end, technology plays a vital role in enhancing the productivity and the efficiency in these sectors. While reviewing the role of technology in rural development, therefore, agriculture, cottage industry and rural services should be taken into consideration.

In the case of agriculture, the technology adopted in general is still backward as the consumption of high-yielding inputs such as chemical fertilizer, improved seeds (HYV), pesticides, etc. is still very low. The consumption of chemical fertilizer and improved seeds for instance, was only 4,100 metric tonnes and 2,550 metric tonnes respectively in 1984–85. The intensity of the use of chemical fertilizer was just 0.014 metric tonnes per cropped hectare in that year. The intensity of the use of improved seeds was 0.00032 metric tonnes per hectare, 0.00017 metric tonnes per hectare and 0.0044 metric tonnes per hectare for paddy, maize and wheat in the same year. Moreover, the degree of farm mechanization is still low and limited to the plains region of the Terai. There was only one tractor for 1,000 hectares of cultivated land in 1980.

Likewise the technologies adopted in the industrial sector of rural areas also seemed to be less effective in enriching the lives of rural areas, in the sense that most of the local resources and local labour are under-

utilized especially during the agricultural off-season. Only 195 days out of a total available 323 days for work in rural areas seemed to have been utilized. (4)

The application of improved technologies for harnessing local resources and the conservation of forest resources also have been less than encouraging in the country as water resources have not been properly utilized for irrigation, drinking water facilities and electricity generation. The forest resources are depleting rapidly due to the extensive farming and a lack of alternative energy resources.

The application of technologies which are superior to the conventional technologies and at the same time appropriate to the rural environment of Nepal therefore seems to be an attractive alternative or strategy for rural development.

The government stated its science and technology policy for the first time at the beginning of the Sixth National Development Plan (1980–5). The objectives of the science and technology policy, according to the plan document, were to fulfil the basic needs of people, enhancing the scientific and technical capabilities and extending the use of appropriate technology among the people. Accordingly the plan spelled out the following policies:

1. Appropriate technology suited to mobilization of natural resources and optimum utilization of local skill and labour will be extended and promoted.
2. In the context of the need to develop science and technology along the lines of national development process, science and technology-related plans and programmes will be launched according to development plans.
3. Necessary co-ordination will be maintained between sciences and related institutions to enhance the science and technology policy of the country.
4. The institutions involved in research and development of science and technology will be strengthened and new laboratories will be added according to the need.
5. The acquiring of scientific and technical manpower needed for the implementation of science and technology programmes related to national development, will be enhanced quantitatively and qualitatively.
6. A national science and technology information system will be developed by fostering linkages and co-ordination among various laboratories of the related institutions of science and technology.
7. In addition to developing, improving and modifying the technologies in rural areas, technological extension services will be provided to the common people in order to acquaint them with the usefulness and need of science and technology through various media.

The role of science and technology in the process of development has also been highlighted in the seventh plan document (1985–90). The main objectives, as laid down by the plan, for science and technology policy are fulfilment of the basic needs of the people by maximally using the available means and resources, and development of appropriate technology for the country. The plan also emphasizes the need to develop such technologies as will be of immediate benefit and to fulfil national need. The plan has further assigned the science and technology-related institutions, such as the National Council for Science and Technology and the Royal Nepal Academy of Science and Technology, the following roles within their programmes:

1. Improvement of the traditional technologies, which have been used by people from time immemorial.
2. Development of intermediate type of technology in agriculture keeping in view the agricultural predominance and declining land productivity in Nepal.

3. Sophisticated and modern technology will be imparted only for the sectors where their need is highly pronounced.

Although Nepal has not yet spelled out a separate science and technology policy specifically for rural development, the policies mentioned above have deep implications for rural development. Apart from this, the sectoral development policies and programmes, rural development projects and various institutional policies may also have significant implications for the technological aspects of rural development. These aspects are analysed below. The development of appropriate technology and the improvement of traditional technologies have significant implications for rural development.

Past plans

The agricultural sector did not get the emphasis it deserved until the end of the second plan although the need to provide improved seeds, implements, fertilizers and extension services is stressed in all the plan documents. Several efforts, such as the enactment of Agricultural Reorganization and Co-operative Bank Acts of 1962, and the reform measures of 1964 were taken during the second development plan period (1962–5). The third plan (1963–70) emphasized the improvement of techniques in agriculture by providing improved seeds, fertilizers and better implements for which an Agricultural Supply Corporation was established. The fourth plan (1970–5) aimed at attaining the maximization of output for ensuring rising levels of consumption and providing greater export by supplying adequate industrial raw materials. The main policies during this plan period were to concentrate the efforts in a few selected fields so that the limited resources would not be scattered thinly over too many projects and integrating institutions related to agriculture for a better distribution of inputs and services. Sixteen districts in the Terai region and twelve districts in the hill region were identified as targets for the Intensive Agricultural Development Programme (IADP). The fifth plan (1974–80) gave top priority to agricultural development. The policies of the fifth plan incorporated technological aspects by mentioning that labour intensive techniques would be stimulated, an effective institutional system would be provided and preference would be given to adaptive research for agricultural development. The sixth plan also gave due consideration to technological aspects in agricultural development by stating that agricultural research and extension would be integrated with each other. Adaptive research would be given the highest priority in research and labour-displacing mechanization would be discouraged by checking credit facilities for machinery purchase.

The current plan

To fulfil the stated objectives of increasing consumption levels, the diversification of agricultural activities, export promotion and adequate provision of industrial raw materials from the agricultural sector, the seventh plan (1985–90) document sets out the following policies:

1. to achieve self-sufficiency in food production in hill regions within ten years by launching a food production programme as a movement;
2. to stress the development of animal husbandry in northern areas and to diversify agricultural activities in urban areas and dense settlements;
3. to make institutional arrangements more integrated to utilize the already created infrastructure by concentrating production programmes in command areas of infrastructures;

4. to interlink the programmes related to irrigation and agriculture with each other by enlisting the people's participation for projects such as the improvement of small irrigation schemes and tubewell boring;
5. to withdraw successively the subsidization of inputs and fertilizer by activating co-operatives and the private sector especially in the areas where agricultural production programmes are focused;
6. to relocate the production and supply of improved seeds progressively at the level of farm households by making institutional arrangements;
7. to achieve self-sufficiency in the production of industrial raw materials and give emphasis on cash production;
8. to increase production to enhance exports and substitute imports, keeping in view the internal demand. To direct the commercial production lines in this direction, necessary services and facilities will be provided;
9. to increase income and employment opportunities in rural areas by diversifying agriculture;
10. to provide price subsidies and marketing facilities by creating agencies responsible for agricultural marketing;
11. to ensure that agricultural research will be more problem oriented and useful;
12. to extend the programmes for harvest protection and seed selection and standardization;
13. to ensure the efficient conduct of agricultural services programmes by strengthening institutions;
14. to make agricultural extension programmes more effective by integrating agricultural extension, agricultural credit and agro-equipment;
15. to extend and strengthen the agricultural statistics collection system; and
16. to integrate a review and monitoring system by a reward and punishment system.

The agricultural policies stated above have implications for the need for improving or changing technologies in agriculture. The role of technology itself in agriculture has been inadequately mentioned and this may have deep implications for rural development. One major deviation in the policy statement of the seventh plan in comparison to that of the sixth plan is the policy of discouraging agricultural mechanization on the ground of displacement of labour. This has been left out of the current plan, indicating the softening of control on the use of agricultural machines. This fact has also been substantiated by the fact that the Agricultural Development Bank seems to be more free at present than before in financing farm mechanization.

The development of policies to date

The development of rural areas received due consideration following the overthrow of the Rana Regime. (5) The first rural development programme in the name of Tribhuvan Gram Vikas had the following objectives:

1. Education for rural people.
2. Mobilization of manpower, people's ingenuity and enthusiasm for national, economic and social development.
3. Teaching rural people through a self-help principle for increasing productivity and improving their living standards.
4. Developing responsible village leadership and organization for the planning and implementation of village improvement programmes.

5. Maintaining a two-way channel between the different departments of government and villagers in the field, and taking back the problems of the field for solution in the department concerned.
6. Assisting each village in planning and carrying out integrated multi-phased family and village programmes directed towards increasing agricultural production and improving village crafts.

The village development programme mentioned above was supported during the first national plan period (1956–61). The country was divided into 150 blocks for the implementation of the programme. In 1958 India also came forward to assist the programme. The programme was implemented at three levels, namely local, rural and regional development, each encompassing successively larger areas and bigger projects for the development of social services, agriculture and other sectors of rural development.

The second plan (1962–5) coincided with the introduction of a new political system in Nepal. This system, referred to as the panchayat system, replaced the parliamentary system based on multi-party political activities. The new partyless panchayat polity redirected the rural development programmes into a new panchayat development programme with the identification of a new development sector known as the panchayat sector. The objectives of the panychayat development programmes were to reform and develop institutions; to bring social change; and to change the attitudes of people towards development.

The fourth plan document stated that the objective of the panchayat development programme was to bring about the proper mobilization of manpower and resources and to secure the active participation of the people in social welfare and national development. It further stated that emphasis would be given to those programmes initiated at the zonal, district and village level in accordance with the principle of decentralization.

The country was divided into three regions, namely the Himalayan region, the Hill region, and the Tarai and Kathmandu valley, for the purpose of providing development grants. The Himalayan region, Hill region and Tarai and Kathmandu valley region were supposed to receive respectively 75 per cent, 50 per cent and 30 per cent of the total costs of development projects as a development grant from the government. Besides these arrangements, programmes like remote area development programmes were provisioned in the plan to include the backward areas within development efforts.

The fifth plan made provision for two categories of programmes for the development of the panchayat sector and ultimately for rural development: the local development programme and the panchayat training programme.

The objectives of the local development programme included, among others, improving employment, income and living standards of the people. The policies were mainly to fulfil the technical needs by supplying more technical manpower, to maintain the regional balance and integrate the development projects. The special provisions for rural development were rural drinking-water projects and remote area social development projects. These were institutionalized as the Regional Intensive Development Project (RIDP), the Small Area Development Programme (Rasuwa Nuwakot IRDP) and the Hill Transportation Project.

The local development programmes were provisioned to continue during the sixth plan. The emphasis of the plan document was on people's participation, the fulfilment of basic needs and the reduction of disparities. The programmes were more or less the same as those of the fifth plan. The integrated rural development programme (IRDP) which was initiated in the fifth plan was extended to twenty-four districts through six IRDP Projects. Another significant feature of the plan document was a separate policy statement for integrated rural development which included the following.

1. implementing suitable and effective land reform programmes for structural and institutional change in the agricultural sector;
2. implementing different redistributive measures such as land redistribution and fixed rents;
3. giving priority to developing infrastructures in the areas under rural development; and
4. giving priority to the implementation of the projects directly contributing to increased production and local employment. (6)

The policy on rural development for the current plan period has been revealed in the panchayat sector policy statement as in the past plans. The objectives of the plan are as follows:

1. To increase production by mobilizing natural resources locally for improving the standard of living.
2. To create maximum possible employment opportunities.
3. To provide basic facilities for local people.
4. To preserve and protect the local ecological environment by maintaining an environmental balance.

The strategies for fulfilling these objectives comprise multi-sectoral programmes launched in combination with adopting integrated planning and decentralization policies. Emphasis will be laid down for the fulfilment of local needs by maximally utilizing local resources through institutional development of panchayats. The policy of appropriate land use, land conservation and protection will be followed to maintain balanced ecology. The use of local technology, knowledge and skill will be promoted by developing appropriate technologies. Finally, the relationship between urban and rural areas will be developed by creating service centres and marketing centres.

Other programmes mentioned in the plan document are similar to those of the sixth and fifth plans. One significant addition is that in the present plan the technological needs for rural development are clearly identified in contrast to the past plan documents.

Resources for rural development

Financial resources are crucial for rural development. They are also needed for the generation, transfer and extension of the technology required for rural development. The capacity for the generation of financial resources is, however, severely limited in Nepal. As such, most of the rural development programmes are heavily funded by friendly countries, through bilateral and multilateral aid agencies. For instance 80 per cent of the total projected cost of Rasuwa-Nuwakot IRDP has been supported by IDA (World Bank) and UNDP assistance in the form of credit. The allocation of resources for research and development of technology needed for rural development, however, is insignificant both in absolute and relative terms.

Though Nepal has sufficient unskilled labour, the skilled labour force is still a critical bottleneck in the process of rural development. Besides this there is a serious imbalance in the availability of technical manpower at different levels, especially the middle level. It has been estimated that even at the end of the current seventh plan, there will be a deficit of 7,386 persons in the technical field. Besides this, the quality of the available technical personnel is subject to question. The basic issue is, therefore, the ineffectiveness of the existing manpower and the pool of manpower is still inadequate in Nepal for the development of technology needed for rural development.

There are insignificant mineral resources which are economically viable in Nepal. Mineral resources like magnesite have been developed in some parts of the country. The forest resource which has been one of the critical natural resources has recently come under stress due to the extension of cultivated land for

household needs and by the export of timber. One of the most significant resources in Nepal is water which can be harnessed for irrigation, generation of hydro-electricity and the development of small processing mills. The extensive use of this resource of rural development up to date however is insignificant because only about 13 per cent of the cultivated land, by the end of the sixth plan period (mid-1985), was irrigated and not even 1 per cent of the hydropower potential has been exploited to generate hydro-electricity. In such circumstances the government must choose appropriate technologies to harness the natural resource wherever available in the country.

Special programmes for rural development

There have been a number of rural development programmes initiated and implemented by the government. However, specific provisions for technology for rural development have not been clearly spelled out in these programmes. For instance, the first rural development effort in the form of Tribhuvan Gram Vikas has duly recognized the role of new technology in agriculture as a result of which the use of chemical fertilizers and improved seeds has been extended in some parts of the country. The past rural development programmes in various forms, for example the Panchayat Development Programme, the Small Area Development Programmes, and the Integrated Rural Development Programmes had, in one way or another, attempted to extend new technologies into the rural economic sector by the introduction of new improved seeds and chemical fertilizer. At present Integrated Rural Development Programmes (IRDP) and Small Farmer Development Programmes (SFDP) are the most favoured efforts for rural development in Nepal. But despite such efforts in introducing new technology in the agricultural sector, the sector has still remained backward. The reasons behind such a situation are the lack of adequate adaptive research, inefficient training and extension services and, in addition to these, the poor receptivity of farmers at the local level. Besides this, the need to introduce new farm equipment and machines has not been seriously considered in any of the rural development progammes.

Some of the specific projects worth mentioning in the area of technology for rural development in Nepal at present are: an Appropriate Technology Unit of the Agricultural Development Bank; an appropriate Technology Information Clearing House Project of the Research Centre for Applied Science and Technology; and Training for Rural Gainful Activities (TRUGA) of the Department of Cottage and Village Industries.

The Appropriate Technology Unit (ATU) is the result of the efforts of the Agricultural Development Bank. The objectives of ATU are to introduce, test and disseminate appropriate technologies to the rural people. Once a new technology is shown to work, the ATU arranges to supply and distribute the product with little or no financial subsidy. It also conducts training for the potential users of such technologies through programmes such as the Small Farmer Development Programme. There have already been three ATUs set up in different parts of the country. ADB/N has been planning to establish one A TU in each of the fourteen zones of the country. Some of the appropriate technologies being introduced by ADB/N currently are biogas plants, water turbines, improved stoves, microhydel plants and pedal pumps for irrigation.

The Research Centre for Applied Science and Technology (RECAST), a research centre under Tribhuvan University, in early 1983 established an Appropriate Technology Information Clearing House under the RECAST/UNFSSTD project. It serves as a link between the technology users and technology development institutions both within and outside the country. It provides the contact points for the users of appropriate technology to submit research and development requests. The project has four fully operational Village Out

Reach Centres (VORC) in different rural areas of the country. These VORC serve to demonstrate and train the local people in new technologies that seem to be helpful to rural communities.

The Training for Rural Gainful Activities project is jointly undertaken by the Department of Cottage and Village Industries and the International Labour Organization. The main financing agency is the Swedish International Development Agency (SIDA). Its aim is to raise the living standard of rural people by the provision of training in the fields of tile and brick laying, pottery, sewing, etc. It has established several extension centres in different parts of the country.

Besides the above-mentioned projects, there are several other projects such as cottage and small industry projects, priority sector lending projects, integrated cereals projects, etc., each of which seeks to promote technologies and introduce improved technologies in rural areas. It is as yet unclear to what extent these projects have been helpful in changing rural societies of Nepal.

It is very difficult to assess the impact, especially the social impact, of technology on the rural communities of Nepal, mainly because of the lack of detailed information and studies. On the basis of a few studies done in the past (Pudasaini 1980, Thapa and Roumesset 1979) some economic impact of tractor use, as one of the types of new technology, has been examined. Cropping intensity, income and employment, for instance, were higher in mechanized farms than in traditional farms according to Pudasaini (1980). He remarks, however, that the yield and income effects cannot be solely associated with mechanization. Similarly the impact of the introduction of new inputs like improved seeds, chemical fertilizer and pesticides is as obscure as that of farm mechanization. Apart from this the degree to which the new technologies in agriculture have been adopted is itself a subject of discussion in Nepal in the sense that a very low degree of adoption of new technologies in agriculture may not generate a significant and perceptible social impact in the rural communities.

The degree of adoption of new techologies in agriculture is still low in Nepal. In 1984–85, the consumption of chemical fertilizers and improved seeds was just 4,100 and 2,550 metric tonnes respectively. If these figures are divided by the total area covered by all the cereals and cash crops (2,813,090 hectares) for the same year, the intensity of use of chemical fertilizer and improved seeds comes out to be 0.014 and 0. 001 metric tonnes per hectare respectively (based on figures given in the Economic Survey 1984–5). The use of chemical fertilizer has not been made in accordance with the dose recommended by the soil specialist (Das and Haanyat 1981, p. 16). Such a situation involving the improper adoption of new technologies may produce undesirable social and economic impacts which may offset positive results even if they occur. The adoption of farm mechanization is even more complicated in the Nepalese context. The exent of farm mechanization is also very low in Nepal. It was estimated in the agricultural census of 1981 that only 2,591 tractors were in use in agriculture in that year (Ministry of Agriculture HMG/N 1982). In the case of mechanical tillage, the rising cost of acquiring a tractor, the difficulty in getting spare parts and the difficulties of obtaining repair and maintenance services pose serious problems for farm tractorization. Relatively, over the years, the prices of power-driven farm machinery and fuel have been the biggest increase, followed by draught animals, agricultural produce and tools and equipment. (7) The non-availability of spare parts for the operation and maintenance of farm machines, combined with inadequate servicing and repair facilities, have been the main bottlenecks to farm mechanization. (8) Nevertheless, with an increasing number of tractors available in the Terai region of Nepal and adjoining villages of India, the availability of spare parts, repair and maintenance services seems to have become easier than in the past.

There are two sources of adoption of new technologies —those introduced deliberately by the government under various rural development programmes and new technologies adopted by rural communities by their own initiative with some institutional support. The government has attempted to introduce the use of such new inputs as improved seeds, chemical fertilizers, new information on farming through input supply

agencies and extension workers. On the other hand technologies such as the introduction of tractors in farming and the instalment of biogas plants in some parts of the country are basically on the initiatives of the rural families, sometimes with the help of the Agricultural Development Bank and of the Agricultural Tools and Biogas Company.

The impact of technology supported by the Rural Development Programmes in Nepal is still unclear due to the lack of information and studies highlighting the social aspects of technological impact. Moreover, the impact of rural development programmes itself is subject to some questions. In the case of the Intensive Hill Development Project, one APROSC study has remarked that the demonstration effect of the project has not been very effective. (9) The results of other rural development programmes in Nepal from the evidence available are unfortunately similar. In such a situation it is difficult to discuss changes in social structures which are in fact rigid and unchanged at least in comparison to the immediate past (say a decade). If the impact of new technology in agriculture is compared among different categories of households, it is households of higher landholdings which seem to get more employment benefit in comparison to those of similar landholdings, who are normally the people of a lower social status (Amatya 1983). One writer has concluded that the greatest weakness in IRDPS, overlooked by the available evaluations, is the inability to involve poor people in the development process (Pradhan 1985). The dominance of a rural elite aside, the divisions among the poor themselves and their dependence on the rural rich inhibit them from taking part in the development process. New stresses and changes in structure and value systems in rural communities of Nepal may well be taking place but it is very difficult to state that these stresses for change come from technologies introduced by rural development programmes, or to identify the components of social change due to technology.

The introduction of tractors for tillage, the instalment of biogas plants, water mills, etc. which are usually not a part of rural development programmes in Nepal, also play a significant role in changing rural communities. Once again how far such technological changes have changed the rural social structure and value systems is still very difficult to assess, because of a lack of information and relevant studies. There have, however, been several studies highlighting the impact, especially the economic impact, resulting from mechanization in agriculture, the focus of the study. Pudasaini (1980) highlights some of the impact of agricultural mechanization on farm operations, cropping intensity, farm employment, farm income, farm efficiency and productivity on the basis of his field study in Bara district, as in the case of a district with high-farm mechanization (see Appendix 5.1). His findings can be summarized in the following points:

1. The annual needs per hectare of human labour, with a high proportion of hired labour, absorbed by machine users was much higher than that absorbed by traditional farmers.
2. The higher absorption of labour by machine users over the traditional farmers resulted from the increased use of labour, mainly in weeding, harvesting and threshing as well as from higher cropping intensity.
3. The bullock labour used by machine users, seemed to be less in comparison to that of traditional farmers.
4. Machine users had a higher farm income than traditional farmers.
5. The contribution of both tractors and pumpsets to farm revenue was positive but insignificant.

To what extent these changes have caused changes in values, attitudes and belief systems of farmers is the question which is not fully answered in the Nepalese context. Some implications can be drawn, however, from the above findings. For example, that the demand for hired labour may increase with the mechanization of agriculture to the extent achieved in the study area and on the other hand, less use of

animal labour may change the labour use pattern in rural areas releasing some labour which is currently used to look after animals, usually women and children. This in turn increases the possibility of the participation of rural women in other social and/or income generating activities. The social impact of farm mechanization through increasing farm revenue on the other hand will be marginal.

CASE STUDY

The adoption of mechanical tillage in agriculture by rural communities in countries like Nepal may have a social impact and thus implications for policy makers. The use of tractors in the first instance may shorten the time needed to produce crops, especially in managing the land tillage. The animal holding pattern may change by increasing the holding of other categories of animals, such as goats, pigs or ducks, instead of animals used for tillage. The women who are released from agricultural labour may become involved in other economic activities thereby expanding the economic activities of the family. Just as owning and using a tractor may have several impacts upon rural communities, the holding of a tractor itself may be the result of many factors, topographical, economic and social. Thus the social structures and tractor technology are inter-related in a number of ways. This case study endeavours to highlight some economic aspects in rural communities that compel them to use tractors, and social impacts that arise from tractors' use in land tilling.

Background of the villages selected

1. Anandaban village

The village is located in the Terai region of the western development region. It is about 300 km southwest of Kathmandu, the capital city of Nepal, along the highway linking the capital with Bhairawa—a small town near the Indian border. It is easily accessible both from Bhairawa— the district headquarters of Rupandebi district—and Butwal, the zonal headquarters. The village was originally forest land belonging to a princess of Nepal. One of the Rana Prime Ministers, who received the land from the princess, awarded the land again to Ram Mani Adi, a well-educated Brahmin in Kathmandu. He attempted to develop a rural settlement there in the mid-nineteenth century.

The Anandaban village lies within the Anandaban panchayat or Manigram—a more popular name for the panchayat itself. The village is inhabited mostly by Brahmin families who have migrated from the hilly region of the country. The village is well known for its tractor utilization and adoption of new technologies in agriculture. The panchayat itself, within which the village lies, had the first tractor in the rural part of the district early in 1963. At the time of the field survey there were altogether eleven tractors in the panchayat—the highest number in any of the panchayats of the district. Of the eleven tractors, there were five tractors within and near the village fulfilling the local demand for tractors in Anandaban. Most of the farmers adopted mechanical tillage either by owning or hiring tractors during the land tilling periods when labour is scarce in the village.

2. Uttar Baroli

This is the second village in the same region and selected for study as a case of low tractorization. It lies within the same district as the former village and is easily accessible by road from Butwal. The village is within the Saljhandi panchayat. The inhabitants of the village are mostly Brahmins who migrated from hilly parts of the country. The village had one tractor formerly, but no tractor at the time of the study. The adjoining villages have however some tractors owned by large land-holders, but almost all the villagers of

Uttar Baroli did not make use of tractors, due to the high cost of hiring which comes to Rs 15 per hour. The topography of the village, however, is not unfavourable for the use of tractors.

3. Distinguishing characteristics of the two villages

The two villages selected do not differ much in terms of land availability and cropping pattern as shown in Table 5.1. The main area of difference between the two villages is the rate of hiring bullocks. The easier availability of bullocks and complementary human labour in Uttar Baroli seem to have made the bullock hiring rate half that of Anandaban. The lower rate of bullock labour coupled with the higher rate of tractor hiring in Uttar Baroli, both in comparison to those of Anandaban village, seem to attract the villagers of Uttar Baroli to bullock use instead of tractors for tilling the soil. Easier access to forest and cheaper labour from seasonal migrants from hilly areas, in Uttar Baroli seem to

Table 5.1 Basic characteristics of the studied villages

	Anandaban	Uttar Baroli
No. of households	101	81
Average landholdings (ha)	1.37*	1.49*
Average cultivated land of households*	1.22*	1.48*
Average family size*	13.70*	10.40*
Total population	1,384	845
Main crops	Paddy, maize, wheat	Paddy, maize, wheat
Number of tractors	5	0
Rate of pay of animal tillage bullock driver	Rs60/day ($2.8)	Rs30/day ($1.4)
Rate of tractor tillage	Rs120/day ($5.7)	Rs150/day ($7.1)
No. of biogas plants	11	0

Source: Panchayat offices of the two villages.

Note: * Figures derived from basic data provided by panchayat offices.

be the main cause of this situation. The scarcity of labour and lack of forests in the case of Anandaban have made tractor-use essential. It is also cheaper there in relation to animal power and labourers for tilling the soil.

Besides these differences, the villagers of Anandaban seem to have better housing, food and social facilities such as roads, irrigation and electricity. Most of the houses in the Anandaban village are modern in character, and show similarity with urban houses whereas most houses in Uttar Baroli are either made of clay or wood and have poor designs. Apart from this the farmers in Anandaban village are more receptive to new technologies than those of Uttar Baroli. (10) Roughly 30 per cent of the households in both the villages were taken for the study.

The basic characteristics of households selected are revealed in Table 5.2. The table indicates some differences

Table 5.2 Ethnic composition of households selected

	Total households	No. of selected households	Ethnic composition in no. of household selected				
Brahmin	Chetri	Magar	Tharu	Newar			
Anandaban	101	30	23(76)	5	1	1	x
Uttar Baroli	81	25	15(60)	x	2	7	1

Source: Panchayat office.

Note: Uttar Baroli+a small settlement close to it.

Table 5.3 Family composition of sample households (sex composition and literate composition)

					Literacy composition (no. of member)				
	Average family size	Sex composition			Children small enough to attend school			Illiterate	
		Male	Female	Total	Male	Female	Total	Male	Female
Anandaban	9.0	150 (55)	120 (45)	270 (100)	22	15	37	25	30
Uttar Baroli	7.1	116 (54.2)	98 (45.8)	214 (100)	29	21	50	20	44

	Literacy composition (no. of member)							
	Just literate		Below high school graduate		Just above matric (high school graduate)		With higher education	
	Male	Female	Male	Female	Male	Female	Male	Female
Anandaban	11	15	58	48	18	10	16	2
Uttar Baroli	19	10	42	23	6	0	6	–

Source: Field survey.

in the ethnic composition of the sample households. This was inevitable as it is very difficult to select two villages of similar ethnic composition in Nepal. Utmost care was, however, taken that the second village should have as high a proportion of Brahmin households as that of the first one— Anandaban—where the field survey was undertaken first.

Table 5.3 shows the sex and literacy composition within the selected households. The table indicates that the family size of sample households in Anandaban is comparatively bigger than that of Uttar Baroli. The two sets of households do not differ much in sex composition. The figures further indicate that the general level of education is remarkably higher in Anandaban than that of Uttar Baroli. Moreover, this difference is more pronounced in female education in favour of Anandaban village. The number of children per family is lower in Anandaban (1.23 per family) in comparison to that of Uttar Baroli (2.00 per family). This fact may be the result of more popular family planning practices in Anandaban, as it is claimed by panchayat workers in Anandaban that 75 per cent of couples have adopted some family planning devices.

Agriculture is the main occupation for almost all households studied in both villages. Among the two villages selected, sample households of Anandaban village seemed to be richer and have more side income generating occupations as shown in Table 5.4.

Table 5.4 Basic economic characteristics of sample households

	Average landholding (ha)	Average value of family house (in Rp)		No. of households with side occupations
Anandaban	2.80	76,092	($3,623.4)	7 (23.3)
Uttar Baroli	1.49	3,580	($646.6)	2 (8.0)

Source: Field Survey

From this table it is clear that the selected households of Anandaban seemed to have a higher economic status than that of Uttar Baroli both in terms of the average land holding and average value of the family house. This fact is borne out by the higher proportion of households with side occupations in Anandaban in comparison to those of Uttar Baroli. The average land holding of sample households in Anandaban is almost double that of sample households in Uttar Baroli. But this average value of the family house is roughly five to six times higher than that of Uttar Baroli.

The adoption of mechanical tillage and related technology can bring out several social structural changes. Changes in family relationships are one example of such structural change in the society adopting such technology. This depends upon the nature of the technology—income generating, labour saving, capital intensifying etc.

Causes of change in family relationships caused by mechanical tillage in the studied villages are many. Some of these as observed in Anandaban, the mechanized village, are as follows:

1. Time saved by female members especially in care for the oxen used for tilling the land.
2. Time saved by female members in preparing food for the Hali (bullock driver) during the land tilling periods under the traditional mode of tilling.
3. Extra income generated from hiring out the tractor for farm works or off-farm works like transportation (only for tractor owners).
4. The tendency of producing some surplus besides fulfilling domestic needs especially in the case of wheat.

Besides the above mentioned causes of change in family relationships in the mechanized village, there are certain other factors magnifying the results of the causes such as use of other agri-equipment; greater use of biogas plants for generating energy needs of the family; the availability of electricity within the house; a higher level of education and literacy; and better exposure to urban areas, all in contrast to the traditional village Uttar Baroli. Because of these additional factors, it is difficult to attribute all the changes in family relationships to mechanical tillage alone. A very wide use of tractors, almost 83 per cent using a tractor either as an owner or as hirer in Anandaban, however, does seem to be a major significant source of change.

Changes in responsibilities

The adoption of mechanical tillage does not seem to have had a significant impact in changing family responsibilities; only five households out of thirty in Anandaban perceived some changes in family responsibilities. Even out of those five households only two households perceived changes in responsibilities related to agriculture. In the case of one household owning a tractor two brothers learned tractor repairing

and driving and were engaged to look after the use and hiring out of the tractor. In the case of the second household, the land which had been rented out by the family was taken back for farming.

The change in the family responsibilities can be traced also by comparing the households' occupations in the two villages studied. It has been found that the proportion of households with income generating jobs outside the house in the form of administration and community services is higher in the mechanized village than in the traditional village. This fact becomes clear in Table 5.5.

Table 5.5 Proportion of households having responsibilities for earning income outside agricultural and household duties

	Proportion of households engaged in income generating administrative or community activities	Average annual income from such activities (in Rs)
Anandaban	66.6% (20 out of 30)	29,716.00 ($14.15)
Uttar Baroli	28.0% (7 out of 25)	1,918.40 ($91.3)

Source: Field survey.

Since 66.6 per cent of the households in Anandaban (mechanized village), in comparison to only 28 per cent of households, have responsibilities to earn income from activities such as business, administrative and other activities there is an indication that family members of the mechanized village in almost all cases seemed to be able to devote more time to income-generating economic activities in comparison to those of the traditional village. Not only this, the members, usually male, of the mechanized village seemed to be able to earn nearly fifteen times more from such activities than the members of traditional village households. Though other factors, such as the education level and better infrastructure might have been the cause for such a superior position, the wider use of tractors which lessened the need to devote more time to agriculture and animal husbandry might have enabled the male members of the households in Anandaban to engage in income-generating activities that were not possible in Uttar Baroli. Timeliness and rapidity in performing agricultural activities, especially tilling the soil, might have allowed them greater freedom to be engaged in other income-generating activities in Anandaban village.

The adoption of mechanical tillage may bring some changes even in the relative importance of the sexes. In general the female members in the households in Anandaban seemed to be relatively better off in the household activity patterns. This is shown in Table 5.6. The female members of households of the traditional villages seemed to be engaged more in agriculture-related activities whereas the female members of Anandaban households seemed to be engaged more in household works such as cooking food and child care. This is also supported by the responses given by female respondents that owing to the release from having to prepare food for agricultural workers they could devote more time to household duties; usually seven or eight days especially during the land tillage period.

In order to assess the role of women in the households of the villages, the field team also visited the local schools in both villages, believing that the role of women in households would be reflected in the local institutions as well. The result of the data collected from the schools is presented in Table 5.7.

The table shows that the proportion of female students and female teachers in the high school of Anandaban is higher in comparison to that of Sal Jhandi—a settlement close to Uttar Baroli. This fact may be an indication that the use of tractors in tilling has, in some way or other, provided more chances for women to participate in educational activities either as students or as teachers. Moreover, the headmaster of the high school in Anandaban

Table 5.6 Number of households with different primary, secondary and tertiary roles of female members in the villages studied

	Primary		Secondary		Tertiary	
	Anandaban	Uttar Baroli	Anandaban	Uttar Baroli	Anandaban	Uttar Baroli
Cooking food	21 (70)	15 (60)	5 (16.6)	1 (4)		
Child care	4 (13.3)	x (0)	2 (6.6)	4 (16)	8 (26.7)	2 (8.0)
Cattle care	2 (6.6)	5 (20)	3 (10)	3 (12)		6 (24)
House cleaning and washing clothes	x	x	18 (60)	8 (32)	2 (6.6)	4 (16)
Agricultural work	2 (6.6)	5 (20)	1 (3.3)	9 (36)	8 (26.6)	5 (20)
Skilled works	1 (3.3)	x	1 (3.3)	x	2 (8)	

Source: Field survey. The figures in parentheses denote the respective percentage of total households.

Table 5.7 Number and proportion of female students and female teachers in the local schools

High school in	No. of male students	No. of female students	No. of male teachers	No. of female teachers
Anandaban	491 (57.4)	363 (42.6)	14 (56.0)	11 (44.0)
Sal Jhandi (very near to Uttar Baroli)	580 (64.4)	320 (35.6)	14 (82.4)	3 (17.6)

Source: Field survey. The figures in parentheses denote percentage of the corresponding totals.

remarked that the women in the village seemed to be very active in sports activities as a team of female students of this school had been awarded the Birendra Shield, being first in the district level sports competition.

The chairperson of the women's class organization in Anandaban also agreed that the women of her village (Anandaban) are more educated than those of other adjoining villages. According to her, the roles of women in households were largely limited to agricultural work, cooking food and fetching firewood. Among these, fetching firewood is the most difficult task for women due to the destruction of forests nearby. Water supply has also been a difficult activity for women during the dry season. All these factors, in her opinion, have limited the role of women in household duties and they were unable to participate in developmental activities for lack of time. She also remarked that the use of tractors in the village did not seem to have improved the status of women significantly within the households and the community.

The adoption of new technology may affect the decision-making patterns directly or indirectly. For instance the more time available for women owing to agricultural mechanization may involve women to a greater degree in household decision making. Apart from such direct impact on decision making, there may be many other indirect

Table 5.8 Domination of sex in decision making in specific household matters (in terms of number of households)

	No. of households in which male dominates		No. of households in which female dominates		Male and female equal domination		Households with responses unclear	
	Anandaban	Uttar Baroli	Anandaban	Uttar Barolli	Anandaban	Uttar Baroli	Anandaban	Uttar Baroli
Food purchasing (kind of food)	2 (6.6)	4 (16)	6 (20)	3 (12.0)	21	16	1	2
Cloth purchasing (kind of cloth)	3 (10)	6 (24)	4 (3.3)	1 (4.0)	21	17	2	1
Building constructio n (type of building)	5 (16.6)	5 (20.0)	2 (6.6)	1 (4.0)	20	16	3	3
Religious ceremonies (timing and method of observing)	1 (3.3)	2 (8.0)	10 (33.3)	9 (36.0)	14	13	5	1
Investment in agriculture (type of inputs)	12 (40)	14 (56)	2 (6.6)	1 (4.0)	14	7	2	3
Saving (size and method of saving of cash)	13 (43.3)	14 (56.0)	0	1 (4.0)	14	2	3	6
Marriage (selection of partner for son or daughter)	3 (10)	1 (4.0)	5 (16.6)	2 (8.0)	20	18	2	4
Participatio n in community developme nt (form of	12 (40)	9 (36)	0	0	8	17	10	9

	No. of households in which male dominates		No. of households in which female dominates		Male and female equal domination		Households with responses unclear	
	Anandaban	Uttar Baroli	Anandaban	Uttar Barolli	Anandaban	Uttar Baroli	Anandaban	Uttar Baroli
participation)								
Tractor (sale or purchase)	8	0	0	0	0	0	22	25

Source: Field survey.

impacts on the decision-making patterns. To study decision-making patterns, questions like the dominant agent in making decisions, elders or children, male or female, are also relevant. The study of decision-making methods can be taken from many aspects and angles. The present study has attempted to examine which sex is more dominant in a particular area of decision making, and the implications of mechanical tillage on such decisions. The comparison of the relative position between the sexes in certain decision-making areas between the two villages is shown in Table 5.8.

As the table shows, the percentage of households in which male or female is dominant in each area of decision making is shown in relation to the respective number of households. The percentage figures indicate that females play a relatively more dominant role in the mechanized village than the non-mechanized village except in such areas as religious ceremonies, savings, marriage and participation in development. The dominant role of females in Anandaban in areas like food purchasing and cloth purchasing is conspicuous in comparison to that in Uttar Baroli. This situation may, however, be a result of many other factors such as higher female education or better accessibility to the use of other facilities like Gobargas plant in that village.

In order to know the changes in the position of children within the households, they were asked if they perceived any change in the role of children or not. Almost all households in both villages responded in the negative. They were then asked to provide the most prominent role of children within their household. The information provided by the households is presented in Table 5.9.

The most distinguishing feature of the role of children is that a higher proportion of households seemed to regard study as a primary role of children in Anandaban (40 per cent) in comparison to that for Uttar Baroli (8 per cent). Similarly the children's role for cattle care and agricultural works seemed to be more prominent in Uttar Baroli than in Anandaban. From this response it can be surmised that adoption of tractors might have played some part, though it may not be a dominant one, in changing the role of children within the households. Moreover, a higher proportion of couples are adopting family planning devices in Anandaban than in Uttar Baroli which indicates the implications for higher status of children in the former than in the latter.

Table 5.9 Number of households with different primary roles for children

	Agriculture works	Cattle care	Assisting in household work	Study	No. children	Small or unable	Total no. of sample households
Anandaban	4 (13.3)	2 (6.6)	3 (10)	12 (40)	3 (10)	6 (20)	30
Uttar Baroli	6 (24)	6 (24)	3 (12)	2 (8)	2 (8)	6 (24)	25

	Agriculture works	Cattle care	Assisting in household work	Study	No. children	Small or unable	Total no. of sample households

Source: Field survey.

Notes: Calculated value of x=9.34. Tab value of x at 5 per cent level of significance and five degrees of freedom=11. 076 and at 10 per cent level of significance=9.2.

Impact on rural labour

There is a feeling at the government level that adoption of farm mechanization displaces rural labour from farm employment. This has been reflected in most of the plan documents up to the sixth plan of His Majesty's Government of Nepal. Some of the studies about farm mechanization, however, revealed that it has not displaced rural labour keeping in view the net labour absorption after mechanization. (11)

This fact has also been to some extent supported by the study. Most of the household heads stated that the displacement of labour in tilling operations has been compensated by absorption of labour due to the increase in cropping intensity and cultivation of more wheat in the case of Anandaban. Table 5.10 indicates this fact.

Table 5.10 Proportion of area covered by wheat in terms of ratios of areas covered by wheat and paddy in the two selected villages

Villages	Total area covered by paddy (in ha)	Total area covered by wheat (in ha)	B:A
	(A)	(B)	
Anandaban	69.95	33.75	0.48
Uttar Baroli	41.54	14.15	0.34

Source: Field survey.

The proportion of areas under wheat cultivation is higher (0.48) in Anandaban than that (0.34) in Uttar Baroli. More farmers tend to cultivate wheat in the former than in the latter. They state that this has been possible due to the use of tractors in their village. Moreover the farmers in Anandaban have also produced surplus wheat over and above their consumption needs. As a result they have sold 400 quintals of wheat (40, 000 kg) to the local co-operative in Anandaban. This indicates that the labour force might have been increasingly absorbed by expanding the wheat cultivated area due to the use of tractors.

Table 5.11 Number of males and females with different categories of skill

Skill descriptions	Anandaban		Uttar Baroli	
Male	Female	Male	Female	
Sweater weaving	–	14.0 (11.6)	–	7.0 (7.2)
Knitting and sewing	–	11.0 (9.2)	–	–
Making domestic equipment*	5.0 (3.3)	2.0 (1.6)	13.0 (11.2)	18.0 (18.36)
Agricultural tools (ploughing equipment)	1.0 (6.6)	–	10.0 (8.6)	18.0 (18.36)

Skill descriptions	Anandaban		Uttar Baroli	
Male	Female	Male	Female	
Tractor driving	6.0 (4.0)	–	–	–
Simple machine or mill operating	6.0 (4.0)	–	1.0 (0.86)	–
Natural treatment specialist	1.0 (0.66)	–	–	–

Source: Field survey (figures in parentheses indicate percentages).

Note: * Male members exclusively make ropes, fishing nets, bed equipment, etc. while females weave mats and make simple domestic appliances.

In fact the use of tractors has been a necessity to almost all households due to unavailability of labour during the peak agricultural season in the mechanized village which is not so in the less mechanized village.

Changes in skills

The adoption of new technology may significantly change the skill endowments of a community. The wide use of tractor tillage in Anandaban seems to have affected, to some extent, the skill endowments in the rural community of that village. This situation is depicted in the table above by comparing the skill endowment situation of Anandaban

Table 5.12 Comparative sales and purchase of the co-operative agencies for the fiscal year (1984–5) in the studied villages

Description and amount of goods	Co-operative in					
Anandaban			Sal Jhandi (near Uttar Baroli)			
Quantity	Rate (inRs)	Amount (in Rs)	Quantity	Rate (in Rs)	Amount (in Rs)	
Sold UREA (Qtl=100kg)	653	($16.9) 356.0	($11,069.9) 232,468.0	129.00	($17.4) 366.0	($2,248.9) 47,228.64
Complex (fertilizer) (Qtl)	741	($15.7) 331.0	($11,679.5) 245,271.0	293.90	($16.2) 340.0	($4,772.3) 100,219.90
Potash (Qtl)	29	($7.5) 158.0	($218.2) 4,582.0	7.15	($18.3) 175.0	($59.5) 1,251.25
Pesticides (in Rs)	($452.4) 9,500.0	–	($452.4) 9,500.0	–	–	($11,597.8) 33,554.0
Seeds of paddy (Qtl)	14	($20.4) 430.0	($286.6) 6,020.0	–	–	–
Seeds of wheat (Qtl)	24	($31.7) 666.0	($761.1) 15,984.0	–	–	–
Seeds of maize (Qtl)	–	–	–	–	–	–
Sugar (Qtl)	123	($44.3) 930.0	($5,447.1) 114,390.0	–	–	–

Description and amount of goods	Co-operative in Anandaban		Sal Jhandi (near Uttar Baroli)			
	Quantity	Rate (inRs)	Amount (in Rs)	Quantity	Rate (in Rs)	Amount (in Rs)
Salt (Qtl)	113	($4.1) 86.0	($462.7) 9,718.0	–	–	–

Description and amount of goods	Co-operative in Anandaban		Sal Jhandi (near Uttar Baroli)			
	Quantity	Rate (in Rs)	Amount (in Rs)	Quantity	Rate (in Rs)	Amount (in Rs)
Seed potatoes	–	–	–	–	–	($56.0) 1,177.0
Others	–	–	–	–	–	($174.4) 3,663.93
Total sale (purchased)				828,533.0 ($39,453.9)		185,996.87 ($8,856.9)
Wheat (qtl)	400	($15.2) 319.0		127,600.0 ($6,076.2)	–	–

Source: Field survey.

village with that of Uttar Baroli—the traditional village.

Table 5.12 shows that a higher proportion of people in Anandaban have skills—like tractor driving, operating mills and simple machinery—whereas the proportion of people engaged in activities such as making agricultural tools and domestic equipment, as can be guessed, seemed to be higher in Uttar Baroli.

Another contrasting feature in this respect is that the female members in Anandaban village seem to be more skilled in knitting, sewing and weaving activities. This indicates, again, the relatively more important role played by women in Anandaban, as argued in the above section on the relative importance of sexes. It may be due to having more time to manage their domestic affairs and a higher social and economic status achieved both before and after the mechanization. But it would be unfair to attribute all such skill endowments only to mechanization in general and tractorization in particular because tractors have saved female labour only in agriculture and in the special period before planting or sowing activities; that is, tilling and land preparation.

Another remarkable fact, however, is that the institutions seemed to have played a less than significant role in promoting such skills both in Anandaban and in Uttar Baroli, because whatever skill they seem to have acquired has been through their own initiative and a mutual transfer of skill from individuals or from elder members to a younger member (in the case of traditional skills in Uttar Baroli). Moreover, the skills the villagers possess have not been used to earn an outside income, as most of them are used just to fulfil their own domestic demand, not even the local demand. It should also be noted that the number of people having some special skills seems to be not remarkably high.

Changes in family-community relationships

The relationship between family and community is determined by many factors—education, infrastructure, etc. The level of technology is one such factor affecting this relationship. The relationship may change both in terms of quantitative and qualitative dimensions. For instance, adoption of mechanical tillage may increase the dealings with the government or with the agencies controlled by the government (such as payment of tax on tractors, local repayment of credit for the tractor purchase, etc.). Besides such direct impacts, the introduction of tractors may increase the input consumption of chemical fertilizer, improved seeds, pesticides, on the one hand, and increase the volume of agricultural products for sale due to the enhanced productivity on the other.

Changing role of the government

In order to assess whether the government role has changed or not due to tractorization, the field team tried to identify the governmental institutions involved locally in the two village panchayats selected and then tried to assess the recent changes in policies of the governmental offices. The governmental agencies that are found in the villages or within the sub-regions where the villages are located were as follows:

1. Sajha Sanstha—co-operative for marketing agri-inputs and consumer goods available in both villages.
2. Agricultural Services Centre (district-level offices).
3. Mini post offices (in both villages).
4. Health post (only in Anandaban).
5. Nepal Electricity Authority branch office (only in Anandaban).
6. Small Farmer Development Project Officer of Agricultural Development Bank (in both villages).
7. Nepal Bank Limited (in Anandaban).

It is clear that Anandaban has more government and related agencies close to it than has Uttar Baroli. It is difficult to associate this difference in the two situations, however, only with the level of mechanization. One most pronounced change in government policy is, however, indicated by the strategy adopted by the Agricultural Development Bank to implement small farmer development projects in the two villages. According to the official of the Small Farmer Development Project Office in the Uttar Baroli area, the office at present has concentrated more on social programmes to raise the social consciousness of local small farmers as a basis for making economic programmes successful in the Uttar Baroli area. In contrast it seems that the emphasis of the Small Farmer Project Office in Anandaban area has focused more on economic programmes

Table 5.13 Number of households using different types of agri-inputs purchased from co-operatives in the studied villages

	No. of households using complex for			No. of households using urea for			No. of households using potash for			No. of households using pesticides for		
Paddy	Wheat	Other seeds	Paddy	Wheat	Other seeds	Paddy	Wheat	Other seeds	Paddy	Wheat	Other seeds	
Anandaban	16 (53.3)	19 (63.3)	2 (6.6)	17 (56.6)	22 (73.3)	–	9 (30)	10 (33.3)	–	12 (40)	–	–

	No. of households using complex for			No. of households using urea for			No. of households using potash for			No. of households using pesticides for		
Paddy	Wheat	Other seeds	Paddy	Wheat	Other seeds	Paddy	Wheat	Other seeds	Paddy	Wheat	Other seeds	
Uttar Baroli	4 (16)	12 (48)	7 (28)	–	3 (12)	–	–	–	–	14 (42)	–	–

Source: Field survey.

rather than on social programmes as in Uttar Baroli.

Relationships with other marketing sectors

There are few organized marketing sectors in either of the studied villages. The only notable marketing agency dealing with the sale of agricultural inputs and daily necessities like salt and sugar, etc. is the co-operative agency (Sajha Sanstha).

Each of the two villages has one co-operative agency controlled by the district-level controlling body: the District Co-operative Agency. So both the agencies have the same organizational structure and, as such, have similar operational procedures as well as similar problems. The field study team contacted the head of both the agencies to know the extent of transactions that occurred between the agencies and the community as a whole. The financing responsibility of all the co-operatives within the district, as elsewhere, is handled by the Agricultural Development Bank. A Managing Committee is formed by electing three members from the general members of each of the three sections of the command area. Thus the managing committee is made up of nine members, who elect a chairman and a vice-chairman among themselves. The problems of management seem to be no single source of command because it is controlled by several district level branches of the Agricultural Development Bank, Agricultural Inputs Corporation, Salt Trading Limited, etc. and, as such, they have no clear authority to communicate with the public about local needs. The manager has to carry out directions from many sources which seldom are in conformity with each other. The manager in Anandaban himself, admitted to being unclear about the role of the co-operative in which he is involved. The role played by the two co-operatives is compared in Table 5.13 in terms of the quantity of various goods sold out to the community and purchased from it.

Table 5.13 is for the fiscal year 1984–5. Nevertheless, some simple conclusions can be drawn on the basis of quantity and diversity of transactions done by the two agencies. Table 5.14 further clarifies the cause of difference in the volume and nature of transactions.

The use of chemical fertilizers and improved seeds seemed to be higher in the mechanized village (Anandaban)

Table 5.14 The number and percentage of user households of chemical fertilizers, pesticides in the selected villages

	Number and percentage of households		
using chemical fertilizers	using pesticides	using improved seeds	
Anandaban	28 (93.3)	13 (43.3)	8 (26.6)
Uttar Baroli	17 (68.0)	9 (36.0)	1 (4.0)

Source: Field survey.

Note: Percentages are shown in parentheses.

than in the non-mechanized village (Uttar Baroli). The diversity of transaction between the co-operative and the mechanized village is greater than that between the non-mechanized village and its co-operatives. Moreover, the purchase of wheat by the co-operative from the Anandaban area was about Rs 127,600 (in 1984–5) whereas there was no purchase of wheat by co-operatives in Sal Jhandi, close to Uttar Baroli. This fact is in conformity with the responses of most of the villagers that they have been able to produce more wheat for sale, due to the use of tractors in tilling soil. In some respects, however, the co-operative near Uttar Baroli has sold more pesticides and potato seeds. Overall the diversity and volume of transactions is greater in the co-operative of Anandaban than that of Sal Jhandi near Uttar Baroli.

The influence of the government and/or marketing sector on the community can be explained by the proportion of users of inputs like area, complex, etc. in agriculture. The comparative situation of a percentage of users and their reactions are revealed in Table 5.14.

Table 5.14 clearly indicates that the proportion of Anandaban households using high-level yielding inputs is greater than that in Baroli, the less-mechanized village. The proportion of households which are satisfied with the use of such inputs does not, however, differ significantly between the two villages as shown in Table 5.15.

Table 5.15 indicates some disparities in the proportion of households satisfied with pesticides (76.9 in Anandaban

Table 5.15 The proportion of households completely satisfied with the use of high-yielding inputs

	Number of households completely satisfied with the use of		
Chemical fertilizers	Pesticides	Improved seeds	
Anandaban	17 (60.7)	10 (76.9)	8 (100)
UttarBaroli	10 (58.8)	9 (100.0)	1 (100)

Source: Field survey.

Note: The figures in parentheses indicate the respective percentages to total number of user households.

and 100 in Uttar Baroli). The relatively low proportion of households satisfied with the use of chemical fertilizer indirectly shows the lack of agricultural extension services to guide the use of chemical fertilizer in both villages. This situation is also confirmed by the response of most of the households in both villages that they could not get efficient agricultural advice from extension agents such as JT or JTA (Junior Technicians or Junior Technical Assistants).

The dependency of families upon the government, its institutions and other agencies may vary due to the adoption of new technologies in agriculture in general and adoption of mechanical tillage in particular. The dependency of the families may either be a direct result of the introduction of mechanical tillage or an indirect result of it through other means such as more use of high yielding inputs encouraged due to the use of tractors. For instance the use of tractors in a certain village may compel the government or co-operative agencies to adopt different policies, to facilitate credit, inputs or repair services for tractors. Such a situation however has not been clearly seen in the mechanized village selected (Anandaban).

The indirect dependency of the mechanized village (Anandaban), however, seemed to have been more pronounced than that of the less-mechanized village (Uttar Baroli) in the following ways:

1. The demand for inputs such as chemical fertilizers and improved seeds seemed to be higher in the mechanized village. According to the local responses (household heads and key informants) this

increased demand for inputs seemed largely due to the result of mechanical tillage. This was not so in the less mechanized village (see Table 5.12).

2. The dependence of the less-mechanized village upon the local co-operative is only for acquiring agricultural inputs whereas the mechanized village's dependence is for basic needs such as salt and sugar. Moreover the mechanized village depended upon its co-operative for the sale of surplus grain (especially wheat). The dependence of the mechanized village is therefore more diverse than that of the less-mechanized village.
3. The dependence of the mechanized village upon the basic services of the government seemed to be higher because of the greater possibilities for frequent contact, even with the institutions which are relatively distant from the villages. In Anandaban, for instance, most of the pregnant women have their deliveries in the hospitals, some eight to ten kilometres away. By contrast the villagers of Uttar Baroli get the delivery services from local midwives or nurses. The availability of tractors for transportation services seemed to be the significant factor for this situation in Anandaban.
4. The availability of tractors for emergency cases has been highly appreciated by the local people in Anandaban. The tractor owners in that village seemed to be invariably generous to their neighbours by providing their tractors for services in time of emergencies, such as accidents or snake bites, even without making any charge for the expenses so incurred. This has created a very co-operative atmosphere, at least in this respect, in the mechanized village.

Changes in family mobility

The change in mobility may be in various forms, for example geographical mobility (movement of family from one place to another), economic mobility (extension of areas of operation), etc. The study deals only with family movement and extended areas of operation as other kinds of mobilities take a considerably longer period of time to be felt and realized.

Family movement

Family movement seemed to be higher in the mechanized village than in the less-mechanized village. Table 5.16 indicates this.

Table 5.16 Number of households having a relative residing outside the family

	Number of households having someone living outside the village	Number of households having someone living outside the country
Anandaban (mechanized village)	6 (8) 20%	8 (12) 26.6%
Uttar Baroli (less-mechanized village)	1 (1) 4%	4 (6) 16%

Source: Field survey.

Note: Figures in parentheses indicate respective number of family members outside the family.

It seems from Table 5.17 that fourteen households (46.6 per cent of total) in Anandaban have someone living away from the family. This figure is considerably higher than the five households (20 per cent of the total) of Uttar Baroli. The main reasons for such family movement, in both the villages, is for employment and, to a lesser extent, for study.

Extended areas of operation

The difference in the extended areas of operation is expressed in Table 5.19, showing wider extension in Anandaban.

Table 5.17 Change in family occupation in the two selected villages (by types of side occupations)

	Professional services in the community or government								Industrial, business or other service providing entrepreneur
	Administrative services in govt. and related institutions	Industrial or production worker at home (3)	Number of households with side occupations (2)						
Settlements	Teachers	Doctors	Engineers	Other specialists	Military services	Total			
Anandaban (in percentage of households)	8 (13) (26.6)	4 (4) (13.3)	1 (1) (3.3)	2 (2) (6.6)	−1 (1) (3.3)	1 (1) (3.3)	2 (2) (6.6)	3 (3) (10.0)	17 (25) (56.6)
Uttar Baroli (in percentage of households)	–	1 (2) (4)	–	–	–	–	2 (2) (8)	1 (1) (4)	4 (5) (16)

Source: Field survey.

Notes: 1. Figures in parentheses denote respective number of members.
2. Most of the members with side occupations are male except that two teachers are female and one production worker (weaving bags) is female, in the case of Anandaban.
3. Almost all industrial workers of Uttar Baroli were in India during field visit.

Table 5.18 Change in family occupation in the two selected villages (by types of side occupations)

	Number of households and family members having various side occupations in the past but left them recently							
	Professional services in the community or government							Industrial business or other service entrepreneur
	Administrative services in govt. and related institutions		Number of households of side occupation					
	Industrial or production worker at home							
Settlements	Teachers	Doctors	Engineers	Other specialists	Military services	Total		
Anandaban (in percentage of households)	3 (3)[1] (10)	–	–	–	–	1 (1) (3.3)	– –	4 (4) (13.3)
Uttar Baroli (in percentage of households)	–	–	–	–	–	2 (2) (8)	– –	2 (2) (8)

Table 5.19 Present distribution of households by various primary and subsidiary occupations in the villages selected

	No. of households in Anandaban		No. of households in Uttar Baroli	
Primary				
Agriculture	30	(100%)	25	(100%)
Subsidiary				
Industrial entrepreneur	3	(10%)	1	(4%)
Business	1	(3.3%)	1	(4%)
Administrative services	8	(26.6%)	–	
Army service	1	(3.3%)	0	
Tractor driver	1	(3.3%)	–	
Teacher	4	(13.3%)	1	(4%)
Industrial worker	2	(26.6%)	2	(8%)
Dignified UN service	1	(3.3%)	–	

Source: Field survey.

The content and variety of occupations in Anandaban also seemed to be richer and more diverse than those of Uttar Baroli as also shown in Table 5.19. Table 5.19 also shows that the households in Anandaban seemed to be more active in administrative services in contrast to the households of Uttar Baroli. The difference in mobilities, as observed in Table 5.19, cannot, however, be solely attributed to the different level of tractorization in the two villages. As the two villages seem to be different in other respects such as educational location, social awareness, etc. in favour of the mechanized village, the mechanized village may be more mobile in many respects in comparison to the less mechanized village. The use of tractors might have somehow made the villagers of the mechanized village more mobile than they might have been without the use of tractors.

Changes in aspirations and expectations

Changes in expectations are one of the dimensions of social impact with the adoption of new technology. Adoption of new technology such as mechanical tillage may also bring changes in people's expectations from the government and from other institutions. These changes also may either be direct or indirect through other changes. The field team tried to assess the changes in such expectations, if any, by comparing the situation of the two villages, Anandaban and Uttar Baroli, and attempted to trace any connection between mechanization of tillage and social expectations.

Social services such as health care, postal services, security, etc. are essential for any community. The form of demand and expectation of people for such services reflects the local situation as well as people's aspirations which are affected by the technology they adopt. In the case of the two villages studied, however, there seemed to be no significant change in expectations in spite of the technological differences—the use of tractors in Anandaban or non-use of tractors in Uttar Baroli. Nevertheless, it would be interesting to note differences in expectations of the households in the two villages, in an attempt to get some insight into the nature of households' expectations affected by tractor-use in agriculture.

The expectation of household heads in Uttar Baroli seemed to be more basic than that of Anandaban, in the sense that the household heads of the former village demanded the availability and accessibility of various services, for example, health, social security (police administration) whereas the household heads of the latter requested better services from healthposts, hospitals, etc. (Appendix 5.3.). This seemed to be due to the fact that a relatively developed social infrastructure had been seen in Anandaban and the use of tractors even in transporting patients in case of need.

Differences in expectation from education between the two villages bear similarity with those of the social services. The expectations of the household heads in the mechanized village are for higher education, but in the less-mechanized village the expectation is more pronounced for free education and easier accessibility to schools (see Appendix 5.3). Such difference in expectation may reflect more the differences in the actual situation faced by the two villages in the sense that there were two high schools, one middle school and two primary schools in Anandaban whereas there is only one high school and one primary school near Uttar Baroli.

Expectation for better irrigation facilities is well pronounced in the mechanized village whereas it is for better transportation (for example all-weather roads) facilities in the less-mechanized village (Appendix 5.3). Some households require telephone facilities in Anandaban, whereas electricity is the main demand in Uttar Baroli. Such differences also reflect the situation within the two villages. The mechanized village is somewhat dry and far away from rivers to irrigate the land easily. Though the villagers from early times have developed their own institutional arrangements for irrigating their land, the frequent washing away of the dam which they built in a river posed a serious problem for them. Their expectation is,

therefore, for a permanent irrigation system to be provided by the government. In the case of the less-mechanized village, however, irrigation is not a serious problem because they have two relatively big rivers nearby which sometimes even flood their fields causing a serious flooding problem. Thus the people of the less-mechanized village expect the development of flood control measures in addition to a more efficient irrigation system.

The demand for telephones by more households in the mechanized village reflects the better standard of living and more frequent contact with people from outside villages whereas the expectation for telephones is still not a priority for the less-mechanized village which is not even electrified.

As the household heads were requested to voice any expectations they had in their minds during the field visits, they provided a number of inputs which seem interesting from the viewpoint of the study and to reflect the real situation within the villages. Eight household heads in the less-mechanized village responded that they had not seen any agricultural extension workers and that they needed agricultural extension services. Several householders however, who had had contact with extension JTAs, (Junior Technical Assistants) were not satisfied with them. It may be concluded that the agricultural extension service has not been efficient in either village but was seen to be worse in the less-mechanized village.

Another interesting fact is that two household heads in the mechanized village seemed to be alert to the misuse of funds collected by Sajha (the local co-operative for marketing), whereas none of the households in the less-mechanized village mentioned such a fear. This showed relatively more consciousness of the people in the mechanized village in comparison to that of the less-mechanized one.

One more remarkable difference between the two villages was that the less-mechanized village households, and two in particular, spelt out the need for better marketing arrangements for grain and for easier accessibility to the market, whereas this problem was not recognized in the mechanized village.

It is very difficult to estimate what changes or differences in social expectations are due to the use of the tractor alone. Other social differences such as different educational background, different economic status, environmental milieu etc. might have resulted in a difference in expectations and in level of mechanization as well.

It is also difficult to say that the difference in the level of mechanization between the two villages does not have any direct or indirect influence upon such expectations. The use of tractors in tilling the land might have increased consumption of high-yielding inputs which in turn has increased the frequency of contact with marketing co-operatives such as Sajha. This, in turn, might have led some household heads to talk about the Sajha and raise doubts about the misuse of savings funds that the villagers contributed to it. Again, the occasional use of tractors to transport patients from the villages to the hospital increased the frequency of contact between villages and hospital staff. As such, the expectation of the two villages showed some disparity regarding the health and maternity services. The extent of mechanization might therefore have directly or indirectly changed the expectations of people.

Changes in the economic base of the family

The use of tractors may in many ways have changed the economic base of a family. First and foremost, it may have led to increased agricultural productivity and increased the use of high-yielding inputs encouraged by it. Second, the use of tractors may increase the cropping intensity by diversifying agricultural production. Third, the ownership of the tractor may provide the owner with the ability to earn

Table 5.20 Average production, yield rate and percentage sale of various main crops of the selected villages (annual)

		Paddy Yield kg/ha			Wheat Yield kg/ha	
Average prod. of household (in kg)	% of sale	Average prod. of household (in kg)	% of sale			
Anandaban	6,892.66	2,955.9	66.47	1,079.92	1,365.25	64.0
Uttar Baroli	22,041	1,326.43	15.64	360.56	636.56	10.15
		Maize Yield kg/ha			Oil seeds Yield kg/ha	
Average prod. of household (in kg)	% of sale	Average prod. of household (in kg)	% of sale			
Anandaban	213.25	1,485.7	0.0	143.08	905.5	44.2
Uttar Baroli	67.36	1,107.19	9.12	54.87	376.0	10.3

Source: Field survey.

more income by hiring out the tractor for agricultural as well as non-agricultural purposes. Apart from these there may be other direct and indirect impacts of using a tractor resulting in various changes in the economic base for the family.

Real income means the actual goods and services acquired by a family or person, or the amount of goods and services the family or the person can buy with money income in a certain period of time. Since agriculture is the main source of income for almost all the households in both villages, it would be relevant to find out the level of agricultural production, agricultural productivity and share of produce exported, on average basis, in both villages. The findings from the field survey are presented in Table 5.20.

The table shows that the households of Anandaban have a higher real income in terms of agricultural production than those of Uttar Baroli. Such a higher production level seems to be not only the result of relatively bigger landholdings in the mechanized village—Anandaban (Table 5.4)—but is also due to a higher-yield rate in this village than that of the less-mechanized village. Not only this, the percentage share of production sold by the household also seemed to be higher in the former than in the latter. Moreover, the yield-rate figures in Table 5.20 are close to the figures given in Appendix 5.2 for tractor hirers.

The size of cash income should also be taken into consideration while considering real income, because it is the size of cash income in combination with the general price level that determines the real income. As the two villages are within the same district and a few hours' drive from each other, the general price level of the two villages seemed to be almost the same. So it is the difference in size of cash income which determines the difference in real incomes rather than the general price level difference. It has been found that there were twenty households (66.6 per cent of total) having some other sources of cash income in Anandaban than agriculture, whereas there were only seven households (28 per cent of the total) having another source of cash income in Uttar Baroli. The annual average cash income from the sources other than agriculture in Anandaban is Rs 29,716.66 (approximately US$1,415.48) whereas the corresponding figure for Uttar Baroli is Rs 1,918.4 (approximately US$91.35). Thus the households of the mechanized village seemed to be far ahead in earning cash income from sources other than agriculture.

Changes in lifestyle

As a natural consequence of higher agricultural and non-agricultural income in Anandaban, there seemed to be significant differences in lifestyle, especially in housing. Most of the houses in Anandaban bear a resemblance to urban or semi-urban areas as mentioned earlier. Most of the houses are made of bricks and

others cement. The houses in Uttar Baroli, with few exceptions, are made of clay, bamboo and wood. The houses have poor appearances. Even those who have the means to make good houses seemed to be satisfied with their poor-looking houses as they do not seem to wish to stay permanently in Uttar Baroli because of such inconveniences as a lack of transportation, floods in the summer season, etc. The average value of a house in Anandaban is Rs 76,892 (see Table 5.4), whereas it is only Rs 13,580 (US$646.6) in Uttar Baroli. The main form of entertainment for 91 per cent of the households in Anandaban seemed to be visiting the cinema. The main form of entertainment in Uttar Baroli seemed to be visiting local fairs and only 5 per cent of the households seemed to go to the cinema, although the cinemas are not far away in the nearby town—Butwal.

To assess the change of household expenditures on non-subsistence activities, the households in both villages were asked to determine whether they had recently increased their expenditure on various non-subsistence items (non-subsistence items being already identified to them in the questionnaire itself). The responses which recorded 'increased' are totalled in Table 5.21.

Table 5.21 shows that a higher proportion of households in the mechanized village seemed to have increased their expenditure on non-subsistence items. An increase in savings seemed to be the most prominent one and this was followed by the purchase of durable household goods: furniture, utensils and increased expenditure on education. Increased expenditure on education seemed to be most prominent in the case of the less-mechanized village. The most conspicuous difference between the two villages in such expenditure was in the purchase of ornaments: 30 per cent in Anandaban, in comparison to none in Uttar Baroli, seemed to have bought ornaments. As ornaments are usually worn by women, the status of women, at least in this respect, seemed to be higher in Anandaban than in Uttar Baroli.

Table 5.21 Number and percentages of households which have increased their expenditure on various 'non-subsistence' items in the selected villages

Non-subsistence items	Anandaban (mechanized) %	Uttar Baroli (non-mechanized) %
Bought land	1 (3.3)	0
Built houses or expanded	10 (33.3)	1 (4.0)
Ornaments purchased	9 (30.0)	0
Durable goods purchased (furniture, stoves, radios, etc.)	12 (40.0)	3 (12.0)
Increased expenditure on education	12 (40.0)	9 (36.0)
Savings increased	13 (43.3)	3 (12.0)
Increased expenditure on entertainments (e.g. cinema, visiting towns)	6 (20.0)	2 (8.0)

Source: Field survey.

Note: The figures in parentheses represent percentage of respective total number of households.

The facts revealed in Table 5.21 indicate substantial differences between the economic basis of the families of Anandaban and Uttar Baroli in favour of the mechanized village. It is, however, difficult to pin down such differences with the use of the tractor alone. Nevertheless, on the basis of most of the household heads' responses in Anandaban as to encouragement they have received for using high-yielding inputs in agriculture and direct production increase it was attributed to mechanical tillage. Mechanical tillage, to some extent, enabled them to increase their economic status compared to their less-fortunate counterparts in Uttar Baroli.

SPECIAL PROBLEMS AND ISSUES

The field survey team noted several remarkable differences among the reactions and responses from the respondents, usually the household heads. Such responses and special problems faced are discussed below.

Research issues

While conducting the research, some of the main issues faced were as follows:

1. Non-availability of systematic secondary data. It would have been better if data related to the extent of application of new technologies were available in various regions of the country. The detailed socio-economic information, on a region-wide basis, seemed also necessary for assessing the impact of mechanical tillage. In Nepal, however, the database for having such information is still weak. Therefore the macro-level impact has been very difficult to assess.
2. Lack of past studies. Past studies relating both to technology and to rural development and their interrelationship are inadequate in Nepal. Some of the studies done in the past related more to economic impact, rather than social, in new agricultural technologies. For this reason it has been very difficult to find documentary evidence related to the social impact of mechanical tillage in rural communities of the country.
3. Hesitation of the household heads to provide information. Rural families were scared and misunderstood the purpose of providing information. They were hesitant to provide required household information. The situation of the mechanized village was somewhat better than the less-mechanized village in this respect. The field team had to convince the informants that their information would not be misused or used against them.

Limitations of the study

The study has been limited in several ways. First, the study is in the form of a case study of the two villages only, one with high tractorization in agriculture and another with low tractorization in agriculture. Second, the social impacts are the result of many factors including that of using tractors for tilling the land and as such it is difficult to separate the components of social impacts. Only the social impacts of using tractors for land tilling which are easily perceptible to villagers are brought to light. There may be others. Third, valuable information like changes in responsibility, and the role of women and children, is very difficult to get without a long stay in the village and special observation. In-depth interviews with all individual family members would be needed to get clear pictures of the household situation. Women and children in Nepal are shy and hesitant to provide such information. The study tried to get information in most cases, therefore, from elderly male members of the families. Finally it would have been better if each and every household within the selected settlements had been contacted. This however was almost impossible in the field situation, because most of the household heads were either busy in their fields or away from home for one reason or another.

Special problems of tractor use

Regarding the use of tractors, most of the households in Anandaban, the mechanized village, seemed to be very satisfied with the use of tractors in tilling. The use of tractors, however, is not without its problems some of which, recorded during the field survey, were as follows.

1. The people who have smaller landholdings could not make use of the tractor, because, according to some respondents, tractor owners seemed to be unwilling to provide their tractor for one or two hours only. Besides this, some of the small landholders were psychologically hesitant to pay more than Rs 100 per hour for the use of a tractor; according to them Rs 150.00 is too high a price to pay for the service.
2. Another problem mentioned by a household head, who had a fairly large landholding and who still does not use

Table 5.22 Basic economic characteristics of tractor owners, tractor user and tractor non-user households in Anandaban

Type of household	Number of households	Average landholding (ha)	Average number cattle holding				Average annual sale of cereal (in Rs)	Non-agricultural income (annual) (in Rs)	Average value of house
			Cow and bullock	Buffalo	Sheep	Small stocks			
Tractor owner	5	9.99	4.2	5.6	0.4	5	($5,885.7) 123,600	($5,531.4) 116,160	($8,666.6) 182,000
Tractor user (without being owner)	20	1.3	1.25	2.2	1.7	2.8	($763.1) 16,025	($617.1) 12,060	($4,211.6) 88,444
Tractor non-user	5	1.16	0.2	2.8	1.8	1.8	($280.9) 5,900	($347.6) 7,300	($1,819.0) 38,200

Source: Field survey.

a tractor, is that the use of a tractor for tilling the soil is beneficial only to the tractor owner. According to him, the tilling of the soil should be done two or three times repeatedly with special care to get full

benefit from tractors, but the tractor owners are only interested in earning cash and are not usually sincere in tilling the soil for others to the same extent as on their own farms. Moreover, the need for bullocks and bullock drivers is still there for levelling the land after tilling.

3. In contrast although the use of tractors is subject to problems, some households are forced to use tractors for tilling the soil because there is a difficulty in getting labourers to do the work.

To further assess the social impact of tractor tillage, it is interesting to examine the social and economic differences between various categories of households classified as tractor owners, tractor users and tractor non-users, even within the mechanized village. The basic differences between these households are presented in Table 5.22.

The table indicates that the tractor-owner households are economically far better off than tractor-user and non-tractor-user households. There seem to be, however, no significant differences between tractor user and tractor non-user households except with respect to selling cereals and non-agricultural income. This shows that tractor users, with an almost similar economic base as non-users, have been able to earn more. This may be the indirect or implicit impact of tractor use.

In order to assess the impact of tractor ownership, tractor-owning householders are asked several questions regarding the benefit of tractors, and the cost of using tractors. According to the tractor owners a tractor costs about Rs 150,000 to Rs 250,000 with all its accessories. The tractor use pattern of each of the five tractor owners is shown in Table 5.23.

The table shows that each of the five sample tractor-use patterns is different. Some households as under C and E are heavily committed towards tractor hiring. They are followed by tractor-owner B. On the other hand, owners A and D seemed not so interested in tractor hiring. The social impact of tractor use may be highly dependent on the pattern of use of the tractor. Moreover, the process of generating social impacts depends also upon the mode of use of the tractor either for land tilling or for generating

Table 5.23 Number of days of tractor use for different purposes by the tractor owners

	Tractor owner A	Tractor owner B	Tractor owner C	Tractor owner D	Tractor owner E
Number of days for own use	90	100	80	300	85
Number of households for hiring tractors	7	22	55	2	50
Number of days hired out	25	30	180	9	200
Miscellaneous use	–	5	5	6	10
Number of days not used	250	150	100	50	70
Purpose of hiring out	Agriculture +transport	Agriculture +transport	Agriculture +transport	Agriculture +transport	Agriculture + transport

Source: Field survey.

income through hiring out for transportation.

Most of the tractor owners indicated that their tractors had not been used to full capacity owing to the smallness of land-holdings. Other problems regarding the use of tractors were the difficulties of maintenance due to inadequate spare parts, lubricants and technicians. Moreover, the cost of operation is fairly high and this uses up most of the earnings from the tractor. Non-availability of diesel fuel sometimes put the tractor out of use.

Despite all the problems mentioned above, almost all the tractor owners seemed to be highly in favour of the use of tractors both in agriculture and for other purposes. The interaction of tractor owners and other villagers, according to them, seemed to have increased with the creation of a favourable atmosphere for co-operation in rural areas. The most visible forms of co-operation between tractor owners and the village community are the provision of tractors for emergency purposes like transporting patients and injured people to the hospital and the participation in physical infrastructure development by transporting construction materials etc. The tractor owners even provide their tractors for social purposes like marriage ceremonies, religious gatherings or school picnics.

The use of tractors for agricultural operations has also been helpful in achieving timeliness and solving labour scarcity problems, now getting acute in the locality of Anandaban over the past few years. In addition to this, according to most of the tractor owners, the use of tractors in tilling has, in general, attracted the use of high-yielding inputs such as improved seeds and chemical fertilizers.

The participation of tractor owners in local development also seemed to be relatively higher than that of the tract or-user and non-user households. One of the tractor owners, (B) for instance, has been the chairman of Jaycees (a non-governmental organization). Another tractor owner (D) has been active in managing committees of the local co-operative and the local school management committee.

Almost all of the tractor-using households seemed to be attracted to using tractors because of time saving in agricultural operations and to avoid the complications associated with using bullocks. In some ways the villagers of Anandaban seemed to be compelled to use tractors due to the scarcity of human labour needed for handling bullocks and their equipment.

The average annual number of tractor-hours per household is 12.74. There were households using tractors only for 3 hours per annum and other households using them for 70 hours per annum. The intensity of the use of tractors by this category of households seemed to be 9.8 hours per hectare per annum. The tractor's main purpose is for tilling the soil for paddy, wheat and to some extent for oil seeds. The average rate of substitution of bullock labour (in number of days) by tractors is about 0.63 tractor-hours replacing one bullock labour day.

The most conspicuous benefits in using tractors seem to be the saving of money, saving of time and helping to improve work schedules. The amount of money saved by using tractors for tilling the soil instead of using bullocks ranged from Rs 147.66 per hectare to Rs 236.26 per hectare. This situation, however, is true only for Anandaban where the rate of bullock labour is Rs 0.60 per day plus meal and that of tractor use is Rs 120 per hour ($6.0).

All but one of the households in this group reported that they had been able to increase agricultural production by using a tractor. The process or reasons for such increments, however, differed among households. To some, the use of the tractor has achieved timeliness and this has been helpful in increasing production, while some others reported that the increased use of improved seeds and chemical fertilizer, which have been indirectly encouraged by tractor-use, have been helpful in increasing agricultural productivity.

It seemed also encouraging that, according to eighteen household heads out of twenty in this group, the use of tractors is essential for agricultural development. They seemed to be impressed by the availability of tractors in transporting patients to the hospitals, increased co-operation within the village and support in developmental or construction activities. Apart from these, nineteen households out of twenty in this group responded that they have been able to save time by using tractors. The time thus saved is used for better household management (for fourteen households), for other business or income generating activities (for four households) and for social activities (for four households). A few households still reported that the use of tractors has been helpful for their children to devote more time for study, and for their female members to

take care of children. Some households (two households) also reported that the standard of living in Anandaban has risen to some extent, due to the use of tractors in agriculture.

There were five households not using tractors in Anandaban. One of them is the tractor driver himself who has a very small landholding of about 0.03 hectare. Three other households have very small landholdings ranging from 0.54 hectare to 1.01 hectares. According to them, they have been able to manage without a tractor because of the small size of the landholdings. Besides this it is difficult to get a tractor for small periods of time, say one hour or two hours. The fifth household has a relatively larger landholding of about 3.6 hectares. This household head still uses bullocks because he is not completely satisfied with using a tractor.

Although most of the tractor non-using households still tend to rely on bullock labour for tilling the soil, they have in general a positive attitude towards the tractors availability in their village as they could get a tractor in case of emergencies. As an instance the large landholder mentioned above once needed to take his mother by a tractor to a nearby hospital, when she was bitten by a poisonous snake. On arrival he was angered by the lack of service provided by doctors in the hospital. He claimed that the government administration, in which he himself had once held a responsible post, had not been as co-operative as the simple villager had been in providing a tractor to help his mother.

In order to assess accurately the impact of tractor tillage, an opinionnaire study among the elites of the two villages was also conducted by the field team. Educated people, especially the local teachers and institution heads, were given an opinionnaire sheet on which they were asked to show their agreement or disagreement on ten positive statements and ten negative statements concerning tractor use in their villages. Altogether twenty-seven persons were contacted.

The result of the opinionnaire study which is given in Appendix 5.2 reveals that the use of tractors in tilling has been helpful, in general, in increasing cultivated land, crop diversification, enhancing agricultural productivity, solving the labour scarcity problems during peak seasons and facilitating the application of new technologies in agriculture. According to them, it seemed that the use of the tractor has, to some extent, created social values and attitudes favourable to development, checked land fragmentation, and created a co-operative environment in the society. Only the responses to the creation of new organizations and increased employment opportunities seemed to be not so favourable to the use of tractors in the villages.

It seems that though there have been some negative aspects, as tendencies in the form of concentration of land in a few hands, keeping labour in an unfavourable position, and a decrease in investment potentialities, those have not been sufficiently significant to be worried about. The use of tractors, however, seems, to some extent, to have increased the income disparity, decreased the employment opportunities and increased rural indebtedness. But even these negative tendencies need not be worried about as 'N' responses to them were relatively frequent.

There seemed to be few special issues associated with the use of tractors in agriculture in Anandaban village. One issue reported by some household members in the village is that the local inhabitants who are called Tharu and serve as agricultural labourers have migrated to other areas away from the village due to the use of tractors in their own area. The local Tharus used to serve as agricultural labourers who handled bullocks for tilling the soil and these have now less opportunity to work as hired labourers. Some Tharus are still living together with large landholders and their families.

The field team tried to assess some of the issues associated with tractor use in the less-mechanized village Uttar Baroli—as the village was to some extent familiar with tractor use in adjoining villages. The respondents were asked what situations would probably develop if tractor use expands to their own village. Most of the respondents guessed that employment will decline to some extent, but not seriously, if they adopt tractorization in agriculture. They hardly expect any problems related to cultural, political, economic

and environmental issues to arise out of adopting mechanical tillage and using tractors. They too seem to have positive attitudes towards tractors in the sense that they will have at least some immediate transport which can be used during emergencies.

Another notable issue in the study area is undoubtedly the small sizes of the landholdings. The average landholdings of the families in Anandaban is 1.37 hectares according to the panchayat record and 2.80 hectares according to the field survey result. This shows that the land fragmentation due to household separation, population growth and division of small parcels might have been the cause for discouraging the use of tractors in agriculture. One of the households seemed to have sold its tractor due to land fragmentation arising from household separation. Government efforts, it appears, have not been directed effectively towards checking such land fragmentation.

CONCLUSION AND IMPLICATIONS

On the basis of the findings and discussions presented in the preceding sections, some implications can be drawn that are relevant to the community, to the families and to the government. Areas for further research can also be identified to complement and further intensify the findings of the present research.

Implications for the family

The application of tractors for tilling the soil seems to be beneficial to rural families provided the family has adequate land and the opportunity to use it in alternative ways, especially during the slack season of agriculture.

The adoption of tractor tillage seems to have, to some extent, increased the opportunities to stay at home which can be used for better household activities or other social and economic activities (as has happened in Anandaban).

The time saved through the use of tractors in agriculture seems to be helpful to female members of the families to do some other meaningful job and to raise their status by way of changing family relationships with their male counterparts. Women seem to have more decision-making powers within the families adopting tractorization, which may be due to greater leisure time in addition to the better educational opportunities they have in Anandaban.

The adoptors of mechanical tillage have to some extent been able to enhance agricultural productivity by using more high-yielding inputs in addition to using a tractor which itself facilitates productivity increase. This, in turn, seems to have raised their economic status by having better housing, other domestic equipment and even savings.

It is better to have simple and low-cost machines for tractorization and other agricultural operations keeping in view the small landholdings and low purchasing capacity in rural areas of Nepal. This may also keep down the repair, maintenance and operation costs of agricultural machines.

The possibility of using electric power for agricultural operations through simple devices, which does not seem possible in Anandaban, should be encouraged and worked out through research and development efforts and adopted or transferred from elsewhere, where applicable.

Implications for the community

Some sort of agricultural modernization even to the extent of using farm mechanization seems to be a compelling need for agricultural operations upon which the majority of rural people depend. The use of

tractors and other less capital-intensive machines may be helpful to the rural communities, for relieving the workload of women and children in agriculture, and solving the problem of labour scarcity, as in Anandaban.

Morever, mechanization in tillage may encourage and, in some way, compel the use of high-yielding inputs such as chemical fertilizers, improved seeds and pesticides. The relief of some workloads from agriculture by using machinery such as tractors may provide an opportunity to contribute more time, more resources for community development, as in Anandaban, where many more non-governmental organizations seem to be actively involved in local development. There are several non-governmental organizations, for example Nepal Red Cross, Nepal Jaycees, Cita Club, Young Jharana Sports Club, which are very active in Anandaban in comparison to no such organizations in Uttar Baroli.

The participation of women and children in the local schools as teachers or students may also increase due to the mechanization of agriculture. The adoption of mechanical tillage may, however, displace some labour, especially hired, from agriculture. But this does not seem to be so serious or give rise to a need to deliberately discourage tractorization or mechanization of tillage because of labour scarcity. The use of tractors may increase income disparity, as the tractor owners are able to earn much more in comparison to tractor users or non-users.

Implications for the government

As the communities and families seemed to adopt mechanical tillage only in case of compelling need and due to labour scarcity, the government need not be worried so much about the displacement of labour from agriculture. Moreover, the labour displaced, if any, may get employment within agriculture itself in other operations such as weeding, harvesting and processing which may increase due to cropping intensity and the diversification of agriculture. In addition to this the extra additional income arising from mechanical tillage may increase savings and investment in rural communities and this may further generate rural employment. The government, however, should take note of the unemployment situation and examine it from time to time so as to monitor any relationship between unemployment and mechanization at the local level.

The government should try as far as possible to introduce cheap machinery (soft capital), keeping in view the small landhol dings and low purchasing power. In connection with this, hand-tractors and power tillers may be more favourable than large tractors.

Since the expectations from the government seem to be raised with the adoption of mechanization, the services of the government for agricultural extension works, input supply, health and community services should be made more efficient by making new institutional arrangements where necessary.

With the introduction of mechanical tillage, the economic gap between the large landholders on the one hand, and marginal farmers and landless labourers on the other, may widen. The government should therefore introduce programmes of employment generation and improvement of weaker sections of the community along with increasing mechanization.

Further research implications

Adoption of new technologies in agriculture, especially mechanization, may have deep impacts on rural societies of Nepal. Some of these impacts may be in conformity with rural development policy, such as the generation of more employment opportunities, increased income and greater productivity. These impacts further induce change in different sociological aspects such as the status and role of women and children

within the families and communities. Some of the impacts, however, may have an adverse effect on development through decreased employment opportunities or increased income disparities. Thus sociological evaluation of each piece of technology or each particular combination of technologies in agriculture should be done to assess the appropriateness of existing technologies and identification of appropriate technologies to be applied in agriculture.

In this connection, Nepal has adopted, especially in the Terai region, different kinds of technologies even in the case of tilling the soil. Most recently some hand-tractors which are less bulky and less costly have been distributed in some eastern parts of the Terai region. Some semi-mechanization has also been introduced for irrigation, for example use of pumpsets, tubewells, etc. Therefore it would be highly relevant to study agricultural operations overall within the rural communities of Nepal.

On the basis of the discussions in the third section and the household comparison (tractor user and non-user) it seems that the tractor-user households in the tractorized village are better placed in the process of development in comparison with Uttar Baroli. But it is still difficult to conclude that agricultural mechanization and development are closely associated with each other by simply studying two villages. Therefore the study should cover more panchayats or villages to obtain more concrete results. It would be interesting in the future to conduct studies to get correlation between levels of development and levels of agricultural mechanization.

In view of the smallholdings and rugged topography of Nepal, it would be helpful to introduce low cost and simple machines and, sometimes, even to upgrade traditional technologies. The introduction of a single bullock-drawn plough and lift pumps, both developed in the Philippines, has been under experiment in some parts of Nepal. But the simple adoption of these technologies without a socio-economic evaluation may lead to unforeseen problems. Socio-economic studies may help facilitate the smooth transfer and dissemination of such technologies once they have proved to be successful in other areas.

The introduction of new technologies may generate new types of expectations and attitudes among the people. New institutional arrangements may, thus, be needed to facilitate the operation of new technology and to cope with changed expectations and attitudes in the communities. Thus some studies seem to be necessary to examine the stress and implications upon the existing institutions due to new technologies, including different types of agricultural mechanization.

NOTES

1. See Merrill, R.S., The study of technology' in the Encyclopedia of Social Service, D.L.Sells (ed.) (New York, Macmillan, 1968). Quoted in the UNITAR Research, Report no. 14. 1971.
2. Chitamber, T.B., Introductory Rural Sociology (Wiley Eastern Limited, New Delhi, 1972), p.323.
3. Preliminary estimate according to Economic Survey 1985–86, His Majesty's Government (Ministry of Finance, 1986).
4. See National Planning Commission (NPC): A Summary of Employment Income Distribution and Consumption Patterns, vol. IV. Summary Report (NPC) (Kathmandu, 1978).
5. A regime which ruled Nepal for 104 years from 1846 to 1951 depriving the true monarchs of that period of their power.
6. Ram Bahaddur, K.C., 'Rural development policy and implementation gap', in Panchayat Darpan (Panchayat and Local Development Ministry (HMG) Kathmandu) vol. 12, no. 4, 1981/82, p.2.
7. Sharma, R.P., 'Farm mechanization in Nepal', Paper submitted to Asian Productivity Organizations (APO), Japan as Nepal Country Paper, July 1980, p. 18.
8. Ibid., p. 10.

9. Agricultural Projects Services Centre, Socio-economic Disadvantage and Disabilities of the Rural Poor. A Case Study from Nepal (An evaluation of IHDP) (Kathmandu, Aug. 1982).
10. Information provided by District Agricultural Division in Bhairawa—the district headquarters.
11. See Ganesh Bahadur Thapa and James Roumasset, The Economics of Tractor Ownership and use in the Nepal Terai, and Som Prashad Pudasaini, Farm Mechanization and Income in Nepal. Both published jointly by the Agricultural Development Council and the Agricultural Project Service Centre, Kathmandu (1980).

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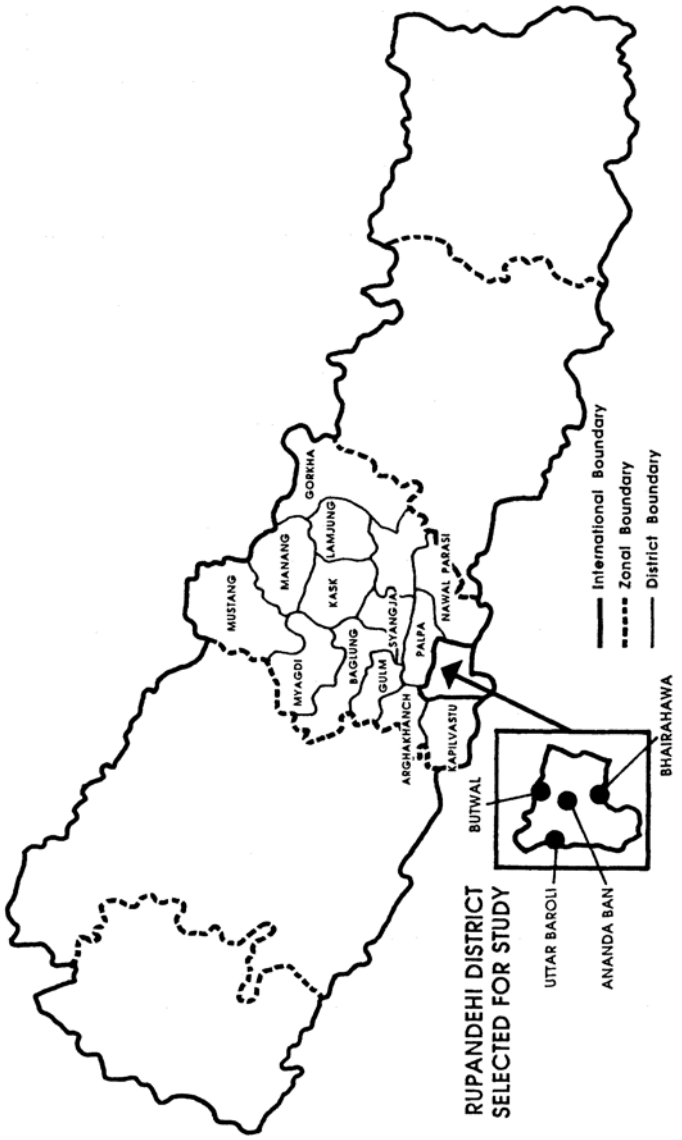

Map 5.1 Nepal: Administrative divisions with location of the village selected for study (Anandaban and Uttar Baroli)

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Thapa and Roumasset, The Economics of Tractor Ownership and Use in the Nepal Terai, APROSC, Research Paper Series, no. 8, APROSC, Kathmandu, 1979.

Appendix 5.1 Comparative characteristics of traditional and mechanized farm and impact of mechanization of agriculture, Bara District 1987

	Education years	Land-holding (ha)	Area cultivated (ha)	Exp. for improved inputs Rs/ha/yr	Yield (t/ha)		Cropping intensity		Labour used (days/ha)	Annual bullock labour used (d/ha)	Gross farm revenue (Rs/ha yr)
Rice	Wheat	Before	After								
Traditional	3.8	5.9	5.3	64	0.72	1.98	145.0	145.0	149.0	63.3	2,167
Pumpset owners	5.6	8.8	8.3	682	2.00	2.57	137.4	155.3	190.4	57.4	3,533
Tractor owners	7.0	32.1	21.1	653	2.20	2.42	121.2	165.0	176.4	3.4	3,687
Tractor hirers	6.7	9.4	6.2	388	2.09	7.09	148.8	166.9	187.0	53.5	3,110
Pumpset and tractor owners	7.9	25.0	21.6	857	2.28	2.50	115.2	174.1	182.0	4.8	4,527

Source: Son P. Pudasaini, (Farm mechanization, employment and income in Nepal), Research Paper Series no. 5, Feb. 1980, APROSC.

Appendix 5.2 Results of opinionnaire survey

		Yes	No	Undecided	z values
1.	Increased the cultivated land*	22	4	1	
2.	Facilitated crop diversification*	19	5	3	
3.	Increased agricultural productivity*	21	1	5	
4.	Solved the labour scarcity problem*	18	9	–	
5.	Helped to apply new technologies in agriculture*	21	2	1	
6.	Increased the employment opportunities*	6	16	5	
7.	Created social values and attitudes favourable to development in rural society*	21	2	4	
8.	Checked the land fragmentation*	15	5	7	
9.	Created new organizations and institutions	10	10	7	
10.	Created co-operative environment in rural areas	14	10	3	
11.	Concentrated land in few hands	11	13	3	
12.	Increased the disparity between rich and poor	16	10	1	
13.	Decreased the employment opportunities*	18	7	2	
14.	Decreased the agri-production quantitatively*	4	21	2	
15.	Decreased the agri-production qualitatively*	6	18	8	

		Yes	No	Undecided	z values
16.	Checked the adoption of other new technologies*	3	18	6	
17.	Increased unnecessary indebtedness in rural areas	14	10	3	
18.	Increased social tension*	2	16	9	
19.	Increased opportunities for exploitation of labour, especially by rich by way of displacing labour	14	12	1	
20.	Decreased the possibility of generating funds for other development	9	15	3	

Source: Field survey.

Note: *z values significant at 5% level of significance,
z=y-np/v npq where,
y=total number of yes and no responses divided by 2
n=total number of yes and no responses
p=proportion of yes responses
q=proportion of no responses
and tab. value of z at 5% level of significance= 1.96.

Appendix 5.3 Number of household heads with various expectations

		Anandaban (mechanized)	Uttar Baroli (less mechanized)
1.	Health facilities should be available nearby	2	14
2.	Services of health facilities (hospitals, health posts) inadequate	2	–
3.	There should be permanent post office facilities	–	5
4.	Police station should be near for better security	–	3
5.	Higher education after high-school graduation should be made available in the village	3	–
6.	School should be near to the village	–	2
7.	Better education is needed	–	5
8.	School should be free of tuition charge	–	1
9.	It is better to have schools for disabled	–	1
10.	Better and permanent irrigation facilities are needed	10	–
11.	Better and all-weather road network is needed	–	5
12.	Telephone facility is needed	2	–
13.	Electricity facility is needed	–	2
14.	Did not meet any agriculture extension worker (JTA) and need extension service for agriculture	–	6
15.	Did meet JTA and satisfied with them	1	–

		Anandaban (mechanized)	Uttar Baroli (less mechanized)
16.	Frequently met JTA but service is unsatisfactory	–	3
17.	The fund of the co-operative misused	2	–
18.	Markets far away and no proper selling arrangements	–	2

Source: Field survey.

Chapter Six
THE PHILIPPINES

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INTRODUCTION

The introduction of high-yielding varieties of rice and expansion of irrigated lands in the Philippines brought about a concomitant demand for the mechanization of farm lands.

From the beginning of 1960 to the end of the decade, there was substantial mechanization of farm operations in the Philippines, especially on rice farms (Ranis Report, 1974). The number of tractors sold between 1961 to 1973 increased from 813 to 1.663. The sales of power tillers increased from 1,505 in the years 1960–65, to 4,250 in 1973.

As more and more importance was given by the Philippines government to raising agricultural output, the number of loans released for tractors increased from 72 in 1966 to 463 in 1973, and for power tillers from 126 in 1966 to 724 in 1969 although this declined to 104 in 1973. After this period, the years 1975 to 1980 had shown annual declines in the sales of four-wheel tractors and two-wheel tractors on account of the high cost of fuel (Shields, 1983).

What this scenario of farm mechanization depicits is that the major source of farm power is still human labour and draught animals (Faigmane et al., 1985). In terms of farm power per hectare, 0.46 horse power per hectare (58 per cent) represented draught animals and 0.33 horse power per hectare (42 per cent), mechanical power (Faigmane et al., 1985). Moreover, the level of farm mechanization may be related to the available labour and draught animals, size of farm operations, and the profitability of using farm machinery (Faigmane et al., 1985).

There is little evidence of the effects of farm mechanization on the output of rice production (Ranis Report, 1974, p. 566; David, 1983, p. 423). This is further confounded by the introduction of high-yielding varieties to the extent that the consideration of the effects of this new technology and tractorization was difficult to sort out. Nevertheless, farm mechanization seemed to have shown that land preparation and threshing tended to have reduced labour inputs.

Data of the International Rice Research Institute, however, show that while farm mechanization is associated with both total labour inputs and hired labour inputs during threshing, hired labour inputs were raised by mechanization of land preparation. This was especially observed in irrigated small farms. This observation may not hold in rainfed areas where the mechanization of land could displace hired labour as the present level of mechanization is much lower (Shields, 1983, p. 107). Furthermore, farm size does not seem to determine whether the labour consists mainly of hired workers or family workers (Ranis Report, 1974).

On the whole, what has been shown by the study of Shields (1983) was that family labour was significantly lower in farms using farm machinery than in farms without farm mechanization. The decrease in hired labour was also noted although the findings were inconclusive.

This country study, therefore, intends to pay particular attention to the changes brought about by modern technology on the roles of the family and on the social structure of a rural village. The objectives of the study are:

1. To analyse the changes in family and social structure brought about by the introduction of mechanized farm operations.
2. To describe social processes and institutional patterns related to the introduction of mechanized farm operations.

The adoption of technology is influenced by socio-psychological elements in a culture enacted by the elements in a social structure. It may be hypothesized therefore:

1. An adopted technology defines role-sets in a social structure.
2. Changes in social behaviour are a function of the changes in the elements of a social structure given a technology that is practised.

Methodology

A field survey was the main method employed in the study. Since a large amount of information was to be collected in a short span of time covering some widely dispersed areas and households, a survey was considered the most appropriate approach. To improve the analysis and interpretation of the data, other techniques were also employed such as informant interviewing, observation, and review of documents.

The survey was conducted in the four rural villages of Iloilo Province. These were Tiring, Batuan, Sermon, and Nagba. Tiring is in the municipality of Cabatuan, Batuan is in Oton, and Sermon and Nagba are in Tigbauan.

The municipalities in which these villages are situated were the target areas of the Rainfed Agricultural Development Project of the Ministry of Agriculture and Food in Region 6 of the Philippines.

The objective of this agricultural development project was to increase the intensity with which limited land resources are to be utilized by introducing cropping patterns that enable farmers to harvest three crops annually. The rural villages of Batuan, Sermon, and Nagba were areas in which the Rainfed Agricultural Development Project was fully implemented. The village of Tiring was one without a deliberate agricultural development programme and may be defined as a spill-over area.

The primary unit of analysis was the household. A household is defined as a group of persons living together and sharing the same housekeeping, kitchen, and eating arrangements (Castillo, 1980). This can extend beyond the basic family unit. The family in the analysis was, however, the basis for examining the roles of husband, wife and children. The secondary unit of analysis was the village from which the respondents were drawn.

A sampling frame was constructed for each village under study. This consisted first of a list of farm households with mechanized farm operations and second those who did not practise farm mechanization at all. Farm mechanization here refers to the use of tractors and threshing machines although the former was the emphasis in the study.

A complete enumeration was done on households with mechanized-farm operations as there were very few of them. Moreover, a random sampling of households which did not practise farm mechanization was done as there were more of them than those with mechanized farm operations.

Data collection procedures

A semi-structured interview schedule was devised to collect information from farm households categorized as 'with' and 'without' mechanization. The interview schedule consisted broadly of the following major items:

1. Socio-economic information
2. Social processes
3. Institutional patterns in the community
4. Consequences of farm mechanization.

As shown in Table 6.1, the households in the rural villages of Sermon and Nagba did not mechanize farm operations.

Table 6.1 The sample distribution of the two categories of households

Village	Households with Mechanized farm operation (a)	Households without Mechanized farm operation (b)
Tiring	25	8
Batuan	10	17
Sermon	–	15
Nagba	–	18
Total	35	58

Notes: (a) Complete enumeration,
(b) Sample from a population of 90 household heads.

The interview schedule, which was written in English, was translated into the Hiligaynon dialect of Iloilo. This was pretested in one of the villages under study. The interview schedule was administered by two graduate students who speak fluent Hiligaynon. The field work began in the last week of December 1985 and was partially completed in the second week of January 1986. Two more field visits between the last week of January and the second week of February were needed to complete the interviews of respondents. The collation and tabulation of the data was finished in the last week of March 1986. To carry out the interviews, an official request to undertake such activity was made to the Regional Director of the Ministry of Agriculture and Food. Courtesy calls were made also by the research assistants to the barangay (village) captain of each village under study.

Informant interviewing was done on a very limited scale with some officials of the Ministry of Agriculture and Food in Iloilo. With regard to the review of documents pertinent to the mechanization of rice farms, material was obtained from the International Rice Research Institute in Los Banos, Laguna. In the analysis of the data for the two research objectives, frequency, percentage, mean, and rank order were used. However, deductive analysis which was descriptive in nature was also applied in the attempt to draw inferences about the social impact of technology at the village level.

The study focused on the analysis of roles (tasks or activities) of households, groups and institutions in relation to the agricultural technological practices, both modern and traditional, existing in the village and the consequences brought by some changes in these elements of the social structure. The consequences observed were limited to land use, cropping pattern, cropping intensity, the analysis of income, standard of living, attitude toward some technological practice, aspirations and community satisfaction.

GOVERNMENT POLICY ON AGRICULTURAL MECHANIZATION

The historical perspective

The Philippines government does not have an explicit policy on farm mechanization although some of its economic policies do have features favourable to the promotion of farm mechanization (David, 1983). A case in point is the programme on agricultural development which involved a series of loans underwritten by the Central Bank of the Philippines with the technical assistance of the International Bank for Rural Reconstruction and Development and administered by the rural banking institutions. This financing scheme was intended primarily to enable farmers to purchase four-wheel and two-wheel tractors (Faigmane et al., 1985).

Through the release of loans by the Central Bank and the International Bank for Rural Reconstruction and Development, there was also a corresponding increase in the sales of tractors between 1966 and 1968 (Faigmane et al., 1985). It cannot be said, however, that the Philippines government made a direct intervention in the decision of the farmer to use agricultural machinery (David, 1983).

It may be helpful to set in historical perspective the development of farm machinery utilization in the Philippines. In this context, the introduction of tractors in the country was largely on account of the sugar industry (Faigmane et al., 1985). In the 1960 inventory of farm machinery, 35 per cent of those who owned tractors, more than 5,000, were in Western Visayas and in Pampaga (Faigmane et al., 1985). The expanded sugar export and the increased US quota for sugar led to this rise in the sales of tractors during this period with an average of 900 tractors a year. In the same period, 176,000 hectares were planted with sugarcane.

With regard to rice production, mechanized operations began in 1965 with the introduction of high-yielding varieties. It was noted, however, that power tillers (6–15 horse-power tractors) were initially introduced in 1960 and were generally used on land preparation. The sales of this type of machinery increased rapidly between 1966 and 1968 and in the early 1970s as a consequence of the development of the tiller manufacturing industry. Power tillers continued to be popular among farmers in the mechanization of rice farms on account of their low cost.

The trends in the sales of tractors in the ensuing years after 1965 can be divided into four phases according to Gonzales, Herat, and Webster (Faigmane et al., 1985). These were:

1. The Initial Phase (1966–8). This period was marked by a high intensive cultivation requirement as a result of the introduction of high-yielding varieties. It was at this time that the sales of two-wheel tractors increased.
2. The Peso Devaluation Phase (1969–71). This period was characterized by declining sales of two-wheel tractors as the peso was devalued. This currency devaluation resulted in the restriction of tractor importation on account of its prohibitive cost and stricter collateral requirements imposed on loans by the rural banks. At this time, fewer loans were released.

3. The Recovery Phase (1972–5). It was during this period that the sales of four-wheel and two-wheel tractors bounced back in the market. Moreover, the sales of the two-wheel tractors doubled in comparison with the sales noted in the first phase.

   The increase in the sales of the two-wheel tractors was due to the following conditions:

   (i) The implementation of land reform which dismantled large estates and increased the incomes of share-tenant farmers;
   (ii) The special financing programme for two-wheel tractors sponsored by the Central Bank of the Philippines and the Development Bank of the Philippines to countercheck the loss of draught animals afflicted with foot-and-mouth disease;
   (iii) The manufacture of IRRI-designed two-wheel tractors and the availability of assistance for locally-built farm equipment; and
   (iv) The expansion of the market for tractors and threshers as a result of Government Order No. 47 in 1974.

4. The High Cost of Fuel Phase (1975–80). This period saw the annual decline in the sales of four-wheel and two-wheel tractors as a result of the rising cost of fuel. With the advent of mechanized farm operations in rice production, notable social gains were observed in the rice-growing regions (Bautista and Lantin in Faigmane et al., 1985). These positive consequences were in terms of time saved in field operations, release from the traditional burdensome farm labour, emergence of farm leaders, numerous and varied local activities and improvement in social status.

Over the years, changes occurred in the type of machinery used in rice production (Del Rosario in Faigmane et al., 1985). Three new types of machines were introduced in the Philippines. These were (1) the Chinese version of the reaper found in Isabela, Cagayan, and Bataan; (2) the rice transplanter which is at the stage of field testing in the farms; and (3) the deep placement fertilizer applicator designed to increase fertilizer efficiency.

While there is the emergence of new types of machinery, the transplanter is perceived to make rice farming even more dependent on draught animals especially for the final levelling of rice paddies (Del Rosario in Faigmane et al., 1985). There is the need, then, to develop levelling attachments to the hand-tractor. In addition, a reassessment of the use of hand-tractors is becoming very necessary in the light of the high cost of commercial inputs and the increasing unemployed as well as underemployed labour on the farm.

Problems of agricultural mechanization

In 1980, there were about eighty-four firms engaged in the manufacturing of agricultural machinery. Of this number, 79 per cent were located in Metro Manila and 21 per cent (consisting of networks of dealers and branches) were strategically distributed throughout the country. Also, there were twenty-six corporations engaged in the importation of tractors, tillers, and transport equipment. These corporations were accredited by the Agricultural Machinery Distributor Accreditation Committee (AMDAC) and were classified as the first category of business organization. Of this number of corporations, 65 per cent were sold through dealers, 2 per cent through company-owned branches, and almost 3 per cent through a combination of branches and dealers.

The local manufacturers of power tillers and equipment belonged to the second category of business organization. There were seventeen of these firms, ten of which were corporations and seven were

registered as single proprietors. Twelve of these firms sold through dealers, four through a combination of branches and dealers, and one sold through a network of branches.

In the third category, there were thirty corporations and eleven single proprietors which distributed stationary engines and manufactured post-harvest machinery. Of this number of firms, thirty-one sold through dealers, two through branches, and eight through a combination of dealers and branches.

At the end of the 1970s, a significant number of firms had closed down. Problems relevant to the decline of the sales and popularity of machines were identified as the high cost of farm machinery due to increasing production costs; the low profit margins of manufacturers, distributors and dealers as these were cut down by high operating costs and tax and tariff rates on imported knock-down parts; the absence of after-sales parts and services support to farmers on account of a weak dealer network; geographically dispersed and limited markets; inadequate marketing information and relevant statistics on agricultural mechanization; and high fuel and maintenance costs (Gonzales and Alvior in Faigmane et al., 1985).

On the whole, the problems of agricultural mechanization in the Philippines can be outlined as follows:

1. Low level of mechanization. In 1978, the estimated average farm available was 0.79 horse-power per hectare of net agricultural area (Bautista and Lantin in Faigmane et al., 1985). This was rather low compared to the ideal of 0.9 horse-power per hectare for the Asian region. Of this average farm power in the Philippines, draught animals contributed 0.46 horsepower per hectare (58 per cent) and mechanical power shared 0.33 horse-power per hectare (42 per cent).
2. Inadequate irrigation facilities. Inadequate irrigation and drainage facilities and deep muddy fields discouraged the widespread use of farm machinery.
3. Low purchasing power of farmers. The low purchasing power of farmers, high costs of production inputs and low prices of farm products were factors related to the inability of farmers to own farm machinery.
4. Under-utilization of farm tractors. As mechanized farm operations were limited to the few who could afford to hire or own tractors and to a small number of farms, farm tractors were under-utilized.
5. Poor after-sales service. There are inadequate maintenance and repair services for farm machinery. Even the procurement of spare parts is difficult. These difficulties arise from a very inadequate after-sales service of farm machinery distributors.
6. Frequent occurrences of natural calamities. Investment on expensive farm machinery is not always seen as advantageous in a country that is frequently visited by natural calamities such as floods, typhoons, drought and so on.
7. High initial investment on diesel engines. Diesel engines are expensive to acquire even if diesel fuel is cheap. It is for this reason that engines fed with petrol are more popular than diesel engines.
8. Tax problems of manufacturers. Thirty per cent of import duties and 10 per cent tax are imposed on power tiller distributors and manufacturers. Moreover, manufacturers under the manufacturing programme of the Board of Investment are sometimes required to pay tariff rates higher than the normal 30 per cent for completely knocked down parts and tiller components.
9. Decreasing sales of tractors. The overcrowding of the four-wheel tractor industry in a diminishing market led to the decline in sales of standard tractors. In addition, there was the entry of ten brands of compact tractors (four-wheel tractors below 30 horse-power capacity). This number of distributors overcrowded the market and led to the further decline in the sales of tractors.

In consideration of the problems in agricultural mechanization, the government has created a body called the Agricultural Mechanization Inter-Agency Committee mandated to formulate policy recommendations

on agricultural mechanization. The government, however, has yet to formulate policies which take account of the structure of economic incentives at the farm level. As David (1983) puts it:

> The government should not make the user cost of machineries artificially cheap. The government should remove the penalty imposed on domestic manufacturing of farm machineries by the over-evaluation of the domestic currency—making imports artificially cheap— and by the higher tariff on raw materials than on finished products. The government should encourage the development of new technology which will lower the unit social cost of agricultural products through research and extension. Furthermore the subsidy required for doing this should not be fully paid by farmers because the benefits of new technology in agriculture particularly for food production largely accrue to food consumers not farmers…When we have correct price signals, farm machinery engineers and manufacturers will produce the appropriate type of mechanical technology.

THE CASE STUDIES

Analytical framework

Technology is 'any set of standardized repeatable operations that regularly yield predetermined results' (Freeman, 1974). It specifies standards for technical operation. When a technological package is adopted, it becomes a source of role definitions and normative requirements. It is for this reason that the social roles relevant to the technology often take their character from the requirements of technical operations.

A technological package, however, may not be culturally elaborated because of the demands it imposes technically on existing behaviour, for certain behaviourable prerequisites which a technology specifies are often intermeshed with establishd behavioural patterns. That is why people interact within the framework of tradition, expectation and status. This gives rise to the distinctive character of a community which may be different from other communities. In brief, the network or patterns of interaction is the structure of a community. Moreover, a community structure exists for purposes of solving problems within a given local area.

A community as a discrete social structure consists of elements and dimensions. The elements represent the relationships among institutions, groups, or other component units within the community. These relationships are operationalized in terms of functions. For instance, the relationship between an economic institution and the rural farm households is centred around credit assistance. A package of technology would require a household or a community to relate to an economic institution such as a rural bank through a credit assistance scheme or loans for farm inputs.

The dimensions are the roles and statuses reflecting the all-pervasive patterns which permeate the entire social structure. As a package of technology is disseminated in the community, adjustments are made with respect to the requirements of a technology and the set of norms attached to statuses. Where previously a wife performed mainly household chores, she now participates in agricultural training programmes and other relevant activities which entitle the household to an agricultural loan. She may even participate in farm activities to see to it that farm inputs such as fertilizers and chemicals are properly applied. The role of the wife now is extended to include those tasks which traditionally were assigned to the husband.

There are instances, however, when conflicts of values occur. A traditional authority may reject agricultural technology because this is channelled through the modern local government. Any change which the political institution attempts is resisted because it represents the values of modern society which do not fit with the traditional value system.

There is also a conflict of values between two subcultures. When two component subunits in a community act in opposition to each other, a technology introduced from the outside could be outrightly rejected. Thus, the common components of the rejection of innovations are vested interest and factionalism.

A community structure is, therefore, made up of elements and dimensions which can hinder or accelerate change. Given the structure, a community may have a traditional orientation. People in the community revere the past and emulate former conditions. Another community may have the opposite orientation relative to the expectation that change will occur in the future and take steps to facilitate change through deliberate actions.

Background to the sample

Physiographic characteristics

Panay Island has four provinces. These are Aklan, Antique, Capiz and Iloilo. The island has a total land area of 1.1 million hectares and is bounded by mountain ranges in the northeast and west.

Iloilo has forty-four municipalities three of which were the sites of the survey. These were Cabatuan, Oton and Tigbauan. The topography of Iliolo varies from flat lands to rolling plains, hilly lands, and mountain ranges. It has ten soil series one of which is the Alimodian series—the largest of the series covering most of the rolling hills and lands in the north.

Iloilo has three rainfall patterns, namely: Type 1 (Class A), Type 3 (Class C) and Type 4 (Class B). Type 1 has two pronounced seasons, that is, wet from June to November and dry from December to May. This rainfall pattern pervades the southern and western portion of the province notwithstanding Iloilo City. Type 3 has no pronounced maximum rainfall period. The dry season lasts from one to three months. This rainfall pattern prevails in the east and northeast portions of the province. Type 4 has no pronounced rainy period and dry season. This is found in the northern part of the province.

The main cropping in Iloilo is a two-rice cropping pattern using high-yielding varieties followed by upland crop production such as mungbeans, cowpea, sweet potato, and other vegetables. This cropping pattern is a recent development as the traditional practice was a one-rice crop pattern using traditional varieties of rice succeeded by a long fallow period.

Rice is grown in both irrigated and rainfed areas although the latter are more extensive. As rice is extensively grown in the province, Iloilo has become known as the rice granary of the south. (See map of the island of Panay and the municipalities of Iloilo province, p.

Profile of two household categories

While the household was the unit of analysis, the information about it was taken from household heads. The households were categorized as mechanized and non-mechanized in their farm operations (Table 6.2).

The heads of households with mechanized farm operations were generally younger and had higher educational attainment than the heads of households that did not mechanize farm operations. Both household categories predominantly had males as heads of households although there were a small number of women as household heads. Also, most of the household heads of both categories were married.

The size of households with mechanized farm operations was larger than the non-mechanized households.

Of the latter category, there were more landowners and tenants than the former category. However, the mechanized households had more leaseholders and a high number of varied tenurial statuses.

As regards the land cultivated and number of parcels owned, mechanized households had larger landholdings than non-mechanized households.

Inferring from the characteristics of both household categories, it can be stated that mechanized households tend to have a higher social and economic status than non-mechanized households.

Table 6.2 Characteristics of two household categories

Characteristics	Type of household	
	Mechanized N=35	Non-mechanized N=58
Age		
Mean	48.33	50.98
SD	12.94	12.81
Educational attainment		
Mean	7.57	5.05
SD	3.94	2.33
Sex (%)		
Male	83.00	86.00
Female	17.00	14.00
Civil status (%)		
Single	9.00	7.00
Married	82.00	93.00
Widow/widower	9.00	–
Size of household		
Mean	5.71	4.47
SD	3.02	2.27
Tenure status (%)		
Owner	17.00	43.00
Leaseholder	54.00	9.00
Tenant (%)	20.00	36.00
CLT holder (a) (%)	–	5.00
Multi-status (b) (%)	29.00	7.00
Size of land cultivated		
Mean	3.37	1.80
SD	2.29	1.08
Number of parcels per respondent		
Mean	2.07	1.98
SD	1.48	1.01

Notes: (a) Certificate of land transfer,
(b) Landowner who at the same time rents additional land or is a leaseholder.

Occupational differentiation

Heads of households with mechanized farm operations tended to have more differentiated occupations than heads of households without mechanized farm operations (Table 6.3).

Table 6.3 Occupational distribution of heads of both household categories

Occupation	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Farmers	80	98
Drivers	3	–
Employees	8	–
Teachers	6	–
Traders	3	2

A very high proportion of heads of households with mechanized farm operations were farmers, although some were engaged in such occupations as drivers, government employees (clerks, bookkeepers, etc.), teachers, and traders. With regard to heads of households in non-mechanized farm operations, they belonged to two occupational categories only: farmers and traders.

In brief, heads of households with mechanized farm operations tended to occupy a more varied range of status than heads of households without mechanized farm operations.

Membership of rural social organizations

A person normally occupies a number of positions in a community. Outside of the position he occupies as a member of the family or as a member of an occupational group, he may be a member of social organizations relevant to his livelihood or the social status he enjoys in the community.

The majority of the heads of both household categories belonged to rural social organizations (Table 6.4). However, a higher proportion of heads of households in non-mechanized farm operations were members of rural social organizations than those heads of households with mechanized farm operations. It may be inferred from this information that some households with mechanized farm operations had no need of social organizations because they did not perceive them to be useful to their farm operation and as they were already economically stable. The inference can be extended, then, that since rural social organizations in this particular context have materialistic goal-orientations, more households not employing mechanized farm operations find them relevant in serving their economic needs.

Table 6.4 Percentage distribution of responses to the question 'Are you a member of any organization in the community?'

Category	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Yes	66	71

Category	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
No	34	29

With regard to the specific nature of the rural social organization (Table 6.5), the most distinctive with which the households had been identified were the 'Masagana 99 Farmers Association' and 'Compact Farms'.

The members of the Masagana 99 Farmers Association were those who had availed themselves of loans for rice production. They seemed to be preferred by the banks as they were less of a security risk. Given their higher economic status than those non-mechanized households, bankers perceived them to be capable of repaying their loans. In addition, the sole membership of heads of households with mechanized farm operations in compact farms is a clear reflection that they had larger landholdings than the 'non-mechanized' households.

Table 6.5 Percentage distribution of members in village social organizations

Social organization	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Local government	17	20
Pilot village development project	–	20
Samahang Nayon	61	63
Arba (a)	–	10
Kabsaka (b)	7	37
Masagana 99 Farmers Association	22	10
Compact farm (c)	13	–
Cotton Growers Association	–	3
Catholic religion sector	–	3

Notes: (a) Agrarian Reform Barangay (village) Association,
(b) Kauswagan Sa Kaumahan (Visayan for 'Bounty on the Farm'),
(c) Contiguous farms organized around a particular agricultural service.

Changes in household roles and social structure

When a technological package is adopted, it becomes a source of role definitions and normative requirements. That is why social roles relevant to the technology often take their character from the requirements of the technical operation. However, certain behavioural prerequisites which a technology specifies are often intermeshed with established behavioural patterns. This is further exacerbated by poor economic conditions, relative physical and social isolation, limited human and physical resources, and the absence of institutions interstitial to the community which can influence market forces (Chua, 1986).

Household labour participation in land preparation for rice

In land preparation for rice production, the major activities identified were ploughing, harrowing and bunding. Related to these activities, however, was the role of other members of the household such as preparing meals for those involved in the task of land preparation and contacting labourers (Table 6.6).

Ploughing and harrowing were solely the responsibilities of husbands and male children in both categories of households although a few male relatives outside of the nuclear family were also involved especially among the 'non-mechanized' households. It can be noted, however, there were more members of the 'non-mechanized' households who were involved in these particular tasks.

In the task of bunding, it was largely the responsibility of husbands and male children although a greater proportion of husbands in 'non-mechanized' households were involved. What is notable in this particular task is the involvement of female relatives outside of the nuclear family among 'mechanized' households.

In the preparation of meals only wives and female children of both categories of households were involved. In this particular activity, more wives in 'non-mechanized' households were involved than in 'mechanized' households.

In contacting labourers to be hired for land preparation, more members of the 'mechanized' households were involved than in 'non-mechanized' households. Those members of both household categories involved were husbands and wives, male and female children, and other relatives in the household.

Household labour participation in crop establishment

A very distinct difference can be observed between 'mechanized' and 'non-mechanized' households in the task of planting with dry-seeded rice (Table 6.7). Among the immediate members of the family in a 'mechanized' household, no one was involved in furrowing except some male relatives.

Table 6.6 Household labour participation in land preparation for rice

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Ploughing		
Husband	40	79
Wife	–	–
Children		
Male	17	28
Female	–	–
Relatives		
Male	–	5
Female	–	–
Harrowing		
Husband	31	79
Wife	–	–
Children		
Male	11	24

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Female	–	–
Relatives		
Male	3	3
Female	–	–
Bunding		
Husband	17	69
Wife	3	2
Children		
Male	14	17
Female	–	–
Relatives		
Male	–	2
Female	20	–
Prepare Meals		
Husband	–	–
Wife	60	83
Children		
Male	–	–
Female	14	9

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Relatives		
Male	–	–
Female	–	2
Contacting labourers		
Husband	51	45
Wife	17	12
Children		
Male	11	2
Female	6	3
Relatives		
Male	6	3
Female	–	–

Household labour participation in transplanted rice culture

Transplanted rice culture includes seedbed preparation, seeding, pulling and distribution, and transplanting (Table 6.9).

Among members of the two household categories, a greater proportion of husbands and male children among 'mechanized' households participated in the major cultural practices of transplanted rice culture as compared with those in the 'non-mechanized' household category. It can be noted that a very insignificant proportion of wives and female children were involved in the pulling, distribution and transplanting of seedlings.

Household labour participation in upland crops

The major tasks involved in the cultivation of upland crops especially corn are furrowing, sowing and basal application of fertilizers. Taken into account in performance of these farm tasks are the preparation of meals and contacting of hired labourers (Appendix Table 6.10).

Table 6.7 Household labour participation in dry-seeded rice

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Planting		
Furrowing		
Husband	–	26
Wife	–	2
Children		
Male	–	7
Female	–	–
Relatives		
Male	3	–
Female	–	–
Broadcasting		
Husband	11	41
Wife	–	2
Children		
Male	–	19
Female	–	–
Relatives		
Male	3	–
Female	–	–
Harrowing		
Husband	3	17
Wife	–	–

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Children		
Male	–	5
Female	–	–
Relatives		
Male	–	–
Female	–	–

Table 6.8 Household labour participation in wet-seeded rice

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Seed germination		
Husband	57	64
Wife	–	–
Children		
Male	17	14
Female	–	2
Relatives		
Male	6	5
Female	–	–
Broadcasting		
Husband	37	52
Wife	–	–
Children		
Male	11	10
Female	–	–
Relatives		
Male	6	5
Female	–	–

In furrowing, no members of the ‘mechanized’ households were involved. This means that a tractor was used in land preparation. In the ‘non-mechanized’ household, those involved were husbands and male children. Only a very insignificant proportion of female children participated.

In sowing, only a small proportion of husbands in ‘mechanized’ households were involved. In the ‘non-mechanized’ households, husbands, wives, male and female children and other relatives were involved in this particular activity.

In the basal application of fertilizer, husbands, male children and male relatives of both 'mechanized' and 'non-mechanized' households participated in this particular task. It appears, though, that a greater proportion of members of the 'non-mechanized' households participated compared with members of the 'mechanized' households. It can be inferred

Table 6.9 Household participation in transplanted rice culture

Activity	Type of household	
	Mechanized N=35 %	Non- mechanized N=58 %
Seedbed preparation		
Husband	29	16
Wife	–	–
Children		
Male	6	2
Female	–	–
Relatives		
Male	3	2
Female	–	–
Seeding		
Husband	23	17
Wife	–	–
Children		
Male	9	3
Female	–	–
Relatives		
Male	3	2
Female	–	–
Pulling and distribution of seedlings		
Husband	9	–
Wife	–	3
Children		
Male	6	5
Female	–	–
Relatives		
Male	–	–
Female	–	–
Transplanting		
Husband	5	11
Wife	–	–
Children		
Male	11	3

Activity	Type of household	
	Mechanized N=35 %	Non- mechanized N=58 %
Female	–	2
Relatives		
Male	–	–
Female	–	–

from these data that the difference in the proportion of members involved in this particular activity reflects the greater need of 'non-mechanized' households to reduce farm expenditure and to produce more for family consumption.

In another vein, upland crop production activities of 'mechanized' households did not involve wives and other female members. Also, no members of the household were involved in land preparation.

In contacting labourers to work on the farm, more 'mechanized' households had husbands, wives and other male relatives who performed this particular task than 'non-mechanized' households. 'Mechanized' households, however, did not indicate any of their children contacting labourers. Moreover, only a very small proportion of male and female children of 'non-mechanized' households was involved.

Household labour participation

Crop management practices involved fertilizer application, spraying, weeding and controlling water. Family labour participation in both 'mechanized' and 'non-mechanized' households varied in this respect (Table 6.11).

A greater proportion of members of 'non-mechanized' households participated in crop management than members of 'mechanized' households. Also notable was the participation of a large proportion of wives in weeding activity among 'non-mechanized' households. In 'mechanized' households no wives were involved.

These data imply that in crop management, hired labour tends to replace members of 'mechanized' households in performing farm activities. It can also be noted that wives in 'non-mechanized' households participated actively in crop management especially in weeding activities. The task of harvesting involves other activities such as supervising and contacting labourers and preparing meals for them (Table 6.12).

In performing the task of harvesting, a greater proportion of members of 'non-mechanized' households were involved than members of 'mechanized' households. But in certain activities related to harvesting such as contacting labourers, more wives in 'mechanized' households were involved than in 'non-mechanized' households.

Post-harvest activities include supervising labourers in the threshing of rice, sun-drying, hauling, milling, and contacting labourers (Table 6.13).

Table 6.10 Household labour participation in marketing

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Hauling farm product		
Husband	54	57
Wife	17	17
Children		
Male	6	19
Female	3	2
Relatives		
Male	3	2
Female	–	–
Arranging for transport facilities		
Husband	51	45
Wife	14	14
Children		
Male	3	10
Female	3	3
Relatives		
Male	3	–
Female	–	–
Bringing products to market		
Husband	54	53
Wife	23	14
Children		
Male	3	12
Female	3	3
Relatives		
Male	–	2
Female	3	–
Contacting buyers		
Husband	49	52
Wife	26	14
Children		
Male	3	10
Female	3	2

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Relatives		
Male	–	2
Female	3	–
Selling		
Husband	54	60
Wife	23	14
Children		
Male	3	12
Female	3	3
Relatives		
Male	–	2
Female	3	–

The pattern of family labour participation in post-harvest activities tended to show that a greater proportion of members in 'non-mechanized' households were involved than members of 'mechanized' households. In the analysis of individual activities, however, wives in 'mechanized' households tended to be more involved in supervising and contacting hired workers. Also more male children in 'mechanized' households participated in supervising, sun-drying, and hauling activities and in contacting labourers.

It seemed that certain tasks in 'mechanized' households are assigned to wives and male children as husbands performed managerial tasks, and they got less involved in 'hands-on' or actual farm operations.

Marketing of farm products included the hauling of farm products, arranging for transport facilities, bringing farm products to the market, contacting buyers, and selling (Table 6.14).

In performing the task of marketing, a greater proportion of husbands and wives in 'mechanized' households were involved in some specific activities unlike those in 'non-mechanized' households. The activity in which a large percentage of husbands were involved was arranging for

Table 6.11 Household labour participation in crop management

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Fertilizer application		
Husband	49	72
Wife	–	–
Children		
Male	14	22
Female	–	–
Relatives		

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Male	6	5
Female	–	–
Spraying		
Husband	37	69
Wife	–	2
Children		
Male	11	24
Female	–	2
Relatives		
Male	6	5
Female	–	–
Weeding		
Husband	14	64
Wife	–	38
Children		
Male	3	33
Female	3	19
Relatives		
Male	6	9
Female	–	2
Controlling water		
Husband	23	19
Wife	–	–
Children		
Male	3	5
Female	–	–
Relatives		
Male	11	2
Female	–	–

Table 6.12 Household labour participation in harvesting

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Harvesting		
Husband	11	41

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Wife	3	10
Children		
Male	3	26
Female	–	7
Relatives		
Male	3	2
Female	–	–
Supervising workers		
Husband	49	72
Wife	9	14
Children		
Male	11	5
Female	–	3
Relatives		
Male	9	2
Female	–	–
Contacting labourers		
Husband	23	40
Wife	17	3
Children		
Male	3	3
Female	3	2
Relatives		
Male	6	2
Female	3	–
Preparing meals		
Husband	–	–
Wife	43	71
Children		
Male	–	–
Female	14	3
Relatives		
Male	–	–
Female	20	–

Table 6.13 Household labour participation in post-harvest activities

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Supervised threshing		
Husband	51	72
Wife	11	9
Children		
Male	20	12
Female	3	3
Relatives		
Male	11	–
Female	3	–
Sun-drying		
Husband	40	76
Wife	11	16
Children		
Male	29	24
Female	3	5
Relatives		
Male	11	2
Female	–	–
Hauling		
Husband	17	36
Wife	–	10
Children		
Male	17	3
Female	–	–
Relatives		
Male	6	2
Female	–	–
Milling		
Husband	23	64
Wife	6	3
Children		
Male	14	19
Female	–	3
Relatives		
Male	14	–
Female	–	–

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Contacting labourers		
Husband	37	40
Wife	20	7
Children		
Male	11	5
Female	–	3
Relatives		
Male	6	–
Female	–	–

transport facilities. On the other hand, the activities in which a large proportion of wives participated were bringing farm products to the market, contacting buyers and selling farm products. It seemed that under this situation, wives performed the social roles of relating to market forces after husbands had secured transport facilities for bringing farm products to the market.

With regard to 'non-mechanized' households, a greater proportion of male children were involved in all the marketing activities, hauling farm products, arranging for transport facilities, bringing products to the market, contacting buyers and selling farm products. What this information implies is that husbands were preoccupied with immediate farm operations, and social roles relevant to marketing were assigned to male children.

The other reason why male children in 'non-mechanized' households assumed social roles in marketing is due to geographic isolation and the many farm activities of husbands and wives which often preclude them from relating to external market forces and engaging in travel beyond the range of their work environment.

Table 6.14 Household labour participation in marketing

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Hauling farm products		
Husband	54	57
Wife	17	17
Children		
Male	6	19
Female	3	2
Relatives		
Male	3	2
Female	–	–

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Arranging for transport facilities		
Husband	51	45
Wife	14	14
Children		
Male	3	10
Female	3	3
Relatives		
Male	3	–
Female	–	–
Bringing products to market		
Husband	54	53
Wife	23	14
Children		
Male	3	12
Female	3	3
Relatives		
Male	–	2
Female	3	–
Contacting buyers		
Husband	49	52
Wife	26	14
Children		
Male	3	10
Female	3	2

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Relatives		
Male	–	2
Female	3	–
Selling		
Husband	54	60
Wife	23	14
Children		
Male	3	12

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Female	3	3
Relatives		
Male	–	2
Female	3	–

Hired labour in crop production

The employment of hired labour in crop production was greater among 'mechanized' households than 'non-mechanized' households especially in such activities as land preparation, crop establishment, and land care and management (Table 6.15). However, there were more 'non-mechanized' households that indicated the employment of hired labour in harvesting, post-harvesting and in hauling products for marketing.

On the whole, hired labour for both categories of households was largely male. Female hired labour was employed only in such tasks as transplanting, weeding and harvesting. 'Mechanized' households, on the whole, employed more female hired labour than 'non-mechanized' households.

A pattern also distinctly emerging was that a greater proportion of male children and other male relatives in 'mechanized' households were involved in livestock production activities than in 'non-mechanized' households.

With regard to the participation of housewives in this task, there appeared to be a larger proportion of housewives in 'non-mechanized' households involved in livestock

Table 6.15 Households indicating the use of hired labour in crop production

Activity		Type of household	
		Mechanized N=35 %	Non-mechanized N=58 %
Land preparation			
Ploughing			
Male		66	50
Female		–	–
Harrowing			
Male		49	34
Female		–	–
Bunding			
Male		46	16
Female		–	–
Crop establishment			
Planting			
1.	Dry-seeded rice		

Activity		Type of household
Mechanized N=35 %	Non-mechanized N=58 %	
Furrowing		
Male	9	7
Female	–	–
Broadcasting		
Male	17	5
Female	–	–
Harrowing		
Male	11	3
Female	–	–
2.	Wet-seeded rice	
Broadcasting		
Male	34	14
Female	–	–
3.	Transplanted rice	
Seedbed preparation		
Male	20	3
Female	–	–
Pulling and distribution		
Male	31	10
Female	20	–

Activity		Type of household
Mechanized N=35 %	Non-mechanized N=58 %	
	Planting	
Male	29	12
Female	29	7
4.	Upland crops	
Furrowing		
Male	–	–
Female	–	–
Seeding		
Male	3	–
Female	–	–
Fertilizer application		
Male	26	2

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Female	–	–
Care and management		
Fertilizer application		
Male	37	16
Female	–	–
Spraying		
Male	49	16
Female	–	–
Weeding		
Male	20	12
Female	23	14
Harvesting		
Male	43	66
Female	31	21

production activities than in 'mechanized' households. Nevertheless, the difference in labour participation between wives of the two categories of households was not as distinct as the involvement of male children and other male relatives.

The information on household labour participation in livestock production generally implies that heads of

Table 6.16 Labour participation of household members in livestock production

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Construction of shed		
Husband	64	84
Wife	4	11
Children		
Male	21	15
Female	–	–
Relatives		
Male	36,	4
Female	–	–
Buying of stock		
Husband	75	82
Wife	4	11
Children		

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Male	21	7
Female	4	–
Relatives		
Male	18	5
Female	–	–
Gathering of forage and feeding soilage/silage to animals		
Husband	71	78
Wife	21	16
Children		
Male	29	38
Female	–	–
Relatives		
Male	39	5
Female	–	–
Shepherding/pasturing		
Husband	68	78
Wife	21	18
Children		
Male	29	45
Female	–	–

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Relatives		
Male	43	5
Female	–	–
Training (draught animals)		
Husband	61	47
Wife	7	2
Children		
Male	25	11
Female	–	–
Relatives		
Male	29	4
Female	–	–

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Attending to pasturation		
Husband	29	35
Wife	4	5
Children		
Male	4	5
Female	–	–
Relatives		
Male	25	4
Female	–	–
Castration of stock		
Husband	7	13
Wife	–	4
Children		
Male	7	11
Female	–	–
Relatives		
Male	39	2
Female	–	–
Health care		
Husband	71	67
Wife	11	22

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Children		
Male	21	24
Female	–	4
Relatives		
Male	32	4
Female	–	–
Slaughtering of stock		
Husband	21	29
Wife	–	7
Children		
Male	11	2

Activity	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Female	4	–
Relatives		
Male	14	2
Female	–	–
Selling		
Husband	68	14
Wife	14	13
Children		
Male	21	14
Female	11	–
Relatives		
Male	14	4
Female	–	–

'mechanized' households devote more of their time in major farm enterprises which cover large areas than in minor enterprises such as livestock production. In this case, male children and other male relatives in 'mechanized' households assumed tasks which did not affect so much the adaptation or survival of the households.

A different condition occurs in 'non-mechanized' households. Crops produced on their farms were mostly for home consumption. Heads of these households, therefore, have a greater need to engage in enterprises that ensure the survival of the household. For this reason, livestock production was a major responsibility of household heads. Moreover, the small size of their farm enterprises was not enough for the employment of the other members of the household.

Only three 'non-mechanized' households were engaged in feedlot cattle fattening. Among 'mechanized' households, no one was involved in this type of farm enterprise. A distinctive aspect of feedlot cattle fattening was the almost total involvement of the nuclear family, that is father, mother and children in the major tasks of this enterprise. As 'mechanized' households had no serious need for additional income in order to survive, no one engaged in feedlot cattle fattening.

In poultry production, members of both 'mechanized' and 'non-mechanized' households were engaged in varied tasks. The proportion of members engaged in poultry production tasks greatly differed, however, in both catgories of households. A greater proportion of husbands in 'non-mechanized' households performed varied poultry production tasks than husbands in 'mechanized' households. On the other hand, in 'mechanized' households a higher percentage of other male relatives outside of the nuclear family were involved in varied poultry production tasks than in 'non-mechanized' households.

Earlier, it has been noted that the need for additional income in 'non-mechanized' households was greater than in 'mechanized' households. It is, then understandable that more husbands of 'non-mechanized' households performed poultry production tasks than in 'mechanized' households. But it can also be noted that a greater proportion of other male relatives in 'mechanized' households performed poultry production tasks than in 'non-mechanized' households. The reason for this is that husbands and the immediate

members of the 'mechanized' households are largely occupied with activities in major farm enterprises and the minor or contributory enterprise is relegated to the other members of the household outside of the nuclear family.

In swine production a higher percentage of wives performed varied tasks than in other farm enterprises. In both categories of households, a greater proportion of wives than husbands performed such tasks as gathering of feeding material, cooking of feeding material, feeding, bathing, natural and artificial breeding, attending to pasturation, health care and slaughtering.

The task of selling hogs tended to be equally performed by husbands and wives in 'mechanized' households. In 'non-mechanized' households, there was only a slight difference between the proportion of husbands and wives engaged in selling hogs.

Given the aforementioned data, the tasks generally required in swine production were largely performed by wives. It can be inferred from this working arrangement that swine production in a rural household is essentially an enterprise in which wives play a major role.

Hired labour in livestock production

Only a very few households employed hired labour for livestock production (Table 6.17). Among 'mechanized' households, nine employed hired labour; while among 'non-mechanized' households only two employed hired labour.

Table 6.17 Proportion of households employing hired labour for livestock production

Category	Type of household			
Mechanized		Non-mechanized		
Number	%	Number	%	
Yes	9	26	2	3
No	26	74	56	97
Total	35	100	58	100

Hired labour performed such activities as live-in caretaking, live-out caretaking, construction of poultry-houses and pig-pens, making nests for poultry and slaughtering.

The information on hired labour in livestock production shows that livestock production among 'mechanized' and 'non-mechanized' households was largely a family undertaking in which most of the tasks are performed by its immediate members. In addition, livestock production, as indicated by a very few households engaged in it, is not yet a regular economic enterprise from which an important portion of farm income is derived.

Household record-keeping of farm enterprises

The majority of the households did not keep records of farm expenditures (Table 6.18). The reasons for not performing this particular task varied in importance among the two categories of households (Table 6.19).

Table 6.18 Household keeping record of farm expenditures

Category	Type of household	
Mechanized N=35 %	Non-mechanized N=58 %	
Yes	34	36
No	66	64

Table 6.19 Reasons for not keeping record of farm expenditures

		Type of household	
Mechanized N=33 %	Non-mechanized N=58 %		
1.	Too busy	61	12
2.	It is useless/unnecessary; too small to put on records	39	80
3.	No fixed income	–	8

Among 'non-mechanized' households, keeping a record of farm expenditures was useless and unnecessary as they incurred only a small amount of expenditure in cultivating a small parcel of land. The other reason that follows in importance was their heavy schedule of activities on the farm which made it difficult for them to keep records.

On the part of 'mechanized' households, their heavy activities on the farm did not permit them to keep records of farm expenditures. While this was the major reason for their inability to keep records, the other important reason was the futility of performing the record-keeping task. This is again on account of the small size of the farm.

In sum, the heavy work schedule on the farm and the small amount of expenditures incurred in cultivating a small sized farm make record-keeping an unnecessary task among the rural households.

Record-keeping is a task performed by several members of the household (Table 6.20). Both in 'mechanized' and 'non-mechanized' households, a very small proportion of husbands performed record-keeping. This particular task was performed largely by wives. More daughters also performed record-keeping than the household heads.

Table 6.20 Members of the household assigned to keep record of farm expenditures

Category		Type of household	
Mechanized N=12 %	Non-mechanized N=21 %		
1.	Husband	8	10
2.	Wife	67	62
3.	Daughter	25	14
4.	Other members of the household	–	14

It can be said that farm record-keeping is a task performed by female members of the households. In large measure this task is done by the wife and, if not, by a daughter in the family.

Patterns of household decision making

Patterns of interaction tend to be observable in a household in terms of phenomena which can be classed as a social process. One of the social processes often observed in rural farm households is the extent of participation of its members in decisions pertinent to farming activities and the use of scarce resources.

As resources on the farm are usually scarce and may not be available at all, some form of strategy is often resorted to by the household in order to meet the requirements for survival. One strategy is the use of credit. Interactions, then, centre around credit as households attempt to satisfy their economic wants.

In making decisions to carry out farming activities, the members of households usually involved were husbands, wives and children (Table 6.21). Relatives outside of the nuclear family were also involved in decision making although this occurred in only a very few households.

Among the two categories of households, a higher proportion of wives and children in 'mechanized' households participated in decision making. It can be noted, though, that a higher proportion of wives in 'non-mechanized' households were involved in decision making pertinent to spraying pesticides, threshing, sharing of harvest and paying credits to the bank. A distinct pattern seemed to emerge which indicated that wives and children in 'mechanized' households were generally involved in decision making in a large number of farming activities.

By contrast, a higher proportion of husbands in 'non-mechanized' households were involved in decision making than husbands in 'mechanized' households.

In brief, the trend in decision making on farming practices showed a higher proportion of wives and children in 'mechanized' households that participated in decision making than in 'non-mechanized' households. In the latter households, more husbands were involved in decision making.

It can be inferred from the data that the involvement of more wives and children in decision making among 'mechanized' households may be related to the large size of farms cultivated by this category of household and the economic risk involved in farming. In 'non-mechanized' households, small sized farms were cultivated. For this reason, decision making tended to rest with the husbands alone.

In the pattern of decision making for the allotment of funds for farming expenditures (Table 6.22), it can be noted that the immediate members of the family were more involved than relatives. Among the immediate members of the family, a greater proportion of children in 'mechanized'

Table 6.21 Patterns of household decision making in farming activities

Farming practice		Type of household
Mechanized N=35 %	Non-mechanized N=58 %	
1.	What to plant	
Husband	80	83
Wife	29	19
Children	17	7
Relatives	3	2
2.	When to borrow	

Farming practice		Type of household
Mechanized N=35 %	Non-mechanized N=58 %	
Husband	74	88
Wife	14	10
Children	9	7
Relatives	3	2
3.	When to change variety	
Husband	77	83
Wife	20	14
Children	20	7
Relatives	–	2
4.	When to weed or spray herbicides	
Husband	80	88
Wife	14	14
Children	14	9
Relatives	3	2
5.	When to spray pesticides/insecticides	
Husband	80	90
Wife	11	14
Children	14	9
Relatives	3	2
6.	When to apply fertilizer	
Husband	77	86
Wife	14	12
Children	14	9
Relatives	6	2
7.	When to harvest	
Husband	74	76
Wife	11	12

Farming practice		Type of household	
Mechanized N=35 %	Non-mechanized N=58 %		
	Children	17	7
Relatives	6	2	
8.	Hire tractor		
Husband	66	34	
Wife	11	9	

Farming practice		Type of household
Mechanized N=35 %	Non-mechanized N=58 %	
Children	14	2
Relatives	3	–
9.	Hire thresher	
Husband	60	71
Wife	6	12
Children	11	5
Relatives	6	2
10.	What livestock to raise	
Husband	34	66
Wife	31	22
Children	14	5
Relatives	3	3
11.	Who should care for the livestock	
Husband	74	81
Wife	29	26
Children	23	12
Relatives	3	2
12.	Who decides to construct pen/corral	
Husband	71	81
Wife	26	12
Children	17	7
Relatives	–	2
13.	Who makes decision as to whether to use produce for consumption, seeds, or to sell it	
Husband	77	79
Wife	49	43

Farming practice		Type of household	
Mechanized N=35 %	Non-mechanized N=58 %		
	Children	9	7
Relatives	3	2	
14.	Decision as to whom to sell farm produce		
Husband	77	72	
Wife	40	28	
Children	11	5	
Relatives	–	2	

Farming practice		Type of household
Mechanized N=35 %	Non-mechanized N=58 %	
15.	Decision as to where to sell farm produce	
Husband	66	66
Wife	23	21
Children	14	2
Relatives	–	2
16.	Decision in the pricing of farm products	
Husband	69	69
Wife	34	26
Children	17	3
Relatives	–	2
17.	Decision in the hiring of transportation	
Husband	66	62
Wife	20	21
Children	17	2
Relatives	–	3
18.	Who decides on the sharing system	
Husband	69	78
Wife	20	28
Children	11	5
Relatives	3	–

Farming practice		Type of household
Mechanized N=33 %	Non-mechanized N=58 %	
19.	Who decides on the settlement of credit payments	
Husband	71	81
Wife	37	43
Children	11	3
Relatives	–	–

households participated in decision making than in 'non-mechanized' households.

Again, this situation may be explained by the fact that 'mechanized' households had larger farms under cultivation than 'non-mechanized' households. For this reason, farm activities became more complex and costly and thus seem to require the sharing of responsibility for decision making.

On the whole, decision making in the allotment of funds for farming expenditures reflects a pattern of family relationships in which decision making is shared among husband, wife and children.

When it comes to decisions on the allotment of funds for home expenditure, it seems that a greater proportion of wives than husbands were involved in such matters as the purchasing of food and clothing for the family (Table 6.23). These items of expenditure tend to be consigned to the wife's domain of decision making.

In other items of expenditure, a large proportion of wives still participated in decision making although husbands tended to be the dominant element.

The data also indicated that a greater proportion of children in 'mechanized' households participated in decision making than in 'non-mechanized' households. It seems, then, that children in this category of household tend to be more involved in decision making than in the 'non-mechanized' households.

Table 6.22 Household decision making on the allotment of funds for farming expenditures

Items	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
1.	Payment for hired labour	
Husband	57	67
Wife	43	33
Children	20	5
Relatives	–	2
2.	Purchase of farm inputs	
Husband	71	74
Wife	34	33
Children	23	7
Relatives	–	2
3.	Payment of land preparation	
Husband	71	72
Wife	34	33
Children	20	3
Relatives	–	2
4.	Purchase of draught animal	
Husband	57	57
Wife	17	16
Children	17	–
Relatives	–	2
5.	Purchase of livestock	
Husband	63	76
Wife	23	24
Children	17	–
Relatives	–	2

The pattern of household decision making for the allotment of funds for home expenditure predominantly involves the immediate members of the family.

Awareness of credit institutions

The rate of technology diffusion is affected by the availability of social devices and accumulated knowledge in the social system. One of these social devices is credit which is centred around the interactions of farmers in pursuit of their economic activities. Even if this form of social device is available, however, farmers may be unable to take advantage of it by being unaware of its potential and implications. That is why within a social system, a new technology may be only slowly disseminated because individuals or groups are unaware of its advantages and availability.

The rural bank seemed to be the credit institution that a large proportion of 'non-mechanized' households knew in their village. Only a very few knew of such banks as the Philippines National Bank, Co-operative Rural Bank, and Land Bank.

With regard to the households which were unaware of credit institutions, more 'non-mechanized' households than 'mechanized' households were unaware of such facilities.

The data imply that 'mechanized' households tended to be cosmopolites, while 'non-mechanized' households tended to be provincial in their level of awareness of credit institutions (see Table 6.24).

Sources of credit

The major sources of credit of both household categories were banks, relatives and friends (Table 6.25). Among these three major sources of credit, banks and relatives were the usual sources of loans for a large proportion of both 'mechanized' households and 'non-mechanized' households. Some 'mechanized' households obtained loans from usurers and landowners, while 'non-mechanized' households did not use these sources of credit.

A greater proportion of both 'mechanized' and 'non-mechanized' households obtained loans in the past twelve months (Table 6.26). A very large proportion of households, both 'mechanized' and 'non-mechanized', applied for loans to pay for matriculation fees and medical expenses during planting time. This meant loans for agricultural production were diverted to meet family needs.

Table 6.23 Patterns of household decision making in the allotment of funds for home expenditures

Items		Type of household
Mechanized N=35 %	Non-mechanized N=58 %	
1.	Purchase of food	
Husband	31	60
Wife	63	69
Children	20	5
Relatives	–	2
2.	Purchase of clothing	
Husband	53	46
Wife	69	72

Items	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Children	20	3
Relatives	–	2
3.	Schooling of children	
Husband	60	64
Wife	54	64
Children	9	2
Relatives	–	–
4.	Repair of house	
Husband	80	72
Wife	46	55
Children	14	2
Relatives	–	2
5.	Medicines	
Husband	51	62
Wife	51	53
Children	17	2
Relatives	–	2
6.	Recreation	
Husband	57	34
Wife	43	36
Children	17	2
Relatives	–	2
7.	Who decides when to avail of credit	
Husband	71	95
Wife	37	60
Children	11	2
Relatives	3	–
8.	Who decides when to pay the loan	
Husband	74	90
Wife	46	67
Children	11	–
Relatives	–	–

Table 6.24 Credit institutions known to households

Credit institution	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Co-operative Rural Bank	34	12
Rural Bank	26	50
Philippine National Bank	37	5
Land Bank	20	9
Development Bank of the Philippines	6	–
Masagana 99	6	–
Commercial Bank of the Philippines	–	–
Unaware of any credit institutions	14	36

Table 6.25 Sources of credit as indicated by household heads

Source of credit	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Bank	51	60
Relatives	43	60
Friends	20	21
Usurer	3	–
Landowner	3	–

Table 6.26 Farmers' responses to the question whether they availed themselves of credit in the past twelve months (at the time of interview)

Response	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
Yes	63	69
No	37	31

Problems in Joan repayment

While a large proportion of households had no problems in repaying loans, some were unable to pay their loans (Table 6.28). Among 'non-mechanized' households the major problem in loan repayment was that money for loan repayment was used for household needs. With regard to 'mechanized' households their major problem in loan repayment was the occurrence of natural calamities and late harvests which delayed repayment of loans.

The problems in loan repayment were thus usually those related to natural calamities and the diversion of money for some personal or family needs.

Table 6.27 Periods when households applied for loans

Period	Type of household	
	Mechanized N=22 %	Non-mechanized N=40 %
During planting season	86	70
During fertilizer application	14	8
Enrolment/matriculation	9	5
During land preparation	5	–
During sickness	–	8
As the need arises	–	3

Table 6.28 Problems of households in loan repayments

Problem	Type of household	
	Mechanized N=18 %	Non-mechanized N=31 %
Delays in production	11	3
Natural calamities	17	–
Used for household and emergency purposes	6	16
None	67	80

Institutional patterns in the community

Institutions are the established forms or conditions of procedure characteristic of group activity (Rose, 1974). People act within the framework of institutions as these provide guidelines by which actions have to proceed. The term institution also refers to established ways of doing things (Broom and Selznick, 1970). In a rural community, institutions are easily identifiable in terms of the specific arrangements by which people conduct their economic or social activities.

Cropping pattern by seasons and crops

A large proportion of both ‘mechanized’ and ‘non-mechanized’ households followed two cropping seasons (Table 6.29). There were those who followed one cropping season and three cropping seasons although these institutional arrangements were largely practised by the ‘non-mechanized’ households.

Table 6.29 Cropping patterns by seasons

Cropping pattern	Type of household	
	Mechanized N=35 %	Non-mechanized N=58 %
One cropping season	14	21
Two cropping seasons	72	62
Three cropping seasons	14	17

Among the 'mechanized' and 'non-mechanized' households who practised a second cropping, the normal pattern was 'rice-rice' (Table 6.30). As indicated earlier, a large proportion of both household categories followed this cropping pattern. Those households practising a one-cropping season followed the cropping pattern as 'rice-fallow'. Only a small proportion of 'mechanized' and 'non-mechanized' households adopted this cropping pattern.

With regard to the practice of three cropping seasons, a few 'mechanized' households followed 'rice+corn —rice— rice' cropping pattern. In ten 'non-mechanized' households the cropping systems followed were 'rice+corn—rice— rice', 'rice—rice—mungbean', 'rice—(rice)+mungbean— mungbean', 'rice—rice +mungbean—watermelon', 'rice— rice—(mungbean)/corn', and 'rice—rice—corn'.

Rice crop utilization

The social groups receiving shares of the harvest were farmers (lessees), harvesters, landowners, and threshers. Farmers in the 'mechanized' households received two times more than farmers in 'non-mechanized' households (Table 6.31). Among 'mechanized' households, the biggest shares

Table 6.30 Cropping patterns by crops

Cropping pattern	Type of household			
	Mechanized N=35		Non-mechanized N=58	
	No.	%	No.	%
One cropping season				
Rice-fallow	5	14	9	16
Rice-(rice)	–	–	1	2
Rice-(corn)	–	–	2	3
Two cropping seasons				
Rice-rice	24	69	25	43
Rice-rice+mung	–	–	2	3
Rice-rice+cowpea	–	–	1	2
rice-rice+(mung/corn)	–	–	1	2
Rice-rice+(mung)	–	–	3	5
Rice-mung	1	3	3	5
Rice-corn	–	–	1	2

Cropping pattern	Type of household			
	Mechanized N=35		Non-mechanized N=58	
	No.	%	No.	%
Three cropping seasons				
Rice-rice-rice	1	3	–	–
Rice-rice-rice+corn	–	–	1	2
Rice+corn-rice-rice	–	–	1	2
Rice-rice-mung	3	8	2	3
Rice-rice+mung-mung	1	3	–	–
Rice-(rice)+mung-mung	–	–	1	2
Rice-rice+mung-watermelon	–	–	2	3
Rice-rice(mung/corn	–	–	1	2
Rice-rice-corn	–	–	2	3
Total	35	100	58	100

went to farmers followed by harvesters, landowners and threshers in that order.

Among 'non-mechanized' households, the farmers received the biggest shares followed by landowners, harvesters and threshers.

A greater proportion of 'mechanized' households than 'non-mechanized' households sold their rice harvest (Table 6.32). In the 'non-mechanized' households much of the share was set aside for home consumption and storage. This means

Table 6.31 Rice crop sharing

Category	Type of household					
	Mechanized N=35			Non mechanized N=58		
Cavans	Rank %	Order	Cavans	Rank %	Order	
Landowner	1,226.6	9	3	864.8	12	2
Harvester	1,573.9	11	2	722.1	10	3
Thresher	614.5	4	4	398.4	6	4
Farmer	11,110.4	76	1	5,196.1	72	1
Total	14,525.0	100		7,181.4	100	

Table 6.32 Utilization of rice crop shares among household categories

Category	Type of household			
Mechanized N=35		Non-mechanized N=58		
Cavans	%	Cavans	%	
Consumed	1,466.5	13	1,777.5	34
Stored	2,804.9	25	1,888.8	36
Seeds	611.0	6	444.8	9
Sold	6,213.0	56	1,078.0	21
Others	15.0	0	1.0	0
Total	11,110.4	100	5,196.1	100

Table 6.33 Average crop production per hectare each cropping season

Cropping season	Type of household*	
Mechanized N=35	Non-mechanized N=58	
Cavans		
First crop	72.2	65.1
Second crop	62.6	48.2

Note: * In the third cropping season, one 'mechanized' household and two 'non-mechanized' households planted rice. The former produced an average of 44.8 cavans per hectare; while the latter had an average production of 22. 2 cavans per hectare.

that in this latter category of household, farm economy was largely for home subsistence.

In the first cropping season, 'mechanized' households had higher average yields of rice per hectare than 'non-mechanized' households (Table 6.33). The average rice production per hectare among 'mechanized' households was 72.2 cavans, while among 'non-mechanized' households, it was 65.1 cavans.

In the second cropping, 'mechanized' households still produced a higher average yield per hectare than 'non-mechanized' households. 'Mechanized' households had an average yield of 62.2 cavans per hectare while 'non-mechanized' households had 48.2 cavans per hectare.

Land utilization in rice production

'Mechanized' households had a higher land utilization than 'non-mechanized' households in terms of the average area of rainfed farms cultivated per cropping season and the average area harvested annually (Table 6.34). The former type of household had an average of 3.48 hectares of rainfed farms cultivated per cropping season and 5.88 hectares of rice harvested annually.

Table 6.34 Land utilization in terms of average area cultivated and harvested and cropping intensity

	Type of household	
	Mechanized N=35	Non-mechanized N=58
Hectares (average)		
Area of rainfed farm cultivated	3.48	1.58
Area harvested (annual)	5.88	2.58
Cropping intensity	1.78	1.81

It is in the cropping intensity that 'non-mechanized' households had a higher average of land cultivated. The reason for this is that more 'non-mechanized' households were planting upland crops than 'mechanized' households. On account of the limited size of farm they cultivated and small volume of rice crop harvested they tended to plan upland crops to augment home consumption needs and to earn a little additional income (Table 6.32).

The turn-around period between the first and second cropping seasons was shorter among 'mechanized' households (Table 6.35). The turn-around period among 'mechanized'

Table 6.35 Turn-around between rice cropping seasons

Category	Type of household	
	Mechanized N=29	Non-mechanized N=42
Day (average)		
Turn-around period between the first and second cropping	13	16
Turn-around period between the second and third cropping*	21	7

Note: *Only one 'mechanized' household and two 'non-mechanized' households planted rice in the third cropping as farms were affected by drought.

households took an average of thirteen days; while among 'non-mechanized' households this was accomplished in sixteen days.

The turn-around period in the third cropping season took longer for one 'mechanized' household than two 'non-mechanized' households. The reason for this was the need for the two 'non-mechanized' households to cultivate the soil faster before it was overtaken by the dry season. If this is not done the soil hardens and it is difficult for the carabao to break the soil. For the one 'mechanized' household the longer turn-around period did not present any difficulty as it used the tractor to cultivate the soil.

Moreover, during the third cropping season, 'non-mechanized' households tended to have a shorter turnaround period than 'mechanized' households on account of the difference in the method of crop establishment between the two categories of households. 'Non-mechanized' households employ zero tillage. This means that after the second crop harvest, they immediately broadcast seeds for the third crop season. This practice is known as broadcast-relay. If they employ minimum tillage, they only furrow the soil and plant local varieties.

Some 'mechanized' households had a longer turn-around period because they had a high lead time between the second and third cropping. They employed high tillage involving such activities as ploughing and furrowing.

The longer turn-around period among 'mechanized' households was also on account of the types of crops planted requiring high tillage, for example peanuts and hybrid corn.

Income and expenditure for rice crop production

The average gross annual income and average net income per hectare was higher among mechanized households than 'non-mechanized' households (Table 6.36).

Table 6.36 Annual cost and return per hectare in crop production

Item	Type of household	
	Mechanized N=35	Non-mechanized N=58
	Amount (in pesos)*	
Average gross income per hectare of crops harvested	7,894	5,859
Average cash expenditures per hectare	4,980	3,476
Average net income per hectare	2,759	2,877
	%	
Return on cash expenditures per hectare	55.4	84.2

Note: * one US dollar=P20.521

Moreover, 'mechanized' households had higher average cash expenditures per hectare than 'non-mechanized' households. It was for this reason that the return on cash expenditures among 'non-mechanized' households was higher than 'mechanized' households.

The expenditures on which 'non-mechanized' households spent less were hired labour and marketing (Table 6.37). In addition, they had no expenditures at all on the use of tractors. On the other hand, 'mechanized' households had more expenditures on these items. These expenditures largely explained why 'non-mechanized' households had 84.2 per cent return on cash expenditures, while 'mechanized' households had only 55.4 per cent.

Table 6.37 Average farm expenditures in terms of crops (rice) harvested per hectare

Type of expenditures		Type of household			
		Mechanized N=35		Non-mechanized N=58	
Amount (pesos)	%	Amount (pesos)	%		
1.	Landowners' share	769.05	15.6	620.93	18.8
2.	Seeds	380.42	7.7	413.55	12.5
3.	Fertilizer	894.08	18.1	893.97	27.1
4.	Herbicide	57.59	1.2	39.30	1.2
5.	Insecticide	233.83	4.7	143.13	4.3

Type of expenditures		Type of household			
		Mechanized N=35		Non-mechanized N=58	
		Amount (pesos)	%	Amount (pesos)	%
6.	Harvesting	892.08	18.0	569.02	17.2
7.	Threshing	387.31	7.8	325.62	9.9
8.	Hired labour	830.36	16.8	275.77	8.4
9.	Marketing (hauling and transportation)	98.04	2.0	18.38	0.6
10.	Tractor (rent, fuel and engine oil)	402.48	8.1	–	–

On the whole, however, the total net annual income of 'mechanized' households from the total area harvested was 46 per cent higher than the total net annual income of 'non-mechanized' households (Table 6.38). The 'mechanized' households had a net income of P16,223, while 'non-mechanized' households had only P7,451.

Livestock production of households

More 'non-mechanized' households raised livestock than 'mechanized' households (Table 6.39). Since 'non-mechanized' households depended solely on draught animals for rice

Table 6.38 Average net annual income of households in rice production

Type of household	Area harvested (hectares)	Net annual income (pesos)
Mechanized	5.88	16,223
Non-mechanized	2.59	7,451

production, more of them had to raise carabaos. They also raised cattle which were largely for fattening and subsequent sale. They had an acute need to increase their income because of the limited size of land for crop production, used largely for home consumption.

Table 6.39 Percentage distribution of households raising livestock

Type of livestock	Type of household			
	Mechanized N=35 %		Non-mechanized N=58 %	
	Yes	No	Yes	No
Carabao	62.9	37.1	86.2	13.8
Cattle	20.0	80.0	50.0	50.0
Goat	11.4	88.6	29.3	70.7
Swine	40.0	60.0	53.4	46.6

Other livestock, such as goats and swine, were raised mainly for home consumption needs. The selling of these animals was only incidental as they were not raised specifically for the market.

It can be inferred also from the data that 'mechanized' households still used carabaos in rice production. Even if rice cultivation was mechanized, carabaos were still used for ploughing areas which could not be reached by tractors, and for levelling rice paddies. Some households used tractors in the first ploughing and carabaos in the second ploughing.

While 'mechanized' households that raised livestock were fewer in number, they tended to derive more income from this type of enterprise than 'non-mechanized' households. This is shown by the fact that 'mechanized' households had an annual net income of P796 from livestock, while 'non-mechanized' households had only an annual income of P233. It seemed that 'mechanized' households raised other livestock such as goats and swine with the purpose of making profit from them.

The consequences of farm mechanization

When a technology is adopted in the community, changes usually occur in some elements of the social structure. These changes can be observed in the new roles performed by households or groups. These can also be seen in the institutional arrangements made by individuals in the pursuit of their livelihood or in adapting to their environment. All these changes in the social structure have consequences manifested by the behaviour of people and the products of their behaviour, their attitudes and aspirations, and the perceived satisfaction of their community.

Standard of living of households

Some indicators were identified to differentiate the standard of living between 'mechanized' and 'non-mechanized' households. These were kinds of building materials, lighting, fuel for cooking, type of toilet, and source of water for home use.

More 'mechanized' households used building materials made of concrete and galvanized iron than 'non-mechanized' households. In the same category of households, a greater proportion used electric bulbs, a combination of kerosene lamps and electric bulbs, and kerosene and petromax.

A few 'mechanized' households had liquefied gas stoves but none of the 'non-mechanized' households owned one. Also, more 'mechanized' households used electric stoves than 'non-mechanized' households. More of them had also indicated the use of flush toilets, water pumps, and taps.

Table 6.40 Attitudes toward credit

Attitude statement		Type of household	
Mechanized N=35 %	Non-mechanized N=58 %		
1. Credit from the bank will enable a farmer to apply the recommended practices in increased yield and higher profit			
	Strongly agree	46	50
Agree	46	37	
Undecided	8	9	
Disagree	–	2	
Strongly disagree	–	2	
2. Credit for rice or corn or other crops should be used solely for which it is intended			

Attitude statement		Type of household	
Mechanized N=35 %	Non-mechanized N=58 %		
	Strongly agree	31	55
Agree	66	31	
Undecided	3	7	
Disagree	–	5	
Strongly disagree	–	2	
3. One way to increase farm production and investment is to borrow money from the bank			
	Strongly agree	23	48
Agree	68	38	
Undecided	6	12	
Disagree	3	–	
Strongly disagree	–	2	

Attitude statement		Type of household	
Mechanized N=35 %	Non-mechanized N=58 %		
4. A farmer borrows money from the bank because he wants it for his farm enterprises and not because he was persuaded by a technician			
	Strongly agree	34	35
Agree	54	40	
Undecided	3	10	
Disagree	6	12	
Strongly disagree	3	3	
5. It is the farmer's responsibility to provide capital for his farm and not the government			
	Strongly agree	14	17
Agree	43	52	
Undecided	17	15	
Disagree	26	14	
Strongly disagree	–	2	
6. A farmer should not borrow money from the bank except in emergency			
	Strongly agree	11	16
Agree	40	36	
Undecided	6	17	
Disagree	32	22	
Strongly disagree	11	9	

Attitudes toward credit and loan repayment

An attitude is an acquired, or learned, and established tendency toward or against something or somebody (Fairchild, 1966). It is on this concept that attitude statements on credit and loan repayments have been formulated.

Both categories of households tended to have favourable attitudes toward credit and loan repayment (Table 6.40 and Table 6.41). However, a large proportion of both 'mechanized' and 'non-mechanized' households tended to disagree with the statement that 'a farmer should not borrow from the bank except in emergencies'. This attitude seems to indicate that some farmers had an established tendency to regard formal credit institutions as a financial refuge only when an emergency occurs. Thus with the statement that 'It is the responsibility of the government if the farmer cannot repay his loan', again, this indicates the established tendency among some farmers or groups of farmers that government is a source of 'hand-outs'. Government is perceived as the giver and the farmers as receivers. Hence, there is the tendency of some groups as well as individuals to be dependent most of the time on government for assistance on problems of social magnitude.

Table 6.41 Rank order of farm improvement

Aspiration	Type of household	
	Mechanized N=35	Non-mechanized N=58
	(Rank order)	
To increase production	1	1
To construct irrigation facilities	2	3
To acquire farm machinery	3	2
To obtain more capital	4	4

Finally, a large proportion of 'non-mechanized' households agree with the statement that 'farmers should not blame themselves for non-repayment of loans'. Perhaps some of the households had not understood this statement very clearly. There are instances when farmers could not be blamed for non-repayment of loans, especially when these were instigated by natural calamities.

Farm improvement aspirations

Farm improvement aspirations are the desires of the farmer for more than what he has. This is reflected in his desire to improve farm conditions such as yield of crops, irrigation facilities, farm machinery and equipment, capital and so on.

Through open-ended questions, farm improvement aspirations were elicited from the households. Both 'mechanized' and 'non-mechanized' households had the same major aspirations to improve farm conditions although these varied in importance. These were to increase farm production, to acquire farm machinery, to construct irrigation facilities, and to obtain more capital (Table 6.41).

What appeared to be uppermost in their aspirations was 'to increase production' on the farm. Moreover, among 'non-mechanized' households, the desire to own machinery ranked next to increased production. Among 'mechanized' households, the desire 'to construct irrigation facilities' ranked second to increased production.

Both of these aspirations may spring from the motivation to increase farm income from the enterprises on the farm. But needs which are expressed as aspirations vary in importance. Thus, more 'mechanized' households desired the construction of irrigation facilities than 'non-mechanized' households whose desire to acquire farm machinery had priority over any aspiration to construct irrigation facilities.

Table 6.42 Rank order of home improvement aspirations of households

Aspiration	Type of household	
	Mechanized N=35	Non-mechanized N=58
	Rank order	
To send children to school in order to be able to get a job	1	1
To repair house and buy appliances	2	2
To have a higher standard of living	3	3

Table 6.43 Community satisfaction of farmers

Statement		Type of household	
		Mechanized N=35	Non-mechanized N=58
		%	
1. This community is not located in a very desirable place			
	Agree	91	84
Disagree	9	10	
Undecided	–	5	
2. No one seems to care how the community looks			
	Agree	3	14
Disagree	86	79	
Undecided	11	7	
3. Not much can be said in favour of a place like this			
	Agree	9	29
Disagree	85	60	
Undecided	6	10	
4. I'm not satisfied with my present living conditions			
	Agree	9	29
Disagree	85	60	
Undecided	6	10	
5. It is difficult for the people here to get together on anything			
	Agree	29	47
Disagree	68	50	
Undecided	3	3	

Statement	Type of household	
	Mechanized N=35	Non-mechanized N=58
	%	
6. The future of the community does not look bright		
	Agree	3	14
Disagree	88	83
Undecided	9	3
7. The leaders of the community are not capable and ambitious		
	Agree	11	29
Disagree	89	64
Undecided	–	7
8. This community is not a good place to raise one's children		
	Agree	11	29
Disagree	89	62
Undecided	–	9
9. Peace and order condition in this community is not good		
	Agree	9	19
Disagree	89	72
Undecided	2	9

Home improvement aspirations

Home improvement aspirations are reflected in the farmer's desire to improve the standard of living in the family, education of children, and occupational fulfilment.

Home improvement aspirations were elicited from farmers through an open-ended question. Both 'mechanized' and 'non-mechanized' households expressed the same aspirations and there were no differences in the rank ordering of their aspirations (Table 6.42).

On the whole, the fact that the education of children ranked first in the home improvement aspirations of households shows that is has a very important social function—that of conferring a social status on the individual and his family.

Community satisfaction of farmers

Both 'mechanized' and 'non-mechanized' households expressed satisfaction in the community where they live as indicated by their responses to eight of the nine statements constructed to measure community satisfaction (Table 6.43). The only statement to which the majority of both categories of households agreed was 'this community is not located in a very desirable place'.

The daily prism (effective range that a person can physically cover during the day) of a majority of the people in the community is restricted by contingent spatial and social factors. Under this condition, the ability of people to move and to reach desired goals is severely restricted. Thus, both 'mechanized' and 'non-mechanized' households perceived that their 'community is not located in a very desirable place'.

SPECIAL PROBLEMS AND ISSUES

Supplementing the survey with observation and informant interviewing eliminated some inadequacies of the survey. But there were still weaknesses in this effort at triangulation because it was difficult to establish precise procedures for determining the social impact of tractorization in the rural villages given the present stage of adoption of this technology.

Strictly speaking, the hypotheses were forced into the study in the attempt to have a theoretical framework for guiding observations, that is matching observations with hypotheses through deductive analysis.

The limitations of this study are then that generalizations cannot be made using this qualitative approach; except that whatever conclusions made have reference only to the households and communities under study.

Had there been enough time for a study of this nature, participant observations could have been employed especially in attempting to make a comparison of the 'treatment' and 'control groups at the level of the household and the community relative to the changes in the roles of the members of the household and the rest of the elements of the social structure.

Another problem in studying the social impact of tractorization was the difficulty in isolating those factors which could accurately account for the consequences of farm mechanization. To study this particular problem could require a biographic perspective of households and communities under investigation. This means that the observer should have started the study at the same time as farm mechanization was adopted by the households or the community. In this way, observation of the changes in the roles of households and the social structure could have been more accurate than the present methods employed.

On the whole, these problems and issues arising from the methods of research do not negate at all the findings of this study. They suggest ideas which could provide answers to specific problems in research and in the development of the communities studied.

CONCLUSIONS AND IMPLICATIONS

Conclusions

Changes in households and social structures

There tend to be marked changes in the roles or tasks of members of those households with mechanized farm operations. The changes are in the reduction of manual tasks or physical activities of the immediate members of the family with respect to preparation, crop establishment, transplanted rice culture, upland crop production, crop management, harvesting and post-harvest activities.

Heads of households tend to be performing the role of farm managers while wives and children are more engaged in social roles such as the recruitment and supervision of hired labour. This seems to be the case as more households employed hired labour in land preparation, crop establishment, and care and management of crops. This implies that farm mechanization has not displaced labour in the major tasks in crop production.

Farm record-keeping appears to be the task performed largely by wives and daughters. Even in livestock production women are increasingly involved. The entry of women as hired labour is also noticeable in harvesting and post-harvest activities.

The pattern of decision making with regard to farm practices and allotment of funds for farming and home expenditures tends to be shared decision making among the immediate members of the family, although wives and children appear to be pre-eminently involved.

In credit awareness and practice, they tend to be cosmopolite which means that their knowledge of and interaction with credit sources extend beyond the geographic boundary of their community.

The established forms or conditions of procedures characteristic of households with mechanized farming operations appear to be two cropping seasons and a monoculture cropping. Moreover, farmers tend to have a bigger share of the harvest and the economy of the households is oriented toward the market.

Consequences of farm mechanization

The changes in the households and in the elements of the social structure relevant to communities with mechanized farm operations tend to lead to changes in the social and economic status of households. The condition is reflected in increased average rice production per hectare, extensive land utilization in terms of area cultivated and harvested, a shorter turn-around period, higher net farm income and a better standard of living.

Implications

The family

When a technological package is adopted by the family, it becomes a source of role definitions and normative requirements. Thus, social roles relevant to the technology more often than not take their character from the requirements of the technical operation.

The community

In rural communities where households have mechanized farm operations, there seem to be indications that market forces are at work. The farm economy is oriented towards the market. Increasing income is a predominant motive in farm production. Satisfying home consumption needs is no longer a preoccupation in raising crops and livestock.

The government

Tractors could be perceived by farmers as instruments to increase farm production and income. In brief, there is the perceived profitability of farm machinery. The acquisition or use of farm machinery is hampered, however, by its high costs and the absence of a dealer network which can supply after-sales parts and provide services to farmers. Farm mechanization is a systems-dependent technology as it requires a supply line of spare parts, fuel, maintenance, repair skills and materials for farm machinery to be efficiently used. Government policy needs to be geared towards the provision of this necessary infrastructure.

The acquisition or use of tractors through custom hiring is also hampered by the lack of irrigation facilities. Therefore, a wider use of tractors is contingent with the availability of irrigation facilities.

Further research

The hypotheses in this study have been derived from the concept of technology and its underlying assumptions. As these hypotheses have been qualitatively matched with observations from a limited number of households and villages, a research study in the future will refine the hypotheses for statistical testing. The present study has shown evidence of the relevance of technology to the changes in the social structure. This justifies similar research undertakings in the future to test hypotheses.

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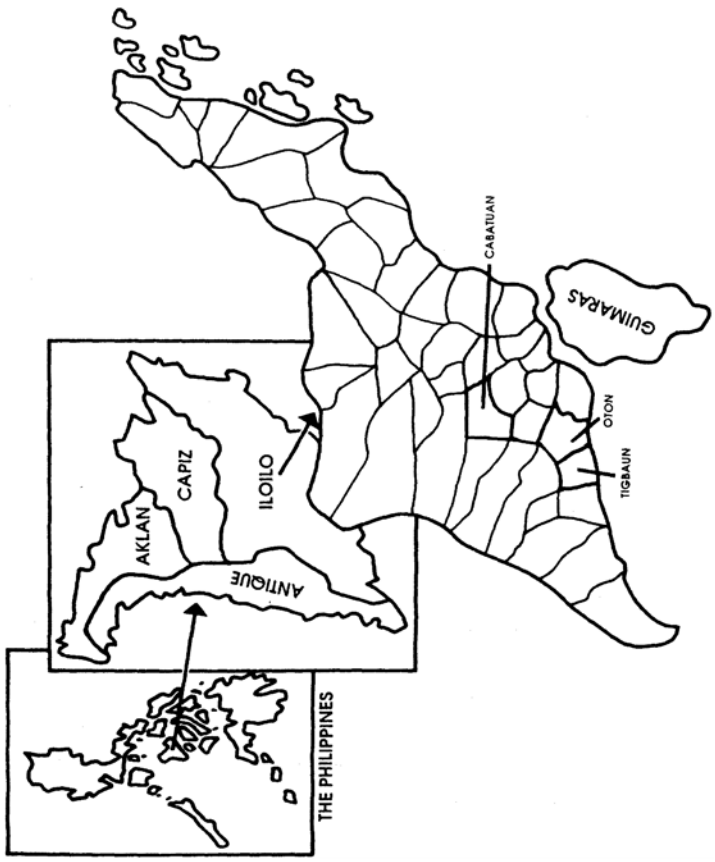

Map 6.1 The municipalities of Iloilo province

Chapter Seven
THAILAND

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INTRODUCTION

The site selected for the case study of Thailand was in Muang district of Khon Kaen province in the northeast of Thailand (see Map 7.1). Khon Kaen province is located 450 kilometres northeast of Bangkok. The area covers 1,340,000 hectares of which 809,000 hectares or 60 per cent are utilized for agricultural cultivation, 218,000 hectares are forest, the rest of the 313,000 hectares are residential areas, water sources and others.

The average temperature in Khon Kaen is about 32.28˚C with average rainfall of 1,103 millimetres per annum. The local government administration covers twenty districts, 148 subdistricts, and 1,686 village communities. Total population is estimated at 1.3 million with 182,576 farm households. (1)

In terms of a regional development strategy, Khon Kaen province was selected to be the centre of the Northeastern region. Similar to other provinces, the development process in Khon Kaen is accompanied by an increasing share of industry and services in the gross provincial product. Nevertheless, agriculture still remains the most important sector in the provincial economy. In 1983, agriculture contributed about 25 per cent of gross provincial product. The most important subsectors in agriculture are crops and livestock. Principal crops grown are glutinous and non-glutinous rice, cassava, kenaf, sugar cane, maize, beans and nuts. Livestock includes mainly hog, poultry, buffalo and cattle. Major industries are agricultural-based and other small-scale industries. Important services are trade, construction and transportation.

Of the twenty districts of Khon Kaen province, Muang district is the largest in terms of population and area. It consists of 45,500 households in 177 villages covering 1,371 square kilometres. Principal crops grown in the district are glutinous and non-glutinous rice, cassava, kenaf and sugar cane. Livestock raised are mainly hog, poultry, buffalo and cattle (Table 7.1).

Table 7.1 Crop production and livestock raising in Muang district, Khon Kaen province, 1982–3

Crop	Production (tons)	Area (hectares)
Non-glutinous rice	26,232	10,488
Glutinous rice	80,588	32,237
Cassava	23,852	2,083
Kenaf	1,392	1,114
Sugarcane	5,024	553
Sweet corn	47	9
Peanuts	23	20

Crop	Production (tons)	Area (hectares)
Sesame	6	13
Livestock	Number (heads)	
Hog	8,526	
Chicken	124,837	
Duck	63,428	
Cattle	12,547	
Buffalo	25,376	

Source: Provincial Office of Commerce, Market Information, 1983, Khon Kaen province, Thailand.

Most farmers in Khon Kaen province occupy land of between 1 to 6 hectares. Average farm size per household in Muang district of 3.5 hectares in 1978 was slightly lower than that of the provincial average (3.9 hectares).

More than 95 per cent of farm households in Muang district as well as in the province have either fully or partly owned land. Less than 1 per cent of total households rented land for cultivation. Structures of land tenure across the districts in the province are similar to those of the Muang district (Table 7.2).

Table 7.2 Households, by tenure status, Muang district and Khon Kaen province, 1978

	Muang district		Khon Kaen province	
No.	%	No.	%	
Fully owned	15,889	96.9	124,016	94.7
Fully rented	47	0.3	1,097	0.8
Partly owned	207	1.3	3,009	2.3
Others	54	0.3	1,418	1.1
Landless	197	1.2	1,438	1.1
Total	16,394	100.0	130,978	100.0

Source: National Statistics Office, The 1978 Agricultural Census, Office of the Prime Minister, Bangkok, Thailand.

Nearly 70 per cent of agricultural land in Khon Kaen province was planted with two crops—rice and other crops. The remaining 30 per cent was planted with a single crop, mainly rice (Table 7.3). Compared to that of the provincial average, a smaller proportion of land in Muang district was under two cropping systems. Since the second crop in the area was mostly upland crops, it is most likely that the area was either rainfed or poorly irrigated. In fact, less than 10 per cent of agricultural land in the province was irrigated. Table 7.3 also shows that agricultural land in the province as well as Muang district has approached its ceiling. In other words, to increase farm output in the province, the improvement in farm productivity per unit of land is a prerequisite.

Mechanization in agriculture in Thailand has been increasing over time. The pace of adoption depends on socio-economic conditions as well as natural resource endowment in that particular area. Moreover, different structures of production and environment in different areas require different kinds of mechanization. Table 7.4 shows

Table 7.3 The cultivated area by type of cropping, Muang district and Kohn Kaen province, 1978

	Muang district level		Provincial level	
Type of cropping	Area (hectare)	%	Area (hectare)	%
Single cropping				
Rice	22,036	39.4	147,033	28.6
Upland crops and vegetables	2,007	3.6	18,227	3.5
Tree crops	59	0.1	500	0.1
Double or multiple cropping				
Rice and other crops	31,820	56.8	346,671	67.4
Other crops (vegetables)	51	0.1	1,714	0.3
Non-cultivated land	14	0.02	287	0.1
Total	55,995	100.0	514,431	100.0

Source: National Statistics Office, Thailand's 1978 Agricultural Census, Office of the Prime Minister, Bangkok, Thailand.

the number of farm machines owned by farmers in Muang district. The most important farm machines owned by farmers are water pumps and two-wheel power tillers. Among the subdistricts, Sila, Samrarn, Koksri and Pra Lup are major mechanized areas in which farms are mostly irrigated.

Methodology

The key strategy in this research is the identification and analysis of the structure of social changes and their consequential impacts on the rural community, following or being associated with the adoption of farm tractors. To accomplish the objectives, data and information at farm and

Table 7.4 Agricultural machines, classified by type and by subdistrict in Muang district, Khon Kaen province, 1983

Subdistrict	Truck	Two-wheel power tiller	Water pump	Sprayer	Thresher
Bah Wah	–	–	13	–	–
Ban Ped	–	–	8	2	–
Pra Lup	–	25	23	–	2
Muang Kao	–	7	58	–	–
Nai Muang	–	6	–	–	–
Don Charng	–	2	5	–	–
Sarapee	3	2	–	–	–
Ban Kor	–	4	8	–	–
Koksri*	4	28	87	–	–
Sila	–	37	47	1	2
Total	17	111	249	3	4

Source: Office of District Agricultural Extension, Muang district, Khon Kaen province. Thailand.

Note: *The subdistrict selected for the case study.

community levels are collected and assessed. The field survey as well as interviews with the people in the selected areas is the approach used in this study. Percentage point analysis is employed.

Two villages of comparable size were selected for field survey. One village represents the community experiencing technological changes and the other village represents one which has not done so. Conceptually, the two villages chosen should be comparable in cultural background while sharing the same market outlet and extension services. The sample size from each village is determined in the light of local conditions such as the size of population, the composition of different cropping patterns, community organization, complexity of land ownership, and the degree of commercial orientation of the households in the community.

The methodology used was a questionnaire interview of selected sample households and the interview of key-informants and organizations in the community. The questionnaire interview included basic family information such as family structure, education level, socio-economic base of the family, work responsibilities of household members of the family in the community, the relationship of the family and other social groups or institutions in the community. Also included are data on production, inputs used, income, output distribution, and related information.

Key-informants in the community included the most knowledgeable persons regarding the community. These are not necessarily the administrative heads or politically important persons in the areas, but are mostly those respectable persons who take the lead in community relationships.

Information on village profile and community development is to be included as well. This information is used to supplement or cross check with that obtained from field surveyed samples.

The selection procedure of the sample from two villages followed the following steps:

Step 1. A collection of preliminary information. A discussion with Khon Kaen provincial agricultural extension officers to obtain information on the agricultural development and the adoption of new technology in the area. Based on the available information, Muang district was selected for the study.

Step 2. A selection of sample villages and subdistricts for a field survey. This selection process was based on the information received from the district agricultural extension office, the village headmen and knowledgeable persons in the villages. At this stage, village no. 1 which is classified as the mechanized village and village no. 7 which is non-mechanized in Koksri subdistrict were selected as sample villages or communities.

Step 3. A selection of sample households through random sampling procedures. In village no. 1 all tractor users were listed and a sample size of forty-six households or 37 per cent of total population was drawn. Similarly, a sample of forty-one farm households or 32 per cent of total population in village no. 7 was drawn from a list of 127 non-users of tractors.

Step 4. A collection of field information. A questionnaire form was designed to collect data and information on basic socio-economic information, farm production and consumption, household's income and expenditure, resource allocation, technology adoption, the social role of family members and the structure of existing social institutions in the community. An indepth interview with key informants in the village was also conducted in addition to the questionnaire interview of the sample farm households.

It is noted that the sample from village no. 7 was drawn from non-users of tractors in rice farming. In fact, not all farms in village no. 7 were purely non-users of farm machines. There were many farmers using hired tractors for the cultivation of upland crops.

Among sample households in both villages, there exists a high degree of homogeneity in most aspects both socially and economically. For example, all samples are characterized by the same northeastern cultural and traditional background, same Buddhist religion, and similar agroclimatic conditions. All villagers in the two communities share the same market outlet—Khon Kaen town. Samples from both villages, by main occupation, were rice farmers.

The scope and limitations of the study

So far, the conclusions on the economic and social impact of agricultural technologies in Thailand, in general, are indefinite. A recent study on irrigation technology by the International Food Policy Research Institute (2) cited the positive economic and social impacts accruing to participating farmers while a study by Kasetsart University Research and Development Institute (3) cited only the economic benefits which appear with the adoption of agricultural innovation. The socio-economic factors such as age, education and land tenuring system were found not to relate to the farmer's adoption of new technologies. In the case of farm mechanization, the available information points to the desirable economic changes following the adoption of tractors and power tillers—e.g. greater farm output, labour saving, greater off-farm opportunities. However, the study failed to cover the impact of social changes following such farm innovation. The present study, therefore, poses the following questions for hypothesis testing:

1. Farm mechanization, e.g. mechanization of tillage has created desirable economic impacts for individual participants specifically and for the village community in general.
2. The adoption of farm mechanization has created changes in the relationships among villagers at both family and community levels. Such social changes are expected to be positively related to changes in the economic status of villagers.

The present research covers only the problems and issues relating to farm mechanization in particular. Data and information used in the analysis are the cross section data obtained from field surveys of sample households and communities in two separate villages in the northeast of Thailand. Due to an imperfect knowledge and indefinite classification of the geographical as well as socio-economic distinction, the present study has experienced the following limitations:

1. The selected site to be studied is bounded only in a relatively poor region in terms of natural endowment, average household's income and living conditions. Hence, it might not fully reflect the maximum level of the adoption of new technology and its impact on the society as compared to other regions although the same conclusion and implication could be drawn.
2. It is not possible to find a village that is purely without induced technological changes. At best, one can examine a village with limited, induced technological changes together with autonomous changes. In addition, it is unlikely that other external factors such as social and community development programmes are homogeneous between the two selected villages.
3. It is warned that, the selection of the two villages is based on the adoption of farm tractors which have a close relationship with the irrigation. Therefore, the village which is a non-user of tractors in this study is the one that does not have an access to the irrigation technology as well.

GOVERNMENT POLICY ON TECHNOLOGY FOR RURAL DEVELOPMENT

Review of technology in rural development

During the past two decades the agricultural production in Thailand has grown at a sustained rate of 5 per cent per year. This impressive growth has been attributable mostly to an increase in land area. Since recently it has been agreed among policy makers that the expansion of farm areas in Thailand has already reached its ceiling, further expansion of cultivated land could be done only through opening up of reserved forest land or an increase in marginal land which is not profitable or feasible in many circumstances.

The possible alternative to sustain such a high growth rate of agriculture is the use of new technologies such as irrigation, new and improved varieties, fertilizers, farm pesticides and farm mechanization. So far, the application of these technical inputs has been an increasing trend but there is a lot more to be done if Thailand is to be successful in accelerating agricultural growth and rural development. Details of each of the above-mentioned technologies are discussed in the following sections.

The construction of large-scale irrigation infrastructures represents the major concern in agriculture of the government of Thailand. For example, the Chainat Dam was first built during 1951–7, with the expansion network of canals, laterals, ditches, and dike and drainage canals. This irrigation network was intended primarily to disperse floods and move surplus water to the natural waterways. Other dams were built up successively beginning from the Bhumiphol Dam (1958–64), Ubolrat Dam (1960–5), Sirikit Dam (1965–73) and Srinakarin Dam (1974–81). There were also many medium-scale dams being constructed in different parts of the country during the 1970s and early 1980s. Despite the construction of dams, the area under irrigation was still limited, and the benefits of the existing irrigation networks have not yet been widely distributed. It was estimated that in 1983 total land with complete irrigation systems covered only 3.5 million hectares, being 17.6 per cent of total cultivated land or 30 per cent of rice areas. Of the total irrigation areas 53.5 per cent is in the Central Plain region, 23.6 per cent in the North, 13.7 per cent in the Northeast, and 9.2 per cent in the South (Table 7.5). From experience, the introduction of irrigation in Thailand has induced some technological innovations such as double cropping or crop intensity for rice, greater use of fertilizers and farm machinery particularly two-wheel power tillers. In some areas, irrigation has been introduced together with the land consolidation programme aimed at building up basic infrastructures for the farmers to gain better access to the markets, better land use and water management.

Seed technology

Initially, seeds were produced or imported by the government sector. Two government agencies are now responsible for the production and multiplication of new and improved seeds for distribution to farmers. They are the Agricultural Technical Department, which is responsible for the production of the foundation seeds of improved varieties, and the Department of Agricultural Extension, which is responsible for the multiplication and distribution of certified seeds to farmers. The private sector also shares the production and distribution of certified seeds. However, the main interest of the private sector is to introduce the imported high-yielding seeds.

Although the Department of Agricultural Extension produced and distributed various seeds for a range of crops during 1977–84 (Table 7.6), the emphasis on seed technology in Thailand has been given to rice and corn. The distribution of rice seed, in particular, has been under the seed exchange programme in which farmers could exchange their own local variety seed with the government's new and improved seed

Table 7.5 Irrigated areas by region in Thailand, 1979–83 (unit: 1,000 hectares)

Year	Northeast	North	Central	South	Whole kingdom
1979	326.4 (11.51)	548.6 (19.35)	1,729.2 (60.97)	231.8 (8.17)	2,836.0 (100.0)
1980	359.7 (12.03)	601.4 (20.11)	1,777.9 (59.45)	251.5 (8.41)	2,990.5 (100.0)
1981	406.3 (12.81)	668.2 (21.07)	1,827.1 (57.61)	269.9 (8.51)	3,171.5 (100.0)
1982	438.6 (13.21)	746.0 (22.47)	1,844.9 (55.56)	290.8 (8.76)	3,320.3 (100.0)
1983	473.4 (13.66)	817.8 (23.60)	1,855.0 (53.54)	318.9 (9.20)	3,465.1 (100.0)

Source: Agricultural Statistics of Thailand, 1983–4–1984–5.

Note: Value in parentheses is percentage to total.

Table 7.6 Production of seeds by seed division, Department of Agricultural Extension (DAE), 1977–84 (in metric tonnes)

Year	Rice	Corn	Sorghum	Mungbeans	Soyabeans	Peanuts	Cotton	Total
1977	323.13	204.36	25.54	16.54	16.95	176.44	90.10	922.37
1978	581.19	384.87	27.66	22.42	228.85	215.72	75.50	1,536.21
1979	1,392.90	688.47	34.54	53.03	303.18	315.83	289.22	3,077.17
1980	1,382.03	1,383.04	28.72	162.40	275.36	346.68	72.40	3,650.63
1981	2,106,87	2,098.21	98.72	137.41	269.91	916.48	79.04	5,706.65
1982	2,505.22	2,453.81	66.57	170.04	133.40	470.52	70.56	5,870.12
1984	3,776.35	2,706.22	14.40	362.85	800.00	619.03	141.95	8,420.88
Total	15,961.91	12,429.62	329.06	1,389.14	2,853.48	3,288.87	822.15	37,134.03

Source: Seed Division. Department of Agriculture Extension, Ministry of Agriculture and Co-operatives.

Table 7.7 Production of vegetable seeds by the Agricultural Technical Department, MOAC, 1977–80

Type of vegetable seeds	1977	1978	1979	1980	Four-year average kilogram	%
Kale	359.5	225.0	106.8	159.2	212.63	13.19
Chinese mustard	449.5	220.0	185.3	201.0	263.95	16.38
Lentil	696.0	705.0	604.2	650.0	663.80	41.19
Long bean	380.0	486.2	197.3	285.7	337.30	20.94
Bird pepper	–	161.0	98.0	100.0	89.80	5.57
Giant cucumber	4.7	4.7	8.0	6.0	5.85	0.36
Others*	69.9	83.1	–	–	38.25	2.37
Total	1,959.6	1,885.0	1,199.6	1,401.9	1,611.58 1	1,00.00

Source: Division of Horticulture, Agricultural Technical Department, MOAC, 1981.

Note: * Includes sweet corn, egg plant, squash, Chinese morning-glory.

without any charge. For corn seed, the farmers could make a purchase directly from the Regional Seed Centre at a price lower than the market price. The farmers' demands for improved seed are substantial, i.e. 80,000 tons for rice, 50– 60,000 tons for corn, and about 1,000 tons for vegetables. However, only less than 5 per cent of the demands were made possible by both the government and private sectors. For vegetable seeds alone, the Agricultural Technical Department produced a total of 1.4 tons in 1980, being 0.14 per cent of average annual demand (Table 7.7).

Fertilizer technology

Fertilizer technology is of the most importance in raising farm productivity. In particular, it has been recognized as a critical factor in the adoption of most high-yielding crop varieties. In Thailand, rice is a major crop requiring more and more application of fertilizers as soil fertility deteriorated and areas under irrigation expanded. During 1975–84, the use of fertilizer increased substantially from 506.4 thousand tons in 1975 to 1,246.7 thousand tons in 1984 with an average annual growth rate of 9.1 per cent (Table 7.8). Most of the fertilizer supplied in Thailand is from imports (Figure 7.1). The use of farm pesticides is also increasing at a very rapid rate. Farm pesticides applied to crop and livestock amounted to only 8,010 tons in total in 1975, increased up to 26,018 tons in 1984 (Table 7.8). The rate of increase was about 12.1 per cent per year. Again, all farm pesticides were imported. Trends in production and imports of fertilizer and pesticides during 1977–83 are shown in Figure 7.1. Clearly, fertilizer imports had been increasing at a much higher rate than the domestic production of fertilizers.

Mechanical technology

Farm mechanization is regarded as a kind of technological change which contributed to a reduction of human drudgery, an increase in crop yield and crop intensity, and perhaps a change in comparative advantage in crop production.

Thailand's crop cultivation in the past was purely traditional. The major power sources in farming were human and animal labour, particularly buffalo. To modernize agriculture, the government of Thailand, in 1919, decided to import tractors from Australia for demonstration at the

Table 7.8 Total use of fertilizers and farm pesticides by farmers, 1975–84 (unit: tons)

		Farm pesticides		
Year	Fertilizers	Crops	Livestock	Total
1975	506,428	8,000	10	8,010
1976	664,391	10,000	10	10,010
1977	792,024	16,000	10	16,010
1978	785,433	23,000	10	16,010
1979	827,204	25,000	10	25,010
1980	786,341	25,000	10	25,010
1981	894,542	27,000	10	27,010
1982	1,042,503	25,000	10	25,010
1983	1,272,041	22,000	12	22,012
1984	1,246,688	26,000	18	26,018

Year	Fertilizers	Farm pesticides		Total
		Crops	Livestock	

Source: Agricultural Statistics of Thailand, 1984–5.

government's agricultural experimental stations. Most farmers, however, did not pay attention to a new technology at that time.

In 1955, a Thai engineer named Debaridhi Dhevakul invented the first power tiller unit, the so-called 'Iron Buffalo'. The early model of this tractor was equipped with a Lister diesel engine of 4.5 horse-power. The model was modified during the 1960s and the latest model was equipped with a Toyota water-cooled 25 horse-power engine.

In reality, domestic farm machinery production first started with the two-wheel power tiller in 1964, followed by the four-wheel tractor in 1967.

Since 1970, further research on small-scale farm machinery has been carried out by the Agricultural Engineering Division of the Department of Agriculture in collaboration with the International Rice Research Institute. At the same time, two-wheel tractor production has been already commercialized by some local manufacturers. In fact, the use of farm machinery has grown rapidly since 1971 (Table 7.9). Up to now, the local tractor production, particularly the two-wheel tractor or power tiller, has continued to expand. In 1980, there were about 100 production firms with a capacity of about 40–50,000 units per year. This has increased the farmers' acceptance of the technological revolution through farm mechanization to a large extent.

Trends in local production and imports of farm tractors are shown in Figure 7.2. As can be seen, except for 1981 and 1982, tractor imports into Thailand have changed marginally. The same is true for production of four-wheel power tillers. In contrast, production of two-wheel power tillers has increased substantially over the same period.

It is quite obvious that while the development of irrigation kept expanding, the use of tractors also expanded. For instance, recent development of the irrigation project in

Table 7.9 Production of power tillers and imports of tractors into Thailand, 1975–84

Year	Power tiller production		Tractor imports
	Two-wheel	Four-wheel	
1975	27,860	2,582	4,231
1976	31,766	2,914	5,257
1977	49,722	4,568	6,161
1978	52,281	5,031	4,298
1979	54,124	4,920	3,348
1980	51,000	4,900	3,892
1981	49,500	4,850	15,840
1982	39,495	6,530	13,438
1983	41,790	3,360	3,389
1984	43,879	1,000	4,673

Source: Agricultural Statistics of Thailand, 1983–4 and 1984–5.

Figure 7.1 Domestic production and imports of fertilizer and pesticides into Thailand, 1977–83

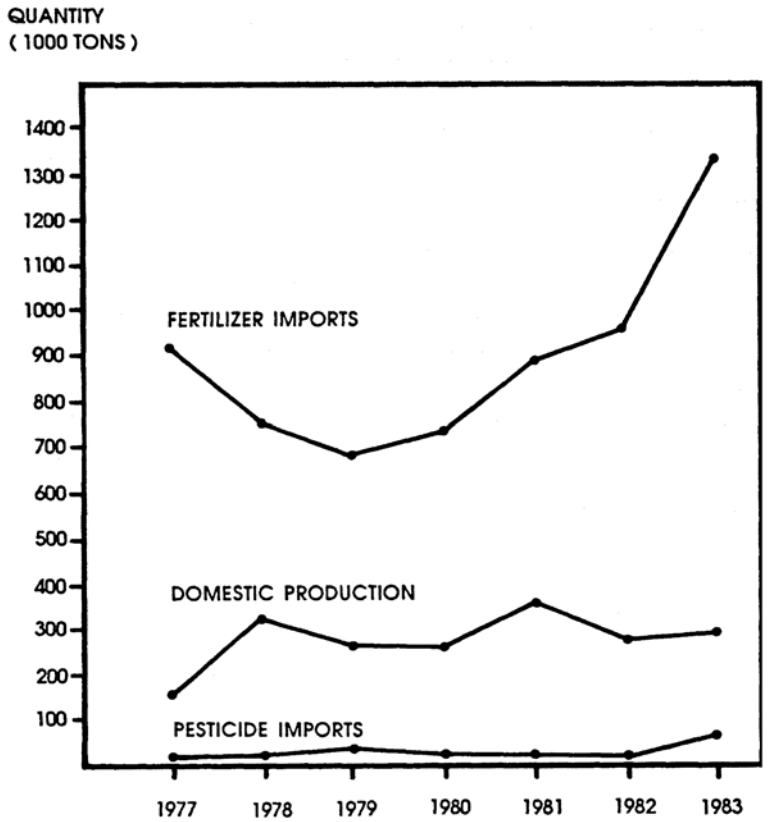


Table 7.10 Use of selected farm machinery in Khon Kaen province, Northeast of Thailand, 1975–9

Year	Tractor	Two-wheel power tiller	Four-wheel power tiller	Water pump
1975	76	380	71	5,267
1976	100	601	80	5,804
1977	130	1,309	101	6,604
1978	165	1,775	163	7,526
1979	189	2,159	200	9,933
Average growth rate (%)	26	58	31	18

Source: Office of Agricultural Economics, Ministry of Agriculture and Co-operatives, Bangkok.

Khon Kaen province, the study site, has stimulated more second cropping for rice, followed by a very rapid increase in the adoption rate of power tillers in the area. Data in Table 7.10 show the use of tractors and related farm machinery in Khon Kaen province. The adoption of large tractors increased from seventy-six units in 1975 to 189 units in 1979, an annual rate of 26 per cent. For two-wheel tractors, the number increased from 380 units in 1975 to 2,159 units in 1979 with an average growth rate of 58 per cent per annum. The use of four-wheel power tillers, on the other hand, increased at the slower rate of 31 per cent

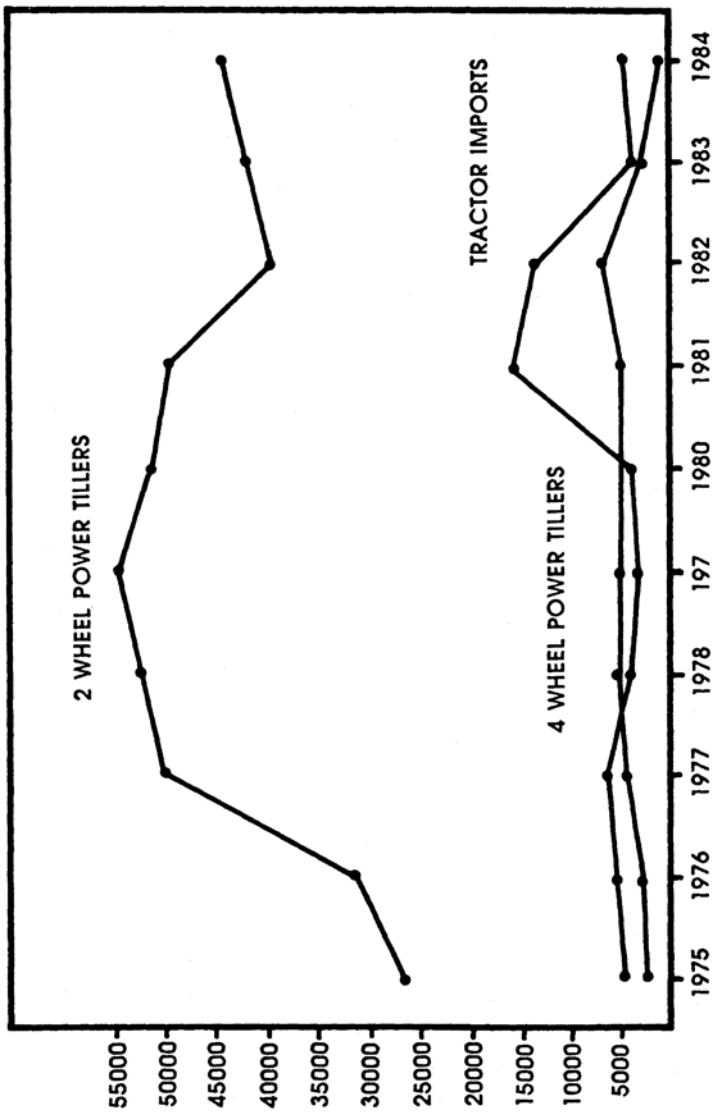
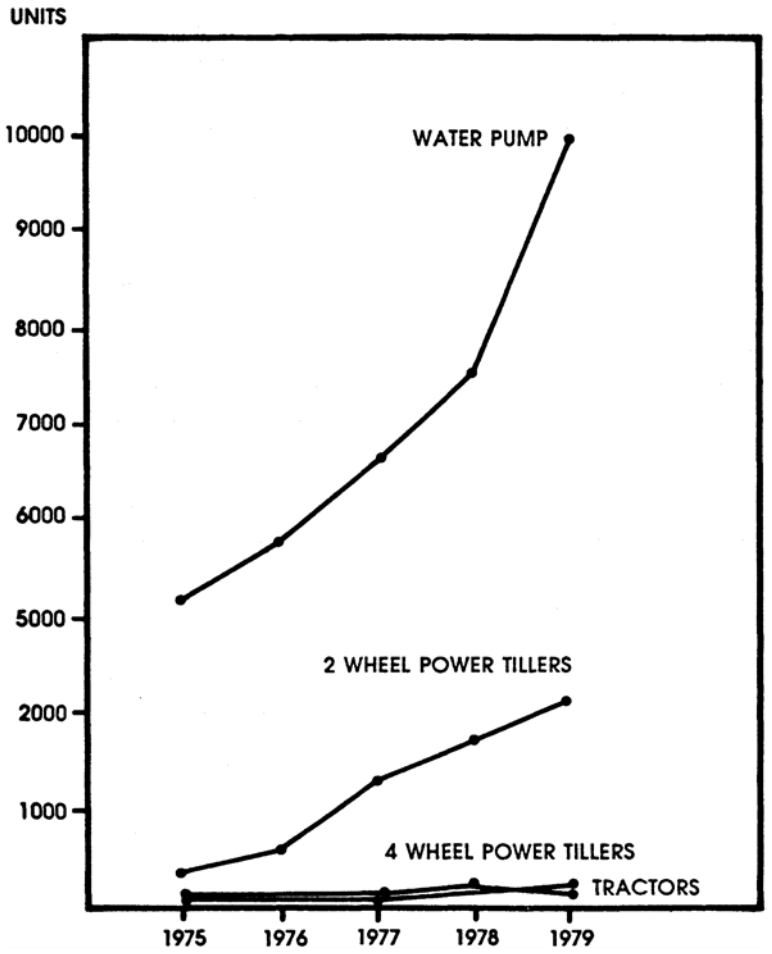


Figure 7.2 Production of power tillers and imports of tractors into Thailand, 1975–84

per year. The use of water pumps also increased, since they are used to drive the tilling machines. Trends in the adoption of selected farm machinery in Khon Kaen province are shown in Figure 7.3.

Overall, the farm mechanization adopted by farmers in Thailand consists mainly of mechanization of tillage. In particular, two-wheel power tillers are adopted in every region of the country. In 1984, the number of this type of machine owned by farmers was 408.8 thousand units, compared to 74.8 thousand units of large-sized tractors, and 46.1 thousand units of four-wheel power tillers (Table 7.11). The growth rate of adoption of two-wheel and four-wheel power tillers during the period 1975–84 was estimated at 10.54 per

Figure 7.3 Uses of selected farm mechanization in Khon Kaen Province, Northeast of Thailand, 1975–9



cent and 6.44 per cent per year respectively. The adoption of tractors also increased at the high rate of 18.6 per cent per year. Similarly, the growth rate of adoption of water pump and rice threshing machines was also high, being 16.8 per cent and 20.4 per cent per annum respectively.

The expansion of irrigation areas and upland crop areas has caused a favourable increase in farm machinery to replace draught animal power. Also, the limited planting time due to multiple cropping and unpredictable weather conditions have caused an increased use of farm machinery, particularly tractors or power tillers.

The estimate of the demand for these small tractors by the Department of Industrial Promotion indicates a very bright future for the small tractor industry. There are, however, some factors limiting the faster expansion of farm mechanization. They are: (1) the limitation of farm size; (2) land fragmentation; (3) a lack of feeder roads between home and farm lots; (4) the slow development of irrigation; and (5) a lack of

knowledge and training among farmers in farm mechanization for the efficient use and proper maintenance of the machines.

Table 7.11 Total farm machinery and equipment owned by farmers, 1975 and 1980–4 (unit: 1,000 units)

Item	1973	1980	1981	1982	1983	1984
Two-wheel power tillers	90.0	280.6	284.4	323.8	364.9	408.8
Four-wheel power tillers	14.6	36.2	39.2	45.7	45.1	46.1
Large-sized tractors	13.3	37.2	50.0	61.8	68.0	74.8
Sprayers	1,310.5	1,632.0	1,659.1	1,701.3	1,871.4	1,994.3
Water wheel engine	56.9	125.8	146.9	148.4	163.2	179.6
Water pump	251.3	518.0	603.5	780.6	858.7	944.5
Rice threshing machines	4.0	18.4	20.6	30.1	33.1	36.8
Paddy cleaning machines	42.3	74.8	83.8	84.1	88.3	92.7
Corn shelling machines	5.7	10.1	11.3	11.4	12.0	12.6

Source: Agricultural Statistics of Thailand, 1984–85.

Government policies and programmes on technology for rural development

The irrigation policy

Irrigation is regarded as the basis for the adoption of other related technologies. The government of Thailand not only takes irrigation as a source of productivity improvement but also a source of energy generation and flood prevention. As far as agriculture is concerned, the irrigation of water contributes a significant increase in cropping intensity and hence to the farm production and the farmers' income. The government policy on irrigation is to provide adequate water supply for crop cultivation while recipients of this kind of technology bear only a minimum burden or nothing for its costs. That is, farmers participating in the irrigation project can use water free of charge to expand their crop production. So far, there is no specific government policy on user charge of irrigation water. Instead, the government still insists on expanding the irrigation areas as far as the budget and manpower are available. In particular, the policy on irrigation in the current national plan of economic and social development, is directed towards the following targets:

1. Intensify the use of water in the existing area of 2.6 million hectares with emphasis on dry season cropping.
2. Develop the existing watersheds with high development potential in land use and crop intensification.
3. Develop existing reservoirs outside the main irrigation areas to reduce risk from natural uncertainty.
4. Conduct a comprehensive survey to divert water flow from the Mae Khong River for agricultural cultivation purposes.
5. Initiate collection of user charge from participating farmers.
6. Restructure the organization and administration system of responsible agencies for the efficient management of irrigation water.

Seed technology policy

The government policy on seed technology is to increase the supply of new and improved seeds to those areas where the private sector has no interest. Under the existing policy, more and more seed centres are to be established to produce, process, and distribute seeds to needy farmers. So far, six seed centres are already in operation and another fourteen centres are under construction. By 1986, all twenty seed centres are expected to operate at full scale. The distribution of seeds will comprise four main market outlets: namely direct sale to farmers, government agencies, the Market Organization for Farmers, and farmer organizations. The prices of government seed will be reasonably lower than the prevailing market prices.

Fertilizer policy

Efforts to increase the supply and lower the price of fertilizers in Thailand include:

1. The promotion of domestic production of fertilizers through a government-owned production plant and private fertilizer mixing plants using imported raw materials. Qualified firms are also eligible to receive an investment privilege grant from the Board of Investment. The grant includes a lower tax rate on imported raw materials and equipment and a reduction in corporate tax.
2. A protection of the domestic producing firms through an import ban on urea and high import tariffs on other formulae. So far, these import control measures are relaxed to allow the import of urea. Currently the tariff rate applied to urea imports for agriculture is 8.8 per cent of the import value, and 14 per cent for other purposes.
3. The establishment of a state enterprise, the Market Organization for Farmers, to handle fertilizer distribution and market intervention to stabilize the market price of fertilizers.

   Under this programme, the Market Organization for Farmers arranges fertilizer procurement from the private importers or from direct imports and takes delivery of fertilizers to farmers through their organization. The Market Organization for Farmers is also granted a transportation subsidy from the government at an average rate of US$13.5 per ton throughout the country.
4. The establishment of a government/private joint investment project called the 'National Fertilizer Corporation' to produce and distribute fertilizers for agriculture.

Currently, the project is at its beginning stage to build up the production plant and necessary equipment.

Farm mechanization policy

The government sector has played a minimum role in promoting the use of farm technology. Especially in the case of farm mechanization, there is no direct government policy. Farm mechanization promotion forms only a small part of the government's general policy on agricultural development. However, in recent years, the Bank for Agriculture and Agricultural Co-operatives, the state bank, has initiated a soft loan programme for farmers. That is, farmers wishing to buy small tractors can apply for a soft loan. The loan repayment is made on an instalment basis with interest charged slightly lower than the rate charged by the private commercial banks. Other government incentives are less impressive. For example, out of 100 firms producing small tractors in 1979, about nineteen received technical assistance from related government agencies, only one factory obtained the investment privilege grant from the Board of Investment and four firms received loans from the Office of Small-Scale Industry Financing of the Ministry of Industry.

Agricultural research and extension policy

The government policy has shown initiative in the area of agricultural research, which has been given first priority in budget appropriation. For example, in 1980, the research budget in agriculture and irrigation was as high as 43.5 per cent of the total research budget which formed about 1.3 per cent of the total national budget. The support of agricultural research is aimed at improving farm productivity through better seed technology, breeding stock, greater use of other technical inputs such as fertilizers and better management of water resources. Under the current five-year plan of national economic and social development (1982–6) the policy of agricultural research and extension includes the following:

1. Increasing farm productivity through the development of water resources and more efficient use of land, water, and forest.
2. Restructuring the agricultural extension network to increase the farmers' knowledge and awareness of resource utilization, particularly water, fertilizers, improved seeds, pesticides, etc.
3. Accelerating crop rotation programmes and techniques to increase land-use efficiency.
4. Accelerating seed and seedling exchange programmes in rice, rubber and fruit trees.
5. Expanding the government's input procurement programme particularly for fertilizers. The target for fertilizer distribution is 30 per cent of total annual demand. This includes the campaign programme for the greater use of organic fertilizers.
6. Expanding the production and distribution of rice seed to the amount of 5,000 tons per year and bean seeds of 4,000 tons per year.
7. Expanding agricultural loans to farmers in support of a greater use of fertilizers, improved seeds and other related production inputs through: (a) increasing the loan ceiling of the Bank of Agriculture and Agricultural Co-operatives from the. existing level up to 4,000 million baht; and (b) reorganizing farmers' associations for greater access to credits and a more efficient input procurement system.
8. Increasing the role of the private sector in agriculture and rural development through: (a) opening up opportunities for private firms to undertake ventures in the production and distribution of high-yielding varieties of crops and livestock. The government will avoid the production of improved seeds where it is being actively pursued by the private sector, and (b) promoting the private sector to participate in the chemical fertilizer production of the country.

General rural development policy

The rural development policy under the current national development plan has been directed towards poverty eradication in the extremely poor areas. The development programmes and projects include: (a) village fisheries development projects targeted for the development of 375 new fish traps, 4,000 water sources, and production of 180 million fish, (b) village water source development projects to develop 368 new water ponds, sixty reservoirs, and the deepening of 164 water pools, (c) cattle/buffalo bank projects to acquire 22,400 head of cattle for the poor farmers in poverty areas to borrow or rent, and (d) community development projects including the establishment of 1,968 small water sources, 462 community rice banks and the provision of employment opportunities to 300 farmer groups.

All of the programmes and projects mentioned above are not geared to the direct promotion of new technology, but aimed at building up basic infrastructures and social services to meet the basic needs of villagers in the poverty areas in which agriculture is still at or below the subsistence level.

The impact of technology on the rural community

Change in the socio-economic structure of households

As mentioned above, the consequential impacts of technological change on the rural community vary with types of technology and the socio-economic structure of the particular community. In the real world, the impacts of technology are of a composite economic, social and political nature.

In general, technologies adopted in Thailand are largely found in rice farming in the irrigated areas where the multiple cropping system has been introduced. Most technology packages adopted include high-yielding varieties, fertilizer and pesticides, double cropping practice and farm mechanization. The economic consequences of these technologies are apparently in the form of increased yield, greater farm output, change in the structure of input use, and change in income and income distribution.

Thailand's experience in second rice cropping during 1975–85 well reflected the technological change in rice farming. The area under the second rice crop increased significantly from 377,600 hectares in 1976 to 704,000 hectares in 1985 while yield per hectare increased from 3,250 kilograms to 3,725 kilograms over the same period. The level of yield of the second rice crop is about two times higher than the yield of the first rice crop (Table 7.12). Certainly, the increase in area and production of the second rice crop has been made possible mainly by the expansion of the irrigated areas.

Changes in the structure of land tenure over the period 1976–84 are shown in Table 7.13. In general, both owned land and rented land areas increased slightly in most parts of the

Table 7.12 Planted area, yield, and the application of fertilizers in second rice farming in Thailand, 1976–85

Year	Area planted (thousand hectares)	Yield (kg/hectare)	Fertilizer use (1,000 tons)	Yield first rice (kg/hectare)
1976	377.6	3,250	82.53	1,762.5
1977	438.4	3,225	104.34	1,768.7
1978	476.8	3,444	128.63	1,487.5
1979	681.6	3,619	178.50	1,831.2
1980	336.0	3,537	100.94	1,756.2
1981	516.8	3,831	154.09	1,775.0
1982	572.8	3,550	169.45	1,843.7
1983	633.6	3,369	189.24	1.775.0
1984	769.6	3,694	204.12	1,906.2
1985	705.6	3,725	n.a.*	1,937.5

Source: Agricultural Statistics of Thailand, 1984–5.

Note: *n.a. not available.

Table 7.13 Agricultural land tenure of farm household by region in Thailand, 1976 and 1984 (unit: thousand hectares)

Tenuring status	Northeast	North	Central	South	Whole kingdom
1976					
Average farm size (hectares)	4.57	3.45	5.32	3.72	4.32
Own land	7,433.6	2,956.8	3,064.0	2,046.4	15,502.4
Rented land	364.8	716.8	1.430.4	84.8	2,595.2
Percentage of rented land to own land	4.9	24.2	46.0	4.1	16.9

Tenuring status	Northeast	North	Central	South	Whole kingdom
1984					
Average farm size (hectares)	4.38	3.57	5.21	3.61	4.22
Own land	7.83	3.44	3.32	2.13	16.72
Rented land	0.69	1.03	1.27	0.16	3.15
Percentage of rented land to owned land	8.82	30.01	38.19	7.57	18.85

Table 7.14 Proportion of agricultural households by type of land tenure in Thailand 1975–6

Community level/region	Farm operator		Farm workers	Total households
Owning land	Renting land			
1. Village community				
Northeast	70.2 (73.7)*	6.6 (6.5)	3.5 (5.6)	80.3 (85.8)
North	44.6	22.4	4.9	72.1
Central	37.5	22.7	9.7	69.9
South	42.0	13.2	6.7	61.9
Whole kingdom	53.0	15.0	5.6	73.6
2. Municipal community				
Northeast	2.0 (3.7)	0.2 (0.7)	0.7 (1.8)	2.9 (6.2)
North	3.2	2.5	1.1	6.8
Central	1.9	3.0	0.6	5.5
South	3.6	6.4	3.0	13.0
Whole kingdom	2.7	3.0	1.4	7.1
3. Bangkok metropolitan	3.9	6.1	n.a.+	10.3 (inc. farm workers)

Source: National Statistical Office; Socio-economic Survey, 1975–6 and 1970–80 (Northeast)

Notes: +n.a. not available
* Value in parentheses is 1970–80 data

country. The exception is in the Central region, where owned land areas increased while rented land decreased. The ratio of rented land to owned land was highest in the Central plain, lowest in the South. In the Northeast region, the ratio of rented land to owned land increased from 4.91 per cent in 1976 to 8.82 per cent in 1984.

In general, changes in farm size and structure of land tenure between 1976 and 1984 were not significant. It should be noted that although there exists a large proportion of rented lands in the Central region, the change in land tenure structure in the region suggests that there was no negative impact of new technology on landholding.

The classification of agricultural households by types of land tenure at both village and municipal community levels is shown in Table 7.14. Particular attention is given to the Northeastern region where the present research was carried out. The table indicates that the proportion of farm households to total households, at both village and community levels, in the Northeastern region increased considerably. Of the farm households, while the proportion of farm owner operators and farm workers increased that of land tenants decreased.

The increases in proportions of farm owner operators and farm workers to total farm households at the municipal community level were less than those at the village level. This implies that there had been a low population migration from village to town in the Northeast. At the same time, increased farm population still found an opportunity to own the land.

Changes in the structure of income distribution of selected socio-economic classes at the village and municipality levels in the Northeast are presented in Table 7.15. At the village level, farm operators earned the lowest per capita income per month, followed by the farm and general workers. Nevertheless the difference of incomes of these two groups was not substantial. In particular, the per capita income in 1979–80 of both farm operators and farm workers declined slightly from the 1975–76 level. However, this change is questionable.

Based on per capita income, farm operators and farm workers at the municipal level earned higher incomes than those at the rural village level. Especially, farm and general workers in town or municipality earned higher incomes than the farm operators due to better non-farm job opportunities. In addition, the income of most socio-economic classes in

Table 7.15 Average per capita income by selected socio-economic class and area, Thailand, 1975–6 (baht/month)

Community level/ region	Farm operators workers	Non-farm own-account workers	Farm and general households	Economically inactive	All households
1. Village community					
Northeast	188 (184)*	334 (257)	208 (167)	320 (302)	215 (206)
North	240	330	206	428	256
Central	367	514	287	529	381
South	204	421	261	260	279
2. Municipal community					
Northeast	301 (193)	577 (725)	294 (325)	640 (1,039)	555 (815)
North	680	943	305	799	774
Central	555	753	269	524	682
South	416	741	273	653	612
3. Bangkok metro politan+	388	679	340	707	605

Sources: National Statistics Office, Socio-economic Survey, 1975–6, and 1979–80 (Northeast).

Notes: * Value in parentheses is 1970–80 data.
+Including surrounding towns.

municipal areas, except the farm operators between 1975–6 and 1979–80, increased considerably. This implies that the structure of income distribution changed in favour of the population in town or municipality and of people who work off-farm and non-farm. These changes may or may not relate to technological change. However, if applicable, they reflect the positive rather than the negative income distribution effects of technology.

Change in institutional organization

The following discussion reflects specific case studies of particular areas or groups rather than a generalization of the whole system of rural institutions. In most cases, they are more of a sociological nature than economic. Again, most of the findings are drawn from the field of rice cultivation.

As far as rice cultivation is concerned, rice farmers have experienced the following social changes:

1. Exchange and hired labour relationship. In a traditional system, farmers are flexible in choosing the transplanting and harvesting time. Mutual labour exchange is commonly practised in the community. This kind of practice establishes a social relationship among villagers, i.e. the contracts between hosts and neighbours are purely social. With the introduction of new cultivation practices, such as double cropping in the irrigated areas, land intensity and time rigidity in planting and harvesting arise. Farmers then demand more labour on a hired basis. Mutual labour exchange tends to decline or disappear. Similarly, mechanization also affects labour demand. Farmers adopting tractors will switch their labour demand from hired workers to tractor owners. Mutual labour exchange is less important or impossible under such circumstances.

   The widespread use of farm tractors and expansion of double cropping in the irrigation areas, therefore, have converted the farm operator-worker relationship from traditional, social contracts to economic contracts.
2. Relationship between land owners and tenants. The impact of technology, particularly farm mechanization, is quite obvious in increasing labour productivity. This allows farmers to operate on a large area. Farmers who rented land to other farmers now do not wish to do so. In some cases, tenants may have to pay higher rent or become landless labourers. The tendency of these changes, although not yet strong, is likely to increase in the Central region and the North.

   On the other hand, there has been a tendency of land segmentation into ownership of small plots through inheritance in most of the communities with technological change in most of the country. This is due partly to the fact that the increased land productivity allows land size to be reduced at the same subsistence level of farming. Therefore, under these circumstances, technology leads to changes in the structure of land ownership.
3. Farmer institution/organization. Technology together with psychological changes leads to change in the farming system from subsistence to commercialized farms. This has induced institutional change among farmers as they gain access to market mechanisms. Small farmers are required to make formal contacts with extension officers, commercial banks and other relating agencies. In many cases, they are formed into groups or co-operatives in order to gain access to the government services and commercial loans from either the public or the private sector. In some cases, farmer groups are formed to control the utilization of public utilities, e.g. irrigation water, public warehouses, etc. The most obvious change under the commercialized farming system is that farmers have been more amenable to changes and have established more formal contacts with other groups and officials.
4. Labourer migration. In general, farmers find hired labourers in their own community. Only in cases of labour shortage, usually during the peak planting and harvesting seasons, hired labourers from nearby communities are required. Therefore, labourer migration between communities or regions occurs only temporarily or seasonally. Temporary migration of farm workers is not only for farm work but also for non-farm activities in towns or cities. Usually, in every planting and harvesting season for sugarcane and upland crops in the Central region, there is a large number of workers from the Northeast coming in for temporary employment.

Changes in value systems

In general, changes in value systems occur before and after the introduction of a particular technology. In a society of well-educated people, the attitudes are more attuned to change and the adaption process for technology takes a shorter period of time than otherwise. In a community which experiences the adoption of a new technology widely, the social value system is expected to change in favour of the positive impact of that particular technology.

The social system in Thailand since early days has been characterized by free private enterprise and an open market economy. The social value system has changed from a subsistence-orientated to a commercial-orientated agriculture, mainly rice, for some time. With a favourable increase in the foreign demand for rice and other farm commodities, the whole agricultural society has been diversified from rice alone to other upland crops such as maize, sugarcane and beans. The commercial-orientated value system and the introduced technological changes following the agricultural diversification became interactive. Most Thai people are well aware of the commercial production of farm commodities but are not good at marketing their products. The role of product marketing and trade, therefore, falls into the hands of the Chinese and Thai-Chinese ethnic groups. However, there is still the belief and norm which favours personal contact and respect for older persons. Some expectations and belief in gods or evil spirits which influence crop production and commercial business are still found in many parts of the country.

As far as technological change is concerned, however, the Thai agricultural system has ceased to believe in gods or evil spirits but to trust more in an efficient commercial system using new and modern science and technology. The only limitation to greater technological change is the limited income of the majority of the rural population. In general, income is found to be the most significant factor influencing the adoption of new technology. Production activities are viewed more economically than socially. This is the reason why social changes occur slowly in relation to economic changes. Even with such changes, however, some conservative attitudes and ignorance are still found in many parts of the country among ethnic groups, and the socio-economic strata.

In addition, strong social and religious activities are still conserved in most rural communities. Most rural households are quite active in cultural and religious activities. Traditionally, this kind of culture is inherited from generation to generation. The only obvious change in this is increased women's participation in social activities. This is due partly to the increasing farming intensity and non-farm work which has reduced the men's ability to participate.

To sum up, the value system in a community experiencing technological change tends to change significantly toward a more economic and commercial attitude while social value judgements tend to change from an informal to a more formal system such as group decision making, frequent contact with officials, and formal cultural and religious activities.

THE CASE STUDY

The basic characteristics of the area

The two villages, namely village no. 1 (mechanized village) and village no. 7 (non-mechanized village) are about 3 kilometres apart and 12 kilometres from the provincial capital. They are comparable in size—123 households in village no. 1 and 130 households in village no. 7. The farmers in both villages are very similar in terms of tradition, language and other social and cultural background. They are all Buddhist.

The two villages have different infrastructure and public service facilities. There are two public schools and two Buddhist temples in the mechanized village while there is only one of each in the non-mechanized village. A public health station, a private clinic, a tractor repair shop and a community market place are found only in the mechanized village (Table 7.16).

Farms in the mechanized village are mostly irrigated while those in the non-mechanized village are rainfed. Most households in the mechanized village used power tillers or tractors in farming and sixteen of them owned two-wheel power tillers. Only three households in the non-mechanized village owned power tillers which are mostly for their own use.

Table 7.17 shows the crop production areas and livestock raising in the two villages. Although they have similar types of land use and livestock, certain differences

Table 7.16 Community profile of mechanized and non-mechanized village, Muang district, Khon Kaen province, 1985

Item	Mechanized village	Non-mechanized village
Total population	660	772
Male	345	384
Female	315	388
Total household	123	130
Average family size (persons)	5	6
Number of households owning power tiller	16	3
Number of schools	2	1
Number of Buddhist temples	2	1
Number of public health service stations	1	(none)
Number of private medical clinics	1	(none)
Number of tractor-repairing shops	2	(none)
Community market place	(exists)	(does not exist)

can be observed. The two villages have a similar major crop rice—but different supplementary crops. The supplementary crops in the mechanized village are mostly vegetables and upland crops. They raise substantially less large domestic animals (buffalo and cattle) but more small ones (hog and poultry) than farmers in the non-mechanized village.

The sample

The family structure of both mechanized and non-mechanized farms is quite similar. The average family size in the mechanized village is five with a greater proportion of males over females. On the other hand, the average family size in the non-mechanized village is six with a

Table 7.17 Crop cultivation (in hectares) and livestock raising in mechanized and non-mechanized villages, Muang district, Khon Kaen province, 1985

Type of land use	Mechanized village	Non-mechanized village
Paddy fields	228.6	221.3
Upland crops	46.7	103.4
Horticulture	27.1	32.0

Type of land use	Mechanized village	Non-mechanized village
Public land	120.0	–
Buffalo	50	228
Cattle	78	117
Hogs	70	20
Poultry	3,000	2,100

greater proportion of females over males (Table 7.18). About four-fifths of family labour forces in the mechanized village and two-thirds of those in the non-mechanized village are actively engaged in farm activities.

On average, one out of four family labour forces in the mechanized village works off-farm on a part time basis, while two out of four members in the non-mechanized village get part time, off-farm jobs (see Table 7.18). In general, the family size and composition of farm households in both villages are comparable to the national average. Most families are of nuclear type. The extended families account for less than 10 per cent of total households.

The average farm sizes in the mechanized and non-mechanized villages are almost equal, i.e. 3.4 to 3.5 hectares. Because of topographical differences, land utilization in the two villages differs. More than 80 per cent of farm land in the mechanized village is devoted to rice, 13 per cent to fruits and vegetables and less than 10 per cent to upland crops. In the non-mechanized village, on the other hand, about 65 per cent of farm land is used for rice cultivation, 32 per cent for upland crops and less than 5 per cent for fruits and vegetables (Table 7.18).

Livestock raising in the two villages also reflects their

Table 7.18 Socio-economic characteristics of farm households in mechanized and non-mechanized villages, Muang district, Kohn Kaen province, 1985

Item	Mechanized village	Non-mechanized village
Average family size	5	6
Male	3	3
Female	2	3
Family labour forces	4	4
Number of children in school	1	2
Average farm size (hectare)	3.58	3.35
Rice	2.89	2.19
Upland crops	0.22	1.09
Fruits and vegetables	0.47	0.07
Livestock farming (heads)		
Cattle	1	1
Buffalo	1	4
Poultry	26	11
Cash income (baht)	39,988	12,064
Farm	17,680	8,892
Non-farm	22,308	3,172

farming technology. As shown in Table 7.19, the dominant livestock raised in the mechanized village is poultry. In the non-mechanized village, on the other hand, cattle and buffalo are raised mainly for draught power in land cultivation, whilst small animals, particularly poultry, are raised for commercial purposes—41.66 per cent of total animals raised. It is noted that for small farmers in the mechanized village, animals raised (both large and small) are mainly for sale—65.79 per cent of total production. In contrast small animals raised in small farms in the non-mechanized village are for family consumption while the large animals are for labour use. The primary reason is that small farmers in this village earn very low incomes. To meet subsistence costs, they have to raise animals for their own consumption and for farm labour use.

Over 84 per cent of total households owned land (Table 7.20)

Table 7.19 Percentage distribution of number of livestock raised for different households in mechanized and non-mechanized villages, Muang district, Khon Kaen province, 1985

	Mechanized village			Non-mechanized village		
Item/purpose	Small	Medium	Large	Small	Medium	Large
Large animals (cattle and buffalo)						
Sale	79	85	99	42	35	43
Home consumption	7	–	–	6	9	6
Draught power	14	15	1	52	56	51
Total	100	100	100	100	100	100
Small animals (hog and poultry)						
Sale	65	27	52	41	66	57
Home consumption	35	73	48	59	34	43
Total	100	100	100	100	100	100

Table 7.20 Land tenure of sample households in mechanized and non-mechanized villages. Muang district, Khon Kaen province, 1985

Farm size	Tenuring status by no. household (%)			Tenuring status by land area (%)		
Owned	Rent	Total	Owned	Rent	Total	
Mechanized village						
Small	94.74	5.26	100	99.86	0.14	100
Medium	94.44	5.56	100	96.23	3.77	100
Large	100.00	–	100	100.00	–	100
Non-mechanized village						
Small	84.62	15.38	100	90.91	9.09	100
Medium	84.21	15.79	100	19.08	8.92	100
Large	88.89	11.11	100	98.59	1.41	100

Table 7.21 Age and education level of household head and number of family labour forces in mechanized and non-mechanized villages, Muang district, Khon Kaen province, 1985

	Household head			Number of labour forces		
Farm size (hectare)	No. of sample	Age	Education	Family size	Farm	Part-time off-farm
Mechanized village						

	Household head			Number of labour forces		
Farm size (hectare)	No. of sample	Age	Education	Family size	Farm	Part-time off-farm
Small (less than 2.4)	19	43	Grade 4	5	3	2
Medium (2.5–5.6)	19	46	Grade 4	5	4	1
Large (more than 5.6)	9	53	Grade 4	6	5	1
Overall	46	47	Grade 4	5	4	1
Non-mechanized village						
Small (less than 2.4)	13	51	Grade 3	5	4	1
Medium (2.5–5.6)	19	46	Grade 4	7	4	2
Large (more than 5.6)	9	51	Grade 4	6	5	2
Overall average	41	50	Grade 4	6	4	2

with an average farm size of 1.6 hectares for small farms, 3.5 hectares for medium and 8.4 hectares for large farms respectively. In addition, there was a smaller percentage of land tenants in the mechanized village than the non-mechanized village. In terms of area, over 91 per cent of total land area in both villages is owned by farmers. The rented land accounted for less than 9 per cent. It is noticed that small and medium farms in the non-mechanized village have a higher percentage of land rent than the large farms. This indicates that the existing owned land is not adequate to expand farm production. In general, however, both mechanized and non-mechanized communities do not have a serious problem with land tenure. The concept of land to tiller is still valid in the areas.

As shown in Table 7.21, the average age of the household head in the mechanized village is around forty-seven compared to fifty-one years of age for the household head in the non-mechanized village. This indicates that farmers in the mechanized village are generally younger than those in the non-mechanized village. In particular, the difference in average age among the family heads in both villages is more significant for small farm size, i.e. forty-three against fifty-one years old. This suggests that small farmers in the mechanized village are mainly young farmers and that the adoption of technology, which is associated with risk, is more acceptable to younger farmers than the older farmers. For medium and large farmers the average age of the household head is about the same in both villages.

The education of villagers in both communities shows some differences in structure, although the household heads do not show much deviation in the education level. Table 7.22 shows the percentage distribution by education level of the family members among different farm sizes. It indicates that in all cases, household members in the mechanized village are better educated than those in the non-mechanized village. While the percentages of family members at pre-school age are similar, family members at primary school level in the mechanized village are much lower than those of the non-mechanized village. However, between 10–25 per cent of family members in the mechanized village are enrolled in the secondary and vocational schools. In the non-mechanized village, on the other hand, children enrolled in post-primary school education consisted of less than 1 per cent. The mechanized village also has a smaller percentage of illiterates than the

Table 7.22 Percentage distribution of family members by level of education in mechanized and non-mechanized villages, Muang district, Khon Kaen province, 1985

		Mechanized village/ farm size				Non-mechanized village/ farm size level		
Education level	Overall	Small	Medium	Large	Overall	Small	Medium	Large
Pre-school	15.72	19.33	18.27	11.45	15.31	10.73	16.46	17.53
Primary school	59.51	70.00	63.45	49.90	80.80	87.01	77.88	82.47
Secondary school	16.74	10.67	11.17	24.95	0.37	–	0.91	–
Vocational school	7.52	–	5.59	13.70	0.37	–	0.91	–
Illiterate	0.51	–	1.52	–	2.15	2.26	3.85	–
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table 7.23 Asset values of sample households in mechanized and non-mechanized villages, Muang district, Khon Kaen province, 1985 (unit: baht/household)

Farm size	Total assets*	Tractor/power tiller	Other farm tools/ machines
Mechanized village			
Small	74,490 (100)+	2,444 (3.51)	16.328 (23.37)
Medium	124,306 (100)	12,506 (10.06)	51,064 (40.09)
Large	101,244 (100)	15,730 (15.53)	7,202 (7.12)
Non-mechanized village			
Small	17,134 (100)	–	82 (1.11)
Medium	33,800 (100)	–	2,262 (6.69)
Large	44,434 (100)	–	156 (0.37)

Notes:* Excluding values of crops and livestocks produced.
+Value in parentheses is percentage of total assets.

Table 7.24 Average annual cash income of farm households in mechanized and non-mechanized villages, Muang district, Khon Kaen province, 1985 (unit: baht)

	Farm size (mechanized village)			Farm size (non-mechanized village)		
Source of income	Small	Medium	Large	Small	Medium	Large
Farm	5,525 (26.06)	19,194 (16.72)	43,418 (47.95)	4,321 (47.54)	7,370 (71.36)	18,769 (79.63)
Non-farm	15,674 (73.94)	31,369 (61.71)	28,574 (39.69)	4,769 (52.46)	2,958 (28.64)	4,800 (20.37)
Total	21,199 (100)	50,833 (100)	71,992 (100)	9,090 (100)	10,328 (100)	23,569 (100)

Source of income	Farm size (mechanized village)			Farm size (non-mechanized village)		
	Small	Medium	Large	Small	Medium	Large

Note: Non-farm income includes income from sources other than farm and off-farm activities. The more important among these include income from wage earnings from working in town, handicraft, trading activities and transfer payments.

non-mechanized village—1.52 per cent compared to 2.26 per cent. The above findings indicate that there is substantial change in the social attitudes of villagers in the mechanized village towards higher education. Meanwhile, in the non-mechanized village which is characterized by older farmers, the education level of most family members is still limited to the primary level.

The sources of wealth of a rural farm family in the studied areas are land and asset endowment. Size and distribution of holdings have been discussed. In the case of asset endowment, data on household assets presented in Table 7.23 suggest a substantial difference in factor endowment and the investment picture of farm households in the two villages. For example, the small farm household in the mechanized village owns total assets of about 25,000 bant higher than the large farm household in the non-mechanized village. Similarly, the medium and large farms in the mechanized village own capitalized assets worth two to three times more than those in the non-mechanized village. Overall, it appears that, in most cases, the larger the farm size, the higher the value of owned assets. The exception is the medium farm household in the mechanized village which owns the largest assets. Thus, the farmers of medium farm size are wealthier than those of other farm categories.

Again, as shown in Table 7.23, the average value of farm production assets in the mechanized village constitutes up to 23–60 per cent of total household asset value compared to 1–6 per cent in the non-mechanized village. Although the important technology adopted in the mechanized village is the power tiller, a major part of investment in agriculture in the mechanized village goes to farm tools and machinery.

In sum, many sources of wealth in the mechanized village are land and housing facilities, irrigation facilities and investment on farm machineries, while sources of wealth in the non-mechanized village are limited to land and housing facilities only.

On average, the cash income of farm households in the two villages differs significantly. As shown in Table 7.24 farmers of all farm sizes in the mechanized village earned two to five times more than those in the non-mechanized village. In particular, the large mechanized farm households earned, on average, the largest income of all, i.e. 72,000 baht per household per year while a small non-mechanized farm household earned the lowest, 9,090 baht per year.

With the exception of large-size farms, non-farm income has been the major source of the household's income in the mechanized village. The reverse is true for the case of the non-mechanized village. Moreover, the smaller the farm size, the greater the household's dependency on non-farm income. This holds true for households in both villages (Table 7.24).

As expected, farm incomes of mechanized households, particularly those with medium and large farm sizes, are much higher than those of the respective non-mechanized farm households. The average farm income of a small mechanized household is higher than that of a small non-mechanized household. This is due largely to the differences in land productivity, types of crops planted and economies of scale in land use. In addition, a mechanized farm household earns not only higher farm income than the non-mechanized farm, but also higher non-farm income as well. As shown in Table 7.24, non-farm income of the mechanized farm household is about three to ten times higher than that of the non-mechanized farm. This is due to several

reasons, both social and economic. Farmers in a relatively high cropping intensity area are more commercially oriented than those in lower crop intensity. Moreover, a higher capital intensive farm requires less labour, allowing more time for farmers to engage in other activities. In addition, technological change in agriculture induced indirect effects by generating expansion in other related activities such as repair shops, transportation, trade and services, etc. Such an expansion offers better opportunities for households in the mechanized village than those in the non-mechanized village.

With much higher income, the living standard of mechanized households is quite different from that of non-mechanized households. As shown in Table 7.25, the consumption expenditure on most items of the mechanized farm households is much higher than that of the non-mechanized farm households of respective farm sizes. That is, the consumption expenditure of a mechanized farm household is about 1.6 to 2 times higher than that of non-mechanized households. The expenditure on non-subsistence goods of households in the two communities also differs significantly. In both villages, farmers with larger farm size tend to spend a higher proportion of their income on social activities. It is also observed that farm houses in the mechanized village are either renovated or recently rebuilt in modern style and the size of the house in general is larger than that of the non-mechanized farm household. Modern electrical appliances such as refrigerators, colour televisions and radios are also found in many cases in the mechanized village. Moreover, most households own bicycles and motor-cycles while many of them own a car or pick-up truck. In contrast, houses in the non-mechanized village are built in traditional style, and old, except for a few families that are relatively better off. Refrigerators and televisions are found only among a few, wealthy families. Bicycles are common transportation means in the non-mechanized village.

Changes in family relationships

Traditionally, the head (usually the husband) of a rural farm household takes the main responsibility for farm and heavy household work. The wife is responsible for house-keeping, washing, cooking and child care. However, she also assists her husband on farm work occasionally. Children in the rural community are expected to contribute their labour on farm work when they grow up and finish their schooling. While being of school age, children also serve as assistants to the parents in animal care and light household work. Because children are expected to be a major source of the family labour force, most of them are kept on the farm and have limited opportunities for higher education.

On the other hand, in the modernized rural community where farm mechanization is adopted, the role of children shifts from being the main source of family labour to other light farm and household work. With a relatively small role in farming together with better household income, children have a greater opportunity to have higher education. This is supported by the fact that members of households in the mechanized village in general have obtained higher schooling than those in the non-mechanized village (Table 7.22).

Changes in family relationships are also obvious in the cases of decision making on farming and family members' participation in farm work and social activities. In general, the decision maker on farming in the individual household in both mechanized and non-mechanized villages is still the family head or husband. Surprisingly, the decision making

Table 7.25 Average annual expenditures of farm households in mechanized and non-mechanized villages, Muang district, Khon Kaen province, 1985 (unit: baht)

	Farm size (mechanized)			Farm size (non-mechanized)		
Item	Small	Medium	Large	Small	Medium	Large
Farm production	6.994 (37.16)	12,870 (38.45)	18,850 (42.59)	8,216 (59.81)	12,818 (52.67)	10,712 (37.16)
Family consumption	7,696 (40.91)	11,700 (34.99)	16,432 (37.11)	4,108 (30.01)	5,642 (23.21)	10,244 (35.57)
Expenditure on non-subsistence goods	2,236	832	3,302	78	312	364
Purchase of non-farm inputs for family manufacturing	312 (0.22)	–	442 (0.99)	130 (0.95)	130	234 (0.85)
Social activities	1,846 (9.80)	8,060 (24.07)	5,226 (11.83)	1,196 (8.63)	5,434 (22.29)	7.254 (25.15)
Total	18,850 (100)	33,462 (100)	44,259 (100)	13,728 (100)	24,336 (100)	28,834 (100)

Note: Value in parentheses is percentage of total expenditures.

Table 7.26 Percentage distribution of decision makers in rice farming and the adoption of farm tractor fertilizers of farm households in mechanized and non-mechanized villages, Muang district, Khon Kaen province, 1985

	Rice farming			Adoption of farm tractor		
Decision maker	Small	Medium	Large	Small	Medium	Large
Mechanized village						
Husband	52.63	66.67	66.67	57.89	72.22	66.67
Wife	10.53	5.56	11.11	10.53	5.56	
Son/daughter	–	–	–	–	11.11	–
Son-in-law	–	–	11.11	–	–	11.11
Family's joint decision	36.84	27.77	11.11	31.58	22.22	11.11
Total	100.00	100.00	100.00	100.00	100.00	100.00
Non-mechanized village						
Husband	53.86	57.10	88.89	53.86	63.16	88.89
Wife	7.69	5.26	–	7.69	15.79	–
Son/daughter	7.67	–	–	7.69	–	–
Son-in-law	15.38	36.84	11.11	7.69	–	–
Family's joint decision	15.38	–	–	23.07	21.05	11.11
Total	100.00	100.00	100.00	100.00	100.00	100.00

Table 7.27 Average age of household head and farm decision makers in mechanized and non-mechanized villages. Muang district. Khon Kaen province, 1985

	Mechanized village		Non-mechanized village	
Farm size	Family head	Decision maker	Family head	Decision maker
Small	43.00	40.53	53.39	40.39
Medium	45.83	40.89	45.95	42.63

	Mechanized village		Non-mechanized village	
Farm size	Family head	Decision maker	Family head	Decision maker
Large	53.30	56.00	51.00	51.00

for small, non-mechanized farm households seems to be more diversified. That is, the son or daughter and the son-in-law have a role in decision making, to a certain extent, on both rice farming and the use of fertilizers. However, for medium and large-size farms, the decision making is still limited mostly to the husband, i.e. 57–89 per cent of total farm households (Table 7.26).

The son-in-law is accepted as the second person next to the family head in making decisions on farming and adopting new technology in both the mechanized and non-mechanized villages.

The most interesting change in both the case of mechanized and non-mechanized farms is the liberalization of the decision making towards joint decisions among members of the family. In particular, in the mechanized village, the family's joint decision making exists in both rice farming and the adoption of new technology. These imply that farmers who are the family heads in the modernized community have liberalized their attitudes and role in decision making by increasing their acceptance of the role and opinion of other members in the family, particularly those of the younger generation who are better educated and have stronger aspirations. Such a tendency of change is quite strong in the case of small farms in which the family head has to travel temporarily for part-time off-farm jobs and thus must let his wife or son take care of farm and family.

Similarly, this kind of change in the family relationship is observed in the case of technology adoption in the non-mechanized village where technology is new to the older generation in the family and community. The role of the younger generation therefore in accepting change has been gradually recognized by the older generation in the community. The information in Table 7.27 has confirmed such a change. That is, by comparing the age of the family head with the age of the decision maker, which is the family head himself in most cases, it appears that, on average, the decision makers in both the mechanized and non-mechanized farm households are younger than the family heads. The exception is the large farm group in the non-mechanized village in which the family head and the farm decision-maker are still the same person.

Table 7.28 Reported changes in social role of family heads in mechanized and non-mechanized villages, Muang district, Khon Kaen province, 1985

Farmer's social role	Reported changes*			
	Mechanized village		Non-mechanized village	
	Increased %	No change %	Increased %	No change %
1. Farm leadership	12.24	87.76	5.88	94.12
2. Recognition and social status in the community	22.24	78.00	17.65	82.35
3. Official recognition	1.47	98.55	23.53	76.47
4. Expenditures on social activities	40.82	58.18	37.50	62.50

Note: *As percentage of total household heads being interviewed in each village.

Changes in family/community relationships

As mentioned earlier, the government of Thailand does not directly involve itself to support farm mechanization. The agency directly involved in promoting mechanization among farmers is the Bank of Agriculture and Agricultural Co-operatives, a government-owned bank. In co-operation with the private sector, the Bank provides loans to farmers to invest in agricultural machines. The role of the government is only to provide agricultural extension services regarding the use and maintenance of tractors to the farmers in general.

It is difficult to argue that the adoption of mechanization alone has induced changes in the family/com m unity relationship. There is still a major proportion of villagers— 88.94 per cent—who believe that their role and status in farm leadership have not changed over the last five years. Only about 12 per cent of farmers reported an increase in their leadership. The farmer's social recognition in the community has not changed much and only around 18–22 per cent of farmers reported any change (Table 7.28).

The percentage of farmers reporting an increase in official recognition by government authorities is much greater in the non-mechanized village than in the mechanized one. This is due to the fact that the non-mechanized village is classified as a poverty area characterized by small farmers who in the past did not have much access to the government service programmes. Since 1984 the Department of Agricultural Extension has initiated the Small Farmers Development Project in the village together with the rural development programme carried out by local government. Most farmers in the village have gained recognition from officials.

Based on the field survey, however, it is found that people's participation in the community is rather active in the mechanized village. All households in the village have been organized to contribute, on a voluntary basis, to the cost of construction of the public drinking water project initiated by the local government. Many rural organizations have been established, such as the young farmers group, the housewife group, the farmers and co-operatives group, and the village medical co-operatives group. Similar rural organizations are established in the non-mechanized village but the level of farmers' participation is still lower than that in the mechanized village. Moreover, the percentage of

Table 7.29 Percentage distribution of group participation of family head and/or family members of farm households in mechanized and non-mechanized villages. Muang district. Khon Kaen province. 1985

	Number of groups participated				
Village and farm size	No group participation	One group	Two groups	Three groups	Four groups
Mechanized village	42.11	36.84	21.05	–	–
Small	42.11	36.84	21.05	–	–
Medium	16.67	66.67	11.11	5.55	–
Non-mechanized village					
Small	69.23	36.77	–	–	–
Medium	42.10	47.37	10.53	–	–
Large	22.22	55.56	22.22	–	–

Note: Social groups include the agricultural and nutrition group, the village governing group, educational group, and religious group. One family member can join more than one group depending on his or her interest and role in the village.

villagers who are not interested in community group participation is higher than that in the mechanized village (Table 7.29).

In general, it may be concluded that there is some change in the family/community relationship in the modernized community compared to the traditional community. Such a change, although being at a low level, is partly attributable to the adoption of new technology—the irrigation, farm mechanization, and government rural development programme aimed at developing small-holding farmers in that particular area.

Changes in expectations

Farmers' opinions relating to expected changes in their village are summarized in Table 7.30. In general, most farmers in both mechanized and non-mechanized villages do not expect much change in their own society. The farmers' expectations of an increasing role for technology in their farming, however, is relatively high in both villages. Expectations of an increase in social services and education levels in both communities are still low. This indicates that most farmers do not foresee or expect much change in the role of the government in the community's social services and education. On the other hand, a high percentage of farmers in a mechanized village have a strong expectation of the expansion of the public utilities, as most farmers are aware that their community is becoming a leading community in the overall subdistrict development.

It appears that farmers in the non-mechanized village have a greater prospect of increase in demand for new technologies such as farm tractors, fertilizers and new varieties. Their demand for non-subsistence goods such as electrical appliances, transportation and community utilities is relatively lower than that of farmers in the mechanized village (Table 7.31). This suggests that farmers in the non-mechanized village who are relatively poorer than those in the mechanized village place their primary demand on an improvement in their farming prospects and income rather than in their social needs. On the other hand, farmers in the mechanized village who enjoy a higher income demand more luxury goods and facilities.

Table 7.30 Expected changes viewed by farmers in mechanized and non-mechanized villages, Muang district, Khon Kaen province, 1985 (as percentage of total farmers interviewed)

Item	Expected change		
	Increase	Decrease	No change
Mechanized village			
1. General farm production	10	2	88
2. Role of tractor in farming	76	–	24
3. Role of other technologies in farming	47	–	53
4. General farm income	63	–	37
5. Social services	24	10	66
6. Education level	27	–	73
7. Public utilities (roads, electricity, water)	83	–	27
Non-mechanized village			
1. General farm production	6	–	94
2. Role of tractor in farming	–	–	–
3. Role of other technologies in farming	76	–	24

Item		Expected change		
		Increase	Decrease	No change
4.	General farm income	71	18	11
5.	Social services	18	6	76
6.	Education level	40	–	60
7.	Public utilities (roads, electricity, water)	36	–	74

Table 7.31 Prospects of changes in farmers' demands in mechanized and non-mechanized villages, Muang district, Khon Kaen province, 1985

Type of demand	Prospects of change*			
	Mechanized village		Non-mechanized village	
	Increase	No change	Increase	No change
Tractor/power	79	51	76	24
Fertilizers and pesticides	47	53	76	24
New seeds	63	37	75	25
New breeding stock	44	56	62	38
Electrical appliances	73	27	69	31
Transportation equipment	75	25	69	31
Community roads, water, electricity	73	27	64	36

Note: *As percentage of total farmers interviewed.

Changes in mobility

Changes in family mobility in both mechanized and non-mechanized villages are not significant as the majority of villagers remain in agriculture. Family migration is also insignificant despite an increase in off-farm and non-farm job opportunities in towns. The reason is that the two communities are not far away from the provincial town or industrial bases in the province and part-time farmers could travel to work off-farm on a daily basis.

However, social mobility activities have increased as more and more government projects and programmes are implemented. In particular, social organization activities such as an informal seminar group of farmers, health services group training, village boy scout activities, etc. are also gaining popularity among villagers. All of those social activities and mobilities are fully initiated and organized by the local government authority concerned.

Changes in the economic base of the family

The experience of the farm families in the mechanized village suggests that the adoption of new technology, particularly the farm tractor with the support of irrigation, has resulted in an increase in both farm and non-farm income. In particular, non-farm income constituted about 74 per cent of total income for small farm households and 40 per cent for owners of large farms. With a higher income, the household's expenditure also increases. The large farm family spent, on average, 44,259 baht per year, being one and a

half times higher than the expenditure of the small farm family. In general, a farm family in the mechanized village earned an average net cash income of about 15,810 baht per year. This is a sizeable net income, and allows for annual savings (see Tables 7.24 and 7.25).

Farm families in the non-mechanized village, on the other hand, earned substantially less income than those in the mechanized village. The increased family income, however, is still below the increased expenditure for all farm sizes. The averge annual expenditure is 22,300 baht per household while cash income earned is only 14,329 baht per household. The balance is covered by loans.

Some changes in the lifestyle of villagers in the mechanized village can be observed. With higher income, people tend to spend more on non-subsistence goods and activities such as refrigerators, colour televisions, and shopping in nearby towns.

There is one restaurant in the mechanized village offering a variety of fashionable food, and music and entertainment. A private medical clinic also provides a health service on a daily basis for the community. These kinds of change in life style have followed what is taking place in towns.

In addition, an emphasis only on a particular technology such as the farm tractor does not seem to be adequate to assess all the economic and social changes induced by the adoption of mechanized tillage. The most appropriate way to cope with this problem is to study the impact of the whole technology package adopted in the community located in different socio-economic environments. For this reason most previous research work limited the scope of analysis only to the farm level and related only to the economic impacts of a particular technology. It is very hard to find research which is concerned with the problems in a broader sense—e.g. at community and national levels.

In the case of Thailand, an improved communication system has provided a closer linkage among communities, regions and socio-economic strata. The adoption of new technology in one community is also influenced, therefore, by the experience of other communities. Under this circumstance, the adoption of a particular technology is not necessarily location specific, and the macro-viewed research approach is more appropriate than the micro-viewed research.

SPECIAL PROBLEMS AND ISSUES

Technological change versus social change

In general, the conclusion of cause and effect between technological change and social change is not yet definite. The result of the Thailand case study suggests that social change induced technological change. The historical background of technological change in Thailand, however, indicates that in the early years rice farming in Thailand was purely subsistence. The introduction of tractors by the Thai government in 1919 changed farmers' attitudes towards more efficient, commercialized farming. This is likely to be the first step of cultural change induced by new technology. Later on, the technological change and social change have become a mixed rather than a cause and effect process, as the adoption of technology widely spreads.

At the present time, the process of technical and social change, one way or another, differs from area to area and from region to region. In others, particularly the remote areas, social change is still technically induced. In this case study, it is quite obvious that certain social changes induced by commercially oriented farming have enhanced the adoption rate of new technology. In other words, it is likely that social change has induced technological change in the area, both mechanized and non-mechanized. The only limitation for non-adopters of mechanization in rice farming in the non-mechanized village is the new availability of the irrigation technology and a low purchasing power or income of the farm household.

On the other hand, a factor which speeds up the adoption rate of farm tractors in the mechanized village is the availability of irrigation and change in cultivation practices. For instance, the extensive fast growing grass and weeds in rice fields due to favourable irrigation water have become an obstacle in land ploughing using water buffalo. This is because the land under increased grass and weeds requires stronger tilling power than that of buffalo within the required planting period. Using tractors or power tillers has solved this problem.

In conclusion, the rural communities in this case study have experienced technological change in rice farming through both social change and the government investment in technology such as irrigation and new seed varieties. This has been followed by multiple cropping in rice and vegetables while more farmers can find more time for off-farm and non-farm jobs both in the community and in the provincial town.

The economic impact versus the social impact of technology

The essence of technological improvement is change— change directly related to economic growth. This process is seen to result in a continuous instability of subsistence or disadvantaged farmers since they have to struggle to stay in agriculture or make a living elsewhere.

In the Thailand case study, it appears that participating farmers are concerned more with the economic impact of technology, particularly farm mechanization. Farmers who have not yet adopted the farm tractor also envisage its positive impact on their farm income in the future. With the existing socio-economic structure, it is most likely that rural villages are more aware of the economic impact of technology rather than its social impact. This has been the case of commercially oriented agriculture in which farmers are more concerned with their economic rather than social status. In the Thai social system, in general, people with good economic status usually gain wider social recognition.

The distribution issue of the impact of technology

The issue of the distribution of the benefits among recipients of technology has been of major concern in many countries. It has been argued that the distribution of benefits from technological change is uneven both within agriculture and between agriculture and the rest of the society. As far as the Thailand case study is concerned, such a problem is less serious, due to many reasons. First, the labour surplus in the farm sector is likely to move into the non-farm sector in town or city either with or without the adoption of farm technology. This results in a higher family income in the rural community as has happened in both the mechanized and non-mechanized villages. Secondly, the rate of increase in farm size and rented land in the Northeast is still low; the problem of landless farmers is thus not critical. Overall, the findings of the Thailand case study do not suggest any serious uneven distribution of the benefits of irrigation and mechanization technology among adopters. On the other hand, the uneven distribution of the benefits is quite critical between the groups that have an access to technology and those that do not. Given this equity problem, one still cannot definitely conclude that technological improvement will lead to better distribution of gains. Because of the limitation by their nature of technology, socio-economic and geographical constraints, and different social as well as political environments, technological change does not always bring about positive distribution of benefits or income.

The findings of previous research, however, have indicated that the introduction of irrigation, and modern technologies associated with it, has resulted in an increase in land productivity and cropping intensity. This technological change has generated a positive income distribution effect among large and small farmers and landless labourers. (4) Another study also cited the same conclusions. (5) That is, farm mechanization

affects farm employment structures by allowing farmers to spend more time on off-farm and non-farm work. The tractor, however, is likely to affect only the family labour structure not the hired labour and hence leads to insignificant changes in income inequalities.

Government and its political role in technological change

In the Northeastern region of Thailand, the climatic and geographical condition in general is not favourable to increased cropping intensity. The more critical problems in agriculture are water shortage, periodical drought and widespread plant diseases. The most crucial need of farmers is thus water before the adoption of tractors, fertilizers and pesticides becomes possible. The government's role in the construction of irrigation dams and water supplies is the key strategy to expand farm output and income in the region.

Similarly, in the studied site of Khon Kaen province, the increase in the adoption of farm technology and a better living standard for most farm families is heavily dependent on the available irrigation technology. Therefore, the role of the government in initiating and developing basic infrastructures, particularly roads and irrigation, is critical for the viable use of new technology for the rural poor.

CONCLUSIONS AND IMPLICATIONS

Conclusions

Based on the findings of the case study, the following conclusions are drawn:

1. New technologies, particularly irrigation and farm mechanization, have contributed to the intensive use of human labour, increased crop intensity and land productivity and hence enhanced a rapid expansion of total farm output.
2. Technology has been found to generate a positive income distribution effect among farm operators, large and small, and landless labourers.
3. At the beginning technological change induced social change. Then, at later stages of widespread adoption, both technical and sociological change became interactive.
4. The social impacts of new technology are positive in relation to the distribution of economic bases and sources of wealth of farm families in general and of technology adopters in particular. In addition, the effect of technology is also distributed to related sectors such as the tractor manufacturing and repair and maintenance services.
5. Associated with technological change, the community's socio-economic environment has improved and the family lifestyle as well as consumption behaviour changed to that of modern society. Technological change also increased the role and formal participation of farmers in the community. The role of women and the younger generation in farm operations has been increasingly recognized.
6. Limitations on technology adoption are not due to the farmers' conservative attitude but to constraints on the natural environment (unfavourable geographical conditions) and the low economic bases of the farm families.

Implications of the findings

Implications for the family

From the case study, it appears that the success in technology adoption by a farm household would provide the following changes in the family: (a) a greater liberalization of the decision making on farming from the older family head to young and progressive children; (b) good training and education of the young farm operators in agriculture and related technologies; and (c) an increase in the family income. New technology not only exerts an immediate impact on land productivity and farm income but also helps a farm family to earn more income from off-farm employment. This also helps farmers to be less dependent on agriculture in upgrading their living conditions. For those who are not yet the adopters of new technology, access to the government services in basic infrastructure, particularly irrigation and farm credits, is a prerequisite for their participation.

Implications for the community

A community experiencing technological change provides some lessons as well as implications in the following areas: (a) once technological change takes place in the community, the socio-economic environment changes towards modern society and its life style, (b) the changed family-community relationship in a modernized community, although not so strong, requires more formal and active rural institutions and organizations to link people's participation or group decision making either among villagers or between villagers and officials. This allows the community to gain greater access to the government services, credit and marketing facilities, and other public utilities, all of which facilitate a more rapid technological change and community development.

Policy implications for the government

The lesson learned from the present case study is that technology has proved to be an appropriate means for rural development. Experiences also suggest that the government investment in basic infrastructures such as rural roads and irrigation facilities has enhanced technological change in agriculture and hence rural development. To promote further technology adoption in rural areas, the key strategy to be followed is the government's initial investment in the basic infrastructure, particularly roads and irrigation facilities. Other strategies include land reform, improved marketing facilities, access to credit for the poor, and the expansion of health facilities.

In addition, the existing problems of income inequality between users and non-users of technology and a serious rural poverty still require additional government intervention aimed at reducing such problems. In this case, technological change is needed to generate economic surplus which together with appropriate government policies and institutional changes would help to achieve such a goal. Although the role of the private sector in initiating technological change is gaining more recognition the existence of the government programmes will tend to reinforce such potential development.

Areas for further research

There are still two areas of technological change which are not covered by this case study and other previous research. They are: (1) an assessment of the impact of technological change beyond the farm level

to reflect the influence of technological change on the social and political factors at regional, national, and possibly the international level. The rationale for this is that the economy of Thailand is an open economy. The economic and social changes at all levels of economic activities are integrated. To understand the whole system of technological change, macro-viewed research is needed; (2) recently the role of the private sector in the development and transfer of agricultural technology has been gaining importance. The Thai government also pledges its support to the private sector on this issue by not competing with the private sector in some areas of technological change. It seems important to examine whether the impacts of technological change induced by the private sector are appropriate and desirable with respect to the growth and equity goals of Thai society.

NOTES

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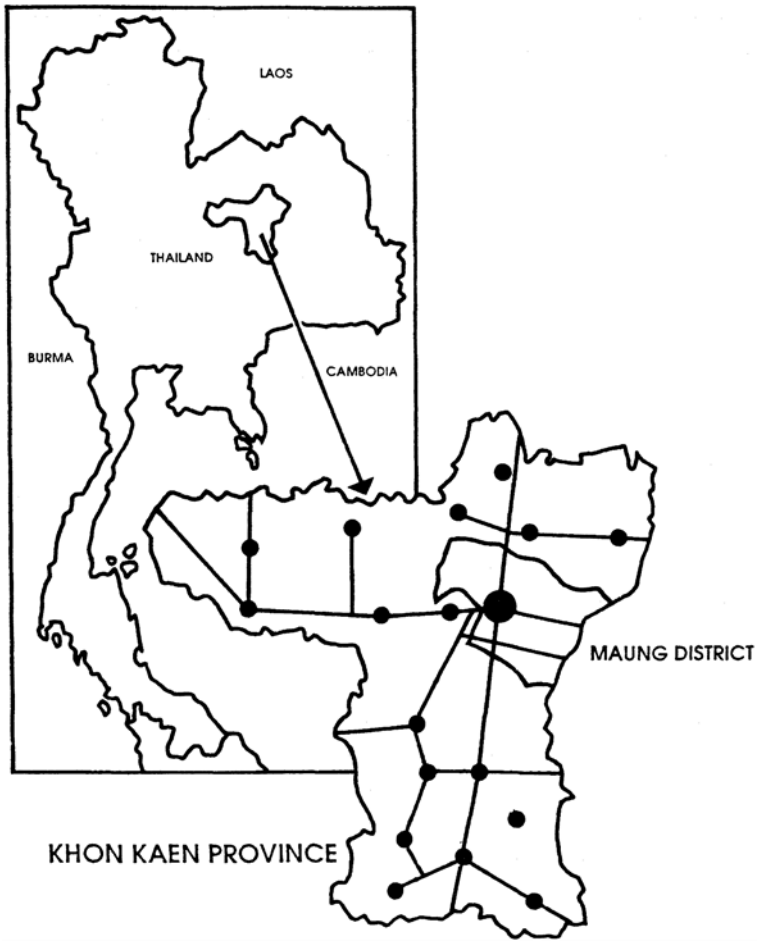
Map 7.1 Khon Kaen province



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Chapter Eight
CONCLUSIONS AND IMPLICATIONS

M.J.Campbell

The findings of this research into the social impact of technology in rural development can be viewed at two levels. Firstly the country studies individually provide useful results for national and sub-national policy as the results will have a direct bearing upon perceived needs and priorities of the rural communities examined. They illuminate an area of study which has been neglected within the region as a whole, although individual research efforts may have been made in some of the countries. They provide a valuable complement to economic studies of technological impact in the rural sector, e.g. those carried out by the International Rice Research Institute in the Philippines. Secondly the study provides the basis for further related research on regional trends in Asia, both within the countries that have participated in this survey and in those that have yet to study the relationship between technology and social change. Here again they complement such regional studies that have been carried out on the economic impact of the introduction of technology and again the International Rice Research Institute has been one of the foremost investigators in such research. Hopefully they will generate further regional research from other bodies in the same field.

The results of the national field studies show that the introduction of mechanized tillage will have an impact (at least) on three levels. It affects the social norms and patterns in the rural family itself. The changes that occur in families in turn have an effect upon the social fabric of the community in which they reside. Finally the introduction of mechanized cultivation will have an impact upon existing government policy. It will strengthen some decisions and will indicate possible guidelines for new or adjusted planning needs. These three levels are discussed below.

Implications for the family

One of the most important implications for the rural family adopting mechanization is the greater importance which is attached to education for children and for the development of mechanical skills. This attitude towards education is identified in all the studies in the survey. A second issue of common identification in the sample is the importance attributed to an improvement in living standards in the rural areas. These needs are identified in the comparative chapter of the work. A third common area of importance concerns the greater need for technical services in the rural areas. All countries identified the enhanced importance placed upon government institutions and government extension services. There was a general feeling that extension services by government in the rural areas were still inadequate and more resources should be directed to providing extension agents, particularly those concerned with agriculture and infrastructural services, in all rural centres.

Without exception there has been a noticeable change in the role of women, particularly wives, in the households. Finance and record-keeping are largely in the hands of the senior women of the household. Women have become less dependent upon agriculture and are used less in the cultivation of land. This has

freed them for other occupations and allowed a greater diversification of the economic base. The marriage age is later for daughters and most female children are encouraged to undertake primary education. Diversification of the sources of income in the mechanized family has also encouraged women to take a more active role in family economics. There are a number of instances of women freed from the drudgery of field labour and food preparation undertaking new craft skills or managing small businesses of their own.

The increased wealth in mechanized families, particularly those connected with multi-cropping, has brought about a greater orientation towards urban areas. Villagers have connections with a number of technical institutions and credit facilities outside the village. These new relationships have encouraged greater mobility, which

Table 8.1 Implications for the family

Country	Greater importance attached to education and mechanical skills	Change in the role of women	Improvement in the status of female children	Diversification of sources of income	Greater orientation towards urban areas	General improvement in living standards	Higher demand for social services	New forms of co-operation within family	Demand for after sales service	New patterns of family decision making	Greater need for technical services
India	X	X (c)	X	X	X (d)	X	X			X	X
Indonesia	X	X (c)	X	X	X (d)	X		X		X	X
Korea	X	X		X	X	X				X	X
Nepal	X	X		X	X	X	X	X	X	X	X
Philippines	X	X (a)		X	X (d)	X		X	X	X	X
Thailand	X	X	X	X (b)	X	X		X		X	X

Notes; (a) These results are those either specifically mentioned or implied,
(b) Record-keeping largely in hands of women,
(c) Later marriage age.
(d) Broader knowledge of institutions.

in turn has also encouraged the use of leisure pursuits and, in the case of women, the development of women's societies and associations, both at village and regional level. Finally, the improvement in economic conditions has led to a higher demand for social services, particularly those concerned with education and health.

The use of mechanical devices such as tractors and water pumps has developed a need for after-sales service and maintenance facilities. Investment in machinery has meant that households have become very conscious of optimizing its use either in assisting the family with its land cultivation or in renting out to others. Successful maintenance of the investment is therefore of primary importance.

These new common needs that have emerged as a result of change have had an important effect upon the family as a unit. They have encouraged new forms of co-operation within the household and a greater

specialization of roles. The male head of the family no longer takes all decisions and a lot of the former prerogative for responsibility is shared with other family members. Children, wives and close relatives all combine in the process of decision making on most of the important decisions, although the final arbiter in most cases on agricultural matters is still the husband. Table 8.1 summarizes these findings.

Implications for the community

The implications for the community resulting from increased mechanization are indicated in Table 8.2. Perhaps the most interesting and common implication throughout the region is that mechanization to date has not had any radical effect upon the need for agricultural labour. Although in the long term it provides dangers for increased rural unemployment there seem to be no indications of this at the present time. All countries indicate that there is a continued need for agricultural labour and in some cases there is an increased need. The pattern of rural labour has changed. Previously landless peasants or neighbours were used for relatively long periods between seasons for the cultivation of agricultural land. The preparation of land process has been speeded up by the introduction of mechanized tillers and tractors and labour is not needed for such long periods. However, multi-cropping, encouraged by

Table 8.2 Implications for the community

Country	Greater diversification of economic activity	Continued need for agricultural labour	Importance of rural marketing activities	Increased development of community organizations	Danger of economic stratification	Greater demand for consultation	Greater land and other asset acquisition	Greater widening horizons
India	X	X		X			X	X
Indonesia	X	X	X	X (b)	X	X		X
Korea	X	X	X					X
Nepal	X	X (a)		X	X			X
Philippines	X	X	X	X				X
Thailand	X	X		X	X	X	X	X

Notes: (a) Increased need,
(b) Through 'desa' government.

irrigation and other methods, has meant that agricultural labour is used throughout the whole year instead of during the pre-planting season alone. This has an advantage as it allows for a more even spread of wages for the landless rural peasant. Where mechanization is used for single or dual cropping and the labour is not required as much as formerly the capacity seems to have been taken up either by use in government infrastructural services, e.g. the construction of feeder roads, irrigation channels, etc. or greater transportation facilities have allowed labourers to commute to nearby urban centres.

A second common implication area has been the recognition of a greater diversification of economic activity in the rural areas. First there has been a diversification in the economic patterns within the family, as already mentioned, and second there is an increase in the demand for greater facilities of a more diverse nature within the community itself. Assets accruing from the improved economic base of mechanized farmers are used in a variety of ways. First there is a demand for a wider range of domestic items associated with

improvements in living standards, e.g. refrigeration, building materials etc., and second there is a greater demand for technical services, ranging from maintenance and repair shops for the machinery to outlets for fertilizers, insecticides and government agricultural extension services. Admittedly, not all these services come to the villages, but there is evidence that so far as the private sector is concerned, demands are being met even at village level by entrepreneurial activity as market demands increase.

There has been an increased importance attributed to rural marketing activities, particularly those concerned with the sale and transportation of agricultural produce. At the same time there has been a marked development of community organizations. Some of these have arisen spontaneously among farming groups, others have been carefully cultivated by government agencies, e.g. the establishment of co-operatives, or through a nationwide movement, as in Korea with the Saemaul development policy.

On the debit side there appears to be an increase in economic stratification between sectors of the rural community. As land becomes important for economic production so there has been a greater need for large manageable portions of land and a decrease in marginal or

Table 8.3 Implications for government

Country	Specialattention to begiven to:			Continued emphasis on infrastructural development	Development and control of mechanization
1. Post-harvest problems	2. Pricing policies	3. Diversification of agriculture			
India		X		X	X (a);
Indonesia	X	X	X (c)	X	X (b)
Korea	X	X	X	X	X
Nepal				X	X (a)
Philippines	X	X	X (c)	X	
Thailand	X	X		X	

Country	Improved infrastructure to rural areas	Watching brief on rural unemployment	Promotion of off-farm income and rural and rural-urban links	Watching brief on stratification in rural communities	Improved credit facilities and cheap machinery for the farm
India				X (d)	X
Indonesia	X	X	X	X	
Korea	X		X	X (d)	
Nepal		X		X	X
Philippines	X		X	X	X
Thailand	X		X	X (d)	X

Notes: (a) Strategy to prevent mechanization which is socially not desirable,
(b) Including improvements in irrigation systems,
(c) Problems of surplus rice production,
(d) Including land reform.

grazing land previously kept common for the community. The larger landowners have increased their parcels of land buying from the small holders who in many cases have now become landless peasants. With more land available to them the mechanized farmers have greatly increased economic assets and have become relatively rich. This has increased the gap between the poor peasant and those that have taken advantage of the new technology.

Implications for government

Table 8.3 indicates the implications for government arising from the various case studies. Common to all the studies is a demand for improved infrastructural development. This need has arisen from the greater use of government services by those embracing mechanization for the export of surplus produce and to satisfy a need for higher living standards. Perhaps the most important infrastructural services are the wider development of irrigation systems and an adequate network of all-weather roads. Other implications apply to specific countries but not to all. They include a recognition that special attention should be given to post-harvest problems, particularly in marketing and in credit availability. Secondly there is a perceived need now to provide a definitive policy for the pricing of agricultural produce and thirdly that guidance is needed on the diversification of agriculture.

The important advantage of mechanization has been recognized as the relaxing of time constraints in the cultivation cycle. This has allowed time for the introduction and development of other forms of agriculture. New crops, the augmenting of income by the raising and sale of domestic animals and similar initiatives need to be examined by government and advice provided to farming communities. There seems to be some concern that mechanization as a desirable objective may get out of hand if not controlled. There is a need for strategies to prevent mechanization which may become socially undesirable.

Mechanization aligned to multi-cropping has had the enviable advantage in the short term of making the countries self-sufficient in their staple grain products. In the longer term this may prove an embarrassment to governments as already they are forced to provide storage for large quantities of surplus grain. Although a surplus in grain is desirable to meet the difficulties of droughts and adverse climatic conditions, too much grain will become a financial liability and may in the longer term cause hardship in the communities by occasioning a decrease in the market price.

There appear to be some areas where the government has a need to respond to the changing face of rural agriculture. The first concerns the development of better infrastructural services to the rural areas. This is admittedly high on the priority agendas of national plans and should continue to remain so. The demand for infrastructural services to rural areas is common to the region and is increasing as farmers see the advantages and the necessity of having better transportation and other government services within easy reach. The second situation which requires monitoring by government is the level of rural unemployment. Although as indicated earlier, no problem appears to exist at the present time and there seems to be overall demand for rural labour, the increased mechanization and integration of landholdings may have an adverse effect upon rural poverty in the longer term. Thirdly the introduction of mechanization has had an effect upon livestock population in rural areas. As grazing land comes under cultivation and the tractor replaces the buffalo so draught animals and tillage animals have decreased throughout the region. In some cases the livestock used for tillage has been replaced by other livestock for family consumption or for marketing; poultry, ducks, goats and pigs have increased on small holdings and are used as a supplementary source for the family income. It seems unlikely that these changes in the amount and type of livestock have been monitored by government to date and in some cases they may need to examine them.

Finally the change in family attitudes to the economic base has developed a demand for credit facilities with low interest rates for the rural poor. The inability to obtain credit is a major consideration in preventing further mechanization. If a government wishes to encourage rural mechanization, whatever its consequences, then better credit facilities are needed to encourage the rural poor and the small holders to change from their traditional methods to greater productivity. Aligned to this need for credit is the need for greater research into appropriate technology and the development of machinery which is (a) cheap, (b) simple to use and robust and (c) socially acceptable.

Table 8.4 Suggested areas for further research

Country	Research to be repeated over a wider sample or over longer period	Impact of technology on different agroclimatic conditions	Survey of off-farm income sources	Influences of technological change beyond the farm level	Survey of rural job opportunities	Assessment of effectiveness of assisting institutions for rural development	Research into cheaper machinery and intermediate technology
India	X	X	X	X (a)	X		
Indonesia	X		X		X		X
Korea	X		X	X (b)	X		X
Nepal	X	X			X	X	X
Philippines	X						
Thailand	X	X		X (c)	X		X (d)

Notes: (a) Rural-urban linkages,
(b) Spatial rural-urban linkages,
(c) Influences at regional and national levels,
(d) Role of private sector in developing technology.

SUGGESTED AREAS FOR FURTHER RESEARCH

Table 8.4 reflects the areas for further research highlighted by the studies. The research undertaken in this study has brought to light a number of important issues already discussed, but is limited by the size of the samples taken in the countries concerned. It is considered by all the countries undertaking the research that further studies are required to increase the number of sample studies. A broader base is needed to examine regional differences within countries and to confirm the first tentative results of the present study.

Aligned to this need to broaden the research base is the suggestion from three of the countries that the impact of technology should be studied under different agro-climatic conditions. Studies should be set up, particularly in those countries that have a diversity of climatic and topographic differences, e.g. India, Nepal and Thailand, to measure the impact and advantages of technology under a wider range of natural conditions.

A survey of rural job opportunities would seem important to identify areas of potential danger for rural poverty and a lowering of job opportunities. Although the evidence suggests that there is no immediate danger of greater rural unemployment, it is difficult to estimate how long this favourable situation will continue in the face of increased mechanization.

One element which has been identified as directly relevant to the introduction of mechanized farming has been an increased diversification in off-farm and agricultural sources. To date there appears to be little data

to indicate the magnitude of this trend or its possible directions and its effect upon national development. It is suggested that a survey of off-farm income sources would be valuable to identify possible future trends and problems. A study of the inferences of technological change beyond the farm level is also an issue which appears to have been neglected.

Finally it seems important that the changes that are occurring throughout the Asian region in connection with the introduction of rural technology need to be assessed in relation to the types of institutions which are promoting or assisting them. An examination of national development plans and rural policy seems to indicate that a large number of institutions, both governmental and quasi-governmental, have been set up to further the objective of rural development. As mechanization has increased and as rural attitudes have changed, the efficiency of some of these institutions might be examined. There may be competing institutions in the field which are confusing or are dysfunctional to the rural communities. There may be the need for an integration of institutions to ensure that further policy directives are effective. Finally there may be the need for new institutions for needs that are still to be met. It is a common government policy when a new problem is identified to respond by establishing an organization to take care of that problem. All the countries in the region are subject to the dangers of ‘big government’ and the interrelationship of agencies and their cost-effectiveness are not always taken into consideration. Both national and regional surveys of rural servicing institutions need to be examined in the light of the broad policy for decentralization and for rural improvement.

INDEX