Report No. 3906-TH

Growth and Employment in Rural Thailand

April 13, 1983

Country Programs Department
East Asia and Pacific Regional Office

FOR OFFICIAL USE ONLY

Document of the World Bank

Acknowledgments

This report has been prepared over the past year by members of a joint Thai-World Bank team. The initial inspiration for the work leading up to the report came out of discussions between Mr. Kosit Panpiemraj from the NESDB and Mr. Ian Porter, World Bank whose continued guidance and enthusiasm were essential for the success of the project. The Thai team was coordinated by Ms. Rachaniwan Uthaisri of Chulalongkorn University under the direction of Mr. Kosit Panpiemraj, and included:

Mr. Pitaksit Chayaputi, Khonkaen University

Mr. Kitti Ittiwitya, NESDB

Mr. Somchai Krusuansombat, NESDB

Mr. Sumitr Pitiphat, Thammasat University

Mr. Preeda Prapertchob, Khonkaen University

Ms. Suwannee Samrongwatana, NESDB

Ms. Vanpen Surarerks, Chiengmai University

Ms. Pornpimol Woradiloke, NESDB

The World Bank team was led by Hans Binswanger and included Mark Leiserson, Oey Astra Meesook, Jeannette Murphy, Parita Suebsaeng, Dusan Vujovic, and Trent Bertrand (consultant). Following up on a preparatory mission in the fall of 1980, the full mission visited Thailand in August/September 1981.

The Thai team members prepared a number of regional Profiling Studies which are available as separate reports and listed in the reference section. These Profiling Studies and the mission field trips provided invaluable observational materials which can simply not be gleaned from secondary sources. The study team relied heavily on insights gained and reports written by a joint study of Kasetsart University with the Michigan State and Ohio State Universities which was funded by USAID, and led by Mr. Tongroj Onchan, on the Rural Off-Farm Employment Assessment Project. Indeed it was in participating at a conference organized by them at Kasetsart University that many of the hypotheses underlying this report were formed.

The team benefitted greatly from support by various agencies of the Government of Thailand. The National Economic and Social Development Board (NESDB) acted as the counterpart agency. The National Statistical Office and the Office of Agricultural Economics provided extensive data, and we are particularly grateful for the personal attention given to us by Messrs. Supot Dachates, Prakarn Virakul, Sant Permpongsri, and Suthat Supinacharoen and Ms. Chintana Cherdvudhi, Sasithorn Jotikasthira, and Varai Woramontri.

Others who were particularly helpful included the provincial governors of Chiengrai, Kalasin and their staffs, the Director-General and staff of the Department of Labor, the staff of the Recruitment Association of Thailand, and the Directors and staff of the ILO/ARTEP.

We were impressed by the large number of research studies executed by Thai scholars and their students which bear directly on the concerns of this report and which are noted in the references. Some of the authors were generous with their time and we would in particular like to mention Messrs. Medhi Krongkaew, Niphon Puapongsakorn, Sophin Thongpan and Ammar Siamwalla, who have been thinking about these issues for a long time.

We are also grateful to the staff of the resident mission in Bangkok for logistical support, to Vilma Mataac and Caroline Jen for research assistance and computer programming, and to Felicitas Doroteo for secretarial assistance.

Responsibility for the contents of the report, including remaining errors, rests entirely on the study team. The gracious help which we received in no way makes any of the consulted agencies or persons responsible for any possible errors of fact or interpretation or for any viewpoints expressed in the report.

CONTENTS

I. GROWTH AND EMPLOYMENT IN RURAL THAILAND: AN OVERVIEW

1.1 The Concerns

Over the past two decades economic growth in Thailand has proceeded at a high rate, with agriculture continuing to play an important role in the growth process. It has also been clear for some time now that nonfarm activities have become a major source of income and employment for rural households.

In 1975/76, roughly 17% of village households and 47% of the households of sanitary districts had no agricultural enterprise at all, i.e. they were entirely specialized in nonfarm activities. 1/ In addition, those village households with agricultural sources derived roughly 40% of their incomes from strictly nonagricultural sources (Table 2.1). Furthermore, this report shows that, over the past decade, rural nonagricultural employment and income have been growing more rapidly than agricultural employment and income in all major regions (Table 2.2).

The present study has been undertaken to establish:

(a) the factors explaining the growth in rural nonfarm employment and its dependence on agricultural growth; and

(b) the benefits that poor rural areas derive from rural nonfarm employment and measures, if any, that can be taken to accelerate its growth as a means to alleviate rural poverty.

The major conclusions of the report are as follows:

(a) The growth of rural nonfarm employment is predominantly linked to the growth of agricultural activity; agricultural growth has powerful linkage effects for rural development.

(b) There is relatively little scope to intervene with direct measures to generate more rural nonfarm employment.

(c) Because of the continued existence of rural poverty pockets, it is appropriate to develop programs specifically designed to meet their problems through judicious investments in physical and social infrastructure.

(d) The anti-rural bias of agricultural price policies and industrial protection policies have not been offset by specific agricultural

---

1/ Sanitary districts are semi-urbanized areas with characteristics intermediate between villages and rural towns. For more precise definitions, see Section 2.1.

or nonagricultural programs in rural areas. The primacy of Bangkok must at least in part be attributed to these distortions.

A large portion of the report and Section 1.1 of this chapter are devoted to an analysis of the interactions between agricultural growth and the nonagricultural components of rural development.

Section 1.2 discusses broad implications of that analysis for poverty alleviation concerns. For a number of more specific policy recommendations which emerge out of the analysis, the reader should refer to the respective chapters.

This summary chapter, in order to present the findings of the report in a more general, integrated fashion, departs from the order of topics followed in the report itself. References to sections of the report in which the issues are discussed will be given in parentheses.

1.2 The Mechanisms of Rural Development

1.2.1 The Opening of Rural Subsistence Economies and Specialization

The process of development brings in its wake an ever-increasing level of sectoral specialization among urban areas, rural towns and villages; among different agro-climatic regions; and among different households and individuals within all of these locations.

In traditional subsistence economies, of which we can still find examples in some remote regions of Thailand, high transport and communication costs sharply reduce the scope of market exchange to a few commodities. Few agricultural commodities are traded outside the community. There is limited interregional exchange of labor, agricultural inputs or credit. Farm households which produce most of their own food have very low cash incomes and face high delivered prices for nonfarm goods and services. Therefore they produce many nonagricultural goods and services themselves. These include in particular clothing, housing, agricultural output processing, child care and education services. Thus subsistence orientation in agricultural production implies a high degree of subsistence orientation in nonfood consumption (Section 4.2).1/

Exchange of both output and inputs among families within the community may, however, be quite well developed. And in many communities specialists exist who provide specific goods and services: carpenters, blacksmiths, potters, religious and ritual specialists, etc. Thus even subsistence-oriented villages contain a number of occupational specialists who derive little income from direct agricultural production.

1/ Many areas are only sparsely settled prior to road investments, and such investments often result in substantial immigration.

The opening of these subsistence economies to trade via transport and communication investments has been a process which was initiated in the 19th century in the Central Plain and the Southern provinces of Thailand. It is a process which is still ongoing in the North and Northeast, where massive investments in interregional and rural roads over the past two decades have substantially reduced the long-standing disadvantages in transport and communication. Increased interregional trade is associated with the emergence of monetized markets for outputs, labor, inputs, credit and services which extend well beyond village or subregional boundaries. In the 19th century it led to the sharp specialization of farm households in rice for export purposes in the Center; the South specialized in rubber in the early 20th century; specialization into kenaf, cassava, maize and sugar for sale (rather than crops for subsistence) is a much more recent phenomenon in the outer regions. In all regions, the original opening up to interregional trade was associated with a much sharper expansion of cultivated area devoted to the new crops compared with the rate of population growth. Indeed, the availability of land in Thailand for settlement has been the major source of growth of output for over a century and a half. In Chapters III and IV, we trace this process of specialization and area expansion for the last two decades for some Central regions and the Lower North, and especially for the Northeast.

At the same time as individuals and households increase their specialization in a small set of agricultural commodities for sale we find increased specialization of other households or household members into manufacturing and service activities. In particular, the number of persons primarily engaged in a whole host of trading, transport and agricultural processing activities increases sharply (Chapter III). Improved transport and communication systems reduce the delivered prices of manufactures, food commodities and services produced elsewhere and raise the prices of exported goods. These price changes lead to the disappearance of a number of production activities previously performed in the household and a decline of specialists in the craft production for which interregionally-traded substitutes emerge. For example, home-weaving activities are now restricted to relatively few households in the Upper Northeast and are rapidly disappearing even there (Section 4.2, Table 4.4). Reduced travel costs also sharply increase the participation of household members in outside labor markets such as in nearby towns or other agricultural regions, either on a commuting or seasonal migration basis (Chapter V and Section 6.3).

In the process of development, the specialized activities in processing, commerce, transport and services described above have increasingly become concentrated in smaller rural towns (compared to villages); specialization is taking place not only among households, but even among locations within small rural areas. Such small towns have also emerged as administrative and educational centers. Better roads have enabled farmers to avail themselves of the broader range of goods and services available in small towns but not in the villages, and have enabled the specialists in small towns to service villages from more centralized locations (Sections 4.1 and 6.3). The small towns are fully integrated into the agricultural economy of the regions. Very few economic activities take place which are not directly or indirectly related to agriculture or to final demand of agricultural

producers. The towns are the center for all kinds of agri-support activities and can only be understood in the context of the broader agricultural economy. They produce virtually no industrial goods for export to other regions or abroad (Section 7.1).

In this report we pay considerable attention to potential distributional consequences of the increased income possibilities which arise in rural development. Agricultural producers in Thailand clearly have gained over the past two decades. 1/ Furthermore, the rural regions have increasingly become consumers of both agricultural and nonagricultural commodities, and have benefitted from increased specialization elsewhere. A focus on agricultural producer benefits alone is thus too narrow. We show that in the last decade the poverty regions have participated in the increased specialization of households, areas and regions. These increases in specialization have been accompanied by substantial real income gains for the poverty regions, where nonagricultural income growth has substantially outstripped agricultural income growth (Chapter II).

Nevertheless, it is important to realize that, with the exception of some parts of the South, the regions which went through this process earlier have been able to maintain a per capita income advantage. Rural households in the outer regions of Thailand (Upper North, Northeast) have incomes which are roughly two thirds or less of the more central ones (Center, the Lower North and the Upper South). This major income gradient is paralleled by a similar gradient in all rural wage rates which we have considered. However, differences among subregions within each of these two major geographic divisions in average rural incomes and rural wage rates are remarkably small.

Not all individuals participate equally in rural growth, and some may lose. Some agricultural producers and craftsmen may have concentrated on a commodity which, after the opening up, is produced at a lower cost elsewhere. To the extent that these producers had invested in commodity-specific factors of production and human capital, which cannot find employment elsewhere, they will lose these investments. And the less mobile these people are (in a sectoral and/or geographic sense), the higher will be their losses. While we have little direct evidence on such losses, which must undoubtedly have occurred, the degree of locational and intersectoral mobility of the Thai population documented in Chapter V is likely to have limited the extent of such losses.

1/ The major commodities involved have been internationally traded (rice, rubber, cassava, kenaf) and are thus in elastic demand. This implies that producers capture a high proportion of the productivity gains involved. Most benefits from productivity gains can be transferred to consumers only where final demand is inelastic or tax rates on agricultural commodities increase.

To the extent that initially less specialized households give up some of their activities to specialize more heavily in either new agricultural or nonagricultural opportunities, this is a choice which can only have improved their welfare. One exception, however, may be activities which were sex-specific, such as home weaving. Some of these activities were typically undertaken by women in periods of low agricultural activity (see Chapter VII). Since married women are less mobile, it may be harder for them to find new income-earning opportunities. While we fail to show any sharp differentials in agricultural wages between men and women, these less mobile family members must have lost relative to the more mobile members of the families (just like the less mobile members of the community lose at the expense of the more mobile ones). Of course it is clear that migration of the more mobile ones also assists those who are left behind and find themselves in a better resource position because of outmigration. Furthermore, those who stay in rural areas also tend to receive remittances. Nevertheless, opportunities for specialization, nonagricultural employment and migration have differential impacts on different age-sex groups. Married females in rural areas are more rarely engaged in nonagricultural pursuits as a main occupation than men; they tend to respond to the sharp seasonal variations in agricultural labor demand by withdrawing from the labor force in slack periods, while men tend to shift more easily to nonagricultural employment in the vicinity or migrate to other rural areas or the cities. Young unmarried women, on the other hand, constitute an important seasonal and annual migration stream to Bangkok.

1.2.2 The Spatial Allocation of Agricultural and Nonagricultural Production

Agricultural production and other natural resource-based industries are tied to the rural areas by the presence or absence of land or a natural resource to which all cooperating factors of production must be moved and from which output must be transported. On the other hand, most nonagricultural goods and services are in principle mobile, i.e. they can take place in either rural or urban areas. Their location in rural areas must therefore be governed by different forces from those for agricultural commodities.

As transport costs fall, different agricultural products have increasingly been allocated to different rural regions on the basis of comparative agro-climatic advantage, and to a lesser and lesser extent according to the location of final demand. (Exceptions are poultry, fruit and perhaps pork production discussed in Section 4.4.) Note here that such increasing agro-climatic specialization is a phenomenon which is observed in most countries, including the developed world.

The resulting expansion of agricultural output, input use and incomes in a particular region clearly leads to powerful forward, backward and consumer demand linkages, both in agriculture and nonagriculture. Will these linkage effects be felt in rural or urban areas? The agricultural linkages clearly have secondary effects in the rural areas, unless the commodities demanded are imported from abroad. On the nonagricultural side, the linkage effects may affect either rural areas or urban areas: it depends on whether the goods and services demanded via the linkage effects are interregionally

tradeable or not and whether rural or urban areas have a comparative advantage in producing them. Rural linkage effects are powerful only for what trade theorists call "home goods", which are goods or services in which the local rural areas have a powerful cost advantage in production, or which must be produced at the place where they are used or consumed. 1/ Agricultural growth thus has powerful rural linkage effects via the home goods and services only, but not via interregionally tradeable ones.

Our study and research elsewhere demonstrate that of all linkage effects the consumer demand linkages exert the most powerful influence on rural nonfarm activities. Marginal budget shares and income elasticities tend to be higher for nonfarm goods and services than for farm outputs, except perhaps for animal products and fruits. Increased regional incomes are therefore increasingly spent on nonagricultural goods and services, and the more so, the higher the initial income levels of the recipient. Furthermore many services and housing, (which are clearly home goods), have especially high income elasticities.

The study also allows us to rank the other sources of demand for nonfarm goods and services in the following order of importance in terms of rural incomes and employment:

1. The provision of goods and services for agricultural populations: trade, services, construction and the manufacturing of certain consumer goods. These are the consumer demand linkages to agriculture discussed in Chapter IV.

2. Processing and transport of agricultural commodities; provision of transport, and production and servicing of agricultural inputs. These are the forward and backward linkages in agriculture discussed in Chapter III.

3. Government demand for public teachers and other public servants (Chapter II).

4 The manufacturing of a limited range of goods for export to other regions or abroad, mainly in textiles, handicrafts, metal goods etc. (Chapters II, III and VII).

It is not hard to understand why commercial, housing construction, and service activities must be located near or at the point of final demand.

1/ We are indebted to Ammar Siamwalla for clarifying this parallel to the home-goods issue in the trade literature. His point is that increased demand for locally-produced tradeable goods will not result in local rural linkages: if the good is tradeable, its price will not change and the level of output of local producers will be unchanged. Any changes in demand will be accommodated by changes in interregional trade.

But it is more complicated to sort out why certain manufacturing activities are usually located in rural areas while others almost never are (chemical, rubber products, electronics, to name a few). Indeed a detailed examination (in Thailand and elsewhere) reveals that rural manufacturing activities fall into a few clearly distinct types whose presence in rural areas is motivated by different forces.

1.2.3 The Limited Character of Rural Manufacturing

In order of their quantitative importance, rural manufacturing falls into the following classes; a detailed table on these industries is given in Section 7.1.

1. Mining and agro-processing units which have to be located near the mine or growing region on account of (1) the weight-losing nature of the processes, or (2) the perishability of the raw materials used. (For many commodities, processing has to occur within hours from harvest in order to maximize recovery or quality). Examples are rice milling and cassava chipping (weight loss); fruit canning, fish products, and the preparation for cold shipping or storage (perishability); sugar factories from cane (weight loss and perishability). Where economies of scale exist in the processing units, the factories can often be very large, (sugar, for example) and these processing and mining activities are virtually the only ones which are ever carried out in large-scale units in rural areas. But even in many of the processing activities small-scale units are the rule. It is important to note that processing activities which do not involve perishability or weight loss are frequently performed in urban centers: flour milling, oil crushing, and the processing of most food products. A good example is rubber where the production of rubber sheets or blocks is rurally based on account of perishability and weight but vulcanization and the production of rubber products is largely based in urban centers (Chapter III).

2. Construction materials such as bricks, cement blocks, pipes and slabs are also often produced in rural areas on account of the transport costs of both the inputs to them (which are often locally available) and the outputs from them. A similar case is simple furniture (Chapter VII).

3. Service-type manufacturing. These activities produce goods which often have a service-type character. An extreme case is custom rice milling which is classified as manufacturing in official statistics (Chapter III). Yet the small rice mills in almost every village process small quantities for households who used to hand-pound the rice that they consume. The small rice mills thus provide a pure service. Other units produce highly perishable foods purchased almost daily and which could be produced by households themselves (soft noodles, soy bean curds, certain pickles). Ice factories are widely dispersed in rural areas where incomes are sufficiently high to generate a demand or in association with fishing or cold storage in the South (Chapter VII).

4. Textiles and handicrafts for export from the regions. These activities have often grown out of a traditional basis, especially in Chiangmai, but many examples exist where they are of recent origin (fish nets, baskets, silk). They may be performed in households, cottage units or small

factories and are characterized by a low capital intensity. They often use female or child labor on a seasonal basis. They range from the weaving of cloth, carpets, mats, baskets, fishnets, to knitting, sewing, etc., and to pottery, woodworking and metal working crafts. Skills for weaving and other textile activities appear to be easily acquired, and returns to labor are often extremely low, indicating severe limitations of final demand. With the exception of specialized villages or regions, and with the exception of silk, employment levels in these areas appear not to be very large. We should note here that one of the most successful cases of modern rural industrialization (Taiwan) is almost entirely based on textiles and agro-processing. (It was made possible by extremely high population densities and a north-south highway linking the two major ports, along which most rural manufacturing takes place.)

5. Metal workshops and agricultural implements or machinery. Emerging often out of traditional blacksmith families, these enterprises produce and often also repair structures and machines for nonagricultural and agricultural purposes. In the course of development they may emerge as regular factories producing for export from the region, but in Thailand this appears to have occurred only in agricultural machinery manufacturing. The impetus for the agricultural machinery industry has arisen from the invention of new or locally-adapted machinery designs, often at the suggestion of customers dissatisfied with designs imported from elsewhere. It is this advantage in invention and adaptation which leads to comparative advantage in rural areas for such firms. The same process is also well documented for the U.S., Japan, Taiwan, and India. It is indeed a near universal pattern that most major and minor mechanical agricultural inventions originated in small-scale local units in collaboration with innovative farmers. Such units, as a consequence, may become major firms or be bought up by large firms. In Thailand such a concentration process is already in progress. In Section 3.2, the nature of the Thai agricultural machinery experience is discussed in detail and interpreted as a beneficial response to increased labor and draft animal demand in the Central Plain arising from improved drainage and irrigation facilities over the past two decades.

For other metal-working industries in rural areas the element of custom jobs is also very important, i.e. they rarely produce large volumes of standardized structures or equipments, i.e. they again have a somewhat service-like character requiring close interaction of client and manufacturer.

With the exception of large-scale mining and agro-processing units, which import highly-trained craftsmen and engineers from urban centers, skills for the nonfarm activities are almost always acquired on the jobs, in informal learning by doing, or informal apprentice systems (Chapter VI). Thus the nonfarm activities are a major training ground for the labor force. In study after study, in Thailand and elsewhere, scarcity of specific skills acquired in formal training is downplayed by the rural entrepreneurs as a barrier to expansion. Limitations of final demand are seen as much more important impediments to growth. Thus many of these rural activities are characterized by low intensities of both physical and (formally-acquired) human capital.

These characteristics of rural and small town manufacturing are not confined to Thailand or the developing world but are a characteristic pattern in the developed world as well. It is true that, as agricultural labor forces have dwindled as a proportion of the population, some of the rural towns in the developed world acquired the status of major urban centers with more diversified manufacturing activities, often based on firms which originally engaged in agro-support mining or forestry activities (Chicago and Minneapolis in the U.S. are striking examples). Such a transformation of some of the major regional cities may well take place in Thailand in the future and should be encouraged where possible. But with the exception of some of the most densely-populated regions of the developed world, rural towns continue to have the character of agro-support centers.

1.2.4 The Labor Cost Issue and the Seasonality of Agriculture

Why do rural areas and towns so rarely produce a broader range of manufactured goods for export to other regions or abroad? There is often a perception that labor costs in rural areas are massively lower than in urban centers and one might expect industries to locate in rural areas in search of low-cost labor.

Lower labor costs in rural areas (relative to large urban centers) may be far less important, however, than commonly assumed. The largest gradient is in rural wages between the outer regions (Upper North, Northeast) and the rest of the country where wages are roughly 1 1/2 times the level of the outer regions. First, inter-regional wage differences in Thailand are not very large. Second, with both annual and seasonal migration between rural and urban areas being unrestricted, and becoming easier over time on account of better transport and communication, the differential in the cost of hiring workers on a full time annual basis may not be that large (and is partly accounted for by higher costs of living in urban areas). There is no doubt that, where agriculture has a pronounced seasonality, slack-season labor availability is large, if we judge it by the differences in labor force participation, especially of females and young people (Chapter V). Yet, open unemployment in Thailand is extremely low, even in the agricultural slack season, and seasonal wage variations are not as large as we initially expected (Chapter V). By our fairly aggregative measures, slack-season wages do not appear to fall short of peak-season wages by more than 20% in any of the regions. These facts imply a remarkable adaptation of the rural population and the labor market to both interregional and seasonal differences in labor demand.

Even if seasonal wage differences were larger, few industries can be economically operated on a seasonal basis. Where the industrial processes require high physical capital intensities and high human capital intensities in the form of supervisory, technical and administrative staffs, the reliance on seasonal labor in manufacturing is limited by an essential tradeoff: if the labor force is to participate in peak season agricultural activities, the manufacturing capital stock, both physical and human, will sit idle during that season. Seasonality of agriculture thus raises a difficult dilemma between the idleness of labor in agricultural slack seasons and the idleness

of capital in the agricultural peak season, capital which would be required to employ seasonally-available labor.

It is precisely for this reason that textile and handicraft activities with low capital and skill intensities are so prevalent in rural areas with high seasonality such as the North and Northeast. They represent an adaptation to the seasonality of agricultural production. 1/ Moreover, modern industrial processes such as electronics may require considerable periods of on-the-job training of labor, an added reason for manufacturers to insist on a year-round commitment of the labor force. To hold these workers at the plant during periods when they experience competing labor demands from agriculture in their homes requires payment of wages which may be nearly as high as in urban centers (to which workers would also have to be drawn as annual migrants from rural areas).

In a particular region seasonality of agriculture may be mitigated by three forces. First, irrigation and double-cropping vastly increase agricultural labor demands on a year-round basis. They reduce seasonality in the Central Plain and in the Lower North and in parts of the Upper North. They lead to sharper specialization of farm households in agriculture and nonfarm households in an increasing array of agro-support activities. Since in these regions the opportunity cost of labor in agriculture is high (Section 3.2.1), resource-independent manufacturing is very rare in these regions. The second force is mechanization of labor power in the wake of rising rural labor costs, again not necessarily favoring rural manufacturing, at least not initially. And third is the fairly even labor demand of rubber over the year. In the South this leads to a more even agricultural labor demand which is associated with a near total absence of resource-independent manufacturing there.

Textiles and handicrafts are also adapted to rural areas with high seasonality in other ways: transport costs of inputs and outputs are low; the low capital intensity is a bonus when borrowing rates are high in poorly developed rural financial systems; and raw materials may sometimes be available locally. More broadly, similar adaptation is evident from the small-scale nature of most nonfarm activities; from the systematic emphasis on a few selected manufacturing activities which have to be located in rural areas on technological or transport cost grounds; and from the reliance on learning by doing or on-the-job training of a semi-skilled labor force.

1/ Even traditional subsistence systems faced such tradeoffs: highly skill-intensive activities for which demand arises in the agricultural peak season were and continue to be performed by specialists: blacksmiths, carpenters, religious specialists (see Table 7.1). Home spinning, weaving and sewing, road and dam construction, and maintenance have low capital and low skill intensities and can be performed in the slack season. They thus make extensive use of labor engaged in agriculture during other parts of the year.

Thus the dominant character of most nonfarm activities, besides their multiplicity and wide variety, is their local and limited character. They are firmly embedded in the agrarian structure and appear to originate in the search of rural households for earning opportunities that they can combine with farming or with the local agricultural demands under the locational and temporal constraints imposed by the agricultural production processes.

1.2.5 The Nature of Economies of Urban Agglomeration

Powerful economies of urban agglomeration must exist in the Bangkok metropolitan area which induce most industries, services, and even those agro-processing activities which do not involve weight loss or perishability, to concentrate there. The agglomeration economies must overcome the modestly higher labor costs of urban areas, the higher space costs, and the considerable diseconomies arising from congestion and pollution. We have not investigated these in detail, but present a general discussion.

It is doubtful that technological scale economies are an important factor favoring the metropolitan area. Where such economies are present, as in sugar production and mining for example, they are clearly realized in rural areas. From the point of view of any given producer, the economies are most likely to be economies of scope, i.e. economies which arise out of the multiplicity of goods and services offered in an urban area. (The supermarket analogy is relevant, where, for the consumer, the economies arise from the multiplicity of goods offered, not from the scale of his purchases). On the input supply side, economies of scope arise in the wider variety of production inputs, production services, credit services and skills available in the urban area. For example, a wide variety of manufacturing stages and production services, which a firm in a rural area might have to do itself, can be purchased from specialized firms which compete with each other or can be contracted out to specialized firms. Thus firms are able to concentrate on a few production processes, i.e. specialize more sharply. On the output side economies of scope arise from the multiplicity of clients in easy reach, and the multiplicity of transport, marketing and communication services which can be used to reach consumers and markets elsewhere. We show, for example, that nearness to these facilities allows rural households in the vicinity of Bangkok to derive more income from the sale of home-made manufactured goods than those in the remote provinces, a finding which was quite unexpected (Section 4.4).

Despite high and often agonizing commuting costs, workers (consumers) benefit from the scope of urban areas in terms of the variety of consumer goods, services and education opportunities available. Labor market opportunities are also wider and less risky.1/ If workers possess specialized

---

1/ In Section 4.4 it is also shown that workers in the provinces adjacent to the metropolis derive benefits from salaried employment opportunities associated with the nearness to Bangkok.

skills, they face lower risks of capital loss associated with declining demand for the output of the firm they work for. They may change employment into other firms or even sectors without moving, i.e. without experiencing the capital losses associated with migration. The extreme contrast is the small rural textile town dependent on a single firm: if the mill shuts down, alternative employment may entail the simultaneous migration of many workers. The cost of migration may then include capital losses on housing and land owned by these workers.

The Thai experience also demonstrates that improvements in transport costs for remote areas is not sufficient to overcome these urban economies of scope. Section 6.3 discusses the counter examples of provincial towns in the Center such as Chainat, Singburi or Suphanburi which are extremely privileged from a transport point of view, but which, so far, concentrate entirely on agricultural support activities. If these towns do not produce manufactures for other regions or for export, it is unlikely that transport improvements in the outer provinces can overcome the economies of scope of Bangkok. 1/

We should note, however, that the government does have some tools to speed up the emergence of similar economies of scope in at least some major regional cities. These include the locational choices for administration, educational and health services to cities outside of Bangkok and the strengthening of local and regional administration relative to the central government.

The urban economies just discussed are hard to measure and the economic profession is still wrestling with how to do it. However, the systematic nature of the patterns of division of labor between rural and urban areas, in Thailand and elsewhere, is an indication that these economies are real, large and permanent.

1.2.6 The Impact of Technical Change and the Responsiveness of Entrepreneurship in Rural Areas

The report discusses at length the successful and extremely rapid emergence of the agricultural machinery industry and of the animal-feed industry since the mid-1960's (Section 3.2). The machinery industry generated and produced highly innovative and locally-adapted design of tractors and other machines. This occurred in response to increases in labor demand in the Central Plain. The animal-feed industry, on the other hand, grew in response to the opportunities generated by the introduction of hybrid chickens from the developed world. It is concentrated more sharply in and around Bangkok and in

---

1/ Most distortions against rural areas discussed in Section 1.2 affect the sectoral composition of output, not the comparative advantage of rural and urban areas within a particular sector. Thus the distortions have an impact on overall growth of urban versus rural sectors, but not on the choice of location within each sector.

larger firms than the machinery industry, although some plants also exist in the outer provinces. The high spatial concentration reflects the concentration of poultry production near the center of urban demand (Section 4.4); since chickens do not rely heavily on a land base for production, they are a "mobile" economic activity, as is most manufacturing, and tend to locate near the centers of high demand. Employment in the machinery and the feed industries is not very big. In particular it must be recognized that the employment potential in manufacturing machinery is minimal compared to the potential labor displacement implied in full-scale agricultural mechanization. The existence of an open land frontier and the concentration of mechanization on tillage, threshing and transport operations mean that mechanization has probably not had serious adverse employment consequences. Rather it has accommodated the process of agricultural intensification in the Center, and the process of area expansion elsewhere.

The responses of these two industries, in the wake of expanding demand, as well as the speed of expansion of rice mills, sugar mills, cassava-processing facilities, kenaf-baling plants, and fishing-boat fleets, imply an impressive responsiveness of urban and rural entrepreneurs to opportunities in rural areas as and when they arise (Chapter III). They also imply that capital market imperfections and problems of finding or acquiring skills in rural areas have not been the major factors holding back resource-independent manufacturing in rural areas.

Also notable is the impact of the availability of, and technical change in, consumer goods on the trade and service establishments in rural towns and villages. The report shows the close association of ownership of automobiles, motorcycles, and television sets with per capita income levels in rural areas (Chapter IV). Service facilities for these durables are available even in remote areas but they are clearly more concentrated in the larger towns of the richer changwats and amphoes.

Ownership of bicycles and radios is uniformly high. These durables are more evenly spread and we can find little relationship between regional income levels and the ownership of such assets. It is also notable that even in remote trading posts it is hard to find many rurally-produced consumer goods, except for the items discussed in Section 1.4. Rural populations exhibit no particular taste for rurally-produced goods (Section 4.2).

1.3 Policy Implications

It is not the role of a report like this to sketch detailed policy recommendations for particular government agencies or particular regions, but rather to discuss the implications of existing policies and potential policy alternatives for the future development of rural Thailand. We are particularly concerned with the emerging division of economic activity, both between urban and rural areas, and among rural regions.

Nevertheless, the policy analysis presented below has quite clear implications. We have not attempted to soften these implications with noneconomic considerations. Such considerations will undoubtedly shape any

policy or program changes with respect to rural areas in the future. The function of the analysis presented here is to bring out the possible efficiency and distributional consequences of alternative policy actions, and not to preempt, through the analysis itself, what must be the function and prerogative of domestic policy makers.

1.3.1 The Overriding Importance of Agricultural Growth

Given the limited and specific nature of rural manufacturing, and given the heterogeneity and geographic dispersion of the other activities which make up the bulk of rural nonfarm employment, the potential for direct project or program intervention to foster growth of these activities is limited (as will be discussed below). More important are policies which affect the growth potential of nonfarm activities indirectly.

The analysis presented above concerning the overriding importance of consumer demand and forward and backward linkages to agriculture imply that policies which promote or discourage agriculture will have powerful effects on the nonfarm component of rural development. Consistent with this analysis is the exceptional nonfarm growth experienced in the past decades by all regions of Thailand in the wake of rapid improvements in farm incomes and farm production (Chapter II). The Muda region of Malaysia, the Indian Punjab, and Taiwan are other examples of areas experiencing high growth of nonfarm activities in the wake of agricultural growth.

In Table 1.1 we summarize a variety of policies which specifically favor rural areas and agriculture. We exclude general education, roads and other investments which take place in both rural and urban areas. The quantifications are order-of-magnitude estimates only and not too much should be made of the specific figures given. We see first that the major transfers in favor of rural areas are specific agricultural investment programs in irrigation, extension and research (roughly B 8 1/2 billion). The rural employment generation program, discussed in more detail below, adds another B 3 1/2 billion. The subsidy elements implied in credit policies are hard to quantify, but the major elements are the interest subsidy on Bank of Agriculture and Agricultural Cooperatives (BAAC) loans for agriculture and the income transfer implied in the overdues. The estimates presented in Table 1.1 are clearly generous estimates, which probably err on the high side. It is notable that, compared to these agriculturally related transfers, all other industrial subsidies and policies combined imply only minimal income transfers in favor of rural areas, despite the attention such special schemes may receive. Given our analysis, the emphasis on agricultural development in the expenditure patterns of the government for rural development is clearly warranted. Since agricultural growth is the key factor fostering rural nonfarm employment, there are important indirect benefits for nonfarm activities from investments in irrigation, agricultural research and improvements in the efficiency of rural credit systems. The quantification of these indirect benefits is difficult (for a very careful study of Malaysia see Bell and Hazell). However, investments in other parts of the economy have income and forward and backward linkages as well. A debate as to which linkages are most important may not be very fruitful compared to the

Table 1.1: A SUMMARY OF GOVERNMENT POLICIES IN FAVOR OF RURAL AREAS, THAILAND

		Subsidy Element (million baht)
1.	Commercial bank loans to agriculture:	
	Interest differential of 2-5% on about B 10 billion	200-500
2.	Commercial bank loans to agrobusiness:	
	Voluntary lending exceeds quota	none
3.	BAAC loans to agriculture	
	Interest subsidy of 5-10% on about B 10 billion	500-1,000
	Loss of capital from overdues, 10-20% of loans outstanding per year	1,000-2,000
4.	IFCT loans to food and tobacco	
	Interest subsidy of 5-10% on B 400 million	20-40
5.	SIFO loans outside Bangkok	
	Interest subsidy of 5-10% on about B 80 million	4-8
6.	Special regional incentives	negligible
	Reduces capital costs by only about 10% relative to urban areas	
7.	Rural Employment Generation Program (1980)	3,500
8.	Agricultural development expenditures	
	on irrigation	7,165
	on extension	917
	on research	515
	Total of quantified effects	13,821-15,645

recognition that the specific agricultural investments in irrigation, research, extension, etc., do have a clear regional dimension, i.e. they can be targeted to specific regions, which is far more difficult with general price and trade policy measures and incentives aimed at fostering industrial investments.

We started with a discussion of the impact of transport and communication investments on both agricultural as well as nonagricultural activities and specialization. In the limited regions where transport and communication systems are yet poorly developed, further investments can have high payoffs in terms of both agricultural and nonagricultural rural growth (Section 6.3). There may of course be regions where rural road investments may have been pushed into the region of diminishing returns. The apprehension that roads may displace more nonfarm activities in rural areas than the new but different, opportunities they create has not been justified by our work (Sections 4.2 and 6.3) - a finding consistent with other research studies which have asked this question. Moreover, road and communication investments can also be targeted towards poorer regions and thus represent one of the few opportunities for region-specific policy intervention.

A rural development strategy based primarily on agricultural growth sometimes faces the problem of income- and price-inelastic demand for most agricultural commodities. For example, further expansion of cassava and kenaf is limited from the demand, not the supply side. With further expansion, prices will move against these commodities with the corresponding adverse consequences for rural incomes. This limitation does not invalidate the strategy in general, and does not apply to traded commodities with large and diverse international markets such as rice. Furthermore, few other alternatives exist to foster rural development. The recognition of these demand limitations directs attention towards development efforts in favor of other traded agricultural commodities, or, if not traded, towards those with relatively higher income and price elasticities.

1.3.2 Policies At Cross Purposes

Thailand has long pursued agricultural price policies and, more recently, industrial trade policies which sharply distort producer incentives against agriculture and in favor of capital intensive, import-substituting or export-oriented manufacturing (Chapters VII and VIII). Other manufacturing policies and some special promotion programs further distort incentives in favor of capital-intensive ventures, and in favor of large-scale enterprises, via lower cut-off points on the size of industrial plants eligible for subsidies and other incentives. These policies must have seriously hampered the growth of rural nonfarm activities and employment. They are as follows:

1. The direct income impact on producers of rice taxation and rubber taxation. In Chapter VIII we have estimated this impact to be between 8,400 and 14,500 million baht for rice and approximately 3,300 million baht for rubber. It is clear that these direct income effects of the pricing policies alone take out about as much or more from the rural areas as the combined rural development expenditures for agriculture and nonfarm activities.

2. The industrial and trade policies tax rural incomes by increasing the prices of consumer goods and production inputs purchased from the urban areas. We have not estimated the magnitude of these effects. However, given the high protection rates in force, these tax effects must exceed the income transfers implied in special rural industrialization efforts many-fold. They are more likely to be of the order of the rice tax effects. The protection policies, by favoring late stages of consumer goods manufacturing, also favor the use of foreign rather than domestic raw materials, but the magnitude of this effect is unknown.

3. Both agricultural price and industrial protection policies discriminate against the production of labor-intensive commodities. In view of the spatially integrated nature of the Thai labor market, they must have a wage-reducing effect which falls heavily on rural and urban wage earners (but the loss of the latter is partly offset by lower rice prices).

4. The rural output and income effects of all these three policies together have detrimental impacts on the rural economy via the backward, forward and consumer demand linkages to rurally-produced goods and services, and thus must have had an indirect secondary impact on rural incomes. Again this is an effect which is hard to quantity but the analysis of the report leaves little doubt that it must be large.

Overall, our analysis implies that the impact of the general discriminatory policies against agriculture must be a multiple of the countervailing incentives and investments provided by policies and programs aimed at fostering agriculture and rural industrialization. The complete set of special employment programs over the past 8 years, such as the Rural Employment Generation Program, have probably resulted in less net transfers to rural areas than the impact of rice and rubber policies in a single year. It is surely important to reconsider the consistency of a policy mix that incorporates a general incentives structure which discriminates against rural areas and, at the same time, attempts to stem the resulting tide of urbanization in metropolitan Bangkok via small, and often poorly targeted rural nonfarm development efforts.

We recognize that revenue and dynamic considerations may call for tariff and taxation measures which imply modest effective protection for industrial sectors and modest discrimination against primary exports. But the indirect effects of such policies on rural development and urbanization must be recognized. Furthermore, past taxation and protection levels have surely been excessive, and needlessly harmful to rural areas in their concentration of protection on import competing and capital intensive commodities.

1.3.3 Excess Urbanization

In light of the discussion above, the alarm about rapid urbanization emerges in a somewhat altered perspective. First of all, past policy has clearly been a net contributor to faster urbanization. A less interventionist industrial tariff and agricultural export tax policy would have resulted in

less urbanization. This despite the specific decentralization measures and the regional cities program discussed in detail in Chapter VII.

Second, if our analysis concerning the nature of urban economies and labor cost differentials is correct, the cost of artificially pushing much resource-independent manufacturing into the outer regions or the rural areas would be very high. Our analysis implies that it is not infant industry problems which prevent resource-independent industries from locating in rural areas, but large and permanent cost and market disadvantages of producing there. Limited opportunities will exist and will have to receive some policy attention (especially in textiles). But a solution to rural poverty cannot be expected from resource-independent manufacturing in the poor regions where local markets are ill developed.

Policy needs to be increasingly directed towards accommodating the urban growth in the metropolitan region and ameliorating its adverse effects by specific policy interventions such as zoning laws, better settlement planning and transport investments there. The decentralization of economic activity along the Eastern Seaboard and into other adjacent changwats of Bangkok is proceeding rapidly and deserves to be accommodated in a foresightful manner.

Regional cities also offer potential for positive policy or program interventions, such as improvements in infrastructure, transport and telecommunications. The latter may play a specially important role given the evidence we assembled on the importance of communication to centers of final demand. Administrative decentralization would also be helpful. And, finally, the government sometimes has a choice about the location of its own activities and institutions in education, health and other fields which could be used to favor some of the regional centers.

1.3.4 Targeted Investment Programs for Poverty Areas

An agriculture-based strategy of rural development, however, runs into difficulties in regions with limited agricultural potential but rapid population growth such as the Northeast, the mountainous Upper North, and possibly the Lower South. Similar regions have posed some of the most intricate development problems in both developed as well as developing countries: the Massif Central and the Bretagne in France, Southern Italy, Appalachia in the U.S., Northeastern Brazil, the Deccan Plateau of India and, in an international setting, the Sahel. Apart from mountainous regions, they include most of the semi-arid tropical world, i.e. regions somewhat similar to Northeastern Thailand.

It is clear that the largest benefits of improved terms of trade for agricultural outputs would accrue to the Central regions, the Lower North and the South. Nevertheless, data discussed in Chapter VIII show that production of rice for sale is not at all negligible in the Northeast and in the Upper North, and, given the large size of these regions (nearly half of the total population resides there), the total benefits accruing to them from improved prices would be quite substantial. Furthermore, improved prices could

substantially raise the rate of return to fertilizer and private or public irrigation investments in these regions.

While the agricultural potential is limited, it is clear that opportunities for agricultural growth exist even in these regions, especially because they start from a lower base. Semi-arid areas in the temperate zone (where agricultural research has a long history) clearly show that crop yields can be much higher than currently achieved in the poor regions of the semi-arid tropics. For many of these regions systematic agricultural research at more than miniscule levels started only in the 1970's. The neglect of genetic research on rainfed rice, both internationally as well as nationally, has been well recognized since the early 1970's (Barker, Kauffman and Herdt); yet to this date this area of research is funded at minimal levels in India, Burma, Thailand and at the International Rice Research Institute. Research on other crops in which the Northeast has comparative advantage has experienced similar lags. While some improved genotypes of rainfed rice and other crops have become available even in these areas, the lag in research continues to explain low pay-offs perceived by farmers to investments in fertilizer and improved agronomic practices in these crops. It also partly explains low pay-offs to some of the irrigation investments. The leading input, the seed, is not yet sufficiently high-yielding and reliable.

Given the limitations and costs of a strategy of rural resource-independent industrialization, it is clear that whatever agricultural potential exists or will develop in the future in these regions deserves high priority. Nevertheless, agricultural opportunities may be more limited than in more prosperous regions. The Northeast has been the major source of interregional migrants. While interregional migration rates have been fairly modest, they have increased over time and are likely to grow further in the future, unless they are hampered by restrictions. Many people of these regions will continue to migrate both to faster-growing agricultural regions and to urban centers. Such migration has been, and will continue to be, an essential mechanism for allowing the population from the poorer regions to participate in growth, both by taking advantage of employment opportunities wherever they may arise, as well as by improving the agricultural resources position of those left behind.

Many of the findings of Chapter V in this report are indeed consistent with a view that the mobility of the Thai population has contributed importantly toward equalizing income and wages of well-defined occupational groups across the broad regions of Thailand. Thus migration is, and will continue to be, an important partial substitute for regional development assistance. This fact implies limitations on (1) the size and character of regionally-targeted development assistance and (2) the price (in terms of foregone efficiency) which can be paid for it. Furthermore, unless they are well targeted, the high cost of otherwise ill-targeted development efforts may lock people into low pay-off activities which may fail in the longer run. The people bound by unwise efforts would have been better-off migrating in the first place.

It is clear from the data, however, that despite the migration flows and the general effectiveness of labor market mechanisms in Thailand, important regional income differentials persist. While transport costs are low, migration is not costless but often implies costs in terms of capital and psychic losses. The migration flows have not been sufficiently high to equalize the substantial income gradient between the outer regions and the more central ones. Furthermore, from the experience of similar poverty regions in the developed world it is quite clear that such disadvantaged regions provide pools of emigrants for decades, and that it takes very long indeed before the migration streams fully equalize income opportunities.

Therefore a limited number of government interventions and programs can and should be specifically targetted to benefit the poorest sub-regions of the country. Selected irrigation opportunities may exist. Where rural roads are still poorly developed, further road construction deserves high priority. Land development, such as improvements in drainages and erosion control may, in selected environments, have a good pay-off, as may assistance for the development of some tree crops or livestock. No individual program, of course, can be a panacea for wide areas. Instead, individual and specific projects must be sought out at subregional levels. It is of course not possible to identify such projects in our report. This must indeed be the function of government personnel located in the poverty regions. It is clearly important to strengthen local administrations to improve their capacity to seek and respond to opportunities, and to carry out the corresponding projects.

In Chapter V we discuss the various rural employment and development schemes which have been executed since the Tambon Development Program over the past decade. These efforts, at least initially, have led to some of waste, which tends to be associated with wholesale crisis efforts. In the more prosperous regions they have drawn labor out of alternative employment where they would probably have been more productive. The ability of the schemes to focus on poorer regions and on creating valuable infrastructure there has improved. Further focussing on these twin objectives deserves high priority. In other regions such schemes are not the proper vehicle for carrying out investments. Within the strategy of agricultural and rural development sketched here, and underlying recent policy thinking, it thus makes little sense to continue such programs in the prosperous Center, the Lower North or the Upper South which stand to benefit far more from improved macro policies. 1/ In these regions labor demand from agriculture does not have sufficiently sharp seasonal variations which would make slack season intervention necessary or desirable. At the most one could operate such programs as relief measures after major flood or drought disasters.

1/ There may of course be individual subregions in the more prosperous regions which require some special attention.

In selected poverty areas of the Northeast and the Upper North there may be room for combining resource and infrastructure development efforts with seasonal employment schemes. Construction activities, if at all feasible, should indeed be meshed into the seasonality of agriculture. A sensitivity in the choice of technique and of contracting modes to the desirability of employing large numbers of workers during the slack season is required.

What about specific support for rural manufacturing? Keeping in mind the overall limitations of such a strategy for the poverty regions, there may be selected opportunities here. Successful implantation of new textile industries or crafts has occurred in some places. However, there exists an equally impressive record of failures which goes back for many years. The earliest unsuccessful systematic efforts to upgrade the quality of silk weaving in rural Thailand with the help of Japanese experts and new looms, for example, go back to 1905. Many of these projects fail because they emphasize skills and techniques in the face of severe market limitations for high-quality outputs and because they de-emphasize development of markets, and of the systems which can rapidly bring market information to bear on the rural production decisions. Furthermore, they may pay insufficient attention to limitations in labor supply and the high cost of labor as when attempts are made to foster the production of rural crafts in regions where double cropping, tree crops or already existing complementary nonfarm opportunities provide sufficient labor demand through most of the year. The study teams did indeed encounter such misguided efforts.

Thailand has created an impressive array of institutions with the expressed goal of fostering rural textile and craft industries (Chapter VI) which deserve continued support. Private entrepreneurs have also penetrated into some rural areas as purchasing and marketing agents, who often also provide inputs, designs and/or credit. It is doubtful that any new institutions are required. However, the effectiveness of some institutions might be improved by selectively targeting towards areas and types of activities which are complementary with, or related to, agriculture, and by stressing attention to the final demand conditions of the outputs to be produced.

Rural industrial estates within which potential manufacturers are to be provided with sites and services, and sometimes extension and credit as well, do not appear to be a viable policy tool, however. The perception behind this approach is that it is constraints on the supply side which prevent industries from locating in rural areas, whereas this report emphasizes the far greater importance of the location and character of final demand. Thus, with few exceptions, these estates have not lived up to expectations in the countries where they have been created. Moreover, the sites and services provided were frequently too expensive for the small-scale activities which have comparative advantages in provincial and rural areas.

One policy intervention for the poverty regions, however, remains essential. This is the upgrading of the access of people residing there to education and training opportunities on a par with the more prosperous areas. Since many of these regions can be expected to provide migrants for

decades to come, and since the potential for investment in physical capital is limited as well, a distributional strategy towards these areas must contain an important investment component into human capital. Not only will education and training assist people in this region to take advantage of those opportunities which are there, it will also equip the future migrants with knowledge and skills to take advantage of opportunities at their destination.

Given the importance of migration as an equalizer of economic opportunities for the poor areas, it matters little if skills acquired in a school or training institute are not used in the poverty region where the institution is located, as long as the students from families residing there have access to the training and find the training useful wherever they may go. The distributional costs of neglect of investment in human capital of potential migrant populations can be high. It often implies that the migrant populations must enter the work force at the bottom of the social and economic ladder once they reach their destinations.

II. AN OVERVIEW OF RURAL NONFARM ACTIVITIES AND AGRICULTURAL DEVELOPMENT

2.1 Definitional Issues

The report will pay very little attention to the precise definition of rural areas as compared to urban areas. The rural-urban distinction is a continuum with Bangkok/Thonburi having an almost exclusively urban character and remote villages being clearly rural. Any attempt to allocate settlements in between as being either urban or rural must be arbitrary. Furthermore, it may result in a neglect of the important agricultural/nonagricultural interaction of the towns and villages, where towns provide goods and services to the surrounding villages and the villages provide earnings opportunities for town residents and vice versa. Even casual visits to non-metropolitan areas quickly reveal the overriding importance of these interactions. Much of our analysis will therefore consider nonmetropolitan changwats or amphoes as complete economic units and thus focus on interregional differences, although we shall also look at the distribution of economic activities among settlements of different sizes within changwats or amphoes where relevant.

In the discussion, particularly of the Labor Force Surveys, the distinction between municipal and nonmunicipal areas is made. Municipal areas, regarded as urban, are defined in the 1970 census as comprising -

1) City - Nakhon: with a population of at least 50,000 persons, with an average density of not less than 3,000 per square kilometer, and with sufficient tax revenues to execute municipal affairs.

2) Towns - Muang: established where the administrative seat of the provincial government is located or where the population is at least 10,000 persons, with an average density of not less than 3,000 per square kilometer, and with sufficient tax revenues to execute municipal affairs.

3) Commune - Tambon: established wherever deemed appropriate.

Nonmunicipal areas include villages and sanitary districts, the latter being localities which have reached the minimum size to qualify as a municipality but have not yet developed other urban characteristics.

Agricultural activities are all those activities concerned with crop and livestock production, but not with processing and transport outside the farm. Farm activities are agricultural activities carried out on the farm of the household operating the farm. Off-farm activities include all nonagricultural activities wherever they take place plus those agricultural activities which take place on the farms of other households, i.e. they can be divided into nonagricultural and agricultural off-farm activities. 1/ Agricultural off-farm activities arise out of endowments of the household

---

1/ See Appendix A, Introduction to Statistical Tables.

which are rented out to other farms: agricultural wage employment, rental of land, machines or draft animals. It is therefore possible for nonfarm households to have agricultural (off-farm) income.

Farm households operate at least one agricultural enterprise (crop production or animal husbandry). Nonfarm households have no agricultural activity, but can have agricultural off-farm income from endowments which they rent out.

2.2 The Extent, Growth and Composition of Rural Nonfarm Activities

The most comprehensive source of data on the extent of rural nonfarm incomes comes from the Socio-Economic Survey (SES) of 1975/76. (However, the SES data contain few details on the composition of nonfarm income or on its growth over time). The SES divides the country into three types of areas: municipalities with an urban character, sanitary districts with a semi-urban character, and villages. The villages contain approximately three-quarters of the population and of the economically active population, with the remainder roughly evenly divided between municipal areas and sanitary districts.

The sectoral composition of the labor force by usual main occupation (Table 2.1) clearly shows the semi-urban character of sanitary districts where the labor force is approximately evenly divided between agriculture and nonagriculture; in municipal areas, on the other hand, 95% of the labor force have nonagricultural usual main occupations, while in the villages only 13% of the labor force are so specialized.

In the villages, 40% of the individuals with nonagricultural occupations are in production and transport activities (5%); as a proportion of nonfarm activities, production and transport activities are relatively more important in the villages than in the cities or the sanitary districts. The next most important group consists of sales workers (3.2%), followed by professional, technical and administrative workers (1.6%). Less than 1% of the village labor force are in service jobs and only 0.4% in clerical jobs.

The occupational distribution of individuals differs only slightly from the occupational distribution of households, where we define farm households to be those which have an agricultural crop or livestock enterprise. Note that farm households often contain members, including the head, whose usual main occupation is not in agriculture. Furthermore, households whose main income comes from a nonagricultural source, say a rice mill, but who have agricultural enterprises (e.g. raise hogs) are counted as farm households by our definition.

Average total household incomes are the largest in municipal areas, the lowest in villages and at an intermediate level in the sanitary districts. Farm households tend to have lower incomes than nonfarm households without an agricultural enterprise, with the difference being larger in sanitary districts than in villages or municipalities. But the income differences between different locations of residence by far exceed those associated with farm/nonfarm status. In particular, in the villages the

average income of the specialized nonfarm households exceeds that of households with agricultural enterprises by only 10%.

The Socio-Economic Survey of 1975/76 allows a breakdown between farm income and total off-farm income. Farm income is defined as the sum of net farm cash income and the imputed value of home-produced food. Total off-farm income includes income from nonagricultural sources and also agricultural income which is earned off the farm, that is, income from renting out land, labor, animals and equipment to other farmers. As would be expected, Table 2.1 shows that farm income is a larger proportion of the total in progressively more rural locations and among farm households; however, even among farm households in villages it accounts for just over 60% of the total. The agricultural component of total off-farm income is estimated as the sum of agricultural wage income, land rent, other rent, food and other goods received as pay, and crops received as rent; this amounts to 6% and 10% of the total in sanitary districts and villages. Wage income is divided into agricultural and nonagricultural according to the primary occupation of the individual 1/. Thus agricultural wage income here may include a nonagricultural portion from the individual's secondary occupation. Likewise, the estimate may exclude agricultural wage income from an individual's secondary occupation. However, the discrepancy cannot be large, given that only a small percentage of the economically active population have two occupations in different sectors at any one time and the primary occupation necessarily accounts for more than half of each individual's income 2/. The remaining components of agricultural off-farm income may also originate in part in the nonagricultural sector. Thus qualified, nonagricultural incomes are estimated to account for 68% of total incomes in sanitary districts and 39% in villages. Note that even among farm households, incomes from nonagricultural sources amount to 41% in sanitary districts and 29% in villages, with agricultural off-farm income accounting for 8% and 9% of the total 3/.

1/ Wage incomes from primary and secondary occupations were not kept separate on the data tapes.

2/ Of those reporting agriculture as the sector of their primary occupation, 20% report nonagricultural secondary occupations; and of those with nonagricultural primary occupation, 14% report agricultural secondary occupations. These percentages cover those with different occupations at different times of the year; thus the proportions with two occupations in different sectors at the same time cannot be very large.

3/ These estimates are reasonably consistent with those obtained from the Survey of Farmers which show agricultural off-farm income and nonagricultural income to be 9% and 35% of total income for all farm households in 1978/79 (see Table 2.9).

Table 2.1: EXTENT OF RURAL NONFARM ACTIVITIES, THAILAND, 1975/76

	Area of Residence		
	Municipal Areas 1/	Sanitary Districts 1/	Villages 1/
Population in Private Households (000)	5,244 (15%)	4,225 (12%)	26,358 (74%)
Average Household Size	5.2	5.2	5.5
Economically Active Population (000)	2,877 (11%)	2,776 (11%)	20,166 (78%)
Sectoral Composition of Labor Force by Main Occupation (%)			
Agriculture, Forestry and Fishing	4.66	56.82	87.01
Agriculture	3.69	55.91	85.84
Forestry and Fishing	.97	.91	1.17
Nonagriculture	95.34	43.18	12.99
Professional, Technical, Administrative	9.97	4.51	1.64
Clerical	7.50	1.31	.40
Sales	35.66	13.56	3.23
Services	11.70	4.31	.94
Production, transport, etc.	26.63	13.06	5.23
Common laborers	3.88	6.43	2.89
Textile workers	.65	1.28	.25
Food-processing workers	1.56	.91	.55
Construction workers	2.61	1.75	.75
Transport workers	5.54	2.69	.83

Type of Household:	Municipal Areas 1/			Sanitary Districts 1/			Villages 1/		
	Farm	Nonfarm	Total	Farm	Nonfarm	Total	Farm	Nonfarm	Total
Distribution of Households by Type (%)	4.63	95.37	100.00	52.65	47.35	100.00	82.71	17.29	100.00
Total Household Income	42,769	41,848	41,891	25,019	29,993	27,377	17,661	19,644	18,004
Distribution of Household Income by Source (%)									
Farm Income	29.54	1.73	3.04	50.47	3.36	26.01	61.53	8.31	51.48
Total Off-Farm Income	70.46	98.27	96.96	49.53	96.64	73.99	38.47	91.69	48.52
Agricultural Off-Farm Income	2.33	2.09	2.11	8.12	4.36	6.17	9.06	11.63	9.54
Nonagricultural Income	68.13	96.18	94.85	41.41	92.28	67.83	29.41	80.07	38.97

1/ For definitions, see Section 2.1.

Source: Data tapes of the Socio-Economic Survey, 1975/76, National Statistical Office.

We shall see below that much of this nonagricultural income in turn derives from activities closely linked to local agricultural production. We shall not, however, attempt to provide even an approximate further breakdown of these 40% into agriculturally related and unrelated activities.

The Socio-Economic Surveys do not give us any information about the growth of nonfarm incomes of rural households over time and comprehensive data from which growth rates of nonfarm incomes can be computed do not exist. However, the biannual Survey of Farmers of the Office of Agricultural Economics has collected information on nonfarm incomes since its inception in 1971/72. The definition of farms is almost identical to the one of agricultural enterprise households in the SES, i.e. it is a very comprehensive one which includes even individuals whose major income comes from nonagricultural sources.

The major strength of the Survey of Farmers is the information it provides on the sources of nonfarm income of agricultural households. However, in the early years of the survey no data on home consumption were collected so that a complete analysis of income growth is not feasible. In Table 2.2, we therefore concentrate on growth rates of agricultural output, as measured by national account statistics, and on agricultural sales, as measured by the Survey of Farmers. All growth rates are real growth rates with consumer price indices for each major region used as deflators. Thus agricultural GDP is not a "quantity" measure but an "income" measure and the same is the case for sales.

In 1978/79, farm households had an income of B19,478, of which B8,429 was earned off the farm, that is, not from any agricultural enterprise of the household. However, of the total off-farm income, B1,671 was earned in renting out household endowments to other farmers, i.e. it was the sum of income from agricultural labor, renting out of land and renting out of machines and draft animals. Even after netting out this portion, nonagricultural off-farm income was B6,758, or slightly more than one third of the income of farm households.

Since separate data collection for agricultural and nonagricultural wage income was initiated only recently, growth rates can only be computed for total off-farm income, which grew at the annual rate of roughly 12% over the seven-year period between 1971/72 and 1978/79. Since agricultural GDP, agricultural sales and agricultural cash expenses grew at substantially lower rates, total off-farm income must have been growing substantially faster than farm income. This is true not only for the country as a whole but for each of its major regions. The growth of total off-farm income has outstripped agricultural income growth by the greatest amount in the North and Northeast, where agricultural income growth was roughly 5-1/2%, but off-farm income grew at roughly 12%; we shall pay considerable attention to this discrepancy in growth rates in these two regions.

Furthermore, because agricultural off-farm income is a small proportion of both agricultural and total off-farm income, we can safely infer that nonagricultural off-farm income has been growing at a faster rate than

Table 2.2: GROWTH OF NONFARM INCOMES OF AGRICULTURAL ENTERPRISE HOUSEHOLDS, GDP AND EMPLOYMENT, THAILAND

	Regional Employment		Real Regional GDP		Total Household Income /1	Off-Farm Income			Agri. Sales	Agri. Expense
	Nonagri.	Agricultural	Total	Agricultural		Total	Agricultural	Nonagri.		
In 1978/79 baht					19478	8429	1671	6758	14901	7326
1978/79 as % of Total Income					100.0	43.3	8.6	34.7		
	Annual Compound Real Growth Rates 1971/72 - 1978/79 /2 %									
Whole Kingdom	/3	/3	7.8	7.2		12.3			8.7	9.0
North	9.6	1.4	6.0	5.4		11.7			8.7	5.9
Northeast	3.5	3.6	6.7	5.5		12.6			4.6	4.2
Center	5.8	3.6	8.1	8.6		10.7			7.7	12.6
South	9.6	1.9	9.7	9.4		13.0			10.5	4.1

/1 As defined in Table 2.9.

/2 GDP and employment growth rates relate to 1971-78.

/3 Employment growth rates for the Whole Kingdom calculated from the Labor Force Surveys are higher than other estimates (3.9% as compared to approximately 3% total employment growth). Due to the yearly fluctuation in employment figures resulting from changes in survey definitions and methodologies, survey totals should not be used to determine the rate of growth. Regional rates are presented here only to show differential growth rates between agricultural and nonagricultural employment. Compound growth rates were calculated based on employment estimates for 1971 and 1978. Similar results were obtained when (1) compound growth rates were calculated using 3-year averages of end points and (2) fitting a log regression using yearly observations.

NOTE: GDP, Income and Expense Figures are deflated by Dec. CPIs for urban areas by regions, see Appendix Table A.11.
Real regional GDP figures in 1976 prices are provided in Appendix Table A.10.
For all items, Whole Kingdom includes all areas including Bangkok-Thonburi. For GDP and employment growth, Center excludes Bangkok-Thonburi. For the Survey of Farmers Income Data, Center in the 1971/72 publication includes Bangkok-Thonburi, Nonthaburi, Pathumthani and Samut Prakarn, but in our 1978/79 tabulations, these areas are excluded in the Center average. Adjusting the 1978/79 data for this discrepancy had virtually no affect on growth rates. Furthermore, due to the way in which the 1971/72 data for the Center were disaggregated, household weights from the 1976/77 Survey of Farmers were used to derive an overall average for this region.

Source: 1971/72 and 1978/79 Income Data: Survey of Farmers, Office of Agricultural Economics. Detailed tabulations for 1978/79 are in Table 2.9 and Appendix Table A.4.
GDP: National Income and Regional Product 1976, Gross Regional and Provincial Product, 1979, NESDB. See Appendix Table A.11.
Employment: Labor Force Surveys 1971 and 1978 Round 2, NSO. See appendix Table A.12.

agricultural income in all major regions of the country.1/ Note that this conclusion can also be found from the GDP statistics given in Appendix Table A.10, because total GDP increased faster than agricultural GDP for all regions.

In Table 2.3, nonagricultural off-farm income of farm households is broken down into sources. The three most important items are salaries, hired nonfarm work and "others", each accounting for between 25% and 30%. Thus over half of nonagricultural off-farm income arises from hiring out labor services of the rural households. Unfortunately the category "others" cannot be broken down further, but it includes income from all service, trading and sales enterprises which the household might have (but excluding the sale of goods made in the home, such as handicrafts). It also includes income from some mining and forestry activities (such as charcoal production). Hunting, gathering and fishing activities result in sales income of 6.4% of off-farm income, and the sale of home-made goods results in another 6.4%. Both of these income sources are quite small relative to labor incomes.

2.3 Agricultural Regions and the Extent and Nature of Rural Nonfarm Activities

The hypothesis suggested in the Introduction concerning the links between the growth and nature of rural nonfarm activities and agricultural development leads us to expect variations in the extent and pattern of nonfarm activities across regions with varying agricultural experiences. The cropping

---

1/ Let a be the growth rate of agricultural income, with b the growth rate of agricultural enterprise income and c the growth rate of off-farm agricultural income. Let t be the growth rate of total off-farm income, with z that of nonagricultural off-farm income.

Then $$a = a_b b + a_c c = .072$$

$$t = t_z z + t_c c = .123$$

where a_b and a_c are shares of the respective income components in agricultural income, and t_z and t_c are the shares of the respective components in off-farm income. The data tell us that $t > a$ but this by itself does not imply that $z > a$, especially if t_c and c were very large. However, in 1978/79, for the country as a whole t_c was about 0.2 while a_c was about .13. It is easy to show that even if c had been as high as .5 per year, z would still have exceeded b.

Table 2.3: COMPOSITION OF NONAGRICULTURAL OFF-FARM INCOME OF AGRICULTURAL ENTERPRISE HOUSEHOLDS, THAILAND, 1978/79

Source of Income	% of Total
Total	B 6758 = 100.0
Salaries	24.2
Hired Nonfarm work	27.8
Selling of Nonraised Animals and Off-farm plants and crops	6.4
Selling Other Home-made Goods	6.4
From Relatives, Rituals and Ceremonies	5.8
Interest Income	0.4
Other	29.1

Source: Survey of Farmers, 1978/79, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives; See Appendix Table A.6.

pattern of a region is in turn determined by natural conditions, such as soil types, climate, rainfall, drainage and topographical features, as well as infrastructure, such as irrigation systems and communication networks.

In this report we divide the country into nine agricultural regions, two in each of the North, Northeast and South, and three in the Center. The Greater Bangkok Metropolitan Area, which includes Nonthaburi, Pathumthani and Samutprakan, is considered an additional special region. 1/ The regions form distinct agricultural areas with quite different infrastructures and recent experiences. In particular, the cropping patterns show considerable variation across regions. Table 2.4 gives the regional utilization of the area under holdings by broad categories: rice, field and vegetable crops, permanent crops, forest and pastures, and other uses. Table 2.5 gives the regional shares in the total production of the major crops. We first give a brief description of each region as general background for the study and then present the extent and nature of rural nonfarm activities for the different regions.

2.3.1 Agricultural Regions

The Upper North can be characterized as smallholder agriculture with a substantial landless labor population. The average size of landholding in this region is by far the smallest in the country. Fully three-quarters of the total area under holdings is in rice. The region is the second most important one for soya beans and the most important for groundnuts, in terms of total area planted and output. Other dry season crops are grown, and some of the area is under tree crops. Some parts of the region are under irrigation, while others are not. There are large differences in cropping patterns and crop yields depending on the availability of water. Where water supplies are reliable, there is double-cropping of rice and very high yields. In addition, several dry season crops are grown: soya beans, groundnuts and mung beans. Where water supplies are not reliable, the average size of holding is larger and rice yields are lower. Maize can be grown in some of these areas.

The Lower North is characterized by recent rapid expansion and immigration. The area under holdings has increased very rapidly, by 65% over the fifteen-year period between 1963 and 1978. There has, in addition, been heavy immigration of both cultivators and noncultivators into the area, especially into Kamphaengphet and Phetchabun.

The extent of crop diversification is greatest here of all the agricultural regions, with 32% of its area under field and vegetable crops. The region is a significant producer of maize (49% of total production); cotton (34%); mung beans (78%); soya beans (50%); sorghum (57%); and sugarcane (16%).

1/ The classification corresponds to the one used in the Socio-Economic Survey, 1975/76, of the National Statistical Office. See Appendix Table A.1 for details.

Table 2.4: LAND UTILIZATION BY REGION, THAILAND, 1978

SES 1975/76 Region	% Area Under Holdings in				
	Rice	Field Crops/ Vegetable Crops	Permanent Crops	Forest + Pastures	Other
North-Upper	76.0	17.1	3.9	1.5	1.5
North-Lower	63.5	32.2	1.7	1.8	0.8
Northeast-Upper	72.4	18.6	0.7	6.8	1.6
Northeast-Lower	74.6	18.3	0.8	4.5	1.8
Center-West	50.5	37.3	7.7	2.9	1.6
Center-Middle	67.8	26.6	3.9	0.7	1.0
Center-East	48.8	32.8	11.8	4.6	2.0
South-Upper	38.8	1.4	51.1	6.0	2.7
South-Lower	28.9	1.1	64.3	3.4	2.3

Source: 1978 Agricultural Census Report, Changwat Volumes, Table 2.3.

Table 2.5: REGIONAL SHARES OF TOTAL PRODUCTION OF MAJOR CROPS, THAILAND, CROP YEAR 1979/80

SES 1975/76 Region	Paddy	Maize	Cassava	Sugarcane	Mung Bean	Sorghum	Soybeans	Groundnuts	Cotton	Kenaf	Rubber 1/
North-Upper	12						34	48			
North-Lower	17	49		16	78	57	50	13	34		
Northeast-Upper	19	9	28	10				5	17	44	
Northeast-Lower	19	15	35					14	14	55	
Center-West				47					6		
Center-Middle	11	19		5	13	40	9		17		
Center-East	7		31	19				10	8		9
South-Upper	6										61
South-Lower											30
Greater Bangkok											
Whole Kingdom	100	100	100	100	100	100	100	100	100	100	100

Note: The regional share of a given crop is suppressed if it is under 5%.

1/ Agricultural Extension Department Data for 1975.

Source: Agricultural Statistics of Thailand, Crop Year 1979/80, Tables 19, 21, 23, 25, 27, 29, 31, 33, 38 and 40, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

Both the Upper Northeast and the Lower Northeast are semi-arid tropical regions with erratic rainfall, relatively poor soils and little investment in irrigation. They are thus characterized by a highly seasonal agricultural labor demand. Both regions can be characterized by two types of farmers: those growing only rice under rainfed conditions and those who have diversified into cash crops. Approximately three-quarters of the total area under holdings is in rice, while just under one-fifth is under field and vegetable crops in both cases. The pattern of crop diversification varies between the two regions of the Northeast, however.

In the Upper Northeast, where the rainfall is heavier, diversification has been into maize, cotton, kenaf and cassava, with the most recent trend being a switch from kenaf into cassava. Sugarcane is now becoming an important cash crop in the area around Udonthani. Overall, in terms of total area planted and production, the Upper Northeast is an important producer of cassava (28% of total production); maize (9%); sugarcane (10%); cotton (17%) and kenaf (44%). The Lower Northeast has diversified into cassava (35% of total production); maize (15%); kenaf (55%); groundnuts (14%); and cotton (14%).

The Center consists of three quite distinct subregions. The Center-West has experienced the most recent expansion in cultivated area and has few irrigation facilities. This is the sugarcane region, accounting as it does for 47% of the country's total production of this crop. Notwithstanding this fact, nearly half of all the region's farm households grow only rice.

The Center-Middle is the major rice-producing area with the greatest investment in irrigation facilities. It is characterized by two different types of farmers: those growing rice, mostly under a double-cropping system with high-quality irrigation, and maize farmers. Roughly 70% of all Center-Middle farmers grow rice; 11% grow maize. The latter are concentrated on the eastern side of the region, in Lopburi and Saraburi. This is the second most important maize-producing area, accounting for 20% of the total production. It is also a significant producer of cotton (17% of production); sorghum (40%); mung beans (13%); and soya beans (9%).

The Center-East also has few irrigation facilities. It is the traditional cassava region. Because of a fall in cassava prices during the 1960's and early 1970's, aggravated by declining yields, cassava production stagnated. Today it remains the second most important region for cassava, accounting for 31% of total production. Other important major crops are sugarcane (19% of total production) and rubber (9%). The region is also notable for other tree crops, mostly fruits; these account for some 3% of the area under holdings. Finally, fishery is an important industry in the Center-East.

The Southern region has agroclimatic conditions quite distinct from the rest of the country. Its agriculture is dominated by tree crops, mainly fruit trees and rubber, which generate only modest seasonal fluctuations in labor demand. Mining, forestry and fishing are also extremely important industries. Although rice is grown by the majority of farm households, the

area under rice as a proportion of the total cultivated area is the lowest of all the regions, 39% in the Upper South and 29% in the Lower South.

In the Upper South, 51% of the area under holdings are in permanent crops, namely fruit trees and rubber. The region accounts for 61% of the total production of rubber, but the majority of farm households also grow rice. The area stagnated during the 1960's and early 1970's when rubber prices fell; however, the prices have risen sharply since 1973 and production has recovered.

In the Lower South, consisting of the four predominantly Muslim provinces, the average size of holding is much smaller than in the Upper South. Tree crops take up 64% of the total area under holdings and the region accounts for 30% of the total production of rubber. It is a rice-deficit region; rice is grown on less than 30% of the total area under holdings by roughly half the households, the remainder being in rubber or coconuts.

2.3.2 Extent and Nature of Rural Nonfarm Activities by Region

The extent of rural nonfarm activities can be measured both in terms of the number of rural households which are not engaged in farming activities and the degree to which farming households also engage in nonfarm activities. Over time the increase in rural nonfarm activities has to be measured both by the increase in the proportion of rural households which do not farm and the increased importance of nonfarm activities among farm households, although the latter depends on whether or not there is increasing specialization of activities by households over time.

Table 2.6 gives a distribution of households in each region by area of residence: municipal area, sanitary district and village. Within the officially-designated rural areas, that is, sanitary districts and villages, households are classified into farm and nonfarm according to whether or not they operate agricultural enterprises. 1/

The Greater Bangkok area and the Center-East have the highest proportion of nonfarm households in rural areas, while the Northeast has by far the lowest. In the rural areas of the Center-East, one in three households is nonfarm, in contrast to the Upper Northeast where only one rural household out of eight is not engaged in farming. Thus complete specialization of entire households outside of agriculture is the most pronounced in the richest regions and the least pronounced in the poorest ones. In the whole country,

---

1/ Note that this definition differs from the one used in earlier reports (for example, World Bank Report No. 2059-TH) in which a household was classified as being agricultural if its head was in the agricultural sector. A farm household here includes households with agricultural enterprises but whose heads are not in the agricultural sector but excludes households without agricultural enterprises whose heads work in the agricultural sector.

Table 2.6: DISTRIBUTION OF HOUSEHOLDS BY AREA AND TYPE, BY REGION, THAILAND, 1975/76
(%)

SES 1975/76 Region	Municipal Areas	Sanitary Districts		Villages		% of Region in Total
		Farm 1/	Nonfarm	Farm	Nonfarm	
North-Upper	7.4	11.1 (3.3) 2/	4.6	64.5 (14.8)	12.3	12.1
North-Lower	7.3	3.9 (1.2)	3.6	71.7 (8.0)	13.4	10.9
Northeast-Upper	4.4	5.1 (.9)	5.7	78.3 (10.1)	6.5	16.1
Northeast-Lower	6.3	4.2 (.8)	5.2	74.0 (8.7)	10.4	16.4
Center-West	8.0	10.6 (3.2)	7.1	61.5 (10.5)	12.7	5.4
Center-Middle	8.8	13.9 (3.9)	10.5	52.7 (10.6)	14.0	8.3
Center-East	7.6	3.7 (.7)	1.9	55.4 (9.5)	31.2	5.7
South-Upper	11.2	6.4 (1.8)	5.7	62.6 (18.3)	14.0	9.7
South-Lower	19.7	3.3 (1.3)	2.0	62.7 (21.0)	12.3	3.0
Greater Bangkok	65.4	4.3 (.6)	9.3	8.7 (1.6)	12.3	12.4
Whole Kingdom	14.8	6.5 (1.6)	5.8	60.3 (10.4)	12.6	100.0

1/ A farm household is one which has an agricultural enterprise. Unlike the definition of an agricultural household used in earlier work, that of a farm household would include one with an agricultural enterprise whose head is not in the agricultural sector but exclude one without an agricultural enterprise whose head works in the agricultural sector.

2/ Figures in parentheses represent percentages of households with agricultural enterprises but whose heads are not in the agricultural sector.

Source: Data tapes of the Socio-Economic Survey, 1975/76, National Statistical Office.

roughly one out of five rural households is completely specialized in nonfarm activities. The figures in parentheses in Table 2.6 are the percentages in the regional total of farm households in which the household heads are not in the agricultural sector. (Only a small number of these are economically inactive.) Of farm households as defined here roughly one in ten is headed by people who work outside the agricultural sector and therefore have incomes from nonagricultural sources. Such "part-time" farming households are most important in the South where roughly one in five farm households has this characteristic.

Even when a farm household is headed by someone in the agricultural sector, some of the remaining household members may work outside the sector. Table 2.7 gives the proportion of the economically active population who work outside of agriculture by household type, area and region of residence. Among farm households, 18% of the economically active population in sanitary districts and 8% of those in villages are primarily outside agriculture. 1/ Again a higher proportion of members of farm households in the South are in nonfarm activities than elsewhere, presumably in forestry and fishery. The Upper Northeast has the smallest percentage of nonagricultural workers among farm households and, with the exception of Bangkok, also the highest percentage among nonfarm households. Thus while it has the fewest nonfarm households, it has the greatest degree of specialization between farm and nonfarm households. A comparison between the Upper Northeast and the Center-East makes clear the need to consider both the proportion of nonfarm households and the degree of specialization within farm households. In the Upper Northeast, which has the lowest percentage of nonfarm households, the proportion of workers in nonagriculture is also the highest in these households, i.e. the nonfarm households are highly specialized; the opposite case holds for the Center-East where nonfarm households more frequently have members working in agriculture.

Table 2.8 gives the occupational distribution of the nonagricultural labor force for the different subregions. The most important groups are production and transport workers, sales workers, and common laborers. 2/ The proportion of production and transport workers is over one-third in the Upper North, Lower Northeast and the South. The lowest proportions of such workers are found in the Center-West and Center-East. Transport workers are particularly important in the Upper Northeast and the South. Food processing and construction workers are most important in the South. Note also the very low proportion of construction workers in the poor Upper Northeast. Textile workers are concentrated in the Lower Northeast, the Center-Middle and the

---

1/ Note that people whose primary occupation is agricultural labor are counted as agricultural, i.e. the percentages discussed here do not include agricultural laborers.

2/ Common laborers do not include any laborers whose primary occupation is agricultural labor.

Table 2.7: PROPORTION OF ECONOMICALLY ACTIVE POPULATION WHOSE PRIMARY OCCUPATION IS NOT IN AGRICULTURE, BY HOUSEHOLD TYPE AND REGION, THAILAND, 1975/76 (%)

SES 1975/76 Region	Municipal Areas	Sanitary Districts		Villages		Total
		Farm 1/	Nonfarm	Farm	Nonfarm	
North-Upper	97.1	22.2	94.7	13.5	75.9	27.3
North-Lower	84.2	18.1	94.4	6.2	69.6	18.7
Northeast-Upper	91.9	12.2	92.7	4.3	79.6	13.5
Northeast-Lower	95.7	18.3	90.2	4.7	66.1	16.1
Center-West	92.0	15.3	84.4	10.0	59.6	21.9
Center-Middle	95.7	17.4	81.6	9.6	65.4	26.5
Center-East	95.0	11.7	78.0	8.9	57.2	26.8
South-Upper	88.5	24.6	88.1	18.6	70.2	33.2
South-Lower	96.0	27.0	100.0	11.3	66.7	33.2
Greater Bangkok	99.1	15.2	94.8	18.3	91.3	81.8
Whole Kingdom	96.3	17.8	90.6	8.4	70.6	27.8

1/ A farm household is one which has an agricultural enterprise.

Source: Data tapes of the Socio-Economic Survey, 1975/76, National Statistical Office.

Table 2.8: DISTRIBUTION OF NONAGRICULTURAL ECONOMICALLY ACTIVE POPULATION BY OCCUPATION, THAILAND, 1975/76

SES 1975/76 Region	% of Nonagricultural Economically Active Population in Total	% Of Nonagricultural Economically Active Population									
		Production and Related Workers plus Transport Operators									
		Total	Textile Workers	Food Processors	Construction Workers	Transport Workers	Common Laborers	Professional, Technical, Administrative	Clerical Workers	Sales Workers	Service Workers
North-Upper	27.3	38.5	0.7	1.0	4.7	3.8	20.8	8.1	2.6	22.4	7.7
North-Lower	18.7	26.9	1.1	3.3	4.1	5.2	13.0	13.1	2.8	32.9	11.3
Northeast-Upper	13.5	27.7	1.7	3.0	1.7	10.2	5.8	13.3	2.5	40.6	10.1
Northeast-Lower	16.1	39.2	4.6	4.0	2.5	5.6	8.8	11.8	3.4	26.7	10.0
Center-West	21.9	20.1	0.0	3.7	1.8	7.2	25.6	11.7	5.9	30.3	6.4
Center-Middle	26.5	31.1	2.7	2.6	4.3	4.9	15.4	14.3	3.1	27.6	8.5
Center-East	26.8	15.8	0.0	1.7	4.5	4.3	41.7	11.4	2.5	24.9	3.7
South-Upper	33.2	37.9	0.0	6.6	7.8	8.4	6.4	12.4	2.8	32.5	8.1
South-Lower	33.2	36.7	1.3	5.6	7.9	10.3	3.4	10.3	4.6	39.2	5.9
Greater Bangkok	81.8	31.6	1.5	1.1	3.5	4.9	8.1	9.0	8.7	30.7	11.9
Whole Kingdom	27.8	31.8	1.5	2.6	4.0	5.9	12.6	10.9	4.9	30.2	9.5

Source: Data tapes of the Socio-economic Survey, 1975/76, National Statistical Office.

Upper Northeast. The sample contains no textile workers at all in the Center-West, the Center-East and the Upper South.

Common laborers without sectoral affiliation also form an important group, especially in the Center-East, the Center-West and the Upper North. (They are unimportant in the South where subsectoral specialization of workers appears to be more pronounced.)

The other important group is sales workers, which form everywhere between 22% and 41%. Service workers are less important in all regions than professional, technical and administrative workers.

A striking feature is the fact that, while the nonagricultural labor force is much smaller outside of metropolitan Bangkok, the proportion of technical and administrative personnel in the nonagricultural labor force is generally higher in the other regions than in metropolitan Bangkok itself.

Table 2.9 gives details on farm and off-farm incomes for farm households by region. The correspondence between the proportions of workers outside agriculture and the extent of off-farm income is quite close. The Upper North, the Center and the South, which have large proportions of workers outside of agriculture, also have off-farm incomes which constitute higher proportions of total incomes, when compared with the Lower North and the Northeast.

Agricultural off-farm income is highest, both in absolute and relative terms, in those regions with the greatest degree of commercialization: the Lower North which has a high degree of crop diversification, the Center-West which grows sugar, the Center-East with sugar and cassava, and the Lower South with rubber. Thus development of output markets and input rental markets for labor, land, animals and equipment go hand in hand.

Total off-farm income is relatively more equal across sub-regions than agricultural off-farm income, being around B 6,000-7,000 in the Northeast, B 7,000-8,000 in the North, and B 11,000-13,000 in the Center and South. Differences in farm incomes contribute more to the regional variations in the incomes of farm households: for example, the much higher total income in the Lower North compared with the Upper North is on account of differences in farm income. Given its total income, the Lower North has an extraordinarily low level of nonagricultural off-farm income. Higher farm incomes rather than nonfarm incomes are also associated with the fact that the Center-East and Greater Bangkok have the highest total household incomes.

The breakdown of nonagricultural off-farm incomes in Table 2.10 shows salaries to be relatively more important in the more advanced Greater Bangkok region and the Center-Middle, but also in the Lower North and Upper Northeast. This may be accounted for by public service jobs, such as teachers, where the government has attempted to equalize the numbers, as well as salaries, across regions. Hired nonfarm work is least important in the Center-East and Greater Bangkok area, whereas the sale of home-made goods is far more important in these two regions than elsewhere.

Table 2.9: FARM AND OFF-FARM INCOMES FOR FARM HOUSEHOLDS, BY REGION, THAILAND, 1978/79
Baht/Farm Household

SES 1975/76 Region	Total Income 2/	Farm Income 2/	Off-Farm Income			(Percent) Off-Farm Income as Proportion of Total Income		
			Total	Agricultural Off-Farm 3/	Nonagricul. Off-Farm	Total	Agricultural Off-Farm	Nonagricul. Off-Farm
North-Upper	14,021	6,914	7,107	1,380	5,727	50.7	9.8	40.9
North-Lower	24,757	17,011	7,746	3,090	4,656	31.3	12.5	18.8
Northeast-Upper	15,129	8,131	6,998	951	6,047	46.3	6.3	40.0
Northeast-Lower	15,317	9,382	5,935	861	5,074	38.7	5.6	33.1
Center-West	24,189	12,164	12,025	2,764	9,261	49.7	11.4	38.3
Center-Middle	25,402	13,643	11,759	1,751	10,008	46.3	6.9	39.4
Center-East	31,968	18,571	13,397	3,078	10,319	41.9	9.6	32.3
South-Upper	23,889	12,380	11,510	1,797	9,713	48.2	7.5	40.7
South-Lower	21,761	11,002	10,759	2,629	8,130	49.4	12.1	37.4
Greater Bangkok 1/	31,131	18,704	12,428	903	11,525	39.9	2.9	37.0
Whole Kingdom	19,478	11,049	8,429	1,671	6,758	43.3	8.6	34.7

1/ Greater Bangkok = Bangkok-Thonburi, Nonthaburi, Pathumthani, Samutprakarn.

2/ Total Income = [(average cash income from agri. + value of home consumption) - cash expenses for agriculture] + average cash total off-farm income.
Farm Income = [(average cash income from agri. + value of home consumption) - cash expenses for agriculture].

3/ Agricultural Off-Farm = hiring out animals; hiring out farm equipment; hiring out farm workers; renting out land or living quarters.

Source: Unpublished tabulations from the Survey of Farmers, 1978/79, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives. See Appendix Table A.4.

Table 2.10: SOURCES OF NONAGRICULTURAL OFF-FARM INCOMES, BY REGION, THAILAND, 1978/79

SES 1975/76 Region	Total Nonagricultural Off-Farm Incomes (baht/Household)	Percent						
		Salaries	Hired Non-farm Work	Sale of Non-Raised Animals & Off-Farm Plants & Crops	Sale of Other Home-made Goods	From Relatives, Rituals & Ceremonies	Loan Interest	Others 2/
North-Upper	5,727	20.8	28.7	8.2	6.5	2.4	.2	33.3
North-Lower	4,656	29.4	33.1	5.3	5.8	5.0	.6	20.8
Northeast-Upper	6,047	31.4	31.0	11.3	5.5	8.5	.2	12.2
Northeast-Lower	5,074	20.7	30.1	9.8	5.9	12.8	.1	20.7
Center-West	9,261	18.8	24.9	3.4	1.0	4.5	.6	46.9
Center-Middle	10,008	25.8	19.8	5.9	5.5	5.3	1.7	36.0
Center-East	10,319	20.6	19.7	2.6	12.1	6.5	.2	38.4
South-Upper	9,713	17.2	28.2	2.2	8.6	2.7	.5	40.8
South-Lower	8,130	18.5	29.1	.6	2.5	.7	.4	48.2
Greater Bangkok 1/	11,525	50.1	17.6	4.8	14.1	4.7	-	8.7
Whole Kingdom	6,758	24.2	27.8	6.4	6.4	5.8	.4	29.1

1/ Greater Bangkok = Bangkok-Thonburi, Nonthaburi, Pathumthani, Samutprakarn.

2/ Others include mining, charcoal production, sales, trapping wild animals, etc.

Source: Unpublished tabulations from the Survey of Farmers, 1978/79, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives. See Appendix Table A.6.

III. IMPACT OF AGRICULTURE AND NATURAL RESOURCES ON RURAL NONFARM ACTIVITIES

In Chapters III and IV the hypotheses set out in the Introduction will be tested: that the majority of rural nonfarm activities can be linked directly or indirectly to agricultural activities and that therefore the expansion of nonfarm activities is closely related to agricultural development. It is not intended that the analysis will be comprehensive; rather, selections will be made of regions and products where recent experience has been interesting.

The structure of the sections corresponds to the analytical framework and deals in turn with (1) output and output processing, (2) the manufacturing and servicing of inputs, and (3) derived consumer demand (Chapter IV).

3.1 Output and Output Processing

Of the three types of rural nonfarm activities, output processing is numerically the most important (see Table 7.1.) We consider outputs originating from agriculture and natural resources separately.

3.1.1 Agriculture

Agricultural development in Thailand during the past two decades has been noteworthy for a number of reasons: its continuing self-sufficiency in food grains in the face of rapid population growth; tremendous diversification into cash crops; changes in agricultural practice; and improvements in infrastructure.

Expansion in Cultivated Area

It is important to understand that the expansion in the production of paddy and the diversification of crops have been achieved through double-cropping, and even triple-cropping, of paddy on paddy land; cultivation of cash crops on paddy land in the dry season; and expansion in total area under holdings. That is, it is a combination of more intensive farming of existing areas and an extension of the total area. In particular, crop diversification has not been at the expense of paddy land which grew at an annual rate of 2% between crop years 1962/63 and 1979/80.

Data from the Agricultural Census for 1963 and 1978 show that the total number of holdings increased by 27%, as might be expected with population growth (see Table 3.1). There was relatively little increase in the Center-Middle and Lower South. The number increased by 36% in both the Upper and Lower Northeast and by 35% in the Lower North. In spite of this, the average size of holding increased in all regions except the South. The reason is that the total area under holdings increased by 36%, that is, even faster than the number of holdings. The largest gains in total area under holdings were in the Lower North, totalling 65% over the fifteen-year period. The expansion was also tremendous in the Northeast, 53% in both the Upper and

Table 3.1: TOTAL AREA UNDER HOLDINGS, NUMBER OF HOLDINGS AND AVERAGE SIZE OF HOLDINGS, THAILAND, 1963 AND 1978

SES 1975/76 Region	Total Area Under Holdings 1/ (rai) 1963	1978	% increase 1963-1978	Number of Holdings 1/ 1963	1978	% increase 1963-1978	Average Size of Holdings (rai) 1963	1978	% increase 1963-1978
North-Upper	3,385,131	4,814,090	42.2	397,113	490,772	23.6	8.5	9.8	15.3
North-Lower	9,172,823	15,128,333	64.9	380,529	513,531	35.0	24.1	29.5	22.4
Northeast-Upper	12,590,168	19,306,895	53.3	619,083	841,361	35.9	20.3	22.9	12.8
Northeast-Lower	13,828,931	21,201,522	53.3	601,703	818,811	36.1	23.0	25.9	12.6
Center-West	4,453,657	5,576,155	25.2	183,194	221,414	20.9	24.3	25.2	3.7
Center-Middle	6,872,203	7,474,704	8.8	264,734	279,663	5.6	25.9	26.7	3.1
Center-East	5,774,507	7,340,234	27.1	186,664	225,815	21.0	30.9	32.5	5.2
South-Upper	9,094,937	9,055,298	-0.4	379,165	439,402	15.9	24.0	20.6	-14.2
South-Lower	2,229,780	1,962,023	-12.0	113,841	125,141	9.9	19.6	15.7	-19.9
Total 2/	67,402,137	91,859,254	36.3	3,126,026	3,955,910	26.5	21.6	23.2	7.4

1/ Includes all area under holdings and all number of holdings reported in the censuses. In 1978, many holdings under 2 rai were not included in the census (for details on coverage see the Agricultural Census Report); for purposes of calculating the percent increase in the area and number of holdings, adjusting the 1963 figures to exclude holdings under 2 rai would have a negligible effect.

2/ Total excludes Bangkok-Thonburi, Nonthaburi, Pathumthani, Samutprakan.

Source: 1963 Agricultural Census, Regional Volumes, Table 1; 1978 Agricultural Census Report, Changwat Volumes, Tables 1.1 and 2.3.

Lower Northeast, and in the Upper North, 42%. More modest increases were registered in the Center-West, 25%, and Center-East, 27%. The increase in the Center-Middle amounted to only 9%. There was more or less no change in the Upper South and a decline of 12% in the Lower South. The most significant expansion in average size of holding occurred in the North and Northeast.

In addition to the expansion in total area, a comparison of agricultural census data shows that there has been a substantial shift in the utilization of land away from tree crops, pastures and woodlands, and "other uses" towards crops (see Appendix Table A.2). Combined with the increase in average size of holdings, this led to substantial increases in area under crops, especially in the North and Northeast. "Other uses" of land include area under holdings but not cultivated; the tendency over time has been to bring such areas under cultivation. When there is no new land to be cleared, then existing land is used more intensively or improved, for example by clearing tree stumps. Thus this trend is significant since it lends support to the assertion that the land frontier may be coming to a close in the near future. The extension of the land frontier has been the central factor in Thai agricultural development during the past two decades, just as the diminishing possibilities for further extension will surely shape future development which will have to rely increasingly on greater intensity of cultivation and substitution among crops.

The extent of crop diversification has been tremendous over the past two decades. For example, area planted in maize tripled while area planted in cassava and sugar increased seven-fold from the first half of the 1960's to the latter half of the 1970's. However, since these crops started off from small bases, it is important to keep a perspective on the relative importance of different crops in the total expansion.

Consider the major food crops (paddy, maize, cassava, sugarcane, mung bean and sorghum), oil seeds (soybeans, groundnuts, castor seeds and sesame), fiber crops (cotton, kenaf and kapok), other field crops (tobacco, chilli, garlic, onions and shallots) and a limited number of tree crops (rubber and coconuts). As can be seen in Table 3.2, the shares of most of the groups in total area planted have remained more or less constant since the early 1960's: roughly 80% in food crops; 2% in oil seeds; 4-5% declining to 2% in fiber crops; and 12-13% in tree crops. 1/ (For greater detail, see Appendix Table A.3.) Most of the changes in shares have come within the

---

1/ The total area planted in tree crops implied by these data is considerably greater than that implied in Appendix Table A.2. In fact, the agricultural census data should not be used to give estimates of aggregate planted areas. In 1978, the census was not carried out in some areas with poor security and the data are also suspect in all areas where technically illegal cultivation is widespread. In this report we use agricultural census data to show changes in average farm size and utilization of land holdings but rely on Ministry of Agriculture data for estimates of aggregate planted areas.

Table 3.2: SHARES OF MAJOR CROPS IN AREA PLANTED AND INCREASES IN AREA PLANTED, THAILAND, 1962/63 TO 1979/80

Crop	Percentage Share of Area Planted				Percentage Share of Increases in Area Planted		
	I 1962/63-1965/66	II 1966/67-1970/71	III 1971/72-1975/76	IV 1976/77-1970/80	I-II	II-III	III-IV
Food Crops	81.3	78.5	79.3	82.1	64.2	84.1	96.0
Paddy	73.0	67.2	62.8	60.7	40.0	37.9	50.0
Maize	5.2	6.8	8.9	8.9	15.0	21.0	8.4
Cassava	1.3	1.6	3.0	5.6	2.9	11.3	19.1
Sugar cane	.8	.9	2.0	3.3	1.3	8.5	9.8
Mung bean	1.0	1.7	1.6	2.5	4.9	1.0	7.0
Sorghum	n.a.	.4	1.0	1.1	n.a.	4.4	1.8
Oil Seeds	2.0	2.2	2.3	2.1	3.5	2.6	1.0
Soybeans	.3	.5	.8	.9	1.4	2.6	1.2
Groundnuts	1.0	1.1	.9	.7	1.6	.2	-.6
Other oil seeds	.7	.7	.5	.5	.6	-.1	.4
Fiber Crops	3.7	4.9	4.1	2.4	10.5	-.4	-6.0
Cotton	.8	.8	.3	.5	1.2	-2.5	1.2
Kenaf	2.4	3.6	3.3	1.6	9.3	1.8	-7.2
Kapok	.6	.5	.4	.4	.1	.3	-.1
Other field crops b/	.9	.9	1.0	.9	1.4	1.4	.6
Tree Crops	12.1	13.4	13.3	12.5	20.3	12.4	8.4
Rubber	9.6	10.9	10.7	9.8	17.4	9.8	5.2
Coconuts	2.5	2.6	2.6	2.7	2.9	2.6	3.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a/ Crop year 1970/71 only.

b/ Tobacco, Chilli, Shallots and Onions, Garlic.

Source: Agricultural Statistics of Thailand, Crop Years 1976/77 and 1979/80, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

groups. Among food crops, the share of paddy declined from 73% of the total area planted in the early 1960's to 61% in the late 1970's. All the other food crops increased their shares in total area planted: maize from 5% to 9%, cassava from 1% to 6%, and sugarcane from 1% to 3%. Among the oil seeds, soybeans increased its share, while groundnuts, castor seeds and sesame lost ground. Within the group of fiber crops, cotton lost its share over the period. Kenaf increased its share in the 1960's but lost it during the 1970's, thereby contributing to the declining share of fiber crops as a whole.

In spite of the fact that the share of food crops has hovered around 80% for two decades, the weight of this group is such that it has accounted for a large and increasing part of the increase in total area cultivated: 64% between the early and late 1960's; 83% between the late 1960's and early 1970's; and 96% between the early and late 1970's. When we focus on changes in area planted in this way, the important crops are paddy, maize, cassava, sugarcane, mung bean and rubber. Kenaf is also notable; it contributed to 9% of the increase between the early and late 1960's, but to a 7% decline between the early and late 1970's. These are therefore the crops that have been potentially important in the generation of nonfarm activities over the past two decades.

Forward Linkages

The major crops vary considerably in the extent to which they generate forward linkages in the processing industries; the variations are related to (1) the weight and volume of each output, (2) the extent to which these are reduced through processing, (3) its perishability and (4) the processing steps required before it can be consumed or otherwise used. We consider here a few of the principal crops. Note that the characteristics of the processing steps for each crop are summarized in Table 7.1 as well.

Paddy: Paddy goes through considerable weight and volume reduction when threshed but only a moderate weight loss when it is subsequently milled. Moreover, it is not perishable. This means that, even though its production is highly seasonal, its processing can be spread out over much longer periods. The processing can be accomplished through varying degrees of capital intensity.

The major processing steps for paddy are threshing and milling. Threshing involves separating the grain from the panicle without removing the husk. Since this involves a very large loss in both weight and volume, it is done in or near the fields. The major recent change in the threshing method has been through the introduction of axial-flow rice threshers; this will be taken up later in the section dealing with mechanization (Section 3.2.1.). Milling is the separation of the husk from the rice kernel. One ton of paddy will be converted into approximately 670 kilograms of white rice and 100 kilograms of bran, the exact conversion rate depending on the milling process used.

Rice is the major staple food in Thailand where it is grown in all the regions; the per capita consumption of rice there is the highest in the world. In spite of its high population growth rate, Thailand has managed to

remain self-sufficient in rice, and even to increase its exports, through the expansion in the total area planted and through double-cropping made possible by irrigation. Paddy yields have not improved significantly. The total area planted in paddy is now some two and a half times what it was in 1940, an increase of over 2% per annum compounded over 40 years.

Traditionally, rice consumed on the farm was milled by hand pounding and only exported surplus rice was milled in mechanical rice mills which were all located in Bangkok originally. The dispersion of rice mills into the provinces came with the spread of the railroads into those areas (Hiranvanichargorn, 1976, p.16).

The mechanical rice mills vary by size and milling system; these are in turn related to location and function. The functions of mills can be divided into service, the milling of usually small amounts for the farmer's own consumption, and trade, the purchase of paddy to be milled and then sold in the domestic or export market. As Table 3.3 shows, the capacities of these three types of mills differ widely. Small mills are usually located in rural rice-producing areas, while the large mills are found near or on good roads or waterways (Somboonsub, 1976, p. 53).

An interesting recent development has been the increase and dispersion of smaller service-oriented rice mills all over the country (see Table 3.3 for an example of expansion in rice mills over time in one province). As farmers find that their time becomes a constraint, they substitute service milling for manual milling. Manual milling has been changed from the mortar and pestle to small stone roller mills. The hand mills remain popular in the single-cropping rice subsistence regions, but much less so in the double-cropping commercialized areas, such as the Center (see Table 3.4). For example, 61% of holdings in the Upper Northeast were found to use hand mills in 1978, compared with 6% to 8% in the subregions of the Center. The farmers actually prefer the hand-milled rice and can use the byproducts to feed their hogs and chickens. The recent explosion in the establishment of small service mills attests to the increasing shortage of labor on the farms (see also Section 3.2.1 and Chapter V).

Cassava: Cassava is not highly perishable but still needs to be processed within a week or so after harvesting. It is a heavy output (say 2,500 kilograms per rai or ten times as much as paddy); with a low value per unit of weight, weight reduction is thus an important part of the processing.

Many people are involved in the processing of cassava: chippers, pelletizers, flour manufacturers, transport workers, exporters, wholesalers, retailers and middlemen. The main steps required in the processing of cassava are chipping and pelletizing or starch production . The primary processing plants, the chipping and flour factories, are usually situated near the planting area while the pelletizing factories are in the towns. Table 3.5 demonstrates the close correspondence between cassava production and the location of the processing factories. Note that the very recent introduction and rapid expansion of cassava in the Northeast implies that the processing plants there have all sprung up in the 1970's.

Table 3.3: RICE MILLS CURRENTLY IN OPERATION, BY DATE ESTABLISHED AND FUNCTION, CHANGWAT NAKHON PATHOM, THAILAND, 1974

Date Established	Number of Rice Mills				Average Capacity (tons/day)		
	Service	Service & Trade	Trade	Total	Service	Service & Trade	Trade
1924-1930	1	2	2	5	7	14	32
1931-1940	2	1	-	3	12	20	-
1941-1950	4	6	6	16	12	22	30
1951-1960	8	18	15	41	9	18	43
1961-1970	9	7	9	25	8	11	34
1971-1974	46	9	9	64	3	19	43
Total in operation	70	43	41	154	5	17	39

Source: Derived from Umpun Hirunvanichargorn, Locational Pattern of Rice Mills, A Case Study in Changwat Nakhonpathom, Thailand, 1974, Unpublished M.A. thesis, Faculty of Economics, Thammasat University, May 1976, Appendix 1 of Table 4.1, p. 136.

Table 3.4: RICE THRESHERS AND STONE ROLLER HAND MILLS, BY REGION, THAILAND, 1978

SES 1975/76 Region	Rice Threshers			Stone Roller Hand Mills	
	% of Holdings Owning	% of Holdings Using	Threshers per Million Rai of Paddy Land	% of Holdings Owning	% of Holdings Using
North-Upper	0.05	1.91	1948.2	2.33	58.15
North-Lower	1.28	17.12	5811.5	1.54	25.38
Northeast-Upper	0.04	0.55	241.5	4.08	60.90
Northeast-Lower	0.11	0.70	270.7	2.82	43.15
Center-West	1.15	8.51	3377.4	0.56	8.41
Center-Middle	2.37	20.20	7559.0	0.57	6.65
Center-East	2.15	7.73	2378.0	0.90	5.68
South-Upper	0.04	0.30	145.2	1.64	36.22
South-Lower	0.00	0.04	25.5	1.52	40.17
Greater Bangkok	9.62	23.12	8995.9	0.33	5.08

Source: 1978 Agricultural Census Report, Changwat Volumes, Tables 1.1, 2.3, 7.1 and 7.3.

Table 3.5: PRODUCTION OF CASSAVA AND NUMBER OF CASSAVA PROCESSING PLANTS, BY REGION, THAILAND

SES 1975/76 Region	Production of Cassava, 1971 (1,000 tons)	Production of Cassava, 1979 (1,000 tons)	% of Total Production of Cassava, 1979	Number of Processing Plants, 1974		
				Chipping Factories	Pelletizing Factories	Flour Factories
North-Upper	14.1	3.7	0.03	1	-	1
North-Lower	62.5	263.3	2.37	87	10	-
Northeast-Upper	82.3	3,095.7	27.89	57	9	-
Northeast-Lower	424.2	3,856.5	34.74	364	15	3
Center-West	208.0	359.4	3.24	75	11	-
Center-Middle	28.7	81.5	0.73	6	-	-
Center-East	2,706.8	3,435.1	30.94	560	126	124
South-Upper	101.4	2.0	0.02	2	-	-
South-Lower	23.5	3.8	0.03	-	-	-
Greater Bangkok	0.6	0.0	0.00	-	4	-
Whole Kingdom	3,652.1	11,101.0	100.00	1,152	175	128

Source: 1) Agricultural Statistics of Thailand, Crop Year 1979/80, Table 23, pp. 24-29, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

2) Boonjit Titapiwatanakun, Cassava Industry in Thailand, unpublished M.A. thesis, Thammasat University, Faculty of Economics, June 1974, Table 4.1, pp. 76-77, and Appendix 1, pp. 143 - 145.

The fresh cassava roots rarely travel more than 60 to 100 kilometers from the farm to the chipping factories. Transportation costs are a constraint to the expansion of cassava production; selling fresh roots is easy for farmers near the road but difficult for those with remote fields. Some chippers send trucks to pick up the roots from the farm. The roots are washed and cut into chips by chipping machines which are domestically produced. The chips are spread out to dry; this used to be done manually, but there is now a machine which scoops up the chips and spreads them out, using blades attached to the machine. The labor use in cassava chip production is thus probably falling.

The dried chips, which weigh about 40% of the fresh roots (Trairatvorakul, p. 108), are taken to the pelletizing factories which have become important since 1969. Because of the lower weight of the chips compared with that of the roots, and because pelletizing involves only a modest weight loss (about 11%) pelletizing factories are located closer to ports; more than two-thirds are in the Center-East. A typical pelletizing plant has a capacity of 300 tons of chips per day and employs 20-30 workers.

Although cassava has been grown in Thailand since around 1850, originally for human consumption, the recent rapid increase in production has been stimulated by the demand for cassava by the animal-feed industry in the EEC and made possible by the expansion of the road network into the Northeast. Much of the expansion in cultivated area in the Northeast can be accounted for by cassava. The price of cassava tripled during the 1970's and production increased at 20% per annum between 1967 and 1978. There are two major cassava-growing regions: the Center-East, accounting for 45% of the total planted area, and the Northeast, of which the Upper Northeast accounts for 14% of the planted area and the Lower Northeast for 29%. As a rule the increase in the area planted in cassava is not at the expense of paddy land; it is newly-cleared and hence represents an absolute increase in cultivated area. Cassava is tolerant to poor soil quality and irregular rainfall which makes it suitable for newly-cleared forest land, especially in areas of the Northeast which are subject to drought.

In conclusion, cassava is an important crop in terms of the nonfarm employment which it generates. Not only does it require a great deal of processing, the employment associated with the transportation of cassava roots, chips, and, to a smaller extent, pellets is enormous. In 1979, the total production of cassava was over 11 million tons, implying that close to three-quarters of a million truck loads of cassava roots had to be made to the chipping or flour factories. Subsequently, assuming that all roots were converted to chips, over 4 million tons of chips, requiring well over a quarter of a million truck loads, would be transported to the pelletizing factories. The pellets, weighing nearly 4 million tons, in turn needed to be shipped ultimately.

Kenaf: Kenaf experiences some weight loss when it is processed. It is not a perishable output but does require water for its on-farm processing.

The crucial step in kenaf production is the retting of the output before it can be sold for further processing.1/ The process is usually done on the farm and requires an adequate supply of clean water, not always available in locations in the Northeast, otherwise the decoloration in the retting process lowers the quality of the fiber. The retting step involves hard physical labor, and is time consuming. After drying for a few days on wooden poles, the kenaf is packed into field bales to be transported to a baling plant and sent on to gunny-bag mills.

Nearly all kenaf in Thailand is grown in the Northeast, divided in terms of area planted more or less equally between the Upper and Lower Northeast. The price of kenaf stagnated in the 1960's; although it rose rapidly in the 1970's, so that the 1981 price was 75% above the 1967 price, it failed to keep up with the increase in the consumer price index. The production of kenaf has declined as many farmers have switched out of kenaf into cassava. Besides the unattractive price, kenaf is a more difficult crop to grow than cassava. The demand for kenaf comes primarily from twelve gunny-bag mills, two rope factories and various types of cottage industries (Rajvongsuek, 1977, p. 89).

Although the production of kenaf has been on the decline, recent developments may alter this trend. A paper factory has been established outside Khonkaen which accepts air-dried kenaf without requiring that it first be retted. This and similar factories have the potential for changing the Northeast economy substantially since farmers will be less dependent on a water supply for the processing stage of production and the labor demand for retting would not arise.

Sugarcane: Sugarcane is an extremely heavy and bulky output and, in addition, must be processed within one day of the harvest, i.e. it is highly perishable. Speed of transportation from the fields to the mill and weight and volume reduction are therefore the most crucial elements in its processing which is highly capital intensive.

The average output per rai weighs approximately 7,500 kilograms, or thirty times as heavy as paddy. Because of the perishable nature of the cane and the transportation costs, the mills are always located near the source of supply and farmers have to have the transportation of their cane ensured before the harvest.

An average mill in the Center-West can process around 6,000 tons of sugar daily. Each of the ten-wheel trucks normally used has the capacity of carrying a load of about 15 tons. Therefore such a mill uses 400 truck loads of cane per day; this generates employment for at least 400 drivers. It would

---

1/ This involves soaking the raw kenaf in water and then stripping it to remove the retted fiber from the central woody stem. The fibers are then washed by soaking them in water and beating them on the water surface.

cost approximately 300 million baht to establish a mill of this capacity which would employ around 300 workers. Thus sugarcane constitutes an important source of nonfarm employment, and probably more so through its transportation requirements than in processing. In 1979/80, over 13 million tons of sugarcane was produced and had to be transported promptly in roughly 850,000 truckloads to the sugar mills. These quantities imply a huge labor demand for cutting and loading as well; indeed, they lead to large temporary migrant streams of farm workers to the sugarcane areas, a topic discussed in more detail in Chapter V.

Sugarcane has been grown in Thailand since the thirteenth century and muscovado sugar 1/ was exported to Japan as early as the fifteenth century. Thailand is now a major producer of sugar but this has not always been the case. In particular, in the 1870's the world price of sugar fell while that of rice rose so that sugar production declined as farmers converted from sugar to rice, to the extent that it became necessary to import sugar. The sugar industry virtually disappeared for nearly 100 years. Since then production has been stimulated through a tariff on imports and other measures.

The price of sugar stagnated in the late 1960's and early 1970's, but has quadrupled since 1973. Total sugarcane production has increased on average at 15% per annum between 1967 and 1978.

There are two major sugarcane regions: the Center-West, accounting for 47% of the total production in crop year 1979/80, and the Center-East, accounting for 19%. In addition, the crop is grown in the Lower North and the Upper Northeast which account for 17% and 10% of total production respectively (see Table 3.6).

Two types of sugar mills can be found: large sugar mills which produce white sugar and small to medium mills producing brown or confectionery sugar for special purposes. The latter are now relatively unimportant compared with the white sugar refineries, of which there were 42 in 1975/76. The locational patterns of white sugar mills are quite different in the two major producing regions. In the Center-East, the older sugar region where sugarcane was traditionally grown and sent to muscovado mills, the sugar mills are more dispersed than in the Center-West where the mills are concentrated along the Mae Klong River within easy reach of the main highway leading to Bangkok. The choice of location of mills along the river can be explained by the requirement of water as an input into sugar production; it takes 10-20 cubic meters of water for each ton of cane being crushed.

The total daily cane-crushing capacity in Thailand has increased from 21 thousand tons in crop year 1961/62 to 184 thousand tons in crop year 1975/76. The number of mills over the same period rose from 40 to only 42

1/ Raw or unrefined sugar obtained from the juice of sugarcane by evaporation and draining of the molasses.

Table 3.6: PRODUCTION OF SUGARCANE BY REGION, THAILAND, CROP YEAR 1979/80

SES 1975/76 Region	Production (1,000 tons)	% of Total Production
North-Upper	187.0	1.5
North-Lower	2,115.0	16.5
Northeast-Upper	1,329.4	10.4
Northeast-Lower	140.0	1.1
Center-West	5,984.4	46.7
Center-Middle	644.5	5.0
Center-East	2,424.3	18.9
South-Upper	0.0	0.0
South-Lower	0.0	0.0
Greater Bangkok	0.0	0.0
Whole Kingdom	12,824.6	100.0

Source: Agricultural Statistics of Thailand, Crop Year 1979/80, Table 25, pp. 30-33, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

while the cane-crushing capacity increased rapidly, meaning that old mills went out of business and were replaced by new mills with far greater capacity (Jessadachatr, 1977, pp. 207, 208). Table 3.7 shows the number of mills by region over the period 1961/62 to 1975/76. The period of rapid growth in number of mills occurred during the first half of the 1970's: 3 in the North, 2 in the Center, with by far the biggest expansion in the Center-West of 6 mills over this period. The average cane-crushing capacity tripled during the 1960's and then nearly tripled again during the first half of the 1970's.

Maize: With the exception of shelling, the first-stage on-farm processing step, the weight loss associated with the processing of maize is small. Although maize is Thailand's second most important grain crop, most of it is used in the animal-feed industry and is therefore not processed locally.

The major maize areas are the Lower North, accounting for 41% of the total area planted, and the Center-Middle, Lower Northeast and Upper Northeast, with 24%, 16% and 9% respectively. Originally, maize was produced for export. Since 1975, however, the chicken industry has developed rapidly, to the extent that chicken meat is now exported. The amount of maize used in the feed industry is estimated to account for 40% of total production and over 90% of total domestic demand. The demand for maize by the feed industry is growing at a rate of 30% per annum and corn constitutes 60% by weight of the ingredients for feed production. There thus appears to be a close relationship between the growth in the feed industry (see Section 3.2.3) and the expansion in the production of maize.

Rubber: Weight reduction is not an important consideration in the processing of rubber. However, freshly-tapped rubber latex has to be processed within hours of tapping: it is liquid and deteriorates in quality if left in that form. The major processing step, which is performed by the tappers and their families on the farm, requires coagulation of the latex with acid, rolling it into rubber sheets and drying of the sheets. The sheets are sold to middlemen or directly to exporters; the latter will send the sheets to be smoked before export.

A recent trend in the industry is towards the export of block rubber instead of sheet rubber. Block rubber may be produced from natural rubber of all types, using a process which reduces impurities such that the final product possesses known and acceptable physical and chemical properties. The output is dried, blocked and graded; 90% of block rubber produced in Thailand is exported (Tinakorn, 1981). In 1977, there were nine private companies registered to produce block rubber, of which only seven actually exported. It is doubtful that a replacement of sheet rubber by block rubber would have major employment implications.

Oil Seeds: Vegetable oil and oil-seed residuals (oil-seed cakes for animal feed) are jointly produced from oil seeds with no weight loss. Moreover, oil seeds are not perishable. These facts explain why all the vegetable oil factories are located in Bangkok and its vicinity. There are two major techniques for vegetable oil production, both of which are highly capital intensive: mechanical pressing and solvent extraction. The popular

Table 3.7: NUMBER OF SUGAR MILLS, BY REGION, AND TOTAL DAILY CANE-CRUSHING CAPACITY, THAILAND, 1961/62 TO 1975/76

Crop Year	Number of Sugar Mills					Daily Cane-Crushing Capacity	Average Daily Cane-Crushing Capacity per Mill
	North	Northeast	Center-West	Center-Middle	Center-East		
						(tons)	(tons)
1961/62	7	9	5	6	13	20,974	524
1966/67	6	7	5	4	10	23,451	733
1971/72	5	4	9	3	9	51,943	1,731
1975/76	8	4	21		9	184,160	4,385

Sources: Phitsanes Jessadachatr, A History of Sugar Policies in Thailand: 1937-75, Unpublished M.A. thesis, Thammasat University, Faculty of Economics, September 1977, Appendix Tables F.22 and F.23, pp. 207-208; Suchada Suwannapirom, Location and Distribution of Sugar Mills in Thailand, A Comparative Study of the Eastern and Western Regions, Unpublished M.A. thesis, Thammasat University, Faculty of Economics, May 1975, Table V-7, p. 73.

oil seeds for use in the vegetable oil industry are soybeans, groundnuts, cotton seeds, kapok seeds and rice bran. In 1970, 56% of all soybeans and 20% of groundnuts produced in Thailand were used to produce vegetable oil. The amount of rural nonfarm employment generated in the processing of oil seeds is small and involves primarily the transportation of the seeds from the production area to the vegetable oil factories.

Fruit and Vegetable Canning: Fruits and vegetables are highly perishable and substantial weight reduction is associated with the canning process. For example, one ton of pineapple will be made into 15-20 cases of canned pineapple, a standard case having 24 cans each weighing 20 ounces; this represents a weight reduction of over 70%. Thus all the canning factories are located near the production area.

The production of processed fruits and vegetables has increased rapidly in recent years, as have their exports which rose fifteen-fold between 1973 and 1978 (World Bank, Report No. 2804a-TH, 1980, p. 10). Pineapple dominates the industry; canned and frozen pineapple accounted for 93% of the exports in 1978.

The total area planted in pineapple has increased rapidly during the 1970's; production increased four-fold between 1969 and 1977. There are three major pineapple areas: changwats Prachuabkhirikhan and Phetchaburi in the Center-West, by far the most important area; changwats Chonburi in the Center-East; and changwat Lampang in the Upper North. Roughly 77% of all pineapple produced is domestically consumed; the remainder is exported, of which 90% is canned and the rest frozen. There are ten canning factories in existence at present (Thosanguan, 1981, p. 5).

The canning industry has the problem of insufficient and untimely supply of pineapple, the latter owing to the seasonality of production. Further increases in production will generate employment related to the transportation of fresh and canned pineapple, with less impact on the canning industry itself.

3.1.2 Natural Resources

Natural resources by definition are fixed in terms of their location. The choice of location for the processing industries associated with these is governed by similar considerations to those concerning agricultural output. The major sectors in Thailand which are founded on the presence of natural resources are mining, forestry, fisheries and tourism.

It is not difficult to demonstrate that the locations of industries related to these natural resources are situated where one would expect them to be. The South is rich in tin, wolfram and other minerals; it accounts for 42% of gross domestic product originating from mining. The mining and processing of tin, the most important mineral, are highly mechanized and combined in a single plant; the process is highly capital intensive with very low labor use. The North is the major supplying region for forestry products. However, roughly half the sawmills in the country are located in the Center. The reason is that it is more economical to float the timber down the river to

sawmills in the Central region than to transport them in processed form by road or rail; Bangkok is then the center of the transportation network which distributes the products out to the provinces, as well as the location of all plywood factories.

The Profiling Study for the South identifies forestry and related industries as one of the most important sources of rural nonfarm employment in the two provinces in the sample: Chumphon and Satun. In Chumphon, forest lands account for some 45% of the total land area; 1,200 workers, or roughly 1% of the labor force, work in activities related to forestry. In Satun, 39% of the total land area is under forest, of which 23% is highland forest, while the remaining 16% is mangrove forest. Again only 1% of the labor force is engaged in activities related to forestry. The presence of mangrove forests provides an interesting example of a rural nonfarm activity which takes advantage of a natural resource: the production of charcoal. There are 37 charcoal furnaces in Satun at present. Two types of activities are related to charcoal production: splitting the fuel wood, which requires a great deal of physical strength, and stacking the wood into, and removing the charcoal from, the furnaces. Wood splitting can only be done 12-15 days each month during the low tide, while charcoal production is a time-consuming process which takes a whole month before being completed and ready for sale. In contrast to the sawmills, the furnaces are located in the mangrove forests. Charcoal production is weight-losing and it is more difficult and expensive to ship and transport the wood than to transport the charcoal out of the forests.

Fishery is an industry which depends in good measure on the presence of a natural resource; this is especially true for marine fishery. Table 3.8 shows how the number of fishing boats registered by region corresponds quite closely with the length of the coastline which in effect represents access to the natural resource, marine fishes. The Upper South and Center-East have the largest shares of the country's total coastline and also of the total number of fishing boats. The Center-Middle and Greater Bangkok have larger shares of fishing boats considering the lengths of their coastlines.

Table 3.9 gives the annual catches of marine fishes for selected years from 1962 onwards. The increase in the size of the catch over time has been enormous. The number of fishing boats registered stagnated in the 1960's but has increased even faster than the catch of marine fishes in the 1970's.

The Profiling Study for the South gives fishery and related activities as the most important nonfarm activity in Chumphon and Satun. In Chumphon there is both coastal and deep-sea fishing. The number of workers in the fishery industry is roughly 32,000, or under 30% of the labor force; 20,000 are full-time fishermen while most of the rest are primarily farmers who are only part-time fishermen, the remainder being migrant workers. There are 1,056 engined fishing boats in Chumphon and these lead to some ancillary activities, such as docking and boat maintenance. Related to the fishery industry are 11 ice factories and 3 cold storage facilities. Around 300 people, accounting for only .3% of the labor force are employed in these activities.

Table 3.8: LENGTH OF COASTLINE AND NUMBER OF FISHING BOATS, BY REGION, THAILAND, 1979

SES 1975/76 Region	Coastline		Number of Fishing Boats Registered, 1979	
	Length (km.)	% of Total	Number	% of Total
North-Upper				
North-Lower	0.0	0.0	12	0.1
Northeast-Upper				
Northeast-Lower				
Center-West	315.4	12.1	1,056	6.5
Center-Middle	60.0	2.3	1,663	10.3
Center-East	514.8	19.7	2,730	16.9
South-Upper	1,352.4	51.7	8,388	52.0
South-Lower	320.2	12.2	1,205	7.5
Greater Bangkok	51.6	2.0	1,092	6.8
Whole Kingdom	2,614.4	100.0	16,146	100.0

Source: Statistical Yearbook, Thailand, Number 30, 1972-1973, Table 4, p.7, National Statistical Office.
Agricultural Statistics of Thailand, Crop Year 1979/80, Table 66, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

Table 3.9: ANNUAL CATCH OF MARINE FISHES, AND NUMBER OF FISHING BOATS REGISTERED, THAILAND, 1962-1979

Year	Annual Catch of Marine Fishes (1,000 tons)	Number of Fishing Boats Registered
1962	270	5,446
1971	1,470	5,567
1975	1,395	7,963
1976	1,552	9,388
1977	2,068	11,407
1978	1,958	12,529
1979	1,570	16,146

Source: Agricultural Statistics of Thailand, Crop Year 1976/77, Table 42, and Crop Year 1979/80, Tables 61 and 66, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.
Statistical Yearbook, Thailand, Number 28, 1967-1969, Table 109, p. 218 and Number 31, 1974-1975, Table 106, p. 216, National Statistical Office.

The fishery industry in Satun is mostly of the small-scale, coastal type. There are 895 engined fishing boats. Roughly 30,000 people, or one-third of the labor force, are fishermen, of whom around 70% are full-time fishermen, while the remaining 30% are primarily farmers. Related activities include docking and boat maintenance, ice factories, cold storage and fishmeal factories. Between 200 and 300 workers are involved in these activities. In addition, another 200-300 workers, mostly women, work at making and repairing fishnets.

3.2 Agricultural Inputs

In this section we confine our attention to mechanical inputs and the feed industry, which are sometimes, but not always, produced in rural areas and thus have employment implications there. Fertilizers and pesticides are traded goods and, even if not imported, are usually produced in urban-based factories. Rural employment arises only in their transport and sales.

3.2.1 Mechanical Inputs

The agricultural mechanization experience of Thailand is important not only because of its actual and potential employment consequences in agriculture and in the rural nonfarm activities, but also because it sheds light on labor mobility and other labor market issues in the country.

Agricultural mechanization in Thailand will be interpreted below as an example of induced innovation (Hayami and Ruttan, 1971, and Binswanger and Ruttan, 1978). New machinery designs and a dynamic machinery industry emerged in response to increased land availability, i.e., to increasing ratios of land to labor and land to animal power. Historically, the inducement of most mechanical technologies was initiated in North America. Many machines did spread to Europe or Japan with lags of between 20 and 80 years. These lags occurred despite the fact that these countries at each stage clearly had engineering industries capable of copying or adapting US machines. 1/ In the lagging countries mechanization was delayed until extremely rapid absorption of labor in the urban sector led to massive rises in agricultural wages during the 1950's. This labor scarcity induced substantial local adaptation of US-type machinery to European conditions and the invention of the East Asian power-tiller-based mechanization in Japan. In each of these countries (and later in Taiwan) agricultural production was then largely mechanized within the period of only 15 to 20 years.2/

Mechanization in Thailand started in the 1950's with the importation of water pumps (Table 3.10). Four-wheel tractors of 35 hp and above were not

---

1/ Pre-World War II mechanization in these countries consisted largely of animal-drawn implements and selected stationary machines for single operations such as threshing.

2/ For a full discussion of these historical patterns see Binswanger, 1982.

Table 3.10: IMPORTS AND DOMESTIC PRODUCTION OF AGRICULTURAL MACHINERY, THAILAND, 1951-1978

Year	Imports		Domestic Production		
	Tractors 1/ (Unit)	Water Pumps 1/ (Unit)	Two-Wheel 2/ Power Tillers	Four-Wheel 2/ Power Tillers	Tractors 2/
1951	-	2,598			
1952	-	4,466			
1953	-	14,319			
1954	-	9,464			
1955	262	11,294			
1956	404	93,485			
1957	267	20,811			
1958	384	13,482			
1959	445	9,409			
1960	855	11,166			
1961	1,487	12,059			
1962	1,353	11,861			
1963	1,922	19,741			
1964	3,446	26,931			
1965	3,047	39,099			
1966	3,872	60,923			
1967	4,305	82,125			
1968	3,610	151,343			
1969	2,614	106,666			
1970	1,763 (688)	136,686			
1971	2,414 (1,367)	105,109			
1972	1,612 (109)	90,092			
1973	1,715 (274)	150,095	n.a.	n.a.	n.a.
1974	3,318 (1,112)	168,524	24,808	2,324	n.a.
1975	6,877 (4,231)	149,021	27,860	2,582	2,426
1976	n.a. (5,257)	-	31,766	2,914	2,332
1977	n.a. (6,161)	-	35,465	3,258	2,380
1978	n.a. (4,298)	-	39,568	3,808	2,158

n.a. = not available

1/ Imports relate to all tractors, including those for industrial units and consist mainly of four-wheel tractors.

Source: Jongsuwat, 1980, assembled from the custom department's Annual Statement of Foreign Trade Statistics. Figures in parentheses relate to Farm tractors as reported by Loohawenchit, 1980, Table 7. In later years imports consisted of about 50% of two-wheel tractors.

2/ Loohawenchit, 1980, Table 8.

imported in substantial quantities until the 1960's. (They are now assembled locally by 3 firms). Apart from their use for industrial purposes, these tractors were used almost exclusively for land clearing, land preparation and transport in upland agricultural areas, a pattern of use of tractors which is familiar from pre-World War II Europe, and well documented for present day South Asia. It is thus a pattern which is nearly universal in the early stage of mechanization. In the low-wage environments the machines are used for those operations where concentrated power and/or speed provide them with comparative advantage relative to animal-drawn implements. Only a naive engineering interpretation of mechanization would argue that these machines are not, or were not, effectively used. High utilization rates are achieved in Thailand by a well-developed system of tractor contracting over wide areas (Chancellor, 1970; Wattanutchariya, 1981). As in other parts of the world standard four-wheel tractors are used primarily for upland fields, while power tillers and small four-wheel tractors are used for paddy fields. 1/ Two-wheel Japanese power tillers have also been imported on an experimental basis since the 1950's, but failed to be widely adopted primarily because of their high cost. The agricultural engineering division of the Ministry of Agriculture devoted considerable resources to the invention of a locally-adapted power tiller, the iron buffalo, which went into commercial production in the mid-1960's. However, at about the same time simple locally-designed two-wheel power tillers became available. The most widely-known producer was a village headman, Prung Farakaew, in the Prapradaeng area. The design was rapidly copied and improved. The same basic design is now being produced by dozens of producers all through the central plains. It consists of a simple chassis with a rather heavy gearing system onto which a variety of imported Japanese engines can be mounted. It is available in several sizes, with and without riding attachment. Implements and tools to go with it are also locally produced. The iron buffalo was less efficient and its production has been discontinued. Similarly, attempts at introducing power tillers designed by the International Rice Research Institute (IRRI) in the Philippines have not been successful, largely because that design is too light for Thai soil conditions. Finally, note that competitive pressure on power tiller prices is now so heavy that a number of producers have abandoned its production (Loohawenchit, 1980), including its original inventor.

Again these patterns of innovation, adaptation and competitive pressure are almost universal patterns of farm machinery development. Most major inventions or adaptations are made by small firms which are close to customers and often at their customer's request. The major innovating small firms either grow to large size or disappear via bankruptcy or mergers.

1/ While the four-wheel standard tractor can be used for paddy cultivation (especially when land is to be ploughed dry), ploughing and puddling of wet paddy lands can be achieved with less power. Two-wheel tractors and small and light four-wheel tractors (25 hp and below) are therefore both effective and cheaper means of doing these operations. On the other hand, the lighter machines are not well suited for upland conditions.

Innovation and production management skills are often not found in the same individuals or organization. Large firms, even in Europe or the US, tend to improve the engineering and quality of innovations made elsewhere and displace or acquire the smaller firms on account of their superior production, marketing and financing skills. A similar shakeout of firms is now clearly under way in Thailand.

The larger power tiller producers have also entered the field of small four-wheel power tillers and tractors of 35 hp and less, of which several designs exist. Again a chassis and gearing system are built domestically and an imported engine is mounted on it. These machines are used for rice cultivation in areas where soils are rather heavy for the power tillers. It is clear that the industry is responding dynamically with product designs to demands from diverse sets of conditions. Of the 35 firms studied by Loohawenchit, only one was established prior to 1966 and only nine prior to 1970. The rapid growth of the power tiller and tractor industry is a phenomenon of the late 1960's and the early 1970's. Table 3.11 relates to 1975/1976 and shows that mechanization is sharply concentrated in the Central Plain, where a remarkable density of two-wheel tractors and water pumps has been achieved. (Pumps and water wheel engines have also become important in the North and the South). The Profiling Studies and field trips showed that these regional patterns have remained except that the use of four-wheel tractors (largely rented) in the Lower North for cultivation has become almost universal. In rice cultivation of the Central Plains the replacement of buffaloes is now nearly complete. Again the speed with which this has been accomplished, i.e., in about 10 years, is remarkable and fully consistent with earlier experience elsewhere.

Not reflected in the data is the remarkable success of axial-flow threshers for rice designed by the International Rice Research Institute.

Traditionally threshing was accomplished by buffalo treading, more lately replaced by tractor treading. Buffalo treading is extremely time consuming and the substitution of tractor for buffalo has speeded up the process considerably. Most recently, rice farmers have been switching to IRRI-type axial-flow threshers which are manufactured domestically.1/ Starting only in 1975, Thailand had become by 1978 the second largest producer of rice threshers, next to the Philippines. The number of threshers produced increased from 10 in 1975 to 1,590 in 1978 and all indications are that this trend will continue.

The use of threshers can relieve the constraint on available labor time and the adoption of rice threshers is far greater in the double-cropping areas, the Center and the Lower North, while buffalo treading remains the common method used in single-cropping areas (see Table 3.4). Table 3.4 shows

---

1/ These machines are often driven by conventional tractors used as stationary power sources.

Table 3.11: FARM MACHINES AND MACHINE DENSITIES BY REGIONS, THAILAND, 1975/1976

(Units)

Region / Category	Northeast	North	Center	South	Total
Farm Holding Land 1975 (000 rai)	47,497	23,955	27,520	13,240	112,212
Four-wheel Tractors > 45 Hp.	3,014 (63.5)	4,624 (193.0)	4,957 (180.1)	743 (56.1)	13,338
Four-wheel Tractors < 45 Hp.	1,306 (27.5)	4,204 (175.5)	10,752 (390.7)	530 (40.0)	16,792
Two-wheel walking tractors	3,003 (63.2)	11,275 (470.7)	66,961 (2433.2)	8,762 (661.8)	30,001
Water pumps and water wheels	6,708 (141.2)	61,195 (2554.6)	175,506 (6377.4)	24,256 (1832.0)	308,179
Corn shellers and rice threshers	1,092 (23.0)	4,029 (168.2)	4,264 (154.9)	291 (22.0)	9,676

Note: Figures in parentheses represent machines per million rai of agricultural land.

Source: Selected Economic Indicators Relating to Agriculture, No. 84(3), 1978, p. 12. Farm Holding Land: Agricultural Statistics, 1979/80, Table 81, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

that each thresher is used by many other holdings besides the one which owns it, i.e. rental markets are very well developed. The mechanization of cultivation and threshing has clearly been a response to increased labor and draft-power demand arising out of area expansion. This can be seen from Table 3.12 which is adapted from Jongsuwat (1980).1/ It shows estimates of the agricultural labor force derived from Census data and of arable land and actually cultivated area over the period from the early 1950's to the early 1970's. The data are five-year averages centered on the year shown which thus smooth out weather-induced fluctuations and show long-run trends more clearly.

The labor force grew fairly rapidly at around 2.5% up to the mid-1960's but then slowed considerably to 1.5%, i.e., it slowed before mechanization had started. Conversely, the growth of available land accelerated from 1% in the mid-1950's to 5% in the mid-1960's. The number of buffaloes and oxen grew at around 2% over this decade and a half. A consequence of these patterns is that the decline of land/labor ratios and the land to animal power ratio of the mid-1950's was reversed and the mid-1960's were a period of rapidly growing land/labor and land/animal ratios. These trends continued more sharply from 1968 to 1973.2/

We have yet to explain the concentration of mechanization in the Center and particularly the Center-Middle, where the great bulk of the machinery industry is also located. From Table 3.1 we see that land area expansion was substantially less in the Center than in the North or Northeast and particularly slow in the Center-Middle. However, this is a misleading picture, because the Center-Middle is the area which benefitted most from irrigation development and flood control projects. Irrigation and flood control have several effects. In many areas of the Center they have led to a shift of the rainy season crop from broadcast to transplanted rice which is much more power and labor-intensive in land preparation, transplanting and in harvesting, threshing and transport (because of higher yields). In addition, irrigation has led to a massive expansion of double cropping of rice in the Center from roughly 70,000 rai in 1963 to 2,557,000 rai in 1978. Much of this expansion was in the Center Middle where the Chao Phya division scheme started to become operational in the mid-1950's. Double cropping shortens the periods of time within which land must be prepared.

1/ Jongsuwat has also tested the induced innovation hypothesis advanced here with cross-section data and her results are consistent with her intertemporal analysis.

2/ Since mechanization by this time was progressing rapidly, it is no longer possible to disentangle cause and effect as easily as for the previous five-year period. For example, the growth in animal power nearly stopped, which might well already reflect the substitution of machines for animals.

Table 3.12: ESTIMATES OF FACTOR ENDOWMENTS IN THAI AGRICULTURE 1/, 1953-1973

	1953	1958	1963	1968	1973	1953-1973
Agricultural Labor	9,352	10,465	11,875	12,820	13,845	
		(2.3)	(2.5)	(1.5)	(1.6)	(2.0)
Arable Land	46,998	49,187	58,283	74,845	98,476	
		(0.9)	(3.5)	(5.1)	(5.6)	(3.8)
Planted Area	41,652	45,126	55,347	67,290	78,559	
		(1.6)	(4.2)	(4.0)	(3.2)	(3.2)
Buffaloes & Oxen	7,272	7,979	8,826	9,876	10,058	
		(1.9)	(2.0)	(2.3)	(0.4)	(1.6)

	Growth Rates				
	1953-58	1958-63	1963-68	1968-73	1953-73
Arable land/labor	-1.3	+0.9	+3.5	+4.0	+1.7
Planted area/labor	-0.6	+1.6	+2.5	+1.6	+1.2
Arable land/Buffaloes & Oxen	-0.9	+1.4	+2.8	+5.3	+2.1
Planted area/Buffaloes & Oxen	-0.2	+2.1	+1.9	+2.6	+1.6

1/ Estimates are 5-year averages centered on the year shown. Labor force estimates are estimates of the Division of Agricultural Economics based on Census data.

Note: Figures in parentheses represent growth rates of the preceding 5-year period.

Source: Calculated from Nongluck Jongsuwat, 1980, Tables IV-3, IV-4, IV-6.

In the other regions, area expansion has primarily been of an extensive type and into upland rainy season or annual crops such as maize, cassava or sugarcane. Land preparation occurs only once a year, is much less demanding than for transplanted rice and can be spread over fairly extended periods. It is therefore quite well suited for mechanization via contract hire systems of large tractors. With the exception of sugarcane (largely concentrated in the Center), labor requirements of these crops are less than for rice and harvesting schedules are more flexible as well, i.e., harvesting can be spread over a longer period of time. While area expansion undoubtedly has led to overall increases in labor demand, such demand could be met more easily from available labor sources. Note here, however, that the increases in labor demand in the North and Northeast and the availability of land for settlers must have severely limited the supply of labor to the Center. The Center would have had to attract or retain labor for rice cultivation in the rainy season when laborers could easily find land for farming on their own. 1/ Wages would have had to be very high. The Center has been successful, however, in attracting migrant labor for the sugarcane harvest which takes place in the dry season and over several months and thus provides fairly steady employment for farmers from the Northeast when there is little agricultural activity there.

The use of tractors and threshers thus appears to have emerged in the Center in response to sharply increased labor demand which could not be met from the rest of the country because (1) the other regions experienced "labor" demand increases from rapid area expansion as well, and (2) the increased labor demand of the Center was not concentrated only in the dry season, but equally in the rainy season. In Chapter V we show clearly that the constraints on labor supply faced by the Central region were not caused by lack of animal or seasonal labor mobility but by overall growth of agricultural labor demand in virtually all regions.

This experience is in sharp contrast to the experience in the Indian Punjab where the increased labor demand arising out of the green revolution was met by agricultural mechanization as well as substantial immigration of harvesting labor for both the rainy and the dry season crops (Laxmimarayan et al. 1981). These workers came from agriculturally stagnating areas of Eastern Uttar Pradesh and Bihar.

3.2.2 Employment Implications

The agricultural mechanization process in Thailand has clearly been demand-driven. It did not depend on government subsidies and assistance and it is limited to particular regions and tasks. Therefore there is as yet little reason to be concerned about its agricultural employment implications. This will continue to be the case until land settlement

---

1/ Arnold and Cochrane (1980) instead document long-term migration of settlers from the Center-Middle provinces to the Lower North.

opportunities and area expansion in the relatively labor-abundant, emigration regions come to an end.

It should also be noted here that the nonagricultural employment implications of mechanization are not very large relative to the potential agricultural employment implications. In 1978, the industry consisted of 100 registered firms employing roughly 2,500 workers plus a fairly large number of small unregistered firms. As an order of magnitude estimate, manufacturing employment would not exceed 5,000 workers. As in many other countries, the impact on rural industrial employment is thus fairly limited.

Employment in sales and services also has to be considered. Table 3.13 summarizes what we have learned from the Profiling Studies about the location pattern and frequency of sales and service establishments. This table cannot give us an order of magnitude estimate of employment and secondary data do not exist from which estimates can be made. However, a comparison with the densities of sales and service establishments for motorcycles and automobiles shown in Table 4.1 of Section 4.1 clearly indicates that service employment generated by motorcycles and automobiles must be far greater than that for agricultural machines, even in the heartland of mechanization, the Center-Middle.

3.2.3 Animal Feeds

The decade of the 1970's has witnessed an extremely rapid emergence of a modern integrated animal-feed industry in Thailand which is already producing more than 1 million tons of animal feeds per year almost exclusively for domestic use (see Table 3.14). 1/ The impetus for this change came largely from the dramatic changes in the poultry industry associated with hybrid chickens of US and European genetic origin for broiler and egg production. The new genetic stock has transformed chicken production not only in Thailand but also in most other South and South-East Asian countries, including India. In Thailand, the transformation was partly assisted by the newly emerging feed companies, the largest of which are highly vertically integrated enterprises which also engage in broiler production with farmers on a contract basis.

The basis of the transformation is the extremely high efficiency with which hybrid chickens convert feed into meat or eggs under controlled environmental, health, and feeding conditions. Such a control simply cannot be achieved in the traditional barnyard production prevailing earlier. Production units must be larger, although the risk of epidemics limits optimal flock sizes, i.e. truly large-scale production of either broilers or eggs remains an exception even in developed countries. Economies of scale arising

---

1/ This section draws heavily on Nipon Poapongsakorn, (1980), on field visits of the mission and on an interview with a director of C.P. industries, the largest animal-feed company in Thailand.

Table 3.13: SUMMARY OF PROFILING STUDIES ON LOCATION AND EXTENT OF AGRICULTURAL INPUT SERVICES, SALES AND MANUFACTURING

Region / Changwat / Amphoes	Relative Level of Development	(a) Mechanical Inputs: Knives & Hand Tools	Small Tractors	Big Tractors	Water Pumps	Welding Fabricating Shops	Petrol Stations	(b) Animal Feed	(c) Fertilizer & Pesticides
CENTER MIDDLE									
Chainat	A	-	▲ s s v v	s v v v	s s v v	m m	▲ s s	s s s	s s s
Sanburi	AA		s s v v	v v		m	s s	s	s s
Manorom	AB		s v v	v	m ▲ s v 1/	m	s	s	s s
Singburi	B	-	s v v	v		m	s s	s s	s s
Bang Rachan	BA		s v	v			s	s	s
Indraburi	BB		v	v			s		
LOWER NORTH									
Sukothai	A								
Sawankalok	AA	m m m m 2/	s s v v	s v v	s v	m m	s s s	-	s s s
Sri Satchanalai	AB		s s ▲ v	s v v	s v	m	s s		s s
Kamphaengpetch	B						s		s s
Klong Khlung	BA		▲ s v	▲ v v	s ▲	m	s s s	-	s s s
Pran Kratai	BB		s s v	▲ v	s ▲				s s
NORTHEAST									
Mahasarakam	A	-			s v v	-			s
Payakkaphum Phisai	AA		s v	-	s v v	-	s s		s
Na Chuak	AB		s v		s		s	-	
Yasothorn	B	-	v	-		-			s
Loeng Nok Tha	BA		v				s s		s
King Amphoe Sai Mun	BB								
NORTHEAST									
Kalasin	A	-	s v	-	s v	-	s s	-	s
Somdet	AA		s v		s v				
Kam Muang	AB								
Chaiyaphum	B	-	s v	-	s v	-	s s	-	s
Jaturus	BA		v		v				
Nong Bua Daeng	BB								
SOUTH									
Chumphon	A	-	▲ ▲ v v	v v v	▲ v v	m m	▲ s s		▲ s s
Lang-Suan	AA		▲ ▲ v	v v v	▲ s v	m	▲ s		▲ s s
Pathiu	AB						s		s
Satun	B						s s	-	s
Langu	BA						s		s
Thung-Wa	BB						s		
CENTER EAST									
Chonburi	A	□ s s s	□ s ▲ v v v	▲ s ▲ ▲ v	▲ s ▲ ▲	m m v v	▲ s s	▲ p ▲ d d d	▲ s s ▲ s s

□ Large Units — x x x very many units
▲ Medium Units — x x many units
○ Small units — x a few units

A: Advanced area
B: Backward area
AB: Backward amphoe in relatively advanced changwat etc.
m: Manufacturing
v: Services
s: Sales (including dealers)
p: Production of poultry feed
d: Production of duck feed

1/ Special case of well-digging and pump services at Tachanuan, Amphoe Manorom, Chainat.
2/ Blacksmith is the traditional craft for generations.

Source: Profiling Studies of the Thai counterpart team as summarized by Ms. Rachaniwan Uthaisri.

Table 3.14: PRODUCTION OF ANIMAL FEEDS, THAILAND, 1965-1979

Year	Production (Tons/Year)		Domestic Use (Tons/Year)
1965	58,000		n.a.
1966	60,000		n.a.
1967	61,000		n.a.
1968	64,000		n.a.
1969	111,000		n.a.
1970	109,387		109,271
1971	199,804		196,513
1972	266,450		251,626
1973	241,986		232,689
1974	284,747		284,747
1975	486,533		486,248
1976	666,353		661,506
1977	725,508		n.a.
1978	922,846	(1,045,000)*	n.a.
1979	1,117,860	(1,260,000)*	n.a.

* Data from C.P.'s estimate.

Source: Reported in N. Poapongsakorn, The Animal Feed Industry in Thailand, ARTEP, Bangkok: 1980.

out of division of labor, quality control, the provision of veterinary services, slaughtering and marketing of chicken and eggs are instead reaped by elaborate "putting out" systems where either feed companies or slaughter houses contract the actual growing of chicken and eggs out to farmers who usually specialize in just one type of production: hatcheries producing chicks from fertilized eggs, broiler producers and egg producers. Feed or marketing companies enter contracts to buy the output and to provide feeds and/or a variety of services such as veterinary services or credit. Prices are predetermined or vary according to predetermined rules. Fully independent poultry producers do of course continue to exist but often carry larger price risk and/or have to provide more of the management input themselves.

It is important to note that these systems are thus far confined to chicken and do not exist yet for ducks or hogs. The largest manufacturer, Charoen Pokhpand Industries (C.P.), anticipates, however, that breeding progress in ducks may soon make similar systems more attractive for ducks. For hogs, however, such systems are less likely and thus far have only emerged in developed countries where quality considerations deriving from consumer demand outweigh the greater difficulties of organizing such systems in hog production. In Thailand, hog production is highly decentralized. Most piglet production is in the hands of farmers, while the fattening is divided between traditional small-scale barnyard production by farmers and larger-scale units of rice millers. The latter use milling by-products which they mix themselves with purchased concentrates and vitamin/mineral additives. The animal-feed industry thus provides ready-mixed feeds to farmers for their piglet and barnyard production, as well as concentrates and vitamin/mineral additives to the millers.

In 1980, the animal-feed industry consisted of 80 factories of which 31 had been granted Board of Investment (BOI) promotional privileges. Such privileges had been granted for the first time in 1969 and have now been limited to new factories located outside of the greater Bangkok area. They are not granted for capacity expansion of existing plants.

The largest market for poultry products and pork is in the Bangkok metropolitan area and it is here that the transformation of the chicken industry started and is now nearing completion. Barnyard production of chicken, partly for subsistence requirement, is still a predominant form of production in the Northeast and, to some extent, the South. This can be seen from the relative magnitude of animal flocks to animal sales, and of animal feed and veterinary costs to animal sales, for different regions of Thailand (Table 4.7). However, even in the outer regions the transformation of the chicken industry is progressing rapidly and so is the expansion of the modern animal-feed industry.

The extreme concentration of the animal-feed industry in Greater Bangkok and the central regions is thus seen to derive largely from the location of the animal-feed demand, and ultimately meat demand itelf. Other factors which continue to favor the Bangkok location are the ready access to the main feed input markets and the proximity to the ports from which one of the major inputs, soybean cakes or meal, is provided. It is clear, however,

that the industry is quite willing to build smaller plants outside the central plains once animal-feed demand is sufficiently high there; transport costs of the mixed feeds to producers are at least as high as transport costs of raw materials to the plant. And many raw materials are available in provincial markets as well as in Bangkok.

The industry is also fairly concentrated. The four largest firms had a market share of roughly 60% in 1975. The large firms are highly integrated vertically, producing their own vitamin-mineral compounds, and often have close connections with foreign firms. They tend to concentrate more on chicken feed, while small factories produce a larger share of duck feed where quality control is less demanding.

Capital-labor ratios vary substantially in the industry, although, given the low wages of Thailand, they are low relative to international standards; output is almost exclusively handled in bags rather than in bulk. C.P. industries tailor plants of smaller sizes to smaller markets in provincial locations and claim that the smaller plants have substantially lower capital intensities than the larger, centrally-located plants. However, this conflicts with survey results (excluding C.P.) which indicate that the smaller firms have the highest capital intensities.

About 50% of all workers employed in every firm size consist of unskilled production workers engaged largely in handling raw materials and finished products. The second largest group consists of salesmen, clerks and office workers, followed by administrative and management personnel. The highest percentage of technical workers (about 5%) is in the large firms which use the most sophisticated production techniques. Despite its rapid growth, total employment in the industry is still quite small. If the industry manages to develop all markets of the non-central locations, employment may double or triple from the present level of the order of 4,000 to 5,000 workers.

Both the agricultural machinery and the animal-feed industry indicate a very fast and dynamic response of both farmers and the industrial sector of Thailand to new opportunities from technical change in agriculture. The response depended very little on government intervention, except for the granting of promotional certificates when it was already apparent that the industries were undergoing rapid change. Clearly, government policy has not had a leading role, although usually an assisting one.1/

1/ Poapongsakorn's study, however, indicates that price controls on the animal-feed industry have, at times, hampered the animal-feed industry and led to undesirable structural changes in favor of larger firms.

IV. RURAL AND METROPOLITAN CONSUMER DEMAND

4.1 Impact of Agricultural Income on Employment

We turn now to rural nonfarm activities which are generated on the consumption side. Rising rural incomes create a demand for goods and services of many different types, and increasing specialization will reflect itself in a changing occupational structure among the rural population.

In Table 2.8 we have seen that the production and transport sector accounts for one-third of nonagricultural employment. Transport here would include that of agricultural inputs and outputs and production-related travel, but a fair amount would presumably involve consumer goods and consumption-related travel. The majority of employment involved in the transportation of urban goods, however, is likely to be based in the towns rather than out in rural areas. An indication that this is indeed the case can be seen from the greater number of transport service establishments in the provincial centers compared to the amphoe headquarters (Table 4.1 from the Profiling Studies). The Profiling Studies also clearly show that the more advanced regions, changwats or amphoes have more establishments dealing with both the sale and servicing of trucks than the corresponding backward areas. Likewise, and consistent with the high income elasticity of demand for housing, construction activities are more abundant in the more advanced areas. This can be seen from the larger numbers and sizes of establishments dealing with construction materials, brick and cement products and contractors. Data on the number and sizes of construction establishments in the Profiling Studies corroborate the evidence from other sources of the relative backwardness of the Lower Northeast and the Lower South in the construction area.

Sales activities constitute the second most important group of nonfarm activities in rural areas, accounting for one-fourth of total employment. These refer to exchanges of rural goods, but also to the purchase of urban-produced goods by rural consumers. Associated with such purchases would be the servicing of urban goods, such as repairs of radios, televisions, motorcycles and automobiles. Service activites account for 8% of rural nonagricultural employment.

Table 4.2 shows the extent of rural household ownership of selected consumer durables by region. Two observations can be made. First is the strong cross-sectional positive association between the level of income and the ownership of items such as motorcycles, automobiles, motor boats and televisions. With the more commonly-owned radio and bicycle, the association is not present. Second, the relationship between income and ownership is very clear over time and implies very high income elasticities of demand for these products. Granted that such goods are not locally produced, they nevertheless must generate sales, transport and service activities, some of which would be located in the rural areas themselves.

Table 4.1: SUMMARY OF PROFILING STUDIES ON LOCATION AND EXTENT OF TRANSPORT AND CONSTRUCTION, RELATED SALES AND SERVICES

Region Changwat Amphoes	Relative Level of Development	(a) Transport Vehicles				(b) Construction		
		Bicyles	Motor Cycles	Trucks	Passenger Cars	Construction Materials	Brick and Cement Products	Contractors
CENTRAL								
Chainat	A	[s] [s] (v) (v)	[s] [s] (v) (v) (v)	[s] [s] (v) (v) (v)	[s] [s] (v)	[x] [x]	[x] (x)	(x) (x)
Sanburi	AA	(s) (s) (v) (v)	(s) (s) (v) (v) (v)	(s) (s) (v) (v)	(s) (v)	(x) (x)	(x)	(x) (x)
Manorom	AB	(s) (v) (v)	(s) (v) (v)	(s) (v) (v)	(s) (v) (v)	(x) (x)		(x) (x) (x)
Singburi	B	(s) (v)	(s) (v)	(s) (v)	(s) (v)	(x)	(x)	(x) (x)
Bang Rachan	BA	(v) (v)	(s) (v)	(v) (v)	(v)	(x)		(x) (x)
Indraburi	BB	(v)	(v)	(v)		(x)		(x) (x)
LOWER NORTH								
Sukothai	A	[s] [s] (v) (v)	[s] [s] (v) (v)	[s] [s] (v) (v)	[s] (v)	[x] (x) (x)	(x) (x)	[x] (x) (x) (x)
Sawankalok	AA	[s] (v) (v)	[s] (v) (v)	[s] [s] (v)	[s] (v)	[x] (x) (x)	(x) (x)	[x] (x) (x)
Sri Satchanalai	AB	[s] (v) (v)	[s] (v)	(v)	(v)	(x) (x)		(x)
Kamphaengpetch	B	(s) (s) (v) (v)	[s] (s) (v)	[s] [s] (v) (v)	(s) (v)	(x) (x)	(x) (x)	(x) (x)
Klong Khlung	BA	(s) (v) (v)	[s] (v) (v)	[s] [s] (v)	(s) (v)			(x) (x)
Pran Kratai	BB	(v)	(v)					
NORTHEAST								
Mahasarakam	A	(s) (v) (v)	(x) (x) (x) (v) (v)	(s) (v)	(s) (v)	(x)		(x)
Payakkaphum Phisai	AA	(s) (v)	(x) (x) (v) (v)	(s) (v)	(s) (v)	(x)		(x)
Na Chuak	AB	(v)	(v)	(s) (v)	(v)			
Yasothorn	B	(s) (v)	(x) (v)	(s) (v)	(s) (v)	(x)		(x)
Loeng Nok Tha	BA	(v)		(v)	(v)	(x)		(x)
King Emphoe Sai Mun	BB							
NORTHEAST								
Kalasin	A	(s) (v) (v)	(s) (s) (v) (v)	(s) (v)	(s) (v)	(x) (x) (x)	(x) (x)	(x) (x)
Somdet	AA	(s) (v)	(s) (v)	(s) (v)	(v)	(x)	(x)	(x)
Kam Muang	AB	(v)	(v)	(v)				
Chaiyaphum	B	(s) (v)	(s) (v)	(s) (v)	(s) (v)	(x) (x)	(x)	(x)
Jaturus	BA	(s) (v)	(s) (v)	(v)	(v)			
Nong Bua Daeng	BB	(v)	(v)					
SOUTH								
Chumphon	A	(s) (v)	[s] (s) (v) (v)	(s) (s) (v) (v) (v)	[s] (s) (v)	(x) (x)	(x)	(x) (x)
Lang-Suan	AA	(s) (v)	[s] (s) (v)	(s) (s) (v) (v)	[s] (s) (v)	(x)	(x)	[x] (x)
Pathu	AB	(v)	(v)	(v) (v)		(x)		(x)
Satun	B	(s) (v)	(s) (v)	(s) (v)				
Langu	BA	(v)	(v) (v)	(v)		(s)	(x)	
Thung-Wa	BB	(v)						
CENTER EAST								
Chonburi	A	[s] (s) (v)	[s] [s] [m] (v) (v)	[s] [s] (v) (v) (v)	[s] [s] [s] [m] (v)	[s] [s] [m] [m] (s)	(m) (m) (m)	[x] [x] (x) (x)

[ ] Large units
△ Medium units
○ Small units

x x x Very many units
x x Many units
x A few units

A: Advanced area
B: Backward area
AB: Backward amphoe in relatively advanced Changwat
m: Manufacturing
v: Services
s: Sales (including dealers)

Source: Profiling studies of the Thai counterpart team as summarized by Ms. Rachaniwan Uthaisri.

Table 4.2: OWNERSHIP OF CONSUMER DURABLES BY RURAL HOUSEHOLDS, THAILAND, 1968/69 and 1975/76

SES 1975/76 Region	% of Households Owning															
	Sewing Machine		Radio		Television		Bicycle		Motorcycle or Scooter		Automobile		Motorboat	
	1968/69	1975/76	1968/69	1975/76	1968/69	1975/76	1968/69	1975/76	1968/69	1975/76	1968/69	1975/76	1968/69	1975/76
North-Upper		9.32		73.47		1.79		34.62		9.32		0.93		0.16
	8.7		45.2		0.2		29.7		8.2		1.7		1.1	
North-Lower		8.05		81.39		2.68		40.32		8.27		1.18		2.57
Northeast-Upper		8.27		66.10		2.48		31.26		5.20		2.51		1.09
	6.5		42.8		1.4		30.0		2.5		0.3		0.4	
Northeast-Lower		6.41		67.34		2.45		16.94		3.46		1.63		0.09
Center-West		13.64		81.62		4.70		56.29		21.64		5.92		0.54
Center-Middle	9.8	14.80	66.7	84.32	4.1	7.67	33.9	33.71	8.3	9.28	3.4	2.37	4.2	8.78
Center-East		10.81		79.82		2.31		30.90		12.09		4.44		2.56
South-Upper		12.84		68.55		1.97		18.73		11.13		2.75		2.04
	13.9		50.5		0.7		31.3		7.7		0.7		0.7	
South-Lower		13.50		51.94		2.64		20.76		19.05		0.86		1.19
Greater Bangkok		21.44		86.40		34.18		12.06		2.06		5.35		8.65
Whole Kingdom		10.37		73.34		4.53		29.32		8.38		2.41		2.18

Source: Data tapes of the Socio-Economic Survey, 1975/76, National Statistical Office.

The Profiling Studies have documented the availability of establishments concerned with consumer goods, sales and services (see Table 4.3). The consumer goods include clothing, household utensils, electrical appliances, hardware products and gas stoves. Service establishments include restaurants, tailors, barbers and so on. The most advanced region, the Center-East, is quite remarkable in terms of the large numbers and sizes of establishments which it has. More and larger establishments are systematically found in the more advanced regions, changwats and amphoes.

Thus we conclude that consumer demand deriving from rising incomes in rural areas generates employment in transport, construction, sales and service activities related to consumer goods in the rural towns, if not the rural areas themselves.

4.2 Substitution of Home-Produced Crafts by Industrial Goods

The opening of Thailand to international trade by the Bowring Treaty led to a rapid specialization of the central plain of Thailand into rice production for export and a virtual disappearance of household textile production, as well as some other cottage industries (Ingram). However, high transport costs to the North and Northeast, in the absence of railroads and roads, prevented both the emergence of export orientation of agriculture as well as the substitution of home-produced textiles and other cottage goods by imported ones. (The delayed substitution has later enabled export-oriented handicraft sectors to emerge in some areas, especially around Chiengmai in the North.) Therefore, better transport facilities, enabling large-scale sales of agricultural produce, also provide the cash incomes which favor the substitution of previously home-produced or locally produced goods by urban goods.

Geographic isolation and subsistence orientation in agriculture favor home production of textile goods and other woven or matted products. Cash is scarce, not only because income is low but also because of subsistence orientation of agriculture; other consumer and producer goods compete for the limited cash available. The textile and other crafts activities found most commonly in rural areas have technical characteristics (see Table 7.1) which fit particularly well into a highly seasonal agriculture: they are almost invariably produced by women who have restricted seasonal labor mobility. Skill intensity and capital intensity are low. Therefore, little human or physical capital is left idle during the busy agricultural season when women shift to agriculture. And raw materials such as reeds, straw, etc. are sometimes locally available or can be grown by farmers themselves, obviating the need for cash to purchase materials.

Table 4.4 provides striking confirmation of the associations discussed above. In 1968/69 hand looms were found in 34% of Northeastern households but only 4% of Northern households. Elsewhere they were insignificant. Mat-making machines were concentrated in the Northeast and the Center respectively (8.3% and 5.4% of households). By 1975/76 looms and mat-making machines had virtually disappeared in all but the households of the Northeast, with the Upper Northeast still having more machines than the Lower

Table 4.3: SUMMARY OF PROFILING STUDIES ON LOCATION AND EXTENT OF CONSUMER DURABLES, SALES AND SERVICE ESTABLISHMENTS

Region / Changwat / Amphoe	Relative Level of Development	(a) Consumer Durables: Clothing	Household Utensils	Electrical Appliances (TV/Radio/Rice Cooker)	Hardware	Gas Stove	(b) Sales: Pharmacy	Retail	Wholesale	(c) Services (Tailor/Barber/ Restaurants, etc.)
CENTER MIDDLE										
Chainat	A	⊗⊗⊗	⊗⊗⊗	⊗⊗⊗	⊗⊗	⊗⊗	⊗⊗⊗⊗	Ⓟ Ⓔ Ⓔ Ⓔ	Ⓔ Ⓔ	⊗⊗⊗
Sanburi	AA	⊗⊗⊗	⊗⊗	⊗⊗	⊗⊗	⊗⊗	⊗⊗⊗	Ⓟ Ⓔ Ⓔ	Ⓔ Ⓔ Ⓔ	⊗⊗⊗
Manorom	AB	⊗⊗	⊗⊗	⊗	⊗	⊗	⊗⊗	Ⓔ Ⓔ	Ⓔ Ⓔ	⊗
Singburi	B	⊗⊗	⊗⊗	⊗⊗	⊗⊗	⊗⊗	⊗⊗⊗	Ⓟ Ⓔ Ⓔ	Ⓔ Ⓔ	⊗⊗
Bang Rachan	BA	⊗⊗	⊗⊗	⊗⊗	⊗	⊗	⊗⊗	Ⓔ Ⓔ	Ⓔ	⊗
Indraburi	BB	⊗	⊗⊗	⊗	⊗		⊗	Ⓔ		⊗
	A									
LOWER NORTH	AA									
Sukothai	A	△⊗⊗	△⊗	△⊗	△⊗⊗	⊗	△△⊗⊗	Ⓟ △ Ⓔ Ⓔ	△△Ⓔ	△⊗⊗⊗
Sawankalok	AA	△⊗⊗	△⊗	⊗⊗	⊗⊗	⊗	△△⊗⊗	Ⓟ Ⓔ Ⓔ	△△Ⓔ	△△⊗⊗
Sri Satchanalai	AB	⊗		⊗	⊗		⊗⊗	Ⓔ Ⓔ	Ⓔ	⊗⊗
Kamphaengpetch	A	⊗⊗⊗	⊗⊗	⊗⊗⊗	△⊗	⊗	⊗⊗⊗	△Ⓔ Ⓔ	Ⓔ Ⓔ	△⊗⊗
Klong Khlung	BA	⊗⊗		⊗⊗	△⊗		⊗⊗	Ⓔ Ⓔ	Ⓔ	⊗⊗
Pran Kratai	BB	⊗		⊗	⊗		⊗	Ⓔ		⊗
NORTHEAST										
Mahasarakam	A	⊗⊗	⊗	⊗⊗	⊗⊗⊗	⊗	⊗⊗	Ⓔ Ⓔ Ⓔ	Ⓔ	
Payakkaphum Phisai	AA	⊗⊗	⊗	⊗	⊗⊗		⊗⊗	Ⓔ Ⓔ	Ⓔ	
Na Chuak	AB	⊗			⊗		⊗	Ⓔ		
Yasothorn	B	⊗⊗	⊗	⊗	⊗⊗		⊗⊗	Ⓔ Ⓔ	Ⓔ	⊗⊗⊗
Loeng Nok Tha		⊗	⊗	⊗	⊗		⊗⊗	Ⓒ Ⓔ	Ⓔ	⊗⊗
King Amphoe Sai Mun	BB	⊗					⊗	Ⓔ		⊗
NORTHEAST										
Kalasin	A	⊗⊗	⊗	⊗	⊗⊗	⊗	⊗⊗⊗	Ⓟ Ⓔ Ⓔ	⊗⊗	⊗⊗⊗
Somdet	AA	⊗⊗	⊗		⊗⊗		⊗⊗	Ⓟ Ⓔ	⊗	⊗⊗
Kam Muang	AB	⊗			⊗		⊗	Ⓔ		⊗
Chaiyaphum	B	⊗⊗	⊗	⊗	⊗⊗	⊗	⊗⊗	Ⓟ Ⓔ Ⓔ	⊗	⊗⊗
Jaturus	BA	⊗⊗	⊗		⊗⊗		⊗⊗	Ⓔ Ⓔ	⊗	⊗
Nong Bua Daeng	BB	⊗			⊗		⊗	Ⓔ		⊗
SOUTH										
Chumphon	A	△⊗⊗	⊗⊗	△⊗	△△⊗	⊗	△⊗⊗	Ⓟ Ⓔ Ⓔ		△△⊗
Lang-Suan	AA	△⊗	⊗⊗	⊗	△⊗	⊗	△⊗	Ⓟ Ⓔ Ⓔ		△△⊗
Pathiu	AB	⊗⊗	⊗				⊗	Ⓔ Ⓔ		⊗⊗
Satun	B	⊗⊗			⊗		⊗⊗	Ⓔ Ⓔ Ⓔ		⊗⊗
Langu	BA	⊗					⊗	Ⓔ Ⓔ Ⓔ		⊗⊗
Thung-Wa	BB							Ⓔ Ⓔ Ⓔ		⊗
CENTRAL EAST										
Chonburi	A	ⓜⓜ△△Ⓢ	Ⓢ△△	Ⓢ△△△Ⓥ	△△Ⓢ	△△	△⊗⊗⊗	Ⓟ Ⓔ/Ⓔ Ⓔ	Ⓟ Ⓖ	△△△⊗⊗

□ Large units
△ Medium units
○ Small units

x x x Very many units
x x Many units
x A few units

A: Advanced area
B: Backward area
AB: Backward Amphoe in relatively advanced changwat etc.
p: Specialized shop
g: Grocery store
m: Manufacturing
s: Sales (including dealers)
v: Services

Source: Profiling studies of the Thai counterpart team as summarized by Ms. Rachaniwan Uthaisri.

Table 4.4: HANDICRAFT-TEXTILE ACTIVITIES AND EXTENT OF SUBSISTENCE ORIENTATION, THAILAND

Region	% of HH owning looms		% of HH owning matmaking machines		Survey of Farmers 1978/79 in baht/farm HH			
	SES 68/69	SES 75/76	SES 68/69	SES 75/76	Total Income[2/]	Total Agri. Sales	Home Consumption as a proportion of Farm Income[3/] %	Total Salaries & Wages [4/]
North Upper	4.1	.18	1.8	-	14,021	7,066	42.4	3,957
North Lower		.14		-	24,757	24,732	15.8	4,012
Northeast Upper	33.7	13.57	8.3	3.36	15,129	6,045	55.0	4,509
Northeast Lower		3.63		.53	15,317	9,167	51.9	3,198
Center[1/]	1.2	.11	5.4	.14	27,052	30,758	19.9	5,734
South	.4	-	.6	-	23,381	13,411	26.5	5,764
Bangkok[1/]	.7	1.35	2.2	.33	31,131	30,808	16.2	8,485

1/ SES 68/69: Center excludes Bangkok/Thonburi; SES 75/76 and Survey of Farmers data: Center excludes Bangkok/Thonburi, Nonthaburi, Pathumthani, and Samutprakan(included in with Bangkok).
2/ Total Income = [(ave. cash income from Agri + value of home consump.) - cash exp. for Agri] + ave cash off-farm income
3/ Farm Income = [(ave. cash income from Agri + value of home consump.) - cash exp. for Agri]
4/ Includes Agricultural Wages.

Note: SES Data relate to households (farm + nonfarm) in SDs + village; Survey of Farmers Data relate to farm households.

Source: Socio-Economic Survey 1968/69 Regional Volumes, and Socio-Economic Survey Tapes 1975/76, National Statistical Office; Survey of Farmers 1978/79 unpublished changwat Tabulations provided by the Office of Agricultural Economics, Ministry of Agriculture and Cooperatives. See Appendix Tables A.4 and A.6.

Northeast. These are clearly poor regions. Even in 1978/79 they were more subsistence-oriented than the other regions: agricultural sales are a lower proportion of total income than elsewhere; home consumption is a much higher proportion of farm income, and labor incomes do not provide more cash than elsewhere.

Household weaving activities thus are a sign of poverty and lack of better labor market opportunities for women in the dry season. No data are published or even collected on rural versus urban origin of manufactured consumer goods. However, from the Profiling Studies and the field trips it became very clear that rural areas are not important consumers of handicraft or cottage goods which traditionally have been produced in subsistence-oriented farm households (except, as discussed before, in the Northeast, when they are produced for consumption by the households themselves). Shops in rural towns all over the country offer hundreds of different consumption items. The overriding impression is that, in any town, only perhaps a dozen different products are of rural origin; primarily mats, baskets, possibly ropes and some varieties of cloth. The variety and, of course, the volume of goods are clearly substantially larger in richer areas than in the poorer ones. But the paucity of rural handicraft goods is a phenomenon of both the poor and rich areas. Rural consumers exhibit no preference whatsoever for rurally-produced goods, and we can expect an almost total disappearance of these activities in the near future.

Substitution of industrial goods for rural goods is also remarkable in areas other than the textile and cottage sectors. Cooking utensils and plastic containers are all industrial-urban products and local pottery concentrates on very large and heavy vessels such as those used for rainwater collection (for drinking purposes) or storage of produce. Soap is clearly no longer produced in rural areas and neither are most tobacco products, matches, etc. And most consumer durables, with the exception of simple furniture, are imported from urban centers.

Before closing, we should recognize that the substitution phenomenon is not entirely an income-related consumer demand story. Technical change in consumer durables, especially electronic goods, has been extremely rapid between 1960 and 1980, reducing real prices of these goods dramatically at a worldwide level. Moreover, domestic production of many of these items has concentrated on simple and cheap versions for which demand from poorer population groups is particularly large. These price-related factors would have led to increased rural consumption even in the absence of income growth and improvements in transport systems.

One also needs to recognize that traders and shopkeepers are not just passively responding to increased demand. The Profiling Studies clearly show that traders actively promote the sale of consumer durables and other urban consumer goods by the provision of retail credit to buyers. A large proportion of consumer durables is sold on installment payments even in rural areas.

4.3 Manufacturing Activities with Service Characteristics

Manufacturing activities which are widely found in rural and provincial areas frequently have the character of a service activity. The characteristics of these industries are summarized in Table 7.1. The goods produced are so perishable that they must be produced virtually on a daily basis: certain types of pickles, soft chinese noodles, and soybean curds are purchased on a daily basis from specialized producers who are invariably household-based firms using only limited and usually unskilled hired labor. The more durable products such as dried noodles or garlic pickles are often imported either from larger urban centers or from picklers located in specialized growing regions. Ice is produced both as a consumer good in relatively richer agricultural zones, such as the Center, and as an input to the fishing industry in coastal areas. Its durability is so limited that it cannot be shipped. Production takes place in many small-scale factories. Finally, rice milling is classified as a "manufacturing" activity in areas such as the Northeast where little rice is exported. As discussed in Chapter III, rice mills in those regions are usually small and found in almost every village where they process rice primarily for subsistence-oriented farmers as a service activity. After being milled, the rice goes back to the farming households.

4.4 The Impact of Urban Demand on Farm and Nonfarm Activities

Distance to urban centers has long been recognized to have a strong influence on the patterns of agricultural activities. The impact on nonfarm activities has been less well recognized. In this section we shall study both aspects, although the data relating to nonfarm activities are again quite scattered.

For agricultural production, von Thunen proposed a framework of analysis in which perishable commodities such as milk, fruits, and those with high transport costs (e.g. potatoes) tend to be produced closer to urban centers of demand than others, such as cotton. If a city were located in a large, undifferentiated plain this would lead to a ringlike arrangement of different agricultural products around it (Von Thunen rings). However, if different regions have sharply different agro-climatic and soil conditions, the resulting cost differences in production may easily overcome the transport cost differences and lead to a spatial arrangement of agricultural production according to comparative climatic advantage rather than distance. For non-agricultural pursuits, such a framework has not been formalized. However, in the tables below we will use a breakdown of the Central region which corresponds to von Thunen rings both for agriculture and nonagriculture. The tables divide the Central region up into the Bangkok metropolitan area (5 changwats), the ring of changwats immediately adjacent to the metropolitan area (8 changwats), and the remaining 13 changwats.

Table 4.5 shows weekly occupational status of the employed labor force in the slack season and peak season of 1979. (The SES data presented in Chapter II refer to usual occupation on an annual basis and do not contain any seasonal patterns). Note first that total employment increases marginally

Table 4.5: LABOR FORCE SURVEY 1979: EMPLOYED BY MAJOR WEEKLY OCCUPATION 1/ BY REGION, THAILAND

	Agriculture Forestry, Fishing & Mining 2/	Production Workers, Laborers	Transport & Communication	Professional, Technical Administrative & Clerical	Sales	Services	Total in Thous. (= 100%)	% increase (peak ÷ slack)
Bangkok Metropolis*								
Slack	13.9	32.6	5.6	17.7	20.5	9.7	2,534.9	2.7
Peak	13.8	31.3	5.8	19.0	20.5	9.5	2,603.8	
Adjacent Provinces								
Slack	49.0	21.9	4.9	6.3	14.0	3.8	1,469.8	13.8
Peak	55.4	18.2	3.9	6.1	12.8	3.6	1,672.0	
Rest of Center								
Slack	56.7	19.2	3.8	5.7	12.1	2.6	1,887.9	12.6
Peak	67.5	13.4	2.5	4.9	9.7	2.0	2,125.6	
Outer Regions								
Slack	69.2	13.3	2.1	4.4	8.8	2.2	10,920.9	35.8
Peak	83.1	5.6	1.3	3.1	5.4	1.5	14,828.2	

* Includes Bangkok, Thonburi, Nonthaburi, Pathumthani and Samutprakan.

1/ Refers to major occupations held during the reference week.

2/ The percentage of Employed persons with mining and quarrying occupations is negligible except in the south where they constitute only 1.8% of total employment in the slack season.

Source: Labor Force Survey Data Tapes 1979 rounds 1 (slack) and 2 (peak), National Statistical Office.

between the seasons in the metropolitan area (+3%), by about 13% in the Center and by more than a third in the outer regions (+36%). These seasonal patterns will be analyzed in greater detail in Chapter V. For both seasons taken together, the proportion of employment in agriculture increases steadily with distance from Bangkok. Note, however, that within the Center the differences in occupational patterns between adjacent and more distant areas are quite modest in the slack season but much more pronounced in the peak agricultural season. In the adjacent provinces the share of agriculture in employment increases by only 6.4% between the seasons, with corresponding small drops in employment shares in the nonagricultural sectors. In the remaining Central provinces, the agricultural employment share increases by 11.7%, which is associated with much more pronounced reduction in nonagricultural shares. For example, the share of production workers and laborers drops from 19.2% to 13.4%. Thus from relatively similar slack season bases, total employment increases by about the same proportion in the two subregions, but the shift out of nonagricultural activities into the agricultural one is less pronounced in the adjacent provinces than in the outer areas. We shall see below that this may be partly a reflection of the greater diversification of agriculture into poultry and fruit production in the adjacent areas. But it may also reflect the fact that nonagricultural activities are less closely linked to, or complementary with, agriculture in adjacent areas. It may therefore be more difficult to withdraw labor from the nonagricultural activities for peak season agricultural production.

Table 4.6 presents some data on the extent and composition of nonfarm incomes of farm households in the adjacent provinces compared to other regions of the country. Total agricultural household income is the highest in the metropolitan area. But in the Center it is only about 10% lower, with little difference between the adjacent and more distant provinces. Proximity to urban centers has the highest impact on salary incomes of agricultural households which constitute 18.5% in the metropolitan area, and 9.4% and 7.4% respectively in the adjacent provinces and the rest of the Center. This decline of salary income with distance probably reflects differential commuting opportunities. Hired nonfarm work, i.e. more irregular employment, on the other hand, appears to be little affected by the proximity to Bangkok. It is highest in the South and roughly constant in all central locations, including Bangkok.

Metropolitan location also provides farm households with substantial opportunities for home production of goods for sale of all kinds. Such production is the highest in the Metropolis, followed by the adjacent provinces. Farm households in regions other than the adjacent provinces earn less than half the amount from the sale of home-made goods than those in the adjacent provinces; and farm households in the Northeast earn only about a fourth, and this despite the fact that seasonal labor availability for home production is more pronounced in the Northeast than anywhere else. Distance from markets seems to limit severely the opportunities of Northeastern households, while proximity to Bangkok appears to favor the putting out of certain manufacturing activities into households. We know the approximate composition of home-made goods in outlying areas (i.e. the craft products of Table 7.1).

Table 4.6: SURVEY OF FARMERS 1978/79: SOURCES OF NONFARM INCOME, THAILAND
(baht per farm household)

	Total Income	Total off-farm nonagri	Salaries	Hired non-farm work	Selling of homemade goods
Bangkok metropolitan area*	31,131	11,525 (37.0)	5,769 (18.5)	2,032 (6.5)	1,621 (5.2)
Adjacent Provinces 1/	27,961	12,429 (44.5)	2,624 (9.4)	2,169 (7.8)	1,269 (4.5)
Rest of Center 2/	26,602	8,610 (32.4)	1,965 (7.4)	2,058 (7.7)	304 (1.1)
Center except Bangkok metropolitan area	27,052	9,876 (36.5)	2,183 (8.1)	2,095 (7.7)	624 (2.3)
Northeast	15,210	5,554 (36.5)	1,468 (9.7)	1,696 (11.2)	314 (2.1)
Upper North	14,021	5,727 (40.8)	1,190 (8.5)	1,642 (11.7)	372 (2.7)
Lower North	24,757	4,656 (18.8)	1,370 (5.5)	1,539 (6.2)	270 (1.1)
South	23,381	9,335 (39.9)	1,626 (7.0)	2,647 (11.3)	684 (2.9)

* Bangkok, Thonburi, Nonthaburi, Pathumthani, Samutprakan.

1/ Adjacent Provinces include: Samutsongkhram, Samutsakhon, Nakhonpathom, Ayutthaya, Saraburi, Nakhonnayok, Chachoengsao, and Chonburi.

2/ Includes provinces in the Central Region other than those in the Bangkok Metropolitan area and those in adjacent provinces.

Note: Total Income = [(ave. cash income from agri + value of home consumption) - cash expenditure for agriculture] + ave. cash off-farm income
Figures in parentheses are percentages of total income.

Source: Survey of Farmers 1978/79: unpublished changwat tabulations provided by the Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

But no studies have been conducted in the metropolis or adjacent areas on what households produce and sell.

From chapter III we already know that much of the regional agricultural production patterns in Thailand are largely based on comparative advantage rather than transport cost, although the specialization of the Northeast in glutinous rice for subsistence consumption rather than nonglutinous rice for export stems partly from transport disadvantages. More interesting than rice and other grains are products with high income elasticities such as fruits, vegetables and animal products.

Table 4.7 presents agricultural data on areas under vegetables (areas under fruit trees are not available) and the number of animals, as well as sales data, from the Survey of Farmers. We see that proximity to final demand is an overriding determinant of poultry production, with farms in the adjacent provinces having three to four times the number of birds in any other region. A slightly smaller advantage is held by the adjacent provinces in fruits (as measured by sales rather than area). The adjacent provinces also concentrate somewhat more on pork production than more distant ones. On the other hand, the adjacent provinces produce less vegetables and cattle than the remaining Central provinces and some of the outer regions, although in vegetables they clearly concentrate relatively more on sales rather than production for home consumption. Thus comparative agro-climatic advantage is a more important determinant of the location of vegetable, cattle and fruit production than for hogs, and especially for chicken and ducks. Chicken production is virtually independent of the land base. 1/ Its location is therefore almost exclusively governed by final demand. We have noted in the section on animal feed that the location of chicken production influences the location of the feed industry and any advantage derived from urban location by feed mills in turn will tend to favor location of chicken production near Bangkok.

The greater concentration of fruit, poultry and pork production in the ring of adjacent provinces would lead to more nonfarm employment there, particularly in the transportation of these products and sales to and in the metropolitan area. But we have no detailed data from which we can disentangle these effects.

From our discussion it is clear that farm households in adjacent districts benefit from the proximity of Bangkok by having a substantially wider set of opportunities in farm activities, in home production activities and in a variety of off-farm activities, including salaried employment. It is noteworthy that these extended opportunities do not translate into higher average incomes of farm households in the adjacent provinces than in more distant Central provinces. It is thus quite clear that differential migration patterns

---

1/ Chicken production is rather incompatible with an urban location, which is why metropolitan farm households have less chicken than those of the adjacent provinces.

Table 4.7: REGIONAL CONCENTRATION OF FRUIT, VEGETABLE AND ANIMAL PRODUCTION AND SALES, THAILAND, 1978/79

Area/Region	Planted Area in Vegetable Crops (Rai per holding)	Sales of Vegetables, Garden Crops and Flowers (baht per farm HH)	Sales of Fruits (baht per farm HH)	Number per holding				Sales of all Animals (baht per farm HH)	Expenditure on Animal Nutrition & Medicine (baht per farm HH)	Number of Feedmills
				Cattle (Excluding those used for working)	Swine	Chickens	Ducks			
Bangkok Metropolitan Area*	.261	260.46	2546.23	.038	.766	17.610	14.093	3378.32	1098.62	27
Center except Bangkok Metropolitan area	.243	938.99	1495.47	.706	2.589	25.412	8.150	4177.16	2296.58	37
Adjacent 1/ Provinces (8)	.108	953.13	2341.55	.342	3.619	45.819	16.162	7327.06	4363.18	20
Remaining Provinces in Center (13) 1/	.306	931.99	1075.80	.877	2.104	15.794	4.374	2614.57	1271.38	17
NE	.053	199.72	83.42	.713	.784	8.831	1.402	933.52	204.07	4
N	.160	736.87	446.75	.565	1.435	13.687	1.563	1004.79	266.61	9
S	.071	127.86	606.03	.662	1.279	12.353	2.067	1297.39	377.53	3

* Bangkok, Thonburi, Nonthaburi, Pathumthani, Samutprakan.

1/ See footnotes on Table 4.6.

Source: Agricultural Census 1978, Table 2.1, 3.7, 4.1, 4.4, 4.6 and 4.7.
Sales and Expenditure figures are calculated from Survey of Farmers, 1978/79. Unpublished changwat tabulations were provided by the Office of Agricultural Economics, Ministry of Agriculture and Cooperatives. Number of Feedmills are from The Animal Feed Industry in Thailand, Nipon Poapongsakorn, ARTEP, Oct. 1980.

into and out of these two subsets of changwats must have contributed to an essential equalization of incomes in the two areas.

We should also note, however, that diversity of economic opportunities provides rural households with a benefit quite independent of income; it reduces income risk by lowering the exposure to income fluctuations arising out of heavy concentration on a single agricultural enterprise such as rice. A price drop of rice would tend to affect the diversified households of the adjacent provinces less than those of the rest of the Center. Furthermore, whatever the source of income decline, it is easier to shift to other economic activities whenever one activity becomes less profitable.

V. RURAL LABOR MARKETS AND NONFARM ACTIVITIES

5.1 The Impact of Seasonality

Two distinguishing characteristics of agricultural production--the fact that it is "location-bound" and, at the latitudes of Thailand, inherently seasonal--are fundamental factors shaping the spatial and temporal patterns of labor utilization and consequently the structure and operation of rural labor markets. The dominance of agricultural demand for labor in rural areas has correspondingly important implications for the structure and potential of nonfarm activities and for the labor market processes determining the employment and movement of labor between localities and over time.

5.1.1 Regional Diversity and Seasonality Patterns

The regional variations in agricultural cropping patterns reflecting differences in climate, rainfall, soils, drainage, topography, etc. have been described in Chapter II above. In that chapter the focus was on the implications of these different patterns of agricultural specialization and diversification for the structure of off-farm and nonagricultural activities. In this section, the concentration will be more on seasonality patterns and the implications of seasonal changes in labor supply and demand for the functioning of labor markets, the short-term movements of labor between farm and nonfarm activities, and the interregional migration of labor.

The principal determinant of seasonality in Thai agriculture is the annual monsoon which produces a rainy season in the northern, northeastern and central provinces extending from May through October. The period of greatest slack in agricultural activities generally falls in the months of February and March in these areas. In the South, rainfall is both greater and more evenly distributed over the year, but with a relatively dry period during February and March.

Existing irrigation as well as its potential is relatively limited and varies substantially among regions. Most irrigation is devoted to rice production during the wet season; although precise estimates are difficult to come by, total dry-season irrigation probably is not more than 3-5% of total cultivated area and perhaps 30-40% of paddy area. Irrigation is concentrated in the central provinces where about one-third of total cultivated area and two-thirds of paddy area are irrigated during the wet season, but even here there is dry-season irrigation for only some 10% of the cultivated area and less than a quarter of paddy area. In the North and Northeast dry-season irrigation is extremely limited, amounting to only 1-2% of total cultivated area (although, in the North, wet-season irrigation is significantly higher--about 10% of total cultivated area). 1/

1/ Trent Bertrand, Thailand: Case Study of Agricultural Input and Output Pricing, World Bank Staff Working Paper No. 385, 1980, Table 12, p. 38.

The seasonal variations in rainfall, the topographical and water resource constraints on dry-season irrigation, and regional differences in crop specialization make for a high degree of seasonal fluctuations in the demand for agricultural labor in all the regions except the South. Although the simple twofold classification of "peak" and "slack" seasons which is used in the following analysis captures a great deal of this seasonal variation, it undoubtedly conceals much of the complexity of the cycles in agricultural operations over the year and the variations within and between regions. In particular, discussion of the labor force survey results take the first round conducted during January-March to be representative of the slack season and the second round conducted in July-September to correspond to the peak season. While there is little or no agricultural activity in February and March, much of the harvesting of rice is done in January in all regions as well as of other crops such as beans and maize. In addition, a portion of the designated peak period actually falls between the busy seasons of planting (May-July) and harvesting (October-January).

In the monsoon-affected provinces, those areas relatively well-endowed with dry season irrigation (mainly in the Central Region) may provide a fairly stable demand for full-time workers in agriculture. In the South, the more evenly distributed rainfall and the importance of perennial tree crops (rubber, fruits) also serve to moderate seasonality in production and labor demand. But, for the overwhelming proportion of the rural work force, the annual shifting in the demand for labor--from season to season, from area to area and from one sort of activity to another--is a pervasive feature of the employment environment.

The significance of these seasonal movements for the structure and operation of labor markets is not confined to the short-run processes of labor utilization and allocation. The behavioral and institutional adaptations that have developed to cope with a regime of fluctuating production and employment opportunities have longer-run consequences for the character and composition of labor supply in rural areas. In particular, they are likely to exercise an important influence on the nature and extent of nonagricultural activities--existing and potential--in rural areas as well as on the pattern of both rural-rural and rural-urban migration.

5.1.2 Magnitude and Composition of Seasonal Employment

A comprehensive measure of the full extent of seasonal variations in employment would require detailed data on the flow of labor services--hours worked by individuals over the year in various occupations, sectors, etc.--which do not exist. But a fairly good idea at an aggregative level of fluctuations in employment can be derived from the Labor Force Surveys conducted each year by the National Statistical Office (NSO) during the slack months January-March and the peak months July-September. (See Appendix Tables A.12 and A.13). The seasonal swings in the structure of nonmunicipal employment in the various regions are strikingly apparent in Table 5.1. They are, of

Table 5.1: SECTORAL DISTRIBUTION OF SLACK AND PEAK SEASON EMPLOYMENT IN NONMUNICIPAL AREAS, BY REGION, THAILAND, 1979

	North		Northeast		Center /1		South		Whole Kingdom /2	
	Slack	Peak	Slack	Peak	Slack	Peak	Slack	Peak	Slack	Peak
Agriculture	71.8	84.7	75.8	91.6	57.7	66.2	71.4	75.4	68.5	81.2
Mining and Manufacturing	9.1	3.9	8.5	1.9	16.7	13.0	10.6	8.3	11.4	6.1
Construction	2.9	1.4	2.8	0.6	3.9	2.8	3.4	2.3	3.3	1.6
Commerce	8.0	4.6	5.5	2.4	8.7	7.1	6.9	6.6	7.2	4.6
Services	6.6	1.0	5.9	2.9	9.7	8.4	5.6	5.5	7.3	5.1
Utilities and Transportation	1.7	4.3	1.6	0.6	3.3	2.5	2.2	2.0	2.2	1.4
Total %	100	100	100	100	100	100	100	100	100	100
(000's)	3431	4541	4613	7328	3329	3759	2158	2222	14013	18358

/1 Center excludes Bangkok-Thonburi.

/2 Whole Kingdom includes Bangkok-Thonburi.

Source: Labor Force Survey data tapes, 1979, Round 1: Slack (January-March) and Round 2: Peak (July-September), National Statistical Office.

course, most pronounced in the North and Northeastern regions where agriculture provides 70-75% of total employment even in the slack seasons and 85-90% in the peak season.

In absolute terms, the seasonal increase in agricultural employment in 1979 amounts to some 5 million workers--over 50% of slack season agricultural employment and around 30% of the total slack season labor force. In the North and Northeastern regions, agricultural employment swells by 1.5 or 2 times during the peak months, but by only 30% in the Center and less than 10% in the South.

Analysis of the "sources" from which peak season agricultural workers are drawn (Table 5.2) reveals that, with the exception of the South, most is accounted for by changes in the labor force between the slack and peak periods. Movements in and out of unemployment are a negligible factor. Unemployment levels in nonmunicipal areas as measured in the Labor Force Surveys are extremely low--about 1% during the slack months and half that during peak periods. In part this is the result of the definition of measured unemployment used in the surveys which classifies as unemployed only those who did not work at all during the week preceding the survey interview and who were looking for work or would have if it were not for illness or the belief that no work was available. However, even if unpaid family workers working less than 20 hours per week and all employees working less than 35 hours per week, who reported that they desired more work, were included, unemployment in nonmunicipal areas during the late 1970's would range only between 3 to 5% of the labor force, except in the South (Table 5.3). Although unemployment on either definition shows substantial seasonal variation in percentage terms, the absolute numbers are miniscule in comparison to the seasonal movements in and out of the labor force.

The seasonal decline in persons recorded as out of the labor force ranges from about two-thirds to four-fifths of the increase in agricultural employment during the peak months for the three regions outside of the South. On a net basis, close to all of the increase in the labor force during the peak season appears to be drawn from persons classified as performing housework or "waiting for the agricultural season" in the slack months. Two-thirds to three-quarters of these are women, with married women making up a substantially higher proportion than in the total female labor force. Of the males reporting themselves as "waiting for the agricultural season" during the slack months, by far the greatest proportion are young (50% being under 25 years of age and almost two-thirds under 30) and single (over 75%).

Considered together with the fact that the overwhelming part of the seasonal increase in agricultural employment is accounted for by unpaid family workers, the picture that emerges from these aggregative data is of a rural labor supply closely attached to agricultural households and highly responsive to the seasonal fluctuations in the demand for agricultural labor. Although it is apparent that there exist in rural Thailand large reserves of labor during the slack seasons that are drawn into productive activity during the months of peak agricultural demand, it cannot be concluded from this fact alone that these off-season labor reserves constitute a pool of underutilized resources or "labor surplus" that could be tapped at low cost simply by

Table 5.2: SEASONAL EMPLOYMENT CHANGES IN NONMUNICIPAL AREAS BY SECTOR, STATUS, AND REGION, THAILAND, JANUARY-MARCH AND JULY-SEPTEMBER, 1979

	North	Northeast	Center /1	South	Whole Kingdom /2
	(Percent of change in agricultural employment)				
Agriculture	100.0	100.0	100.0	100.0	100.0
of which: unpaid family workers	(86.3)	(94.7)	(95.5)	(103.9)	(92.7)
Nonagriculture	-19.7	-15.7	-24.4	-52.1	-18.2
Mining & Manufacturing	- 9.6	- 7.8	-12.2	-32.3	- 9.2
Construction	- 2.6	- 2.7	- 4.7	-16.3	- 3.2
Commerce	- 4.7	- 2.6	- 3.8	- 2.5	- 3.1
Services	- 2.0	- 1.8	- 1.0	1.1	- 1.6
Utilities & Transportation	- 0.9	- 0.9	- 2.8	- 2.2	- 1.0
Unemployed	- 0.7	- 0.6	- 0.4	-	- 0.6
Outside the Labor Force	-75.4	-80.3	-66.4	-23.3	-76.1
Housework	- 7.0	- 6.1	- 5.3	- 9.5	- 6.6
Waiting for agricultural season	-67.9	-71.8	-62.2	-26.4	-68.6
Students and others	- 0.6	- 2.4	1.0	12.7	- 1.0

/1 Center excludes Bangkok-Thonburi.

/2 Whole Kingdom includes Bangkok-Thonburi.

Source: Labor Force Survey data tapes, 1979, Rounds 1 and 2, National Statistical Office, calculated from Appendix Table A.13.

Table 5.3: UNEMPLOYMENT AND PARTIAL UNEMPLOYMENT /1 RATES IN NONMUNICIPAL AREAS, BY SEASON AND REGION, THAILAND, 1978 and 1979

	1978		1979	
	January-March	July-September	January-March	July-September
	(Percent of total labor force)			
Whole Kingdom /2				
Unemployed	0.8	0.4	.9	.5
Partially Unemployed	4.3	3.2	3.3	2.4
Total	5.1	3.6	4.2	2.9
North				
Unemployed	0.6	0.3	.7	.3
Partially Unemployed	2.8	0.7	1.9	1.0
Total	3.4	1.0	2.6	1.3
Northeast				
Unemployed	0.9	0.1	1.0	.3
Partially Unemployed	4.3	2.2	5.3	2.0
Total	5.2	2.3	6.3	2.3
Center /3				
Unemployed	0.8	0.8	1.0	.8
Partially Unemployed	4.1	3.7	3.2	2.2
Total	5.0	4.5	4.2	3.0
South				
Unemployed	0.6	0.4	.5	.5
Partially Unemployed	6.8	11.8	2.0	6.7
Total	7.4	12.2	2.5	7.2

/1 Unemployed includes those not working at all during survey reference weeks but looking for work. Partially unemployed includes unpaid family workers working less than 20 hours per week but wishing to work more and paid employees working less than 35 hours per week but wishing to work more.

/2 Whole Kingdom includes Bangkok-Thonburi.

/3 Center excludes Bangkok-Thonburi.

Sources: Labor Force Survey, 1978, Rounds 1 and 2, and Labor Force Survey data tapes, 1979, Rounds 1 and 2, National Statistical Office.

increasing the level of off-season demand for labor. The observed responsiveness of the labor supply to peak agricultural demands obviously reflects the adaptations embedded in the structure of agricultural households to the timing and location of fluctuations in their primary economic activity. Labor supply responses to additional demands of labor will be very much dependent upon whether the timing, location and returns of additional employment opportunities can be accommodated without imposing too high costs from their interferences with agricultural production. A central question in judging the significance of and potential for rural nonfarm employment, therefore, is concerned with the structure, operation, and effectiveness of labor markets in determining wages and guiding the allocation of labor.

5.1.3 Local Labor Markets and Seasonal Shifts in Economic Activity

The intimate seasonal links between agricultural and nonagricultural activities in rural Thailand are clearly discernible even in the grossly aggregative figures of Tables 5.1 and 5.2, particularly in the two most highly agricultural and seasonally affected regions of the North and Northeast. The increase in agricultural demand for labor during the peak months is matched by marked declines both absolutely and in percentage terms in nonagricultural activity. The net shift from the nonagricultural sectors amounts to some 15-25% of the total increase in agricultural employment. It is significant that, in contrast to the seasonal increase in the labor force, male workers account for the greater part of the net decline in nonagricultural employment.

The highly aggregative nature of the sample survey data makes it difficult to draw inferences about the individual character of off-season nonagricultural activities. The net shift out of the mining and manufacturing sector constitutes the biggest single component in absolute magnitude. From other evidence, especially the Profiling Studies of individual provinces in the regions, much of this must consist of agricultural processing activities such as rice milling and cassava processing, whose seasonal timing can be adjusted to some degree to the fluctuations in peak labor demand. Another large component is certainly accounted for by the wide variety of household or cottage industry activities such as cotton and silk weaving, mat-making, pottery, bamboo weaving, etc. To some extent these activities may be carried out throughout the year with trade and marketing concentrated in the off-season.

Since the optimal period for construction tends to be in the dry season, it is not surprising to find it a significant source of off-season employment. Its economic significance may in fact be greater than indicated by the absolute numbers involved because the level of skills and physical

effort demanded are likely to command higher wages.1/

The dominant characteristic of all these activities, besides their wide variety, is their local and limited character. They are firmly embedded in the small-holder agrarian structure and appear to originate in the search by rural households for sources of income that they can combine with farming under the locational and temporal constraints imposed by the agricultural production process. The aggregative evidence from the Labor Force Survey data is sufficient to confirm the substantial degree to which rural households have succeeded in exploiting local opportunities for such combinations.

Although many of these combinations involve the use of labor resources within the rural household itself, the importance of non-agricultural wage income relative to the production of home-made goods reviewed in Tables 2.3 and 2.10 is evidence that a great deal of off-season activity involves employment elsewhere in the locality or in nearby provincial towns. What the Labor Force Survey, because of the household sampling methods employed, cannot reveal is the extent to which the search for off-season employment extends over longer distances in the form of seasonal migratory movements.

5.1.4 Seasonal Migration

Comprehensive statistical data do not exist to establish the precise magnitudes and directions of seasonal movements in labor between the various regions and provinces of Thailand. However, abundant fragmentary evidence exists that seasonal migration is pervasive and large. The principal source areas are the North and Northeast with the primary destinations being Bangkok, the Central provinces and the South.

As might be expected, it is the Northeast--the most populous region, most dependent on rainfed agriculture, with the lowest income levels and with the fewest alternative employment opportunities in regional urban centers--where the seasonal outflow of labor is greatest. In some Northeastern provinces this seasonal movement can be dramatic in magnitude. A study carried out in 1980 in Chaiyaphum 2/ found that about 8.5% of the total economically active population left the province during the dry season to seek employment elsewhere. Although the incidence of seasonal out-migration varies substantially from province to province, district to district and even village

---

1/ It should also be noted that the survey figures obscure the seasonal shifts that undoubtedly take place within the broadly defined agriculture sector. In many, very probably most, areas, crop production is combined with such ancillary activities as wood-cutting, fishing, hog-, cattle-, and poultry-raising, etc. which can be pursued more intensively during slack periods to provide supplementary sources of income.

2/ See P. Prapertchob (1981), Profiling Study No. 1.

to village it is apparent from field observations that seasonal out-migration is a common occurence in even the more remote areas of the Northeast.

While Bangkok is the destination for the largest fraction of seasonal migrants and there appears to be significant movement to other urban centers, rural-to-rural migration forms a substantial part of the seasonal movement. The largest sources of agricultural demand for off-season workers are the sugarcane areas, particularly in the Central provinces. While there are no reliable data on the numbers of workers involved, estimates range up to 50,000-75,000 workers each season. An indication of the importance of this source of seasonal labor demand is the organized manner in which recruitment for work in the sugar areas has been developed. It is common for sugarcane farmers or associations to make arrangements for the recruitment of workers in villages in the Northeastern provinces and then send trucks to transport them to the sugarcane fields. The other significant source of agricultural employment for seasonal workers from the Northeast appears to be the fruit orchards in the Southern and Center-East provinces.

There is all too little information available about the principal flow of seasonal workers to nonagricultural employment in Bangkok. The Survey of Migration into Bangkok, conducted annually by the National Statistical Office, is designed to document the flow and characteristics of the more permanent migrants into Bangkok. Based on an annual sample in November of each year of migrants who have moved to Bangkok within the preceding two years, the survey cannot provide good estimates of the seasonal flow of migrants, the bulk of whom arrive after the date of one sampling and leave before the next one. A rough indication of the seasonal flow, however, may be derived from the numbers of migrants recorded as arriving in October (the month before the sample is drawn) and who report that they have come to Bangkok to seek work during the slack season in agriculture. With the aid of some rather arbitrary assumptions to reflect the fact that seasonal movements are almost certainly higher in the winter and early spring months, it can be estimated that the seasonal inflow into Bangkok in recent years may have risen to over 100,000 workers per year (Table 5.4). Notwithstanding the uncertainties in Table 5.4 regarding the level, the survey figures would indicate that there has been a rapid increase in the seasonal inflow over recent years (although the large increase indicated for 1977/78 may be, in some measure, the result of earlier and larger movements connected with the drought conditions of 1977).

It is difficult to determine from the data at hand much about the detailed characteristics of seasonal migrants into Bangkok. However, it appears that the large majority of them (about 60%) are female and overwhelmingly young. Of these recorded in the Survey of Migration into Bangkok as coming to Bangkok to look for work during the agricultural slack season during 1976-77, 85% of the males and 90% of the females were in the age group 11-29. This is consistent with field observations that young people frequently leave their villages for one or more periods of time even though they may eventually return and settle down. The high proportion of females is at least in part explained by the large and apparently growing demand in Bangkok for young girls to work as domestic servants.

Table 5.4: ESTIMATES OF SEASONAL MIGRATION INTO BANGKOK, THAILAND, 1974-1978

	Migrants Arriving in Bangkok Looking for Work During Agricultural Slack Season			Estimates of Seasonal Migration into Bangkok if Average Flow for Eight Off-Season Months is:	
	Male	Female	Total	Equal to October Level	2 times October Level
Oct. 1974	950	1878	2828		
1974/75				22624	45248
Oct. 1975	864	1137	2001		
1975/76				16008	32016
Oct. 1976	1385	2808	4193		
1976/77				33544	67008
Oct. 1977	2803	4529	7332		
1977/78				58656	117312

Source: The Survey of Migration in Bangkok Metropolis, National Statistical Office, 1975, 1976, 1977, 1978, Table 16.

The absorption of migrant workers into the Bangkok economy is supported by a complex of formal and informal networks to provide job information and placement. A follow-up study 1/ designed to yield more detailed information about migrant experiences and adjustment found that over 60% of those migrants who came to work either had a job or a promise of a job before moving. Relatives, friends and acquaintances were the principal sources of job information, with employment agencies a much smaller but still significant factor.

It is probable, however, that employment agencies play a more significant role in temporary or seasonal placements. There are about 100 such agencies licensed in Bangkok and perhaps double that number licensed in other regions, some of which also operate in Bangkok. In addition, there is a large number of unlicensed recruitment agencies (estimates range up to 1,000 for the whole country). According to the President of the Recruitment Association of Thailand, most of these agencies in Bangkok are concerned with meeting demands for seasonal or short-term employment in construction, services and small-scale manufacturing since Bangkok employers tend to fill more permanent vacancies by relying on recommendations of their own employees and other sources.

On the single criterion of allocating seasonal workers into jobs (certainly not the only relevant one), these informal and formal labor market mechanisms appear to function effectively. Despite an annual inflow of employment seekers that may amount to as much as 3-5% of the regular Bangkok workforce, there seem to be no significant seasonal fluctuations in aggregative measures of unemployment rates (Table 5.5). As noted earlier, most migrants have located jobs prior to moving, but, even among those who come to Bangkok on the chance of finding work, the evidence is that the period of job search is quite short. The follow-up migrant study by Chamratrithirong cited above found that over 55% of the male and 75% of the female migrant job seekers found work within one week and almost 85% of both sexes within a month.

5.1.5 Longer-Term Migration

The magnitude and character of seasonal employment and migration flows would seem to indicate that the Thai labor force is highly mobile, at least in the shorter term. On the other hand, census data on inter-Changwat movements of population over the five-year periods 1955-60 and 1965-70 show rather moderate (but increasing) five-year migration rates of 3.6% and 6.6%

1/ Apichat Chamratrithirong, Recent Migrants in Bangkok Metropolis: A Follow-up Study of Migrants' Adjustment, Assimilation and Integration. Mahidol University, Institute for Population and Social Research, November 1979, p. 36.

Table 5.5: UNEMPLOYMENT IN BANGKOK-THONBURI, THAILAND, 1976 - 1980

	1976 1/	1977	1978	1979	1980
	(Percent of labor force)				
January-March	1.7	2.1	2.5	2.9	(NA)
	(NA)	(3.1)	(4.2)	(5.3)	(NA)
July-September	1.7	2.2	2.6	3.2	3.5
	(NA)	(3.2)	(4.1)	(5.1)	(5.0)

1/ In 1976 (prior to adoption of the utilization framework) unemployed persons included unpaid family workers working less than 20 hours per week and wanting more work; since then, this group has been included in the employed population.

Note: Figures in parentheses also include as unemployed unpaid family workers with less than 20 hours work per week and wanting more work, and employees with less than 35 hours per week and wanting more work.

Source: Labor Force Surveys, 1976-1978, Rounds 1 and 2; and Labor Force Survey data tapes, 1979-1980, Rounds 1 and 2, National Statistical Office.

respectively. 1/ These relatively low migration rates should not be simply interpreted as evidence of "high" immobility however.

Insofar as the geographical movements of workers are connected with differences in wage levels, the relatively low incidence of migration needs to be viewed in the light of the fairly moderate regional wage differences noted in the following sections. While all the processes underlying the maintenance of rather shallow wage gradients may not be fully understood, a major factor may be presumed to be the interconnectedness of Thai labor markets reflected in the substantial seasonal migrations and high supply elasticities of rural labor. Moreover, neither the estimates of seasonal migration nor measures of five-year changes in residence of the population fully capture the gross movements of the Thai labor force. As might be expected, younger workers - new or recent entrants to the labor force - have the highest propensity to move; age-specific migration rates from the census data show a sharp peak in the 15-19 and 20-29 age groups with rates 1.5-2 times the average. 2/ It is a reasonable presumption that the higher mobility of younger workers is associated with a job search process often involving "circular migration" and multiple moves within the space of a few years. 3/ Consequently, the five-year migration status measures from the census data will underestimate the movement during the period.

Whether the increase in migration rates observed between the 1960 and 1970 censuses has continued is still uncertain. While the Labor Force Survey data for more recent years do indicate an overall five-year migration rate of about 9% compared to the 6% rate for 1965-70 (Table 5.6), some or all of the difference may be accounted for by restriction of the Labor Force Survey to labor force participants and the inclusion of intra-changwat moves for rural residents. From the evidence of Table 5.6 there does not appear to be extremely wide variation in migration rates among regions. Of much greater significance is the fact that the five-year (1973-1978) migration rate for the labor force resident in municipal areas (24.2%) is over three times that of the rural labor force (7.0%). This higher rate of urban labor force movement, together with increasing urbanization, is undoubtedly one factor underlying the observed rising trend in the overall migration rate. Finally, it should be noted that the estimates of gross movements that can be derived from the Labor Force Survey data indicate that substantial proportions of the migrant moves are from municipal to nonmunicipal areas.

Most residential moves take place, of course, within regions but some 38% of labor force moves between 1973 and 1978 were across regional

---

1/ Susan H. Cochrane, The Population of Thailand: Its Growth and Welfare. World Bank Staff Working Paper No. 337, June 1979, Table 23, p. 37.

2/ Cochrane, op.cit., p. 39.

3/ S. Goldstein and Pichit Pitaktepsombati, Migration and Urban Growth in Thailand, 1974, pp. 23 ff.

Table 5.6: EXTENT OF INTERNAL LABOR FORCE MIGRATION AS MEASURED BY RESIDENTIAL CHANGE, THAILAND, JULY-SEPTEMBER 1973 TO JULY-SEPTEMBER 1978

	(1) Labor Force 1973 (000's)	%	(2) Members 1973 Labor Force with Migrant Status 1978 (000's)	%	(3) Incidence of Migration (2)/(1) (%)
NORTH	3928	22.9	311	19.4	7.9
NORTHEAST	6274	36.7	628	39.1	10.0
CENTER	3508	20.5	368	22.9	10.5
BANGKOK-THONBURI	1384	8.1	95	5.9	6.8
SOUTH	2024	11.8	206	12.8	10.2
WHOLE KINGDOM	17117	100.0	1607	100.0	9.3
Municipal	(2379)	(13.9)	(576)	(35.8)	(24.2)
Nonmunicipal	(14737)	(86.1)	(1031)	(64.2)	(7.0)

Source: Labor Force Surveys, 1973 and 1978, Round 2, National Statistical Office.

boundaries. In contrast to the overall migration rates, the proportion of interregional to total migrants varies substantially among regions, ranging from 48.3% in the Northeast and 31.5% in the Center to 19.1% in the North and 14.5% in the South. The general pattern of interregional migration flows can be discerned in Table 5.7. The central attraction of Bangkok is apparent; it was the destination of well over half of all interregional migrants recorded in the period 1973-1978. More than 50% of the inter-regional migrants originated in the Northeast regions and the two thirds of these who settled in Bangkok accounted for over 60% of migrants to that area. Despite the proximity of the Central Region to Bangkok, and the high proportion of migrants (70%) moving there, they amounted to only a quarter of total migrants to Bangkok.

The gross movements revealed in these figures are generally in conformity with the net migration flows apparent in earlier census data. From what is known about the direction and magnitude of migratory movements of labor during agricultural slack seasons, they too seem to have a broadly similar interregional pattern. This combined with the indication of a substantial amount of circular migration, suggests that seasonal employment serves as a mechanism for the acquisition and transmission of information about, and experience in, alternative employment which may lead to longer-term or permanent migration. In any event, the available measures of longer-term movements within and between regions confirm the impression that the networks of information are sufficiently strong and the mobility of the labor force sufficiently great to establish close links among regional labor markets - both rural and urban.

The evidence on the seasonal expansion in employment and the locational movements of labor (both seasonal and longer-term), deficient though it may be in some respects, is sufficient to demonstrate the high degree of responsiveness and adaptability of the Thai workforce to shifting employment opportunities. The amount and character of movement within and between rural and urban areas; agricultural and nonagricultural activities; and various geographic regions testify to the complex inter-relatedness of Thai labor markets. Two features of these labor market interrelations need to be emphasized: (1) the close seasonal connection, within rural areas, between agricultural and nonagricultural activities, and (2) the apparently strong connections between even remoter rural provinces of the North and Northeast and the labor markets of Bangkok and the Central provinces as reflected in seasonal and longer-term migratory flows of labor.

5.2 Wages, Incomes and the Underutilization of Labor

The examination of wage levels and structures in Thailand is hampered by the absence of comprehensive wage surveys and the consequent scarcity of detailed and reliable wage data.

5.2.1 Wage Dispersion and Employment "Contracts" or Relationships

The problems posed for the documentation of wage levels or returns to labor by the heterogeneity of the workforce and the wide variety of circum-

Table 5.7: DISTRIBUTION OF INTER-REGIONAL MIGRANTS 1973-78 BY ORIGIN AND DESTINATION, THAILAND

%

origin 1973 / destination 1978	North	Northeast	Center	Bangkok-Thonburi	South	Total %	Total ('000)
North	-	63.5	15.5	17.4	3.6	100.0	(67.1)
Northeast	12.2	-	38.0	47.2	2.6	100.0	(30.3)
Center	13.0	36.7	-	39.9	10.4	100.0	(146.8)
Bangkok-Thonburi	9.6	61.9	25.0	-	3.5	100.0	(327.0)
South	16.0	14.2	38.7	31.1	-	100.0	(31.8)
TOTAL ('000)	9.9	50.3	19.2	15.7	4.9	100.0	(603.0)
North	-	14.1	9.0	12.4	8.0	11.2	
Northeast	6.2	-	9.9	15.1	2.7	5.0	
Center	32.2	17.8	-	62.0	51.0	24.3	
Bangkok-Thonburi	53.0	66.7	70.5	-	38.3	54.2	
South	8.6	1.5	10.6	10.5	-	5.3	
TOTAL ('000)	100.0 (59.4)	100.0 (303.3)	100.0 (116.0)	100.0 (94.5)	100.0 (29.8)	100.0 (603.0)	

Source: Labor Force Survey 1978 Round 2, National Statistical Office.

stances under which work is performed is most clearly exemplified by the fact that most of the rural labor force consists of unpaid family workers. The relevance of observations on wages received by hired workers or employees as measures by the general level of returns to labor must depend on assumptions about the links between rural labor markets--specifically that opportunities for movement (at least at the margin) are sufficiently untrammelled that the supply of unpaid family workers is a major influence on wage determination in the market for hired workers. By and large the relatively large net movements between employment status, sectors, and locations discussed in the preceding sections support this assumption. The wide variations along the spatial, seasonal, contractual, and quality dimensions of employment inevitably produce a correspondingly wide dispersion of actual wage rates; it is important to keep this in mind in drawing inferences from average wage levels or differentials which at best can serve as rather gross indications of general tendencies within a much more complex network of labor market phenomena.

5.2.2 Regional and Rural/Urban Wage Differences

Tables 5.8 and 5.9 present regional wage distributions for rather broadly defined labor categories derived from two different 1979 surveys. The high degree of overlap between the regional distributions is apparent even though the observations have been restricted to prime age group males with only lower elementary schooling in the one case and urban laborers in the other. This wide dispersion of the intra-regional distributions reduces the significance that can be attached to differences in any calculated measures of average wage levels between regions and areas.

For nonmunicipal workers, the only significant regional differential that stands out is that between the North and Northeast and the rest of the country. Median wages are roughly 1 1/2 times as large elsewhere as in the North and Northeast. Regional differences in median wage levels are distinctly lower among the other regions outside of the Bangkok metropolis.

While data are not available to determine the longer-term evolution in these differential wage patterns, it is a fair presumption (since they undoubtedly reflect basic regional differences in economic structure and in the levels and rates of development) that they are quite stable over time. The evidence from recent years (Table 5.10) provides some confirmation; virtually the identical pattern of differentials is observable in each of the years 1977-1980.

Several things are striking about the patterns of average wage levels revealed in these tables. The first is the absence of significant differentials between the regions within the larger northern and southern geographical divisions of the country; there appears to be only one fairly steep geographic wage gradient for rural labor--that between the more northerly and the southern provinces. Secondly, for municipal workers, the principal significant gradient is that between the central provinces, including Bangkok, and the rest of the country. The South thus appears as a higher-wage area for rural labor and as a lower-wage area for municipal workers. Third, the differences among regions in urban wage levels seem less pronounced than those for the

Table 5.8: PERCENTAGE DISTRIBUTION OF STANDARDIZED DAILY WAGES /1 OF MALE PRIVATE EMPLOYEES /2 (HOURLY, DAILY, AND OTHER PAID) MUNICIPAL AND NONMUNICIPAL, BY REGION, THAILAND, JULY-SEPTEMBER 1979 (BAHT/DAY)

	No. in Sample	<15	15-30	30-45	45-60	60-75	75-90	>90	First Quartile	Approx. Median Daily Wages	Third Quartile
Municipal Areas											
North	94	0	13.8	46.8	23.4	11.7	1.1	3.2	33.6	41.6	54.2
Northeast	58	0	20.7	36.2	20.7	17.2	3.4	1.7	31.8	42.1	58.1
South	125	0	22.4	50.4	12.8	8.0	5.6	.8	30.8	38.2	47.6
Center	139	0	11.5	33.1	23.7	18.0	5.8	7.9	36.1	48.4	65.6
Bangkok-Thonburi	567	.9	6.7	30.5	18.0	19.0	12.7	12.2	39.0	54.9	74.9
Nonmunicipal Areas											
North	292	5.8	44.5	31.2	11.3	4.1	1.7	1.4	21.5	29.9	41.9
Northeast	192	8.3	56.8	23.4	6.8	2.6	.5	1.6	19.4	26.0	36.4
South	96	2.1	16.7	29.2	18.8	24.0	5.2	4.2	33.2	46.6	65.1
Center	416	1.0	14.7	36.1	22.1	13.9	7.9	4.3	33.9	44.3	61.2
Bangkok-Thonburi	147	0	9.5	42.9	27.9	9.5	3.4	6.8	35.4	44.2	57.2

/1 Adjusted to standard 8-hour day.
/2 Includes private employees age 20-59 with lower elementary education (4-6 years).

Sources: Calculated from Labor Force Survey data tapes, 1979, Round 2, National Statistical Office, see Introduction to Statistical Tables, Summary of Major Sources (III).

Table 5.9: PERCENTAGE DISTRIBUTION OF LABORERS BY DAILY WAGES OR EARNINGS, URBAN AREAS, THAILAND, 1979 (BAHT/DAY)

	No in Sample	Under 20	20-39	40-59	60-79	80-99	100-149	150-199	200+	Approx. Median
North	90	10.0	51.1	28.9	4.4	4.4	1.1	-	-	34.9
Northeast	151	-	70.2	10.6	6.6	2.6	8.6	1.3	0.0	33.5
South	209	1.9	45.9	30.6	12.7	6.2	1.4	0.5	0.5	41.4
Center	605	2.5	53.1	25.3	10.1	3.6	4.6	0.5	0.3	37.0
Bangkok-Thonburi	125	4.0	38.4	33.6	8.0	7.2	6.4	0.8	1.6	44.3

Source: Survey of Urban Employment Situation in Thailand, 1979, Department of Labor, Labor Studies and Research Division, Table 9.1.

Table 5.10: STANDARDIZED AVERAGE DAILY WAGES /1 FOR MALE PRIVATE EMPLOYEES (HOURLY, DAILY AND OTHER PAID), AGE 20-59 WITH LOWER ELEMENTARY EDUCATION, THAILAND, JULY-SEPTEMBER, 1977-1980
(BAHT/DAY)

	Nonmunicipal				Municipal			
	1977	1978	1979	1980	1977	1978	1979	1980
North	29.5	28.0	33.3	40.0	36.1	44.9	43.9	52.3
Northeast	23.6	28.4	28.9	38.1	36.5	45.2	43.2	48.8
South	38.0	43.2	50.4	54.6	36.5	40.7	40.5	50.3
Center	36.0	38.5	47.7	53.7	42.7	44.1	52.7	61.1
Bangkok-Thonburi	36.5	42.9	48.3	62.9	49.6	48.3	58.4	67.5

/1 Adjusted to standard 8-hour day.

Source: Calculated from Labor Force Survey data tapes, 1977-80, Round 2, National Statistical Office. See Introduction to Statistical Tables, Summary of Major Sources (III).

more rural areas. One result of this is that in the North and Northeast the rural/urban differential of 35-50% is significantly higher than the 10-20% differential observed in the Center and the metropolitan area of Bangkok, while it disappears (or is reversed) in the South. Finally, and perhaps most important, is the comparatively small size of all the average differentials that can be observed at this level of aggregation.

The high level of aggregation involved in the statistical measures being used will, of course, tend both to increase the amount of wage dispersion and possibly to decrease the magnitude of the differences in the calculated average wage levels. The data in Table 5.11 on wages of a few more narrowly defined occupational groups, however, tend to confirm the more aggregative patterns. Despite the greater sampling variability that must be expected from the quite small sample sizes involved, the broad patterns of wage relationships are much the same.

Two other features of the data on occupational wage levels might be noted. There is no indication of any significant differentials between men and women engaged in farm labor--a finding consistent with reports from individual observers familiar with rural labor market conditions. And while too much should not be read into figures for a single occupation, it is noteworthy that the rural/urban differentials are almost insignificant for carpenters--a comparatively skilled labor category with a greater degree of homogeneity than the other occupational groupings for which we have data. If the same holds true for other more homogenous occupational groups, the occupational or skill mix (as distinct from region or place of residence) would be an important factor explaining the observed average geographic differentials.

5.2.3 Seasonal Wage Variation

The periods are too wide and the employment categories too broad in the Labor Force Survey to provide any precise indications of the amount of variation in wages between peak and slack seasons in rural labor markets. However, there is ample evidence from field observation reports that wages of farm labor do vary significantly from season to season in local labor markets.

Some idea of the quantitative magnitude of seasonal changes in agricultural wages is available from estimates by the Ministry of Agriculture of wages received by workers in specific operations over the crop cycle in paddy and maize cultivations (Table 5.12). From these data, wages in those operations carried out mainly in the off-season would appear to range from 10-20% below those for the peak harvesting operations in the three regions other than the South. In the latter region no significant seasonal variation is discernible, as would be expected from the more evenly distributed rainfall and the dominant importance of tree crops in that part of the country.

Table 5.11: STANDARDIZED DAILY WAGES /1 FOR PRIVATE EMPLOYEES (ALL TYPES OF PAYMENTS) IN SELECTED OCCUPATIONS, BY REGION, THAILAND, JULY-SEPTEMBER, 1979
(BAHT/DAY)

	North	Northeast	South	Center	Bangkok-Thonburi
Municipal Areas					
Laborers (Male)	34.0	29.1	36.9	45.5	47.3
Laborers (Female)	25.8	*	38.2	29.1	35.4
Carpenters (Male)	47.4	48.7	67.4	55.3	68.1
Motor vehicle drivers (Male)	52.4	49.2	49.3	57.1	69.7
Nonmunicipal Areas					
Laborers (Male)	30.3	28.8	42.1	40.3	38.5
Laborers (Female)	20.8	23.6	29.5	30.9	32.6
Farm workers (Male)	23.1	20.6	*	31.7	40.8
Farm workers (Female)	24.5	20.3	*	27.4	34.9
Carpenters (Male)	41.4	39.7	61.3	62.6	58.7
Motor vehicle drivers (Male)	49.7	47.6	58.1	60.0	76.4

* Number of observations too small to compute meaningful average.

1/ Adjusted to standard 8-hour day.

Source: Calculated from Labor Force Survey data tapes, 1979, Round 2, National Statistical Office. See Introduction to Statistical Tables, Summary of Major Sources (III).

Table 5.12: VARIATION IN DAILY WAGE RATES FOR SELECTED AGRICULTURAL OPERATIONS, PADDY AND MAIZE CULTIVATION, BY REGION, THAILAND, 1978

%

	North		Northeast		Center		South
	Paddy	Maize	Paddy	Maize	Paddy	Maize	Paddy
Land Preparation	82.0	92.8	91.3	92.1	78.5	90.0	107.5
Planting	91.2	95.5	98.9	93.8	95.5	90.0	101.8
Weeding	80.6	99.5	95.6	94.7	80.4	87.6	99.6
Harvesting	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Unpublished data derived from the Cost of Cultivation Survey, 1978, Ministry of Agriculture and Cooperatives.

Since it can be justifiably assumed that the large seasonal fluctuations in agricultural employment derive from changes in the demand for labor over the year, it is obvious that wage variations of this order of magnitude imply high seasonal elasticities of labor supply in rural areas.

Although these high seasonal labor supply elasticities may be interpreted to reflect an abundant reserve in rural areas of "underemployed" labor, it cannot be inferred that they represent "surplus" labor in the sense that they are generally available for employment at zero opportunity cost.

5.3 Employment Policy Implications and Issues

5.3.1 Labor Market Interrelationships

It is not surprising that the dominant role of agriculture in rural areas results in a complex system of spatially and sectorally differentiated structure of economic activities in labor markets. What is noteworthy in Thailand is the character and extent of adaptations of nonagricultural activities to the structure of agricultural labor demand and the consequent strong labor market linkages on both the supply and the demand sides among sectors and regions.

The analysis of the structure and operations of rural labor markets in this report confirms the conclusion reached in the earlier Bank study about the effectiveness of Thai labor markets. 1/ As summarized by Bertrand and Squire in a subsequent article 2/, the available evidence on wage and employment behavior "....highlights the role of supply and demand forces in a dynamic disequilibrium context. Seasonality in agricultural activities, changing prospects for crops that are regionally specialized, uncertain production conditions dependent on weather, significant changes in labor demands in areas affected by infrastructure investments, and large scale structural changes in the Thai economy with relative expansion of urban labor markets have all been factors requiring substantial and continuous adjustment in labor markets. These adjustments have taken place in an environment in which the overwhelming majority of rural families have land holdings so that off-farm labor supply decisions must be reconciled with farm labor requirements in an environment with significant adjustment and information costs or in which migration decisions imply changes in life-styles and often in the structure of family assets."

1/ Employment Aspects of Thailand's Development. Background Working Paper prepared for the Basic Economic Report on Thailand (World Bank Report No. 2059-TH, September 1, 1978).

2/ Trent Bertrand and Lyn Squire, "The Relevance of the Dual Economy Model: A Case Study of Thailand". Oxford Economic Papers, November 1980, pp. 480-511.

Although the evidence on the interrelated structure of rural labor markets is sufficient to establish their general responsiveness to underlying factors of economic change, it does not reveal the particular features constraining the speed and character of the responses which to a large extent determine the employment and earnings experience and prospects for individuals and groups of workers. Such factors as the spatial dispersion of rural labor, the inescapable risks and uncertainties surrounding employers and workers' decisions, the distinctive nature of rural capital markets, as well as strong and diverse cultural characteristics, are clearly important determinants of individual behavior, institutionalized contractual relationships, and labor marketing arrangements.

5.3.2 Employment Aspects of Rural Development Policy

The conclusion that the Thai labor market works effectively in and of itself carries no implication that market processes alone can be relied upon to achieve all desired developmental, distributional and poverty alleviating objectives. There remain important issues of employment and labor market policies which may be classified into two general types: (1) Structural or institutional interventions to improve the functioning of labor markets or, more generally, those processes through which wages are determined and employment opportunities distributed throughout the economy; and (2) direct interventions to offset or remedy consequences of labor market processes which are deemed detrimental to efficiency, growth or distributional objectives. Rural works and other employment creation and income maintenance programs fall in the latter category while minimum wages, labor market regulations, and other protective labor legislation, along with policies and programs concerned with collective bargaining, migration, training and skill formation, fall in the former category.

5.3.3 Rural Employment Creation and Income Maintenance Programs

Policy concern with rural development has been an element of the government rural development efforts for almost three decades. The Community Development Program, the oldest and most prominent among such programs, relied on a diversified hierarchical structure of the Community Development Department of the Ministry of Interior and a fairly limited transfer of resources to rural areas. It was based on a self-help concept of rural development relying on village level training programs and technical assistance, comprising mainly expertise and to a lesser extent equipment services. Resulting effects were mostly intangible and thus difficult to assess. Security-oriented programs have an equally long tradition in Thailand. Although they have contributed to rural development, their planning, organization, and funding were done exclusively by military authorities and relatively independently from the Government's general rural development efforts.

The government decided to broaden the scope of its rural development efforts, both in terms of issues addressed and resources involved. The first program to embody such changes was the Tambon Development Program (TDP), launched in 1975 as a longer-term development program designed to: (a)

strengthen local government capacity to plan and carry out local development projects; (b) increase employment and incomes during the slack season in rural areas; and (c) improve rural economic and social infrastructure. It involved (for Thailand's circumstances) a very large transfer of budgetary resources to rural areas over a short period of time (B 2.5 billion in April-June 1975, and B 3.5 billion in April/June 1976). Since then, the government has maintained a continuing high level of budgetary resource transfers into rural areas through a number of programs of changing scope and objectives. In 1977, the high priority objective was drought relief implemented through the Drought Relief Program; in 1979, rural development and poverty alleviation particularly in sensitive areas were addressed through the Provincial Development Program (PDP) and New Village Development Program (NVDP); and in 1980 and 1981, employment creation and income generation in rural areas were done through the Rural Employment Generation Program (REGP).

Since 1975 these five major programs (involving a total transfer of nearly B 19 billion into rural areas) have provided sizeable contributions to rural economic and social infrastructure, (water resource development, roads, bridges, schools, health centers, etc.); helped develop local government capacity to carry out future rural development projects; improved security in sensitive areas of the North, Northeast, and the South; and provided immediate relief in the face of adverse weather conditions. (The details are described on a program by program basis in Appendix Table A.15.) A complete review of these programs lies beyond the scope of this report but it is instructive to consider some of the difficulties met in carrying out these programs and the changes that have been or might be made to improve their effectiveness.

One source of difficulty has been the incorporation of a wide variety of objectives into the programs. The stated objectives have been heterogeneous both with respect to time frame (long- , medium- , and short-term) and type of issues addressed (economic, social, poverty and equity, political, military, governmental, etc.). The multiplicity of objectives posed difficult problems of reconciling the weight to be given to each in actual implementation. And the efforts to resolve these problems in centrally-administered national programs tended to take the form of uniform criteria and requirements for program components, without sufficient regard to the diverse circumstances of different areas and regions in the country.

Experience under the Rural Employment Generation Program (the most recent of the large programs) may serve to illustrate the character of the problems encountered. The REGP focused mainly on employment and income generation in rural areas, and only secondarily on provision of infrastructure and development of local government capacity to organize and execute rural development projects. In order to reach the employment objective, the program in its first year (1980) relied on rigid prescriptions concerning cost shares or labor intensity of projects implemented under the program. At least 70% of all resources had to be spent on wages in water resource development projects and two-thirds of all program resources were allocated for such water development projects irrespective of the differing circumstances among local areas and regions. The problem created for the implementation of the program

with maintenance of reasonable project quality standards led in the succeeding year (1981) to a substantial relaxation of these requirements.

Analagous difficulties have been caused by policy of using the legal minimum wage as the standard for payment of workers employed on REGP projects without regard for local or regional difference in labor market conditions. In some areas (particularly in the Northeast) where the minimum wage standard was substantially higher than prevailing wage levels for similar types of labor, some form of rationing of program work opportunities had to be improvised because of the excess number of job applicants attracted by the higher wage opportunities. Based on the analysis of Thai labor markets in the previous sections, it is likely that a fair proportion of workers attracted by the higher wage levels on REGP projects may have been drawn out of less remunerative activities rather than open unemployment. To the extent that this occurred it would reduce the net income benefit accruing to workers employed in the program. Moreover, under the rationing procedures that had to be adopted, the benefits of increased employment and income may not have accrued to those most in need of them. In the higher-wage regions of the Center and South, where the minimum wage standard was below prevailing wage levels, quite the opposite sort of situation was created by the lack of sufficient labor to execute projects under the program. There are reports that in some instances community pressure was brought to bear on workers to accept employment so that the project objectives of the program could be met.

What these examples illustrate is the importance of giving close attention to local development circumstances and labor market conditions in the design and implementation of rural employment creation and poverty alleviating programs. In so doing, it is important to distinguish between needs for immediate poverty alleviating supportive measures and the longer term objectives of assisting particular groups and areas to improve their productivity and earnings. This has been clearly recognized in the "new approach" to rural development that has been formulated in conjunction with the Fifth National Development Plan for 1982-1986.

The Plan for the Development of Poor Rural Areas (a part of the Fifth Plan) in its statements of principles emphasizes that the Plan is designed (1) to give priority to the development of specific poverty areas; (2) to assure the availability of minimum basic services throughout rural areas; and (3) to support and encourage local participation and self reliance. The employment creation programs will be revised to give priority in allocations to poverty areas, to provide greater flexibility in the regulations on project expenditure, to enhance planning and administrative capabilities at the local level, and to take measures to ensure that the benefits of increased employment generated by the program accrue to those most in need of it. 1/

1/ Plan for the Development of Rural Areas (Translation by Vipat Dharapak), NESDB, 1981, p. 26.

5.3.4 Minimum Wage Policies

Prior to 1973 there was virtually no legal or trade union influence on wage formation; trade unions were prohibited between 1958 and 1972 and the government generally refrained from direct intervention (either administrative or legal) in the labor market.

The situation changed in the early 1970's. The oil crisis and increasing food prices accelerated sharply the rise in the cost of living. An elected government superseded the military regime and lifted the ban on trade unions and collective bargaining. General labor protection laws were first promulgated in that environment in April 1972 and a minimum wage was set at ฿12 per day for Greater Bangkok in April 1973. By October 1974 the area coverage had been extended to the entire Kingdom.

Formally, minimum wages are set and adjusted through a Notification of the Ministry of Interior in accordance with labor protection laws and on the basis of proposals formulated by a tri-partite Wage Committee in the light of such factors as cost of living, production costs, product prices, employers' ability to pay and other prevalent economic conditions in each locality. In principle, minimum wages can be prescribed and legally determined specifically for any type of industrial undertaking and for any particular locality (changwat) in the Kingdom. In practice, however, all industries (excluding agriculture and government administration) have been treated uniformly and only a few geographic zones recognized.1/

Since their inception in April 1973, minimum wages have been adjusted nine times and these adjustments have generally exceeded the inflation rate. By October 1981, the minimum wage standard for Bangkok in real terms had been raised by more than 100% over its initial level in 1973. In the other regions of the country, the real increases since 1974 have ranged between 65 and 85% (Table 5.13).

1/ Between April 1973 and June 1974, the minimum wage was only applicable to a single zone consisting of Bangkok Metropolis and three surrounding provinces: Samutprakan, Nonthaburi, and Pathumthani. In June 1974, this zone was extended to Samutsakhon and Nakhonpathom and then in October of that year minimum wages were prescribed for the whole kingdom divided into three zones: Zone 1 as described above, Zone 2 covering the remainder of the Center, the whole South and four provinces of the Northeast (Ubonratchathani, Udonthani, Khonkaen, and Nakhonratchasima), and Zone 3, the remainder of the Northeast and the whole North. Four Northeast provinces were transferred in October 1977 to Zone 3; and, finally, in October 1981 Zone 1 was extended to the following seven provinces: Chonburi, Saraburi, Ranong, Phang-nga, Phuket, Nakhonratchasima, and Chiangmai; while the remainder of Zone 2 and Zone 3 were merged into a new Zone 2.

Table 5.13: CHANGES IN NOMINAL LEGAL MINIMUM WAGES AND INDEX OF REAL MINIMUM WAGES BY REGION: 1973-81, THAILAND
(baht/day)

Month/Year of Change	Bangkok		North		Northeast		Center		South	
	Nominal minimum wage	Index real minimum wage	Nominal minimum wage	Index real minimum wage	Nominal minimum wage	Index real minimum wage	Nominal minimum wage	Index real minimum wage	Nominal minimum wage	Index real[1/] minimum wage
April 1973[a/]	12	62.2	-	-	-	-	-	-	-	-
Jan. 1974[a/]	16	72.7	-	-	-	-	-	-	-	-
June 1974[b/]	20	80.5	-	-	-	-	-	-	-	-
Oct. 1974[c/]	20	79.0	16	101.2	16	97.1	18	99.0	18	104.2
Jan. 1975[c/]	25	100.0	16	100.0	16	100.0	18	100.0	18	100.0
Oct. 1977	28	93.3	19	101.2	19	102.4	21	98.4	21	102.6
Aug. 1978	35	109.4	25	126.5	25	127.6	28	128.1	28	129.6
Sept. 1979	45	124.3	35	158.8	35	158.8	38	151.6	38	155.0
Oct. 1980	54	125.5	44	171.8	44	166.5	47	156.8	47	162.4
Oct. 1981[d/]	61	127.0	52	184.7	52	178.8	52	158.9	52	163.0

1/ Base year = January 1975. Real wage indexes are derived by applying Regional CPI for the appropriate month.

a/ Minimum wage for Bangkok was also applicable to the 3 neighboring provinces of Samutprakan, Nonthaburi, and Pathumthani.
b/ Area coverage of the minimum wage for Bangkok was extended to the provinces of Samutsakhon and Nakhonpathom.
c/ Until October 1977, the minimum wage of B18 per day was also applicable in the following four provinces of the Northeast: Ubonratchathani, Udonthani, Khonkaen, and Nakhonratchasima.
d/ Since October 1981, the highest prescribed minimum wage is applicable in Bangkok, five surrounding provinces (listed under a/ and b/) and the following seven provinces: Chonburi, Saraburi, Ranong, Phang-nga, Phuket, Nakhonratchasima, and Chiengmai.
e/ Estimate based on January-August 1981 CPI.

Source: Department of Labor, Ministry of Interior (for nominal minimum wages).
Department of Business Economics, Ministry of Commerce, and also reported in the Bank of Thailand Statistical Bulletin (for consumer prices).

Surveys conducted by the Department of Labor, Ministry of Interior, and the Bank of Thailand suggest a low to moderate overall compliance with minimum wage and other labor protection laws (See Appendix Table A.16.) Sectoral and regional variations are, however, considerable, despite the fact that the figures average together organized and unorganized sectors. Compliance with minimum wage laws appears to be directly and strongly related to the firm size.

The policy issues surrounding minimum wages are complicated by lack of complete and firm analytic foundations. But it is a standard conclusion in economic theory that any successful attempt to fix a minimum real wage above what would have been established in competitive markets leads to unemployment or misallocation of resources. And since minimum wage regulations are directed at markets for the lowest paid, least skilled labor, it presumably has adverse consequences on the poorest, least advantaged workers. By imposing constraints on their ability to exchange their labor on most advantageous terms, it forces them into idleness or lower-paying pursuits in sectors beyond the reach of the legislation or its enforcement.

Until recent years the levels and effective coverage of legal minimum wages were such that it is unlikely that they were a significant factor affecting average wage levels. But from data now available, minimum wage levels have reached the point where they approximate or exceed <u>average</u> daily wages for laborers in municipal areas where the legislation probably is most effectively enforced (Table 5.14.)

It is not possible with current information to document the effects of minimum wages in Thailand. But there can be little doubt that, to the extent that minimum wage standards at such high levels are effectively enforced, they will be adverse both to the efficient development of the economy and to the alleviation of poverty. And if the legislation cannot be generally well enforced, there may well be detrimental effects associated with arbitrary enforcement, the promotion of illegality and the possibilities for corruption which that entails, and, not least, the damage to the whole process of developing appropriate and effective labor legislation.

In the light of the evidence of the close links in Thailand between rural and urban, agricultural and nonagricultural, as well as regional, labor markets, the effective imposition of minimum wage standards at or above wage levels prevailing in most areas for most of the lesser skilled work force must be expected to have adverse direct and indirect consequences on employment and earnings opportunities. And these adverse consequences are almost certainly bound to fall most heavily on rural workers, particularly on the growing numbers of those seeking more remunerative employment in nonagricultural pursuits in both rural and urban areas. It is, therefore, becoming increasingly important that minimum wage policies be formulated with more careful attention to the likely impacts on the structure of labor markets and earnings prospects for those most vulnerable groups in the work force.

The limitations of minimum wage legislation as an instrument for alleviating poverty are such that great caution is required in its

Table 5.14: A COMPARISON OF AVERAGE DAILY WAGES FOR LABORERS IN MUNICIPAL AREAS WITH MINIMUM WAGES, THAILAND
(baht/day)

	Average Wage of Laborers 1/ in Municipal Areas						Minimum Wage	
	January-March 1979		July-September 1979		July-September 1980		September 1979	October 1980
	Male	Female	Male	Female	Male	Female		
North	35	25	34	26	39	36	35	44
Northeast	27	-	29	28	37	-	35	44
Center	45	27	46	29	43	35	38	47
South	32	31	37	38	44	-	38	47
Bangkok-Thonburi	41	31	47	35	51	43	45	54

1/ Standardized daily wage for privately employed laborers (all forms of payments), as calculated from Labor Force Survey data tapes, 1979, Rounds 1 and 2, and 1980, Round 2, National Statistical Office. See Introduction to Statistical Tables, Summary of Major Sources (III).

implementation if perverse results are to be avoided. In particular, legislated minimum wage standards should not be mistaken for a means of raising general levels of real wages or for ensuring minimum living standards throughout the economy. Its primary rationale lies rather in providing protection for the real wages of the least advantaged workers in imperfect labor markets. The logic of government intervention to prohibit employers and prospective employees from entering into wage contracts at sub-standard levels rests on the presumption that wage rates below the minimum set are sufficiently below average prevailing rates to be considered prima facie the result of labor market failure -- i.e. employer coercion, workers' lack of information, etc. In this perspective, minimum wage regulation is to be considered as only one rather limited instrument for achieving labor market policy objectives.

5.3.5 Labor Market Policy

The central task of labor market policy in Thailand is to develop an approach to government interventions that fully recognizes the effectiveness and complexity of the economic forces operating in Thai labor markets and concentrates government efforts to channel them in socially productive ways, to reduce abuses that may derive from exploitation of unconstrained economic power, and to ameliorate the costs and inequities that the process of economic change frequently inflicts on disadvantaged groups. The conclusions reached above on the general effectiveness of Thai labor markets argue for policies that emphasize positive measures which assist workers in taking advantage of the changing structure of employment and earnings opportunities - improvements in labor marketing arrangement (both seasonal and longer term), expansion of training and educational opportunities, and programs to raise the health and nutritional status of the work force.

Given the importance of migration to the present and future income prospects for much of the rural population, efforts to reduce the risks and hazards to which migrant workers, both temporary and permanent, are exposed should be a prime focus of governmental policy. But the implementation of policies in these areas requires careful analysis of particular labor market situations so that any remedial and regulatory measures adopted do not have the effect of restricting, rather than expanding, access of workers to remunerative employment opportunities. In the situation prevailing in Thailand, where a complex of private labor marketing arrangements and institutions have already emerged for the recruitment and placement of seasonal and permanent workers from rural areas, it is important that government actions do not result in seriously hampering the real and important economic functions being performed by such arrangements and institutions.

It is not the proper function of this report to attempt to prescribe in specific terms the forms and scope of government labor policies even if we had undertaken (which we have not) the detailed and extensive analysis of Thai labor markets that would be necessary. However, such inquiries, so far as we have been able to determine, have not yet been carried out in Thailand in order to provide the basis for policy in these areas. This lack of firm foundations complicates the policy-making process by giving free rein to

assertions regarding the objectives and effectiveness of particular policy actions that are unconstrained by factual analysis and therefore may reflect consciously or unconsciously the special interests of those groups espousing them. The outcome of such a process may well produce a compromise of political positions that, in seeking to accommodate the interests of all, in the event may serve the interest of none.

VI. SUPPLY-SIDE FACTORS IN RURAL NONFARM ACTIVITIES

In this section we are not primarily concerned with the overall constraints operating at the economy-wide level on the emergence of manufacturing activities. Economy-wide constraints on availability of skills and capital (or specific forms of skills and capital) limit the growth of manufacturing in general (or of specific sectors) and are therefore of general policy relevance. However, so long as they do not affect the rural and provincial locations more severely than metropolitan Bangkok, they are of little concern in the context of this study. Instead we are asking whether substantial difficulties exist in attracting skills or capital to rural/provincial areas, given the overall limits on the availability of such skills or capital. In addition, we shall focus on a few limiting characteristics of the rural/provincial locations such as transport and communication disadvantages.

6.1 Skills Demanded by Existing Rural Nonfarm Activities

As noted above, there is a wide variety of rural nonfarm activities in existence throughout Thailand, with the extent of activities in any given area depending on the type of agricultural activity predominating, other natural resources and the consumption patterns of the population. The level of skills demanded by existing rural nonfarm activities varies as much as do the activities themselves. The large industries which face significant economies of scale -- sugar mills, for example -- demand the widest variety of skills, ranging from completely unskilled labor to highly-skilled engineers and technicians. The production of agricultural implements and all of the handicrafts require a moderate level of skill.

How are the skills demanded by existing rural nonfarm activities acquired? This too varies widely. Much of the weaving activity which now provides segments of the rural population with off-farm income, such as basket or mat weaving, fish net manufacture and some cotton weaving, has grown out of traditional weaving done for the household's own use. When asked how the necessary skills were acquired for this type of activity, villagers often respond "We've always known how". Such skills have traditionally been passed down from generation to generation and were as much a part of the learning process as walking or speaking. Skills for the preparation of specialized local foods and production of simple hand tools are probably acquired in a similar fashion.

Most of the existing rural nonfarm activities seem to require a short period of on-the-job training. The manufacture of farm trailers and plows, silk weaving and furniture making, are examples where it is claimed that skills are acquired on-the-job after exposure of several weeks or months to the process concerned. Industries requiring the use of specialized equipment such as canning factories, larger tractor producers and sugar mills, often have formal training programs and apprenticeship periods. Strikingly, all of the industrialists interviewed claimed that semi-skilled labor had to be trained from scratch, regardless of their educational background.

Highly-skilled labor -- engineers, accountants, technicians -- are acquired from the larger urban centers, most frequently from Bangkok. A variety of incentives are offered to attract such skilled personnel, including competitive salaries, housing, transportation, health insurance, generous leave allowances and, for large companies, prospects of promotion.

By and large, existing rural nonfarm activities have been reasonably successful in acquiring the skills necessary for their existence. Thai laborers, despite their rather limited education (basically four years of primary schooling), have proven themselves to be quick learning, adaptable and skillful at the level of skill being demanded of them. However, it is also true that limitations on the level of skills of both management and labor have acted to constrain the types of activities which are now found in rural areas. For example, numerous small firms have sprung up in the Central region to produce the simple farm trailers and two-wheel tractors that are now being used thee in abundance. However, the four-wheel tractors, requiring greater welding skills, are imported from Bangkok. The growth potential for those engineering industries, which have been identified as being reasonable candidates for regional dispersal 1/, will depend on the ability of individual firms to upgrade their skills to a level competitive with Bangkok.

To date, the only rural nonfarm activities which have attracted high-level management and technical skills to rural locations have been large firms such as the sugar mills which simply must locate in rural areas and can afford to pay the extra incentives required to make this possible. The lack of such skills has, however, been identified as inhibiting the growth of some of the existing rural nonfarm activities. The case of the four-wheel tractor cited above is one example. A lack of marketing know-how has been identified as one

---

1/ The IBRD report, Development of the Engineering Industries in Thailand (May 17, 1980) listed the following types of engineering industries as potential candidates for location in the regions:

(a) Plants that use inputs with high value per unit weight and are therefore not penalized by high transport costs. Usually the product will also have the same characteristics so that transport costs to markets are not excessive. Examples are light electrical equipment and switches, optical and scientific equipment, certain parts for transport vehicles.

(b) Plants which face local consumer demand for simple standard items. Examples are light agricultural machinery and some consumer goods.

(c) Plants which are able to produce efficiently in batches or job-shop conditions (i.e. do not face economies of scale). Examples may include machine shops for production of spare parts and repair, some kinds of tools and implements, and certain types of materials handling equipment.

of the factors inhibiting the growth of handicraft industries. The expansion and diversification of rural nonfarm activities may thus depend on the ability to upgrade skills at the management level.

6.2 Ongoing Programs to Upgrade Skills for Rural Nonfarm Activities

There are a number of programs 1/ in existence which are designed to enhance both technical and non-technical industrial skills of relevance to rural nonfarm activities. Most of these are government sponsored but the private sector also plays a role.

The Department of Labor in the Ministry of Interior has established Institutes for Skill Development at five locations throughout the country: three in and around Bangkok and one each in Lampang and Khonkaen. The Lampang and Khonkaen branches draw their students largely from the northern and northeastern regions, respectively. The major activity is pre-employment training for young men and women (very few of the latter), 16 to 25 years old, who have completed at least four years of primary schooling but not more than the lower secondary level (MS3). The training is basic and terminal and varies from two to six months depending on the trade. It is well suited to industrial demand, concentrating on mechanics and electronics, wood, metal and cement working, and construction, and is supplemented by a period of in-factory training in private industries in the area. Training is also offered in non-technical fields such as training for factory foremen, in-factory training officers, secretaries, receptionists, etc.

Short evening courses are also offered to employed workers who want to upgrade their skills. The institutes also offer a trade skill certification service for craftsmen who lack documentary evidence (diploma, etc.) of their skill which some employers require.

The Institutes for Skill Development do an effective job of imparting practical skills in high demand. Indeed their graduates are reported to find employment in the larger urban centers, including Bangkok. The Khonkaen branch is a major source of semi-skilled labor recruited for employment in the Middle East. It would be useful to undertake tracer studies to determine the extent to which graduates of the institutes find employment in rural nonfarm activities either initially or upon return after employment elsewhere.

The Department of Industrial Promotion (DIP) in the Ministry of Industry has established Industrial Service Institutes in Bangkok and Chiengmai and is considering establishing additional institutes in Khonkaen, Songkhla and Nakornratchasima. In contrast to the Institutes for Skill Development, the Industrial Service Institutes provide specialized short-term training (5 to 10 days) to practicing craftsmen, many of them graduates of

---

1/ This section is based largely on Working Paper No. 29, "Small Industrial Enterprise Supportive Institutions", prepared by Jacques Amyot for the Rural Off-Farm Employment Assessment Project.

vocational training schools. Supervisors and foremen are the main target group. Each institute tends to specialize according to the perceived needs of the area, with the Bangkok institute stressing metal working and furniture making and that of Chiengmai, ceramics, lacquerware and woodworking. The facilities and training of both institutes are excellent and their effectiveness is strengthened by the package of services offered which includes backup research and development, extension, and marketing assistance. Their impact has been less than their potential, however, because of limited staff and budgetary resources.

The Thailand Management and Productivity Center of the DIP offers short-term courses of about five days duration for industrial personnel in marketing, personnel relations, accounting organization, maintenance and safety. Four to five thousand persons a year undergo the training, most of them Bangkok-based middle level management. The impact on rural nonfarm activities has therefore been minute. One large electronics firm based in Bangkok -- whose management (though self-educated) had taken advantage of the center's offerings -- gave it considerable credit for the efficiency improvements which had made expansion possible. This expansion had included opening a subsidiary company in Chiengmai which provides off-farm employment for 600 semi-skilled workers, indicating that there may be considerable potential for rural nonfarm activities indirectly stimulated by the Center's program.

Three divisions of the Department of Industrial Promotion -- Textiles, Cottage Industries and Thai Handicraft Promotion -- have Bangkok-based training staff who go into rural areas to train villagers in their specialities, usually organized at the initiative of rural development agencies of the Ministry of Interior (Office of Accelerated Rural Development (ARD), the Community Development Department, and the Public Works Department) or private organizations such as the Population and Community Development Association. Training sessions may last up to six weeks in a given locality. While thousands of villagers have been reached by the programs because of a lack of follow-up and/or of demand, the skills often fall into disuse and only a limited amount of income-generating activity has resulted.

As mentioned above, rural development agencies have projects involving training but, in most instances, they do not conduct the training themselves. There are several exceptions, however. The Community Development Department has nine regional Rural Development Centers throughout the country, which act as training centers for the department's related project activity, some of it related to home industry. The ARD, which has more technical staff than do the other generalized agencies, is effective at agro-industrial promotion in their project areas. The Public Works Department has centers which teach simple crafts to their clientele (new settlement areas) but the impact of this activity on the villagers' lives is marginal.

Two departments in the Ministry of Education offer skill development applicable to rural nonfarm activities. The Department of Vocational Education has established a network of vocational/technical schools and colleges throughout the country which teach industrial arts (electronics, auto

mechanics, welding, etc.), business (bookkeeping, typing, marketing, business administration) and home economics (dressmaking, hairdressing, tailoring, cooking). There are about 160 such institutions located in the large provincial towns, with an average enrollment of about 1,000 pupils. The Department of Nonformal Education, through its 37 Lifelong Education Centers and numerous outreach programs (mobile trade training schools, continuing education programs and village interest groups) offers skill development in these fields as well as in basic literacy and numeracy. The Department is estimated to reach a total of two million people annually through these programs.

Participation of the private sector in the upgrading of skills has been alluded to above. In addition to the on-the-job training made available to trainees enrolled in pre-employment training by the Institutes for Skill Development, several large commercial firms provide seminars and factory tours as a public service to vocational school students. The extension services provided by such firms to their own subcontractors is also an important source of skill development. The impact of such assistance on rural nonfarm activities has probably been minimal to date, however, because most of these firms are Bangkok-based. Several small private enterprises and volunteer organizations have attempted to initiate handicraft activities in selected villages of the Northeast. While there are notable instances of success, especially if followed-up with marketing assistance, the overall impact of such programs has been minimal.

6.3 Education and Training Policy

Several implications for educational and training policy emerge from the above discussion. First, the close link between the opportunities for rural nonfarm activities and the viability of the agricultural sector suggests that increased attention must be given to the education of the rural population, particularly in the least advantaged agricultural areas, if agricultural incomes are to be increased and rural nonfarm activities stimulated. There is strong evidence that agricultural productivity is directly related to years of education. Therefore, in addition to the agricultural policy actions highlighted above, increased access of the rural population to educational opportunities can be expected to generate agricultural benefits.

Despite a stated government policy of providing equal access to education, studies have shown that there are wide disparities among provinces in such access, and that it is the poorest provinces which are least served (Meesook, 1978). Enrollment rates at the lower primary level are fairly uniform across provinces, suggesting that the government's programs of compulsory education at this level has been successful in reaching the target

population. 1/ At the upper primary level, however, significant disparities are evident and the enrollment rates 2/ in the poorest provinces (measured by gross provincial product per capita) is about 70% of that in the richest provinces, excluding Bangkok. At the secondary level, the disparities widen and enrollment rates in the poorest provinces are half of that of their wealthier counterparts.

The National Education Commission has recently undertaken a school mapping survey which was designed to pinpoint educationally underserved areas. This should provide the basis for directing development expenditures under the Fifth Economic and Social Development Plan to ensure that educational access is more equitably distributed. Relieving the poverty of the least advantaged rural areas necessitates that a concerted effort be made to give their inhabitants whatever skills are required to exploit fully the agricultural potential of the areas or to take full advantage of employment opportunities which may exist elsewhere. Otherwise the poorest farmers of the Northeast and North are destined to remain at the bottom of the economic ladder, without the means to better their existence.

The reform of the educational curriculum which is now underway is a significant step in improving the quality of education for the rural populace. While retaining the emphasis on development of basic literacy and numeracy skills, the revised curriculum will make the technical and social elements of their learning experience more comprehensible and applicable to the rural environment. To gain full benefit from these reforms, it will be important to upgrade the quality of teaching in rural areas. Serious thought must be given to the incentives necessary to attract and retain qualified teachers at rural locations. Consideration should be given to (1) increasing the pay scale for teachers who accept assignments in less attractive rural locations; (2) awarding teacher-training scholarships to promising students in rural areas linked to their return for a period of service; and (3) modifying the current system of remuneration which dissuades experienced teachers from remaining in positions at the lower end of the teaching hierarchy.

Several comments can be made concerning the specialized programs for skill development discussed in Section 6.2.

The more successful handicraft promotion efforts have transformed the lives of selected population groups, giving them considerable off-farm income and enabling them to use to advantage the seasonal nature of their

---

1/ Prior to 1978, primary education was divided into lower (4 years) and upper (3 years) cycles, the first of which was compulsory. It has been replaced with a single 6-year cycle to be compulsory for the relevant age group.

2/ It would be preferable to state these in terms of school places per capita (of relevant age group) but data are not available.

agricultural employment. However, the amount of productive employment generated by these efforts for the country as a whole has been marginal. The government should assess the marginal benefit of continuing to devote resources nationwide to promotion of handicrafts whose potential for growth is severely limited by market constraints. It is proposed that any continuing promotion by government of handicraft industries be restricted to (1) industries which have a proven market and where further research and development and aggressive marketing are likely to pay rich dividends; or (2) those areas which face serious seasonal unemployment because of severe limitations on agriculture potential.

In both instances, it is essential that promotion efforts be part of a larger package including research and development, extension, training and marketing. Consideration should be given, for example, to applying the model being followed in the Roi Et silk industry promotion program in any province where handicraft industries are to be introduced. In that province, the Governor has established a committee of representatives from concerned agencies to ensure their cooperation and coordination in the silk promotion effort. If such coordination is not built in to any promotional effort, it is probably doomed to failure and resources will have been wasted.

While improvements are certainly possible, various vocational education programs, offered by the Departments of Vocational Education, Industrial Promotion and Labor are providing essential skills to those members of the rural population who have access to them, skills which will become ever more important as Thailand's industrialization process continues. However, their urban location - which is partially dictated by cost-effectiveness considerations - necessarily limits the number of rural youths who have access to them. The Ministry of Education is attempting to overcome this problem by developing a diversified curriculum for its more widely spread secondary schools, which does not entail the use of large amounts of sophisticated equipment.

Some critics may argue that investment in technical skill training in rural locations is largely wasted because so many of the graduates migrate to urban areas seeking more remunerative employment than is available in rural areas. Two comments can be made. First, only by raising the general level of skills available in upcountry locations will it eventually be possible to lure some industries away from the greater Bangkok area. Second, a policy of concentrating skill development in larger urban environments would preclude those people most severely disadvantaged by the poverty of their birthplace from grasping opportunities which the economy may offer in other locations.

As Thailand moves to the next stage of its industrialization process, increasing demands will be placed on its entrepreneurs in terms of organizational efficiency, quality control and technological innovations. Those Thai firms which are now on a par with their international counterparts have taken advantage of management and technical advice available either domestically or internationally to streamline their operations and introduce innovations. The government could play a useful role by providing more of this type of advice to small enterprises by expanding the role of the Thai

Management Development and Productivity Center to include courses for small entrepreneurs and those in upcountry locations and by giving greater emphasis to this activity in its Industrial Service Institutes.

6.4 The Impact of Roads on Farm and Nonfarm Activities

In the history of Thailand transport facilities have played a major role in determining development patterns of different regions. During the 19th century the transformation of the economy away from subsistence in both agricultural and nonagricultural production was largely confined to the Center and the South where the proximity to the coast and rivers provided relatively cheap transport for both agricultural exports and manufactured imports. At a later stage the construction of railroads to the North and to Korat in the Northeast allowed limited participation of parts of these regions in rice export, but subsistence orientation remains higher to this day (Section 4.2).

The 1960's and 1970's, however, have witnessed a dramatic improvement in road access even in remote areas of Thailand. A national road network was largely completed by 1975. Availability of rural roads has dramatically improved with heavy investments even in remote areas. Table 6.1 gives rural road densities for the regions with respect to area under crops and population. The Center undoubtedly has a denser road network than the other regions, and a particularly clear advantage in terms of paved rural roads. But when gravel roads are also taken into account, the advantage of the Center, especially relative to agricultural land, is not very large. Road data (Appendix Table A.17) from ARD provinces reinforce the impression that the road network now penetrates very thoroughly to most villages. The data show that, in virtually all changwats of the country, fewer than 5% of all villages are more than one kilometer from the road and do not have an access road to one.

The improvements of roads have undoubtedly had a dramatic impact on agriculture, through reduced transport costs and access to markets, especially in the more remote regions, whose comparative advantage has shifted. Expansion of land area has been most dramatic in the Lower North and the Northeast and has been concentrated on crops such as maize and sugarcane in the Lower North and cassava and sugarcane in the Northeast, rather than on subsistence crops. It is unlikely that the Northeast could have experienced the dramatic area expansion or participated in the cassava boom without the road investments: it had not even been a traditional cassava area prior to the 1970's despite the fact that cassava is particularly well suited for these semi-arid regions (see Section 3.1). Our Profiling Studies also reveal an increase in rice exports from the most prosperous areas of the Northeast where nonglutinous rice is well adapted.

We have earlier documented in detail the consequences of these shifts in production patterns for agricultural processing industries and need not repeat them here (Section 3.1). But we should note that better roads, within a region, may shift the optimal location of weight-losing agro-processing industries from villages to smaller or larger towns (example: trucking of sugarcane and cassava over longer distances) and to larger plants. We have

Table 6.1: RURAL ROAD DENSITY BY REGION, THAILAND

(km. of roads per 1,000 sq. km.)

SES 1975/76 Region	Paved	Gravel	Earth	Total
North-Upper	2.58	45.23	28.90	76.70
North-Lower	1.53	119.07	36.39	156.98
Northeast-Upper	0.63	173.42	32.65	206.67
Northeast-Lower	1.10	122.61	90.63	214.36
Center-West	4.83	103.71	13.68	122.25
Center-Middle	13.91	234.89	53.60	302.31
Center-East	1.90	207.12	21.65	230.64
South-Upper	0.78	103.62	52.34	156.70
South-Lower	0.00	137.68	0.22	137.90

(km. of roads per 1,000,000 rai of area under holding)

North-Upper	47.98	840.66	537.17	1,425.61
North-Lower	8.13	633.78	193.68	835.52
Northeast-Upper	2.90	796.92	150.05	949.71
Northeast-Lower	4.24	471.33	348.42	824.04
Center-West	36.94	793.74	104.73	935.59
Center-Middle	37.06	625.58	142.75	805.12
Center-East	9.40	1,026.94	107.35	1,143.56
South-Upper	4.86	647.36	326.99	978.98
South-Lower	0.00	956.16	1.53	956.68

(km. of roads per 1,000 population)

North-Upper	51.79	907.40	579.82	1,538.79
North-Lower	24.05	1,874.49	572.82	2,471.16
Northeast-Upper	7.12	1,957.26	368.53	2,332.53
Northeast-Lower	11.42	1,267.66	937.08	2,216.29
Center-West	80.16	1,722.18	227.24	2,029.96
Center-Middle	78.76	1,329.54	303.38	1,771.12
Center-East	24.42	2,667.37	278.84	2,970.28
South-Upper	9.99	1,330.46	672.04	2,012.03
South-Lower	0.00	1,433.16	2.29	1,435.45

Source: Study of Rural Roads: Road Inventory Analysis, Department of Highways, Ministry of Communications, May, 1981.

also documented the sharp decline in home-weaving activities which occurred in the North and the Northeast over the early 1970's and which must have been partly a consequence of the road investments. Undoubtedly other subsistence-oriented nonfarm activities of individual households or villages (on which no data exist) must have declined as well; transportation costs for all urban goods decrease and may make them more competitive relative to goods produced by local specialists. Higher-quality bricks, for example, may be shipped from larger, more centrally-located production units. And village residents may obtain services more easily in nearby or more distant towns if travel costs are reduced (retailing, recreation, medical, etc.). Similarly, it may become more efficient to provide services, such as for agricultural machines, from more central locations.

While some may deplore this decline in subsistence-oriented manufacturing, roads open many opportunities for participation in nonfarm activities in a more specialized way, and the evidence suggests that the new opportunities have quantitatively outweighed the losses. Cochrane and Machnes conducted a study of the determinants of employment outside the family and off the farm in 22 villages of the Chiengmai valley where rapid agricultural growth had occurred in the years preceding the enquiry.1/ Their results show that greater distance of the household from the main road substantially reduces household members' chances to participate in nonfarm activities (as primary or secondary occupations) while maintaining their primary residence in the village. 2/ One would expect roads to have a particularly beneficial effect for women whose residence is more closely tied to the village because of their childcare responsibilities. The data examined by us do not allow investigation of the relative effect of roads on increasing nonfarm employment within the village, in commuting distance or via temporary migration. While we have information about the importance of commuting and temporary migration in the Thai economy, the dynamics of these phenomena are poorly understood.

The other piece of evidence that the nonfarm opportunities created by roads have outweighed the ones which have been lost comes from the Survey of Farmers. We saw in Table 2.2 that in the North and the Northeast between 1972/73 and 1978/79 the off-farm component of income of farm households has been rising at around 12%, i.e. at approximately the same rate as for the country as a whole. This despite the fact that the value of agricultural output in terms of purchasing power (not an index of quantity), has been growing more slowly in these regions than for the country as a whole. We

---

1/ Susan Cochrane and Yaffa Machnes, The Determinants of Employment Outside the Family and Off the Farm, World Bank, mimeo, 1982.

2/ The regression results may "overestimate" the impact of roads on the level of nonfarm activities because roads may just have enabled workers already engaged in nonfarm activities to maintain residence on the farm rather than elsewhere. But even where there has been little output effect, there must have been a gain in utility associated with being able to choose location of residence more freely.

believe that much of the growth of these nonfarm incomes over this period is associated with the increased processing and transport of cassava and other commodities which are now exported from the regions. 1/

It is clear, however, that roads have not created powerful opportunities for selling home-produced goods. Such production, whether on own account or via subcontracting, is far more common in Bangkok and the adjacent provinces than in the North or Northeast; thus, it is proximity to markets which is crucial, not transport cost alone.

Our conclusion, therefore, is that the investments in rural roads have been instrumental for both farm and nonfarm growth in the North and the Northeast in the recent past. As the rural road network nears completion, further road investments will have to be targeted to areas which are still poorly served to maintain high rates of return.

Before concluding this section, however, we should indicate that we do not believe roads to be an important engine of rural or provincial manufacturing outside of the agriculturally related activities. Nor do we believe that the lack of resource-independent manufacturing activities in the provinces can be accounted for primarily by transport cost disadvantages. The evidence to the contrary comes from the central regions of Thailand which contain a number of cities located in extremely privileged positions with access to roads, railways and river transport (for example, Ayuthya, Suphanburi, Singburi, Chainat). Furthermore, they are located along or near the major transport axis from Bangkok to the North and would have as easy access to consumer good markets in most regions of the country as Bangkok has. Yet the Profiling Studies of Singburi and Chainat, as well as the extremely careful industrial census of Suphanburi done by the Kasetsart University research team, found no single industrial enterprise which is not directly related to agriculture, serves consumer demand for perishable commodities or produces heavy construction materials. The only provincial location within which more diversified manufacturing takes place is a province like Chonburi on the Eastern seaboard very close to Bangkok, where field trips documented match-making, textiles, coffee grinding, and some processed foods other than the highly perishable ones.

We note here, however, that several of the cities in the central region already contain a wide range of the urban amenities which appear to favor Bangkok so overpoweringly. We believe that, as incomes and markets expand, these cities could well become more important locations for the production of industrial goods of wider variety than at present. Such patterns of development of smaller, well-connected urban centers are familiar from the development experience of the industrialized world.

1/ Because of declining real prices of cassava in these years the quantity effects of the cassava boom have been much larger than the agricultural income effect.

It is also possible that the well-connected cities of the Central region have concentrated on agriculture-related activities so sharply because the decade of the 1970's has been one of the extremely rapid agricultural growth. If agriculture should stagnate or grow less rapidly, this may well induce the shift of firms, skills and capital now used for agriculturally related activities towards other manufacturing activities where markets might still be expanding. Given the high degree of development of these cities, the firms and resources may find it possible to make this shift without a move to Bangkok. For the emerging provincial towns, improved communications and the integration of output and credit markets will become increasingly important.

To conclude we therefore stress the important role of roads for regional growth (both agricultural and nonagricultural) in Thailand in reducing transport costs, improving the flow of information and increasing access to markets and credit. However, we do not believe that improvement in roads alone is the magic key to provincial industrialization of a resource-independent nature.

6.5 Credit and Rural Nonfarm Activities

We shall focus primarily on potential credit problems of household enterprises and small-scale firms which form the bulk of employment in nonfarm activities of small towns and rural areas.

It is clear that distance from commercial and industrial centers and relative scarcity of communication facilities increase the cost of obtaining credit to enterprises located in provincial towns and especially in villages, even if the formal terms of loans (interest rates, collateral requirement, etc.) were the same. Therefore distance acts like transport costs in making relatively isolated locations less preferable for mobile economic activities than locations closer to credit or input and output markets. However, the recognition of such credit cost differences is not sufficient to warrant permanent government subsidies for credits to rural nonfarm activities, just as transport cost differentials are no reason to subsidize transport costs on a permanent basis. On the other hand, the government must definitely be concerned with improving communication systems just as governments build roads when the expected benefits exceed the cost. The government should also promote credit market innovations which reduce the cost of credit in rural areas. An example of such a credit market innovation was the decision by the Bank of Thailand (BOT) in 1967 to accept promissory notes arising from agricultural transactions for rediscounting.

We have no data on how much higher transaction costs are of obtaining credit in rural areas. Nor do we know the magnitude of the impact of such higher transaction costs. Furthermore, data on informal rural credit from moneylenders and traders are entirely absent. We therefore shall present a rather general discussion on whether credit costs have been a particularly constraining factor on various rural nonfarm activities in the past.

The potentially higher cost of obtaining credit in rural areas affects both agricultural and nonagricultural activities equally. There is no *a priori* reason to aim improvements in rural financial intermediation espe-

cially towards agriculture or towards nonagricultural enterprises. While sectoral specialization of a particular financial institution may be warranted on the basis that it allows the staff of the institutions to accumulate sector-specific knowledge over time, it is hard to see why government promotion should single out any specific sector at the expense of another. Furthermore, sector-specific promotion of credit may not be particularly effective even on its own terms where credit is aimed at households which have agricultural and nonagricultural enterprises; after all credit is fairly fungible between end uses.

Nevertheless, the decade of the 1970's has been one of massive intervention by the government in rural financial markets, aimed primarily at agricultural credit. The details of this promotion are described elsewhere and need not be repeated here (Meyer et al., 1978, Meyer, 1980; World Bank, Report No. 2704-TH, February 1980). The key lending agency is the Bank of Agriculture and Agricultural Cooperatives (BAAC) which has been important since 1967 and in 1979 had roughly B 9 billion in loans outstanding to farmers, farmers' associations and agricultural cooperatives. The BAAC has achieved a great penetration into rural areas with 58 provincial and 409 field offices. The BAAC is currently not allowed to lend for purposes other than agricultural production.

The key policy instrument used by the Bank of Thailand has been a requirement imposed on commercial banks to lend to agriculture 1/ a certain quota of their total lending which, in 1975, was set at 5% and was subsequently raised to 15% by 1980. Banks not capable of lending to agriculture directly are allowed instead to deposit corresponding amounts with the BAAC, which then lends to agriculture. This quota system has resulted in an increase of banks which lend directly to agriculture from 5 (of 29) prior to 1975 to 16 in 1979. The commercial banking system has a fairly well developed branch network in the provinces of Thailand. In 1977 there were a total of 1,184 provincial branches, of which slightly more than half were located in the Center. Until recently the Bank of Thailand controlled the opening of new branches -- not an indication that it was particularly concerned about lack of banking facilities in the provinces. It has more recently replaced its control over branch openings by the imposition of a quota on lending in local areas, whereby 60% of local deposits have to be lent out locally, presumably because the Bank of Thailand was concerned about the drain of savings from provincial areas to metropolitan Bangkok.

The agricultural lending quota was initially for agriculture alone, i.e. for farming. During successive increases of the quota, however, commercial banks succeeded in getting a portion of their agrobusiness lending recognized towards the fulfillment of their agricultural quota and the system now has goals both for farm lending and agrobusiness lending. In light of our

---

1/ Information on the structure and magnitude of commercial bank lending to agriculture can be found in Meyer, 1980.

earlier discussion that there are no reasons to promote differentially a single rural sector, this change is obviously appropriate. However, it is also clear that it did nothing to increase agrobusiness lending since commercial banks generally overfulfill their agrobusiness quota, in 1979 by 246%. None of the commercial banks has to use the BAAC deposit facility to fulfill its agrobusiness quota, whereas direct lending of banks to agriculture falls short of the quota by 39%. Agrobusiness lending is a substantial proportion of total commercial bank lending. Compared to commercial bank lending, the Industrial Finance Corporation of Thailand (IFCT) is an insignificant source of funds for the agrobusiness sector, with total loans for food and tobacco products not exceeding B400 million. Moreover, roughly half of IFCT lending is in greater metropolitan Bangkok and almost all goes to fairly large manufacturing plants. Its relevance for most economic activities in which rural areas have comparative advantage is therefore limited. The Small Industries Finance Corporation might possibly be more relevant, but it is so small that we refer to the detailed discussion of it in the references cited.

Difficulties of obtaining credit cannot have been a major constraint in the agrobusiness sectors. In Chapter III we discussed the rapid growth of rice mills, sugarcane factories, cassava chipping and pelletizing factories, and of the agricultural machinery and animal-feed industries. Private road transport of all kinds has also grown extremely rapidly. Final demand limitations currently constrain expansion in these sectors. With the exception of the machinery and animal-feed industries, the expansion has not been concentrated in the metropolitan areas and for rice mills and cassava chipping plants it has penetrated deep into the disadvantaged outer regions.

Thus the question turns to the issue of whether the differential cost of credit constrains the expansion of a more diverse set of household enterprises and small firms in manufacturing, sales, services, construction, etc. These activities (with the possible exception of construction) use very low ratios of fixed capital to labor, and fixed capital is mostly self-financed. Most credit requirements, if any, are for raw materials and inventories which are usually provided in informal credit markets and frequently by a chain of sellers of the inputs or buyers of the outputs. The Kasetsart/Michigan State/Ohio State team has found very little indication that credit is a major problem faced by the existing enterprises. Indeed, especially in manufacturing and handicrafts, final demand was almost inevitably identified as the overriding constraint. The Profiling Studies and field trip came to similar conclusions.

It is thus clear that nonfarm activities are primarily carried out in households or small firms, require limited fixed capital, are largely self-financed, often obtain short-term credit from traders of inputs or outputs and do not view credit as a major constraint. Nevertheless, one has to be careful not to misinterpret these findings. The features just described may well represent adaptations of economic activity to the higher transactions costs of credit in widely-dispersed rural areas compared to large cities. Higher credit costs undoubtedly discourage capital intensity and encourage self-finance to some extent, although the often small markets served and/or season-

ality of the activity work in the same direction. And provision of credit by traders makes use of information about borrowers which traders accumulate anyway in the course of their business activity and which formal lenders might find more costly to accumulate. Because the features of rural nonfarm enterprises may (at least in part) be adaptations to peculiar credit market difficulties, improvements in rural financial intermediation which lead to lowered transaction costs for formal lenders may well accelerate rural growth in general, or nonfarm growth in particular, and allow the enterprises to become more capital intensive.

VII. PROVINCIAL MANUFACTURING; ITS CHARACTERISTICS AND THE IMPACT OF INDUSTRIAL POLICIES

7.1 Provincial Manufacturing: A Summary Statement

Table 7.1 summarizes what we know about the extent of manufacturing activities in provincial areas, its composition, its regional concentration, and its causal relationship with agriculture and other natural resources. The information in this table has been compiled from the reports of the Kasetsart/Michigan State/Ohio State Universities Rural Off-Farm Employment Assessment Project, from a variety of other case studies and from the Profiling Studies and field visits of the mission. The value-added figures refer to total national value-added in the sector considered, since a rural/urban split is not available in the national accounts; but it is fairly clear in which industries the Bangkok metropolitan area dominates, so that order-of-magnitude judgments can still be made.

In terms of value-added, the output processing industries are clearly the most important provincial manufacturing activities. Agricultural input industries pale into insignificance compared even to tobacco curing. In Chapter III we have discussed in detail the variations in how closely each of the processing and input supply activities is linked to agriculture and to a provincial location.

The other industries commonly found fall into 3 distinct groups:

(1) Processed foods with local demand contain only products which are so highly perishable that they cannot easily be shipped from a central location. They are therefore not produced in large-scale factories but in a dispersed fashion wherever incomes are sufficiently high to provide adequate demand.

(2) Construction materials and furniture tend to be locally produced for similar reasons: high transport costs give local producers natural protection against more distant large-scale units. From other studies we also know that higher-quality products (with higher value per weight) tend to be shipped over larger distances and thus produced in larger-scale units. An extreme case is furniture, where virtually all high-quality items appear to be shipped to the provinces from Bangkok.

(3) Craft and textile products are the only other industry group found widely in rural areas. They all rely heavily on seasonally available female laborers and are clearly more prevalent in the North and Northeast where seasonality of agriculture is much higher than in the South or the Center. We have found very little handicraft activities in the South, where the rubber-based agriculture leads to a more even seasonal labor demand, and where fisheries are an important user of seasonally available agricultural laborers. Handicraft activities rely on skills which appear to be easily acquired and the goods are produced with very little fixed capital. The activities fit into highly seasonal agricultural systems precisely because of these features. Not much physical or human capital is left idle during the busy agricultural season when workers are not engaged in handicrafts. Entry

Table 7.1: SUMMARY OF INDUSTRY CASE STUDIES, THAILAND

Industry	% of Manufacturing value added	Growth Experience 1976-1979	Products	Location	Seasonality and Source	Perishability	Scale and Source	Capital Intensity	Transport Cost	Subcontracting	Growth Potential	Remarks, Sources of Location Advantage
				Agricultural Inputs								
1. Handtools (Blacksmith Types)		Negl.	Knives Harvesting Knives Spades Etc.	Towns + Specialized Villages	Growing Season	-	Household upto 6 workers	Low	Low	Yes	NIL to Negative	Locally Adapted Designs Even in Cutting Knives
2. Implements	0.24	Negl.	Animal Ploughs Etc.	Towns	Growing Season	-	Household Few Workers	Low	Some	?	?	
3. Power Tillers & Tractors	100 Registered firms 2500 Employment 45000 Machines in 1978 worth	+++ Since 1970	1.Two/Four Wheel Power Tillers 2.Tractors	Bangkok (Enter close to Final Demand)	February to June, cash available, needed for land preparation	-	Household to 100 employees	High	Some for inputs	Yes	++	1.Local Designs emerge close to users then branch out less than 50% imports 2.Assembly operations 86% import content
4. Animal Feeds	80 Registered Factories 1979 4000-5000 workers 0.50% of Manuf.Va.	+++ Since 1969	1.Chicken Feed 2.Duck Feed 3.Other Feed	Central Towns & Bangkok Large Firms Small Firms	-	some	Increasing vertical integration to chicken breeding, veterinary & marketing	High,but lots of labor in material handling	For both inputs & outputs	No	+++	Price control since 1976!! no imports modest exports. Export potential low. No bulk handling as of now.
				Output Processing								
5. Rice Mills	2.75	+	1.Milled rice 2.Pigs	every where	from rice growing	little			Both inputs & outputs	-	population growth	
6. Modern Fruits & Vegetable Processing, Canning	0.33	+++ especially pineapple	Mainly pineapple for export		high	high for inputs	Product quality & Marketing related	increasing with quality dimension of product?	inputs, less for outputs	-	export ++ little domestic demand	Location closely tied to growing region because of high transport cost and or perishability. Potential for using off season labor limited.
7. Sugar Mills	2.82	+	1.Raw sugar 2.Refined sugar 3.Molasses	CW,CE,LN NEU	high	extremely high for inputs	Product of quality & continuous process		inputs less for outputs	-	?	
8. Rubber	2.63	+++	1.Sheet rubber 2.Block rubber	South	neglible	extremely high for input	Quality needed		input low for outputs	-	modest	
9. Tobacco curing	1.40	+	cured tobacco	Upper North	high	high for input	NIL		negligible	-	modest	
10. Cassava	1.41	++	1.Tapioca Chips 2.Tapioca pellets		Labor availability and output availability	low	1.Row 2.Medium	1.low, lots of bulk handling 2.high, pelleting machine	high for input	-	for export	
11. Kenaf	0.56	++	1.Dried fibers 2.Graded bales 3.Gunny bags 4.Air dry kenaf		Labor availability after harvest	low	low	low	high for input	-	?	farm level employment of women high in drying and netting.
12. Sawmills; Charcoal and Firewood; Forestry Products	7.25	Negl.										

Table 7.1: (Continued)

Processed Foods With Local Demand

13. Pickles	0.47	++	1.Food Pickles 2.Snack Pickles	Widely dispersed towns. Garlic is dependent on North and East growing regions.	From inputs But pickle rs use diverse raw materials to limit seasonality	For inputs and for some food pickles	Specialized house-holds + unskilled workers	low	not negligible	No	population; & income dependent	Ubiquitous market; complete absence of economies of scale; raw material
14. Soybean curd				Ubiquitous, also villages	Nil	Extreme for output	Specialized households	extremely low	negligible	No	population; income dependent	Ubiquitous market; product perishability; no scale econ.
15. Chinese Noodles	0.12	++	1.Wet & semi dry 2.Dry	1.Ubiquitous towns 2.Bangkok	Nil	1.Very high for output 2.Low	1.Specialized households + workers 2.Small factories	some machines	negligible	No	population income dependent	Low scale Econ. ubiquitous markets; perishability
16. Icemaking	2.00	+	Consumerism & Fisheries	Towns	Nil	Extreme	Small factories	Some machines	Very high	No	Income Dependent	Perishability

Table 7.1: (Continued)

			CRAFTS:	General Remark: Skills acquired in families by doing. All rely heavily on seasonal labor.									
17.	Silk Weaving	Growing & weaving involves 460000 households in 1978 0.04%?	+++ (but not over longer period)	1. Patterned cloth for domestic use 2. Plain cloth for export	North & Northeast	Dry season labor availability	Nil	Nil Households to small plants	very low	negligible	Yes	export?	No economies of scale; Seasonal Female labor; promoted since 1903
18.	Cotton weaving	2.29	+	Patterned cloth	North Northeast	Dry season labor availability	Nil	Households to small plants	very low	negligible	Yes	?	As above; also now includes synthetic fibers
19.	Fish Nets Weaving	0.21	++	various nets	Northeastern Bangkok	Labor availability	Nil	Households to small plants	low	negligible	Yes	market saturated	Import Substitution complete
20.	Mat Weaving	0.13	+++ (not over longer period)	Seed & plastic mats	Village Rural towns Northeast Center	Labor availability	Nil	Households to small plants	Very low	negligible	Yes	population, saturated	As for No. 15.
21.	Textile Product	8.66	1. declinig 2. rapid growth ++	1. Taylors 2. Ready made garments 3. Knitting	1. Ubiquitous 2. North Northeast 3. Ubiquitous? North	Final demand for festival or cold season	Nil	From marketing, if any. Mostly household-small plants	low	negligible	wide spread	Population; income; export?	Markets low labor cost, especially seasonal female labor
22.	Pottery	0.26	+++ (not over longer period)	1. Unpolished 2. Polished	1. Ubiquitous 2. North, Chiangmai	?	Nil	1. Households 2. Small factory as well	low	high	No	1. Population 2. Income?	Female labor
						Construction Materials							
23.	Furniture	0.60	++	1. low quality 2. high quality	1. Provincial towns 2. Bangkok	some from labor	Nil	Household to medium plant; marketing	?	high	No	very income elastic	Not close to sawmills. Plywood all produced in Bangkok!! markets, labor
24.	Bricks	0.11	+++	1. Common bricks 2. Facing bricks	Ubiquitous; raw materials	some from construction	Nil	Households to Large firms; technology	From negligible to very high	high for inputs and outputs	No	High: income, population, wood prices	Final demand & raw material
25.	Cement Products	1.90	++	Fence and lamp poles cement slabs, pipes etc.	Towns Ubiquitous	some from construction	Nil	Household to large firms; technology, marketing	From negligible to high	high for inputs & outputs	Yes	high; income, population	Final demand

\+ 1 - 5%
++ 5 -10%
+++ 10%

into the activities is easy and competition is keen. Wages and profit margins are extremely low and finding markets for their outputs is the major problem faced by producers.

The outlook for processed food, construction materials and furniture is very good, on account of relatively high income elasticities of demand. On the other hand, handicrafts, with the exception of textile products, cannot be expected to be a very dynamic sector.

Even in the most remote areas of the Upper Northeast substitution of lower-quality handicrafts by urban-produced consumer goods in the consumption of local consumers is proceeding rapidly. Production of handicrafts for export from the rural areas to other regions in Thailand or for export offers scope for a limited number of relatively specialized villages. It should therefore continue to receive attention by the relevant existing support institutions. But market limitations are severe.

What is extraordinarily striking in Table 7.1 is the absence of manufacturing activities other than those shown here. Engineering goods, electronics, chemical products such as soap and many other industrial products are now produced in metropolitan Thailand. But only in exceptional cases are these goods produced in provincial towns. Even among industries which use agricultural or resource-based inputs only those which use perishable materials and/or weight-losing processes are located where the raw materials originate. The following examples are particularly striking: sawmills are concentrated in the Center along the rivers rather than the forest areas because it is cheaper to float logs than to transport boards by rail or road. The plywood industry, on the other hand, is located entirely in the Bangkok metropolitan area. Charcoal is produced in the mangrove forests because it is hard to ship the wood out of them and charcoal weighs much less than the logs. Cassava chipping factories are fairly evenly distributed among the growing areas since a weight loss of 60% is involved. But pelletizing which results in a weight loss of only around 11% is concentrated nearer the ports in the Center-East. Kenaf retting involves weight loss and is done on or near the farm. Baling of kenaf is done in the growing zones to reduce transport cost, but gunny bags are manufactured in the Bangkok metropolitan area. Oilseeds are not perishable and crushing involves little weight loss since both the oil and the cakes are final products and have to be shipped. The oil industry is therefore concentrated in the Bangkok metropolitan area. Compare this to the sugar industry which is located very near the growing areas because of the extreme perishability of the cane and the massive weight loss involved in the process. Perishability and weight loss also tie the production of rubber sheets, of rubber blocks and of canned pineapple to the growing areas, despite the fact that in each case the weight of the raw material relative to its value is much higher than for sugarcane. It is also well known that in the mining of minerals such as tin, the location of the separation of ore from admixtures is usually located at the mine while the smelting and refining may be located far away, depending on transport costs and on the extent of use of other materials (for example, coal in the case of iron).

7.2 Regional Impact of Industrial Policies

The regional impact of industrial policy has been analyzed in detail in World Bank report No. 2804a-TH, in the background papers to that report and in Guisinger, 1980. We therefore give only a brief summary of their conclusions and highlight the implications for rural growth.

7.2.1. Manufacturing Protection

The deterioration of Thailand's balance-of-payments situation has been a factor contributing to increases in industrial protection in recent years. Between 1974 and 1978, tariffs were raised on 53 industrial categories and reduced on only 19 categories. In the same period, business taxes on a number of imports were increased above the rate applicable to competing domestic products. These changes are reflected in the rise of rates of nominal protection, representing the combined effects of tariffs and differences in business tax rates levied on imports and on comparable domestic products. Between 1974 and 1978, average levels of nominal protection of import-substituting activities increased from 34.6% to 50.8% for products with low import competition (less than 10% of domestic production) and from 24.8% to 35.7% for products with higher import competition.

Import surcharges imposed by the Board of Investment (BOI) on 24 products and product groups, reduction in import duties and business taxes on imported and domestic inputs of a number of BOI-promoted firms, reductions in business tax rates on intermediate products, and increases in the scope of import controls have further raised the protection of import-substituting activities. The import substitution activities, with a few exception, are not generally those in which rural areas have a comparative advantage, i.e. they discriminate against rural areas and in favor of the cities.

The tariff-induced increases in prices for competing imports understates the protection provided to import competing industries. This is because of the low tariff levels on raw materials and intermediate products relative to those on final goods. The weighted average of effective rates of protection on all industries in 1970 was 70%, rising to 90% if food processing, beverages, and tobacco industries are excluded. As for nominal tariffs, there is wide variation across industries. Effective rates of protection on products with a low degree of competition from imports averaged 100% in 1978 compared to 85% on products facing import competition and a negative 40% on export-oriented products.

The heavy and non-uniform protection provided the industrial sector is harmful to the rural economy in several ways. Firstly, such protection implies a heavy tax imposed on broad consumers groups to finance subsidies implicit in such protection to the generally high income groups with ownership of factors specific to these sectors. Secondly, there is a bias in protection towards import-competing industries heavily based on imported raw materials and against resource- and agro-based industries that would increase the demand for products from the rural economy. Thirdly, the bias in industrial

protection favors capital intensive import-competing industries relative to labor intensive manufacturing that is competitive on international markets. Since the rural economy supplies much of the labor to the industrial sector, it is further harmed by the relative disincentives to labor intensive activities. The 1980 World Bank report does not go beyond estimates of the price interventions to provide estimates of the incidence of the transfers. While further research is required in this area, it appears that these market interventions redistribute large amounts of income in favor of narrow producer groups and that the system of industrial protection has significantly harmed the rural economy.

The report does not advocate complete dismantling of all protection measures for industry; revenue and dynamic considerations need to be taken into account. Instead, low and uniform industrial protection levels are advocated. While such protection would still discriminate modestly against rural areas, lowering overall protection levels and abandoning the selective emphasis on protecting import-competing and capital-intensive industries would considerably mitigate the impact on rural areas.

7.2.2. Board of Investment (BOI) Activities

The Board of Investment, chaired by the Prime Minister, is responsible for the implementation of the Industrial Promotion Act. The 1977 revision of this Act provides criteria for the choice of activities eligible for promotion; it sets the guidelines to be used by the BOI to accord promotion privileges to individual investment projects; and it describes the conditions that the Board of Investment (BOI) may stipulate for granting promotion privileges to these projects. The scope of promotion privileges has been determined for the general case, for export activities, for investment in Investment Promotion Zones and, since mid-1979, for international trading companies. Promotion privileges that may be granted in the general case offer substantial benefits to the selected activities and projects. 1/

1/ Under the 1977 revision, the Board of Investment may provide (a) exemptions, or reductions up to 50%, of import duties and business taxes on imported machinery and of business taxes on domestically produced machinery; (b) reductions up to 90% of import duties and business taxes on imported materials and of business taxes on domestic materials; (c) exemptions of corporate income taxes for 3 to 8 years, with the carry-forward of losses for up to 5 years after the end of the period of exemption; (d) exclusions from taxable income of fees for goodwill, copyright and other rights for a period of five years after income is derived from the promoted activity; and (e) exclusions from taxable income of dividends derived from the promoted activity during the period of income tax holiday. The Board may also impose import surcharges on competing imports or request the Ministry of Commerce to ban such imports.

The BOI has considerable discretionary authority to determine the list of activities eligible for promotion; to select the investment projects that are to receive promotion privilege; to set conditions for these projects; and to determine the extent and the length of duration of promotion privileges. As of December 31, 1979, there were 15 activities in agricultural products and commodities (mostly processing), 5 in minerals, metals, and ceramics, 8 in chemicals and chemical products, 6 in mechanical and electrical equipment, 31 in other products, and 13 in services eligible for promotion. Promotion is subject to minimum conditions as to the size of the investment and, in selected instances, the share of exports in output.

While the effects of BOI promotion are difficult to gauge in quantitative terms, it is apparent that the application of promotional measures has made it possible to undertake investments that would not have otherwise been profitable.

Capital-intensive products and processes are favored by the exemptions and reductions of import duties and business taxes on machinery. Tariff exemptions and reductions on imported machinery also favor imports and tend to discourage the expansion of the domestic machinery industry; tariff reductions on imported materials have similar effects on the domestic production of these materials. Finally, exemptions and reductions of import duties and business taxes on machinery and materials used in the production process, as well as import surcharges and import bans, raise the level of protection of the promoted activities.

Apart from exemptions and reductions of import duties and business taxes on machinery, capital-intensive activities are encouraged by the minimum investment requirements established as a condition for granting promotion privileges to particular activities. These requirements also favor large-scale industry over small- and medium-size firms. Discretionary decision-making by the Board of Investment (BOI) too, favors large, well-established firms and firms located in the Bangkok area that are generally better able to represent their interests. There is thus no question that Board of Investment (BOI) policies generally discriminate against provincial manufacturing which is primarily labor-intensive and small-scale.

7.2.3. Special Regional Incentives

The results of the anti-rural bias in industrial policy have led to policies aimed at promoting regional diversification of industry.

Thailand's Fourth National Economic and Social Development Plan (1977-81) designated nine industrial centers, among which Chiengmai in the North, Khonkaen and Korat in the Northeast, and Songkhla-Hat Yai in the South have subsequently been selected as secondary cities by the National Economic and Social Development Board.

These regional cities, though dwarfed by Bangkok, hold a promise for eventually broadening the scope of nonfarm activities in rural areas. At the present time, the types of activities one finds in regional cities are not

unlike rural nonfarm activities generally; that is, they include agro-processing and other resource-based industries and enterprises catering to local agricultural and consumer demand. With one or two exceptions, there is as yet no manufacturing in Thailand's regional cities which caters to more than a very localized demand. Because of their relatively large size and influence area, however, regional cities offer a wider variety and higher quality of locally manufactured goods and a broader range of both personal and commercial services than is available in rural areas. Existing data indicate that employment in commerce and services in municipal areas increases more than proportionately with population size. This suggests that the larger a given regional city, the greater the impact of that city on the surrounding agricultural hinterland in terms of credit and marketing outlets and access to education, health and other Government services.

The World Bank's urban sector work 1/ has suggested that a meaningful urban development strategy should differentiate between those few urban areas in peripheral regions with potential for an increased employment-generating and service role and those in the central and eastern regions which have potential for attracting activities catering to the Bangkok and international markets. Weaknesses in municipal finance and administration were identified as a major factor constraining regional cities from fulfilling their development potential.

The designation of these regional centers, however, has not been followed by coordinated action for the development of these cities and regions. Incentives have been applied by and large independently by several agencies. They include (1) preferential tax treatment provided by the Board of Investment, (2) credit preferences granted by the Industrial Finance Corporation of Thailand (IFCT), and (3) industrial estates established by the Industrial Estate Authority of Thailand.

In 1973, the Board of Investment identified ten Investment Promotion Zones located beyond the 50-kilometer radius of Bangkok for preferential treatment. Following the 1977 revision of the Investment Promotion Act, the incentives provided to investments in promoted zones included a reduction of business taxes up to 90% for a period not exceeding five years from the year income is first derived from the promoted activity; a 50% reduction in income tax rates following the end of the period of income tax exemptions available to all promoted firms; double deduction from taxable income of the cost of transportation, electricity, and water; and deduction from taxable income of 25% of the cost of installation and construction, in addition to normal depreciation, to be taken in any of the first ten years of operations.

Board of Investment regional preferences do not appear to have materially affected the regional distribution of promoted investments. In fact, Bangkok's share in Board of Investment-promoted firms has been greater than in all industrial investments (51.0% as against 35.5% in 1978) while the opposite result is obtained for the outlying regions (13.8% as against 39.8%). And, after increases in 1976 and in 1977, the share of BOI-promoted

---

1/ "The Development of Regional Cities in Thailand," June 30, 1980.

firms in the outlying regions declined again in 1978, whereas Bangkok's share remained above 50%.

The limited effectiveness of Board of Investment regional preferences has led to a reduction in the number of Investment Promotion Zones to four. These are located in Saraburi province in the Central region; in Chiengmai and Lamphun provinces in the North; in Khonkaen and Nakhonratchasima provinces in the Northeast; and in Songkhla province in the South. At the same time, regional incentives have been slightly modified, with more generous promotion measures provided in the latter two zones.

The 1% preferential margin IFCT grants on loans to the processing of food and agricultural materials does not appear to have appreciably affected the share of these activities in IFCT lending. Thus, after reaching a peak of 57% in 1976, when large investments in bamboo and kenaf-based woodpulp and in vegetable oils took place, the share of the processing of food and agricultural materials in the total fell to 22% in 1977 and to 9% in 1978. In addition, notwithstanding the 0.5% preferential margin provided to projects in the outlying regions, promotional efforts in the form of the creation of the Project Development Section, and the establishment of regional offices, the combined shares of the three outlying regions in IFCT lending has remained below the national average. At the same time, firms located in Bangkok received about one-half of IFCT loans during the 1960's and the 1970's, exceeding their share in total investments in the years for which comparable data are available.

The regional distribution of SIFO (Small Industry Finance Organization) loans has been more favorable for the outlying regions, averaging 38.3% of the total in the period 1960-75 as compared to 26.1% for Bangkok. However, the share of Bangkok increased again in recent years, in part at the expense of the three outlying regions. At the same time, the amount involved is very small compared to IFCT loans and BOI projects.

Finally, as discussed previously, the Bank of Thailand has required commercial banks to invest a certain proportion of their deposits in the region where the deposits are generated. There is little evidence, however, that this scheme has favorably affected industrial investments in the outlying regions.

Guisinger (1980) summarizes the effects of all these policies in terms of the annual rental cost of a machine costing 100 baht faced by firms of different sizes and locations with and without the incentive policies (Table 7.2). The total implied capital subsidy of large firms in Bangkok comes to 16 baht which can be broken down as follows: subsidy from overvalution 37%, interest subsidy 13%, tariff and tax exemptions on machines 25%, and tax subsidy 25%.

The principle advantage to firms qualifying for the regional incentives is the additional period of reduced taxation: for five years following the end of the normal tax holiday period, firms in Investment Promotion Zones pay only half the normal rate. The actual rental cost of capital for firms in Investment Promotion Zones is 28 baht compared to 30 baht. If the other major deduction affecting the cost of capital--the one-time 25% deduction for installation costs--is taken into account, the rental

Table 7.2: EFFECTS OF PROMOTION POLICIES ON RENTAL COST OF MACHINE COSTING 100 BAHT TO DIFFERENT FIRM TYPES, THAILAND
(baht)

Size/location	Actual rental cost	No incentive rental cost	Implied Subsidy
Large, Bangkok	30	46	16
Large, Investment Promotion Zones	27	46	19
Cottage sector (fewer than 10 employees)	45	54	9
Small-scale firms, Bangkok	60	72	12

Source: Guisinger (1980).

cost is, perhaps, lowered to 27 baht, or exactly 10% below the actual rental cost for firms in the Greater Bangkok area. As is evident, the cost advantage of incentives for regional firms is not great and in many cases may be more than offset by cost disadvantages in utilities, transportation, water and other inputs, in spite of the fact that double deductions for the purpose of calculating income tax are available for the first three mentioned inputs.

Firms with fewer than 10 employees (cottage sector) are not registered and therefore have no obligation to pay corporate income tax. Small-scale manufacturers must register and pay tax on all income at the rate of 45%. Neither cottage nor small-scale industries have access to investment incentives because of the minimum size requirements for applicants. Nor do they have access to IFCT loans. The Small Industry Finance Organization (SIFO) does make low cost loans available to small-scale firms, though not to cottage firms. However, SIFO's level of funding has been so small in relation to the total demand for funds in the cottage and small-scale sector that the subsidies from this source can be ignored in the calculations of rental costs of capital for these two sectors. Both the cottage and small-scale sectors finance themselves largely from owner-operator supplied equity funds. According to a small and medium industry survey (Tambunlertchai, 1978), only 25% of total assets are financed from debt and the bulk of this debt is from the informal financial sector. In recognition of the higher risks involved in loans to the cottage and small-scale sectors, higher costs of equity and debt capital have been assumed in the calculations of rental costs--32% and 24%, respectively. These higher financial costs are not, for the most part, due to policy-induced distortions, but rather reflect higher risks and higher overhead costs of loans in these sectors.

We conclude this section by again noting the discriminatory impact of most Board of Investment activities and especially of industrial tariff and taxation policy against the rural areas. Together with the agricultural price policies discussed in the next chapter, they imply a sharp shift in terms of trade against the rural areas and the products in which they have comparative advantage. The special regional incentives are insignificant in comparison to the major effects of broader policies.

VIII. THE IMPACT OF AGRICULTURAL PRICE POLICIES ON THE RURAL ECONOMY

This report has emphasized the importance of agricultural input, output and consumer demand linkages in creating demand for labor in rural nonfarm activities. It has also identified limits to both cottage industry and rural manufacturing. Other research has documented the extent to which tax, pricing, and trade restrictions have generally been biased against the agricultural sector and in favor of the manufacturing sector. 1/ On the basis of these findings it appears that general economic policies biased against agriculture have had a much greater impact on rural households than policies operating in the opposite direction, which were aimed at either subsidizing agriculture or improving the opportunities or returns in nonfarm employment. While it is beyond the scope of this study to evaluate this hypothesis in detail, the broad outline of this argument is presented here to provide some perspective to our report. The major elements in this case are (1) the product price effects of heavy taxation of rice and rubber, (2) protection of manufacturing, and (3) the relative factor price effects of agricultural taxation combined with manufacturing protection biased towards capital intensive industries.

8.1. Rice Taxation

The issue of the taxation of rice in Thailand is well known and well documented. It concerns the fact that the rice sector, accounting for about one-third of the farm value of all crops in 1979, has been subjected to heavy taxation since immediately following World War II. In terms of its efficiency and distributional effects, the rice taxation can generally be thought of as equivalent to an export tax. Appendix B gives details on the extent of the tax, and the income transfers and efficiency costs of the tax burden in 1981, given estimates of the supply and demand functions for rice on the domestic and world markets. Irrespective of the assumptions made concerning the supply and demand of rice, it is clear that the price-depressing effects of export taxation imply an enormous burden on farm households; the computations in Appendix B suggest a total burden in the order of from 10 to 18 billion baht in 1981, which amounted to 5-9% of agricultural GDP in that year. 2/

One argument usually advanced for the rice taxation is that the benefits of the income transfer accrue to low-income wage earners in the form of reduced prices for this major staple food. In view of the findings of this report, this assertion is probably wrong. Low rice prices discourage rice production which is fairly labor intensive, i.e. they have a direct negative impact on rural labor demand. The reduced rural incomes implicit in the rice

---

1/ See World Bank Report No. 2804a-TH, 1980, World Bank-NESDB "Agricultural Pricing and Marketing", mimeo, 1981, and Trent Bertrand, World Bank Staff Working Paper No. 385, 1980.

2/ In early 1982, the rice premium was reduced to zero, but not abolished altogether.

taxation leads to lowered consumer demand for locally-produced goods and services, i.e. there is a secondary impact on nonagricultural labor demand. Given the high level of interregional labor market integration documented in this report, reduced rural labor demand must have a depressing effect on wages throughout the economy. The negative income impact of the wage effect on poor producers is unlikely to be offset by the rice price effect. Thus taxation of rice farmers probably has a regressive impact not only on farmer groups but also on wage earners.

The burden of income transfers resulting from interventions in rice markets is not evenly distributed by regions. The regional distribution of the burden of the income transfers under the present tax system will correspond closely to the regional distribution of off-farm sales of rice. The relevant data are presented in Table 8.1 which gives the percentages of the farm population, paddy production and off-farm paddy sales for ten regions of Thailand. Since the farm community is a rice-surplus producer in every region of the country, farm households in all regions bear some burden of the income transfers defined in Appendix Table B.1. However, the burden does fall disproportionately on the Lower North and Central Regions (especially the Center-Middle, Center-East and Greater Bangkok). These four regions account for 60% of off-farm sales of rice while having only 28% of the farm population. While the income transfer burden is small relative to population in the Upper North and the Northeast (accounting for 32% of off-farm sales of rice while having 56% of the farm population), over a quarter of the transfers are at the expense of these lower income regions.

These figures suggest that the income transfers from farm households are not as geographically concentrated as is often assumed. It is thus erroneous to believe that the poverty regions could not benefit substantially from improved rice prices. This general conclusion is supported by information on farm households engaged in rice production. Almost half of all farm households outside of the Center-East and South grow only rice and more than three quarters of all farm households outside the Central Region grow at least some rice.

On the other hand, it might be argued that the calculations in Appendix Table B.1 and Table 8.1 overestimate the size of the total burden and the extent to which it is borne by the poorer regions of the country because most of the rice grown in the far North and Northeast is glutinous rice that does not enter into international trade to a significant extent and which is subject to lower tax rates. However, the two types of rice are close substitutes in production so that prices will be closely related. Depressing prices for nonglutinous rice through export taxation will reduce prices for glutinous rice by a similar amount, implying similar burdens on producers of both types of rice. The data in Table 8.2 indicate average paddy prices for the two types of rice. Although there is usually a discount of between 5-10% on glutinous rice, the discount appears to be higher in low price years and lower in high-price years but it has been quite stable over time, despite wide

Table 8.1: REGIONAL DISTRIBUTION OF FARM HOUSEHOLDS AND OF PRODUCTION AND OFF-FARM SALES OF RICE, THAILAND, 1975/76
(%)

	Production of Paddy	Off-Farm Sales 1/ of Paddy	Farm Population
North-Upper	12	9	11
North-Lower	17	22	13
Northeast-Upper	19	10	23
Northeast-Lower	19	13	22
Center-West	4	6	6
Center-Middle	11	19	7
Center-East	7	12	5
South-Upper	6	2	8
South-Lower	1	1	2
Greater Bangkok	3	7	3
Whole Kingdom	100	100	100

1/ Includes barter transactions.

Source: Percentages for the production of paddy are for crop year 1979/80 from the Agricultural Statistics of Thailand, Crop Year 1979/80; the farm population is based on estimates of the total number of households in 1976 from the data service unit, NSO, distributed according to the Socio-Economic Survey, 1975/76; and the off-farm sales of paddy percentages are derived by using the ratio of rice sold and bartered to rice production from the Socio-Economic Survey data tapes for 1975/76.

Table 8.2: FARM-GATE PRICES OF GLUTINOUS AND NONGLUTINOUS PADDY (ANNUAL AVERAGES IN BAHT PER KWIEN) 1/, THAILAND 1967-1980

	Glutinous Paddy	Nonglutinous Paddy	Price differential as % of nonglutinous rice price
1967	1,149	1,211	-5.1
1968	1,097	1,157	-5.1
1969	931	1,023	-9.0
1970	699	888	-21.3
1971	545	701	-22.1
1972	856	939	-8.8
1973	1,429	1,487	-3.9
1974	1,955	2,087	-6.3
1975	1,942	2,098	-7.4
1976	1,684	1,919	-12.2
1977	1,733	1,994	-13.1
1978	2,584	2,364	+9.3
1979	2,050	2,280	-1.3
1980	2,708	2,838	-4.8

1/ One kwien equals one ton of paddy.

Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

variation in export taxes on rice during the past decade and a half. 1/ The high prices of glutinous rice in the periods of high world market prices (1967-1969, 1972-1974, 1978-1980) strongly suggest that any increase in nonglutinous prices which would result from reduced taxation will be quickly reflected in corresponding increases in glutinous rice prices.

Furthermore, to the extent that subsistence-oriented farmers in the poor regions are also sellers of labor (locally or via seasonal migration), they would benefit from the wage effects of reduced rice taxation discussed previously.

The income transfers discussed above must be augmented by the estimates of the 'net loss' due to inefficient allocation of resources and choice of techniques. This loss does not result in a corresponding gain to any other group and falls directly on the rice farmers or owners of factors of production that could be potentially more effectively used in rice production if rice prices were not distorted by export taxes. In the calculations in Appendix Table B.1 based on an estimated elasticity of supply of .6, these losses range from 1.0 to 3.3 billion baht. This estimate of supply response is in line with published estimates. 2/ However, it is difficult to obtain reliable estimates of the supply response to a substantial change in rice prices.

Estimates based on the limited and fairly short-run changes in real rice prices observed in the post-World War II period probably underestimate the supply response. The ready availability of groundwater in much of the Central Plain and Lower North might mean that double- or even triple-cropping could be profitable even outside of the one-fifth paddy land in the Central region or the one-tenth of Northern paddy land with dry season irrigation. 3/ The underutilization of existing irrigation infrastructure, including the small irrigated areas of the Northeast, could be expected to change significantly in response to more favorable price incentives. Despite the common opinion that the possibilities for expansion of paddy land are very limited, a substantial response may also be obtained through increased areas

---

1/ The average 8% discount on glutinous rice prices is not unreasonable since lower rice prices can be expected in less commercialized regions due to transport costs to major domestic markets or export points and because of a risk premium attached to production of nonglutinous rice by glutinous rice-consuming farmers with uncertain prospects for off-farm sales.

2/ Chung Ming Wong "A Model for Evaluating the Effects of Thai Government Taxation of Rice Exports on Trade and Welfare", American Journal of Agricultural Economics, February 1978, estimates a short-run supply elasticity of .4 and a long-run elasticity of .9.

3/ Estimates of irrigated area with projections for 1990 are available in Trent Bertrand, World Bank Staff Working Paper No. 385, 1980.

under cultivation. [1] Yields in Thailand remain low compared to other Asian economies. Studies [2] indicate that changes in relative prices between rice and more modern inputs could be expected to yield substantial gains in productivity.

8.2 Rubber Taxation

Rubber production accounts for about two-thirds of cash income from total crop sales and from 40-50% of total cash income of rural households in Southern Thailand, where over 90% of the output is concentrated. In most of the post-World War II period, rubber was taxed at a low rate via a 7% ad valorem export tax in effect from 1930 to 1960. From 1960 to 1967, taxation was based on rates geared to export prices that implied higher tax rates in the early 1960's but then lower rates as prices declined throughout most of the 1960's under pressure from low-cost synthetic rubber. [3] The present tax system geared to export prices and based on an export tax and a replanting cess, has a 50% marginal tax rate when gazetted prices [4] rise above 10 baht per kilogram. Although this tax system resulted in tax rates below 10% of export prices in the late 1960's and early 1970's, prices and tax rates have increased significantly throughout the 1970's in response to the primary commodity boom of the mid-1970's and the rising costs of synthetic rubber. Prior to August 1981, export taxes were approximately 25% of world prices, implying a tax burden on the farm-gate prices of approximately 40%, very similar to the present level of taxation imposed on rice farmers. [5] Although the farm value of rubber production is only about one-sixth the farm value of

---

1/ A recent report has concluded that less than a quarter of the land suitable for paddy is under rice. See Bimbhanda Vasuvat, Land Development in Thailand, Ministry of Agriculture and Cooperatives, Technical Paper No. 103, February 1974, p.12.

2/ C. Peter Timmer and Walter Falcon, "The Impact of Price on Rice Trade in Asia", Trade Agriculture and Development, Tolley and Zadrosny (Eds.), Ballinger Publications, 1975.

3/ A more detailed description of tax policy is available in Trent Bertrand, World Bank Staff Working Paper No. 385, 1980.

4/ Gazetted prices are roughly equal to the export price minus trade taxes and export marketing margins.

5/ The tax formula for rubber sheets prior to August 1981 were in baht as follows:

$$\text{Export Tax} = .4\ (\text{Gazetted Price} - 5.80)$$
$$\text{Cess} = 0.5 + 0.1\ (\text{Gazetted Price} - 10)$$

On July 28, 1981 the export tax component was reduced by 2 baht a kilogram. This would reduce the total tax rate on a gazetted price of 20.9 baht per kilogram from about 25% to 19% of the f.o.b. price and from 42% to 28% of the farm-gate price.

rice, the tax burden fell on total production since there is no on-farm consumption. In 1980 taxation resulted in a transfer of about 4 billion baht from the rural economy through rubber taxation.[1/] Of this, roughly one fifth is earmarked for a program that provides grants to small holders for replanting. The transfer from the rubber sector net of this program is about 3.3 billion baht.[2/]

As with the rice sector, the transfer of resources identified above does not include the 'net loss' or 'efficiency cost' of price distortions caused by rubber taxation. These costs are again difficult to estimate precisely. Using the World Bank projections, the 'net loss' on an annual basis at the turn of the century measured in prices adjusted for projected inflation rates can be calculated to be in the range from 500 million to a billion baht per year. (For details of calculation see Appendix B.)

The total burden of the heavy export taxation on the rubber sector was about 3.4 billion baht per year in 1980, net of funds channelled back to the rubber sector through the replanting program. On a rough set of estimates, this burden may increase by the turn of the century in real terms to as much as 4.4 billion baht a year. The recent changes in tax rates will modify these estimates to some extent. With the new tax rates, the short-run income transfer in 1980 would have been in the order of 3 billion baht, implying a transfer net of the funds channelled into the replanting program of 2.2 billion baht. The longer-run burden would be reduced to about 3.2 billion baht a year.

Both with respect to the rice and rubber taxes it is important to recognize that the estimated rural income impacts and net losses are not the end of the story. Direct and indirect labor demand will be reduced as well via the various linkages which are so central to this report.

8.3 Revenue Issues and Policy Alternatives

The revenue generated for the government from interventions in export markets for rice and rubber was an important factor in the past. For instance, in the 1949-53 period, taxation of rice exports accounted for more than a quarter of total government revenue. In recent decades, the importance of the rice taxation to government revenue has been greatly reduced. For instance, in 1979, taxation of rice exports generated 600 million baht in export duties, 1.3 billion baht in revenue from the rice premium, and the

---

1/ Production in 1980 was 540 million tons. The export tax based on a gazetted price of 19.32 baht per kilogram was 5.4 baht per kilogram and the cess was 1.60 baht per kilogram. The total income transfer was therefore 4 billion baht, assuming that the farm community bears the full burden of the tax.

2/ The revenue from the Cess in 1980 was 688 million baht.

equivalent of about 1.1 billion baht from the rice reserve ratio. 1/ This 3 billion baht represented less than 5% of total government revenue in 1979, and only one fifth of this (from the export tax) went into general government revenue. One third of it is directly channelled into financing sales of low-priced rice in urban areas (from the rice reserve program) while the rest is earmarked for the Farmers' Aid Fund. Of the potential revenue of 6 billion baht for the calculations reported in Appendix Table B.1 corresponding to 1981 (a year with higher taxes and expected higher exports), relatively more of the tax will be channelled into the low-price rice sales program because of the increased relative burden of the rice reserve policy. 2/ Given the limited effectiveness of the government program to alleviate poverty through subsidized rice sales, it may make sense to eliminate completely the rice reserve ratio policy. 3/ This would leave less than four billion baht of government revenue lost through a complete elimination of rice export taxes. Since the Farmers' Aid Fund channels so little of the total tax burden back to the farmer in programs of doubtful efficiency from the viewpoint of the farmer 4/, this tax and corresponding program might also be eliminated. The resources channelled into general government revenues (about one and a half billion baht) could be compensated for by moderate increases in land and property taxes. 5/ Alternatively, the low (5%) export tax on rice could be retained and this would generate even greater amounts of revenue for general purposes than under the present system, as rice exports would expand with the

---

1/ Average procurement prices for the various types of rice used in settling the rice reserve requirement in 1979 was about B 3,200 per ton compared to B 4,200 per ton wholesale prices. Since the average reserve ratio was about 40% in 1979, and exports were 2.8 million tons, the total tax equivalent was about 1.1 billion baht.

2/ The rice reserve ratio accounts for about two-thirds of the tax burden on high-grade rice and about one-third of the burden on low-grade rice.

3/ To the extent that such programs reduce the cost of living generally for low-income groups in urban areas, they will lower the supply price of labor to the cities and therefore wage rates. Such programs therefore represent hidden subsidies to employers of labor. The low quality and lack of demand for the rice offered at subsidized prices suggest that much of the implicit revenue in the rice reserve policy is wasted through inefficiency in collecting, grading, marketing, and in responding to consumer demand.

4/ What is left over from the administration of the program is used to support farm prices and subsidize inputs. It is not clear that such intervention in marketing channels benefits the farmer.

5/ The local development tax on land varies from one-quarter to one-half of 1% of the market value of land.

removal of the other four-fifths of the export tax. A government revenue constraint is therefore no longer an obstacle to a major reduction in export taxation on rice. The situation in rubber is not very dissimilar.

APPENDIX A.

A.1 Introduction to Statistical Tables

Summary of Major Sources:

I. The Socio-Economic Survey 1975/76 data tapes were provided to the mission by the National Statistical Office (NSO). This enabled us to disaggregate data into groups by region and by household type and location. Survey data were collected between October 1975 and September 1976 with 12,189 households being sampled. The sampling procedure was as follows:

a) Sample amphoes were selected with probability proportional to population size based on the 1970 Census;

b) Sample blocks for municipal areas and sample villages for sanitary districts and villages were selected with probability proportional to size.

c) Households were then listed and classified by size and occupation of the head; 12 households were selected systematically from sampled blocks, and 15 households from sampled villages.

Although the Socio-Economic Survey provides data on agricultural and nonagricultural incomes, it does not have sufficient details on income sources. Thus, the Survey of Farmers was used as a primary source for this information.

II. The Survey of Farmers is conducted by the Office of Agricultural Economics, Ministry of Agriculture. The survey employs a 25% subsample (approximately 10,000 farm households in 1978/79) of the General Farm Survey. Published results of the surveys are available in Thai for crop years 1970/71, 1971/72, 1973/74, 1975/76, 1976/77, 1978/79. 1/. Survey methodologies and estimation procedures vary from year to year. For 1978/79, the General Survey used a two-stage stratified sampling technique:

a) For every changwat, a listing of villages was made with stratification by size of village (large = $\geq$ 106 households, medium = 36-105 households, small = $<$ 36 households). A sample was selected in proportion to the number of villages in each group.

b) From the sample villages, 16% of farm households were selected at random. (For 15 changwats, 75% of the previous year's sample were taken while the remaining 25% of the sample consists of newly-selected households.

1/ A crop year extends from April to March.

The Office of Agricultural Economics provided the mission with detailed tabulations by changwat for 1976/77 and 1978/79. 1/ Unfortunately, disaggregated data for earlier years are not available. Furthermore, the value of home consumption is only available for the most recent 2 years. Therefore, a complete income analysis cannot be made for earlier years even at the aggregate level. Improvements and additions are being made each year and, in future, we would expect the Survey of Farmers to be a major source for detailed insights into nonfarm activities in rural areas.

III. Labor Force Surveys are conducted by the National Statistical Office (NSO) twice yearly, during January-March (designated the slack period) and July-September (designated the peak period). Starting in July-September 1969, Surveys covered the entire country. Sampling procedures and estimation techniques have changed several times as documented in the published volumes. Definitions of the labor force, employment and unemployment as they relate to unpaid family workers and discouraged workers changed in 1974. 2/ Definitions changed again in 1977 as a result of the adoption of the labor utilization framework. The number of sampled households varied between years; in 1977, 50 changwats and 29,300 households were sampled.

The NSO gave the mission data tapes for 1976-1980 for both rounds with the exception of 1980 when the survey was conducted only during July-September. We were able to tap, for the first time, wage information stored on these tapes as well as to extract data for the Von Thunen analysis.

Since 1977, the data tapes have contained wage information for government and private employees. Wage information was collected on the basis of type of payment received, i.e. per hour, day, week or month; persons paid by "other" means were asked to give their average wage received per day. In Chapter V, standardized daily wages were obtained by reducing data of individual records to hourly wages and then adjusting them to a standard 8-hour day as follows:

1) Hourly paid: hourly wage x 8

2) Daily paid: (daily wage/hours worked per day) x 8

3) Weekly paid: (weekly wage/(hours worked per day x days worked per week)) x 8

4) Monthly paid:(monthly wage/(hours worked per day x 22)) x 8

5) Other paid: (average daily wage/hours worked per day) x 8

1/ 1978/79 data by sub-regions are contained in the Appendix tables.

2/ For more details, see footnotes to Appendix Table A.12.

Owing to the fact that wage data on the tapes were unedited, ceilings were established to eliminate a few extreme wage observations. This procedure did not in any way affect the results. For laborers, wage ceiling = 100 baht/day; for farm workers, wage ceiling = 150 baht/day; and for other occupations, wage ceiling = 300 baht/day. For tabulations of employees age 20-59 with lower elementary education, the wage ceiling was set at 200 baht/day.

Definitional Issues:

Agricultural activities are those concerned with crop and livestock production. Farm activities are agricultural activities carried out on the farms of the households in question.

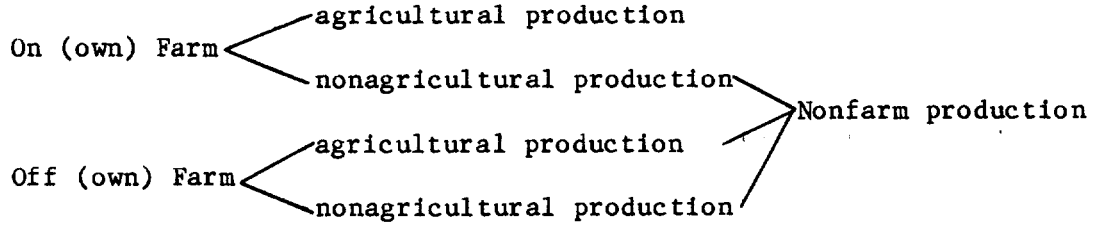
Information on household incomes is based primarily on 2 surveys -

1) The Socio-Economic Survey includes as farm households those operating at least one agricultural enterprise.

2) The Survey of Farmers uses a very similar definition of farm households: those engaged in growing crops, vegetables or raising animals for sale, for consumption or for use on the farm including:

a) Operating farm (rice, crops) and orchards 1 rai and above;
b) Operating vegetable farms (other than crops in a)) .5 rai and above;
c) Growing flowers .5 rai and above
d) Raising animals including fishing, i.e. buffaloes, cows, pigs > 1 animal
e) Raising ducks, chicken, etc. > 30 animals

Data from the Survey of Farmers are disaggregated in the published volumes only as average cash income from agriculture (agricultural sales) or from nonagriculture. However, because certain sources of income categorized as nonagricultural are actually agricultural activities performed on other farms, we have regrouped the data to capture this distinction. The total nonagricultural (off-farm) incomes, however, have been left unchanged so as to be consistent with published numbers. We merely provide a subgrouping under this total resulting in the following groupings -



The Survey of Farmers does not disaggregate nonagricultural incomes on the basis of location i.e. whether on- or off-farm. Therefore, nonfarm/off-farm includes all nonagricultural activities plus those agricultural activities involving renting out household endowments to other farms such as hiring out animals, farm equipment, farm workers and renting land or living quarters.

Appendix Table A.1a: LIST OF CHANGWADS

		AEZ	BER	SES	LFS
North					
1.	Kamphaengphet	8	N2	NL	12
2.	a) Chiangrai	10	N1	NU	11
	b) Phayao	10		NU	12
3.	Chiangmai	10	N1	NU	11
4.	Tak	8	N2	NL	12
5.	Nakhonsawan	6	N2	NL	11
6.	Nan	9	N1	NU	12
7.	Phichit	8	N2	NL	12
8.	Phitsanulok	8	N2	NL	11
9.	Phetchabun	6	N2	NL	12
10.	Phrae	9	N1	NU	12
11.	Maehongson	10	N1	NU	12
12.	Lampang	9	N1	NU	12
13.	Lamphun	10	N1	NU	12
14.	Sukhothai	9	N1	NL	12
15.	Uttaradit	9	N1	NL	12
16.	Uthaithani	6	N2	NL	12
Center-East					
17.	Kanchanaburi	12	C3	CW	42
18.	Chanthaburi	16	C2	CE	62
19.	Chachoengsao	13	C2	CE	62
20.	Chonburi	15	C2	CE	61
21.	Chainat	11	C1	CM	52
22.	Trat	16	C2	CE	62
23.	Nakhonnayok	11	C1	CE	62
24.	Nakhonpathom	11	C1	CM	42
25.	Nonthaburi	11	C1	BKK	81
26.	Pathumthani	11	C1	BKK	81
27.	Prachuabkhirikhan	12	C3	CW	42
28.	Prachinburi	13	C2	CE	62
29.	Pharanakhonsiayutthaya	11	C1	CM	52
30.	Phetchaburi	12	C3	CW	42
31.	Rayong	15	C2	CE	62
32.	Ratchaburi	12	C3	CW	41
33.	Lopburi	7	C2	CM	52
34.	Samutprakan	14	-	BKK	81
35.	Samutsongkram	14	-	CM	42
36.	Samutsakhon	14	-	CM	42
37.	Saraburi	7	C2	CM	52
38.	Singburi	11	C1	CM	52
39.	Suphanburi	11	C1	CW	42
40.	Angthong	11	C1	CM	52
Northeast					
41.	Kalasin	3	NE2	NEU	22
42.	Khonkaen	3	NE2	NEU	21
43.	Chaiyaphum	5	NE2	NEL	22
44.	Nakhonphanom	1	NE1	NEU	22
45.	Nakhonratchasima	5	NE2	NEL	21
46.	Nongkhai	1	NE1	NEU	22
47.	Buriram	4	NE3	NEL	21
48.	Mahasarakham	3	NE2	NEU	22
49.	Roiet	3	NE2	NEU	21
50.	Loei	6	N2	NEU	22
51.	Sisaket	4	NE3	NEL	21
52.	Sakonnakhon	1	NE1	NEU	22
53.	Surin	4	NE3	NEL	21
54.	a) Ubonratchathani	2	NE3	NEL	21
	b) Yasothon	2		NEL	22
55.	Udonthani	1	NE1	NEU	21
South					
56.	Chumphon	17	S1	SU	32
57.	Ranong	18	S1	SU	32
58.	Suratthani	17	S1	SU	32
59.	Phang-Nga	18	S1	SU	32
60.	Nakhonsithammarat	17	S1	SU	31
61.	Phuket	18	S1	SU	32
62.	Krabi	18	S1	SU	32
63.	Phatthalung	17	S1	SL	32
64.	Trang	18	S1	SU	32
65.	Satun	18	S1	SL	32
66.	Songkhla	17	S1	SL	31
67.	Pattani	19	S2	SL	32
68.	Yala	19	S2	SL	32
69.	Narathiwat	19	S2	SL	32
70.	Bangkok-Thonburi	11	-	BKK	71

AEZ - Agro-Economic Zone, 1972
BER - Basic Economic Report
SES - Socioeconomic Survey 1975/76
LFS - Labor Force Survey, 1978, Round I

Note: The LFS classification is not compatible with any other except at the level of major region. In the N, NE and S the two strata consist of large changwads and small changwads, so that changwads like Chiangrai and Phayao or Ubonratchathani and Yasothon which would be classified together elsewhere get into separate strata in the LFS. In the C, the region is first broken down into CW, CM and CE; CW and CE are then divided into strata by size of changwad.

Appendix Table A.1b: CORRESPONDENCE OF DIFFERENT REGIONAL CLASSIFICATIONS

Changwad	Agro-Economic Zone	Basic Economic Report	Socioeconomic Survey 1975/76	Labor Force Survey 1978, Round I
Nongkhai Udonthani Sakonnakhon Nakhonphanom	1	NE1	NEU	NE
Khonkaen Kalasin Mahasarakam Roiet	3	NE2		
Nakhonratchasima Chaiyaphum	5		NEL	
Ubonratchathani Yasothon Surin Buriram Sisaket	2 4	NE3		
Chiangrai Phayao Chiangmai Maehongson Lamphun	10	N1	* NU	N
Nan Phrae Lampang Uttaradit** Sukhothai**	9			
Tak Kamphaengphet Phichit Phitsanulok Phetchabun Nakhon Sawan Uthaithani	8 6	N2	NL *	
Loei**			NEU	NE
Kanchanaburi Ratchaburi Phetchaburi Prachuabkhirikhan	12	C3	CW	CW
Suphanburi** Chainat Angthong Singburi Ayutthaya Nakhonpathom	11	C1	* CM	CM CW
Nakhonnayok** Nonthaburi** Pathumthani**			* CE	CE
Bangkok Thonburi		Not classified	BKK	BKK
Samutprakan** Samutsongkram Samutsakhon	14		* CM	CW
Lopburi Saraburi	7	C2		CM
Prachinburi Chachoengsao Chonburi Rayong Chanthaburi Trat	13 15 16		CE *	CE
Chumphon Suratthani Nakhonsithammarat Patthalung** Songkhla** Ranong Phangnga Phuket Krabi Trang Satun** Pattani Yala Narathiwat	17 18 19	S1 S2	SU SL * * SU * SL	S

* Changwads which are not in SES 1975/76 sample.
** Changwads which are separated from others in their agroeconomic zone in the Socioeconomic Survey 1975/76 classification

Appendix Table A.2: AREA OF HOLDINGS, BY LAND UTILIZATION AND REGION, THAILAND, 1963 and 1978

SES 1975/76 Region	Average Size of Holdings (rai)			Of Which Area Under (rai) 1/											
				Crops			Tree Crops			Pastures & Woodlands			Other 2/		
	1963	1978	Change	1963	1978	Change	1963	1978	Change	1963	1978	Change	1963	1978	Change
North-Upper	8.5	9.8	+1.3 (+15.3%)	6.9	9.1	+2.2 (+31.9%)	0.5	0.4	-0.1 (-20.0%)	0.4	0.2	-0.2 (-50.0%)	0.7	0.1	-0.6 (-85.7%)
North-Lower	24.1	29.5	+5.4 (+22.4%)	19.6	28.2	+8.6 (+43.9%)	0.7	0.5	-0.2 (-28.6%)	1.7	0.5	-1.2 (-70.6%)	2.1	0.2	-1.9 (-90.5%)
Northeast-Upper	20.3	22.9	+2.6 (+12.8%)	15.3	20.9	+5.6 (+36.6%)	0.4	0.1	-0.3 (-75.0%)	2.9	1.5	-1.4 (-48.3%)	1.7	0.4	-1.3 (-76.5%)
Northeast-Lower	23.0	25.9	+2.9 (+12.6%)	16.7	24.0	+7.3 (+43.7%)	0.5	0.2	-0.3 (-60.0%)	2.7	1.2	-1.5 (-55.6%)	3.1	0.5	-2.6 (-83.9%)
Center-West	24.3	25.2	+0.9 (+3.7%)	18.7	22.1	+3.4 (+18.2%)	1.9	1.9	0.0 (+0.0%)	1.7	0.7	-1.0 (-58.8%)	2.0	0.4	-1.6 (-80.0%)
Center-Middle	25.9	26.7	+0.8 (+3.1%)	22.6	25.2	+2.6 (+11.5%)	1.0	1.0	0.0 (+0.0%)	0.9	0.2	-0.7 (-77.8%)	1.4	0.3	-1.1 (-78.6%)
Center-East	30.9	32.5	+1.6 (+5.2%)	21.5	26.6	+5.1 (+23.7%)	4.1	3.8	-0.3 (-7.3%)	2.4	1.5	-0.9 (-37.5%)	2.9	0.6	-2.3 (-79.3%)
South-Upper	24.0	20.6	-3.4 (-14.2%)	7.6	8.3	+0.7 (+9.2%)	11.8	10.5	-1.3 (-11.0%)	2.9	1.2	-1.7 (-58.6%)	1.7	0.6	-1.1 (-64.7%)
South-Lower	19.6	15.7	-3.9 (-19.9%)	4.1	4.7	+0.6 (+14.6%)	13.0	10.1	-2.9 (-22.3%)	1.5	0.5	-1.0 (-66.7%)	1.0	0.4	-0.6 (-60.0%)

1/ Area of holdings by these classifications for 1963 was adjusted to include area holdings less than 2 rai for consistency with Table 3.1 which includes all holdings.

2/ Other includes fallow and other arable land in 1963.

Source: 1963 Agricultural Census, Regional Volumes, Tables 1 and 4 and 1978 Agricultural Census Report, Changwat Volumes, Table 2.3; for average size of holdings see Table 3.1.

Appendix Table A.3: AVERAGE ANNUAL AREA PLANTED IN MAJOR CROPS, THAILAND, 1962/63 TO 1979/80

Crop	Area Planted (1,000 rai)								Increases in Area Planted (1,000 rai)						Average Prices Received by Farmers (1967=100)		
	I 1962/63-1965/66	%	II 1966/67-1970/71	%	III 1971/72-1975/76	%	IV 1976/77-1979/80	%	I-II	%	II-III	%	III-IV	%	1967-70	1971-75	1976-80
Food Crops	45,760	81.3	53,329	78.5	63,373	79.3	78,227	82.1	7,315	64.2	10,044	84.1	14,854	96.0			
Paddy	41,058	73.0	45,620	67.2	50,147	62.8	57,874	60.7	4,562	40.0	4,527	37.9	7,727	50.0	91	122	203
Maize	2,929	5.2	4,636	6.8	7,144	8.9	8,438	8.9	1,707	15.0	2,508	21.0	1,294	8.4	97	162	207
Cassava	729	1.3	1,064	1.6	2,410	3.0	5,362	5.6	335	2.9	1,346	11.3	2,952	19.1	90	110	186
Sugar cane	463	.8	611	.9	1,624	2.0	3,145	3.3	148	1.3	1,013	8.5	1,521	9.8	93	121	209
Mung bean	581	1.0	1,144	1.7	1,263	1.6	2,350	2.5	563	4.9	119	1.0	1,087	7.0	90	102	192
Sorghum	n.a.	n.a.	254[a]	.4	785	1.0	1,058	1.1	n.a.	n.a.	531	4.4	273	1.8	109	179	245
Oil Seeds	1,124	2.0	1,528	2.2	1,836	2.3	1,992	2.1	404	3.5	308	2.6	156	1.0			
Soybeans	178	.3	336	.5	642	.8	820	.9	158	1.4	306	2.6	178	1.2	107	175	278
Groundnuts	558	1.0	738	1.1	756	.9	668	.7	180	1.6	18	.2	-88	-.6	104	155	299
Other oil seeds	388	.7	454	.7	438	.5	504	.5	66	.6	-16	-.1	66	.4			
Fiber Crops	2,101	3.7	3,302	4.9	3,254	4.1	2,321	2.4	1,201	10.5	-48	-.4	-933	-6.0			
Cotton	429	.8	567	.8	273	.3	465	.5	138	1.2	-294	-2.5	192	1.2	97	150	234
Kenaf	1,359	2.4	2,413	3.6	2,624	3.3	1,512	1.6	1,054	9.3	211	1.8	-1,112	-7.2	113	116	162
Kapok	313	.6	322	.5	357	.4	344	.4	9	.1	35	.3	-13	-.1			
Other field crops [b]	482	.9	637	.9	802	1.0	898	.9	155	1.4	165	1.4	96	.6			
Tree Crops	6,807	12.1	9,124	13.4	10,601	13.3	11,894	12.5	2,317	20.3	1,477	12.4	1,293	8.4			
Rubber	5,389	9.6	7,371	10.9	8,541	10.7	9,351	9.8	1,982	17.4	1,170	9.8	810	5.2	91	95	178
Coconuts	1,418	2.5	1,753	2.6	2,060	2.6	2,543	2.7	335	2.9	307	2.6	483	3.1			
Total	56,274	100.0	67,920	100.0	79,866	100.0	95,332	100.0	11,392	100.0	11,946	100.0	15,466	100.0			

[a] Crop year 1970/71 only.

[b] Tobacco, Chilli, Shallots and Onions, Garlic.

Source: Agricultural Statistics of Thailand, Crop Years 1976/77 and 1979/80, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

Appendix Table A.4: SURVEY OF FARMERS 1978/79: RELATIVE IMPORTANCE OF OFF-FARM INCOMES, THAILAND
baht/farm HH

SES Regions	(0) Number of households	(1) Average HH size	(2) Average cash income from agriculture/1	(3) Value of home consumption	(4) Cash expenses for agriculture	(5) Farm income (2)+(3)-(4)	(6) Off-Farm Income /2		(7) Total income (5)+(6)
							Off-farm agriculture	Off-farm nonagriculture	
NU	485,042	4.7	7,066	2,931	3,083	6,914	1,380	5,727	14,021
NL	458,818	5.6	24,732	2,689	10,410	17,011	3,090	4,656	24,757
NEU	715,625	6.7	6,045	4,475	2,389	8,131	951	6,047	15,129
NEL	735,288	6.9	9,174	4,872	4,664	9,382	861	5,074	15,317
CW	186,794	5.8	26,909	2,762	17,506	12,164	2,764	9,261	24,188
CM	238,555	5.6	30,742	2,546	19,644	13,643	1,751	10,008	25,402
CE	188,848	5.9	34,586	3,586	19,601	18,571	3,078	10,319	31,968
US	407,520	5.5	13,704	3,389	4,714	12,380	1,797	9,713	23,889
LS	127,708	5.1	12,475	2,552	4,025	11,002	2,629	8,130	21,761
BKK /3	56,394	6.3	30,808	3,025	15,129	18,704	903	11,525	31,131
WK	3,600,592	6.0	14,901	3,474	7,326	11,049	1,671	6,758	19,478

/1 Agricultural sales

/2 Labeled ave. cash income from nonagricultural sector in published volumes. Off-farm agricultural income includes hiring out animals, farm equipment, farm workers and renting out land and living quarters.

/3 Bkk (Bangkok) also includes Thonburi, Nonthaburi, Pathumthani and Samutprakarn for all subsequent tables from the survey of farmers.

Source: Unpublished tabulations from the Survey of Farmers 1978/79, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

Appendix Table A.5: SURVEY OF FARMERS 1978/79: SOURCES OF AVERAGE CASH INCOME FROM AGRICULTURE (AGRICULTURAL SALES), THAILAND
(baht/Farm HH)

SES Region	Total Agri. Sales	Total Crop Sales	Vegetables, Garden Crops & Flowers	Fruits	Total Animal Sales	Hogs	Poultry	Total Other Agri. Sales
NU	7066	5917	1031	127	872	736	57	277
NL	24732	21521	426	785	1146	799	110	2065
NEU	6045	4931	239	65	830	326	133	284
NEL	9174	7804	162	102	1034	745	84	336
CW	26909	23394	1714	644	1326	949	112	2188
CM	30742	22986	799	1884	5689	1913	1042	2068
CE	34586	27544	349	1847	5088	1813	1623	1955
US	13704	11332	123	657	1550	1101	186	822
LS	12475	10857	143	444	493	227	223	1125
BKK	30808	26895	260	2546	3378	673	86	534
WK	14901	12383	494	543	1598	832	255	920

Note: Total Agri. sales = total crop sales + total animal sales + total other agri. sales.

Source: Unpublished tabulations from the Survey of Farmers 1978/79, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

Appendix Table A.6: SURVEY OF FARMERS 1978/79: SOURCES OF OFF-FARM INCOMES [1], THAILAND
baht/farm HH

SES Regions	Total off-farm Income	Off-Farm Agricultural Incomes					Off-Farm Nonagricultural Incomes							
		Total off-farm agricultural	Hiring out animals	Hiring out farm equipment	Renting land or living quarters	Hired farm work by HH members	Total off-farm non-agricultural	Salaries	Hired non-farm work by HH member	Selling non-raised animals and off-farm plants and crops	Selling home-made goods	From relatives, rituals and ceremonies	Loan interest	Other
NU [2]	7,107	1,380	77	36	143	1,125	5,727	1,190	1,642	471	372	136	9	1,907
NL [2]	7,746	3,090	19	1,754	213	1,104	4,656	1,370	1,539	246	270	234	29	969
NEU	6,998	951	30	91	92	738	6,047	1,898	1,873	681	332	512	10	741
NEL	5,935	861	17	169	50	624	5,074	1,049	1,525	496	297	649	6	1,051
CW	12,025	2,764	24	628	204	1,908	9,261	1,736	2,306	312	95	417	54	4,342
CM	11,759	1,751	8	526	293	925	10,008	2,581	1,983	592	545	534	171	3,603
CE	13,397	3,078	71	1,109	218	1,681	10,319	2,124	2,028	263	1,247	674	17	3,966
US	11,510	1,797	50	456	51	1,239	9,713	1,666	2,735	214	834	258	48	3,957
LS	10,759	2,629	-	241	93	2,295	8,130	1,500	2,365	52	204	59	30	3,921
BKK	12,428	903	-	33	186	684	11,525	5,769	2,032	558	1,621	544	-	1,001
WK	8,429	1,671	34	467	128	1,042	6,758	1,632	1,878	434	429	395	27	1,964

[1] Labeled average cash incomes from nonagriculture in published volumes.

[2] Weighted average for total off-farm income in the North equals B7418, whereas the published total is B7239. This is due to the fact that disaggregated changwat tabulations provided by the Office of Agricultural Economics shows a higher total for the "other" category.

Source: Unpublished tabulations from the Survey of Farmers, 1978/79, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

Appendix Table A.7: SURVEY OF FARMERS 1978/79: AVERAGE CASH EXPENSES FOR AGRICULTURE, THAILAND
baht/farm HH

SLS Regions	Total cash agri. expenses	Hiring services	Transportation	Fuels	Repairs	Chemical fertilizer	Insecticide	Animal nutrition and medicine
NU	3083	817	23	64	29	350	30	158
NL	10410	3873	186	1601	666	361	185	381
NEU	2389	679	192	137	65	362	25	118
NEL	4664	1607	196	134	280	731	200	288
CW	17506	5097	3082	556	371	1905	763	751
CM	19644	5298	462	1181	549	2276	641	3283
CE	19601	6034	1161	1574	604	2094	335	2580
US	4714	1814	119	498	141	493	29	411
LS	4025	2038	67	82	76	355	5	271
BKK	15129	3142	35	1585	504	4647	699	1099
WK	7326	2328	374	527	274	816	192	618

NOTE: Figures do not sum to the total due to categories left out.

Source: Unpublished tabulations from the Survey of Farmers 1978/79, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

Appendix Table A.8: SURVEY OF FARMERS 1978/79: AVERAGE CASH EXPENSES FOR NONAGRICULTURAL SECTOR, THAILAND
baht/farm HH

SES Regions	Total cash expenses	Food	Clothing	Equipment and domestic utensils	Medical care	School fees	Rituals and ceremonies	Beauty parlor and toilets	Fuels	Recreation and entertainment	Transp. and passenger fees	Loan interest	Fees and other expenses
NU	8,116	3,153	936	351	683	474	476	342	490	184	340	69	618
NL	12,912	4,440	1,519	575	1,272	942	1,152	656	635	250	471	149	850
NEU	8,164	2,700	1,089	170	1,000	758	525	417	315	240	466	271	213
NEL	8,396	2,487	990	266	996	608	736	377	280	156	480	129	892
CW	19,828	8,543	1,459	655	1,510	1,501	2,004	708	917	150	515	397	1,470
CM	21,226	8,374	1,535	749	1,487	1,520	1,910	829	722	377	706	574	2,443
CE	21,071	10,460	1,473	324	1,570	1,571	1,868	826	692	201	670	708	709
US	16,293	7,128	1,198	331	1,152	2,356	917	660	522	305	653	238	833
LS	12,917	5,177	884	725	570	1,018	663	469	1,636	258	379	9	1,130
BKK	21,730	10,096	1,389	1,070	1,010	1,923	2,567	743	165	264	688	88	1,725
WK	12,614	4,731	1,182	747	1,082	1,053	961	527	518	227	502	231	853

Source: Unpublished tabulations from the Survey of Farmers 1978/79, Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

Appendix Table A.9: REGIONAL GDP, THAILAND
(billions of current baht)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979*
TOTAL REGIONAL GDP:										
Whole Kingdom	139.4	148.1	168.6	221.7	275.5	298.8	337.6	393.0	477.3	564.4
Northeast	24.2	25.0	27.3	37.4	45.8	49.9	51.2	56.0	69.2	78.8
North	22.8	23.7	27.7	37.8	47.7	51.1	55.7	58.7	73.3	83.4
South	15.8	16.2	19.2	25.7	30.5	33.1	41.4	51.1	61.9	72.5
Center (excl. Bangkok-Thonburi)	40.7	45.1	52.4	69.4	86.4	93.9	107.7	127.2	150.6	179.0
Bangkok-Thonburi	35.5	37.7	41.8	51.6	65.2	70.8	81.7	100.1	122.4	150.8
AGRICULTURAL GDP:										
Whole Kingdom	39.7	42.1	51.5	75.5	87.7	94.1	104.7	110.9	131.2	145.6
Northeast	11.6	11.8	12.7	19.3	22.0	24.3	24.0	24.3	30.3	31.9
North	9.6	10.7	13.5	19.7	23.8	25.2	26.7	25.7	31.9	35.7
South	6.5	6.2	8.1	11.7	12.6	13.6	18.2	20.8	23.1	25.9
Center (excl. Bangkok-Thonburi)	11.8	13.1	16.8	24.5	29.0	30.5	35.0	39.1	44.9	51.1
Bangkok-Thonburi	.4	.4	.4	.5	.6	.6	.7	.9	.9	1.0

* Preliminary.

Source: GDP series were constructed using:

1. World Bank country study, March 1980 for years 1970 and 1971, this source is consistent with 2.
2. National Income and Regional Product 1976, NESDB for years 1972-76
3. Gross Regional and Provincial Product 1979, NESDB for years 1975-79.

Data from the most recent source were used as a basis for reconstructing a continuous series backwards to 1970.

Appendix Table A.10: REAL REGIONAL GDP, THAILAND
(In billions baht -- 1976 prices)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979*
TOTAL GDP:										
Whole Kingdom[1/]	235.1	246.4	255.8	274.7	301.4	304.9	334.3	358.9	416.1	429.2
Northeast	38.6	38.9	39.5	44.5	51.4	50.5	51.0	51.5	61.2	60.3
North	41.9	41.9	44.7	49.1	51.5	52.8	55.0	53.3	62.8	63.5
South	27.4	27.8	29.7	31.8	32.7	33.5	40.2	46.3	53.2	54.7
Center (excl. Bangkok-Thonburi)	68.1	76.2	80.7	89.1	92.1	96.5	107.2	116.0	131.6	134.2
Bangkok-Thonburi	56.4	58.2	59.1	64.8	69.7	72.2	80.7	90.5	100.5	107.7
AGRICULTURAL GDP:										
Whole Kingdom[1/]	67.0	70.1	78.2	93.6	96.0	96.0	103.7	101.3	114.4	110.7
Northeast	18.5	18.4	18.4	23.0	24.7	24.6	23.9	22.4	26.8	24.4
North	17.7	18.9	21.8	25.6	25.7	26.0	26.4	23.3	27.3	27.2
South	11.3	10.6	12.5	14.5	13.5	13.8	17.7	18.9	19.9	19.5
Center (excl. Bangkok-Thonburi)	19.7	22.1	25.9	31.5	30.9	31.4	34.8	35.6	39.3	38.3
Bangkok-Thonburi	.6	.6	.6	.6	.6	.6	.7	.8	.7	.7
					%					
% AGRI. GDP TO TOTAL GDP:										
Whole Kingdom[1/]	28.5	28.4	30.6	34.1	31.9	31.5	31.0	28.2	27.5	25.8
Northeast	47.9	47.3	46.6	51.7	48.1	48.7	46.9	43.5	43.8	40.5
North	42.2	45.1	48.8	52.1	49.9	49.2	48.0	43.7	43.5	42.8
South	41.2	38.1	42.1	45.6	41.3	41.2	44.0	40.8	37.4	35.6
Center (excl. Bangkok-Thonburi)	28.9	29.0	32.1	35.4	33.6	32.5	32.5	30.7	29.9	28.5
Bangkok-Thonburi	1.1	1.0	1.0	.9	.9	.8	.9	.9	.7	.6

* Preliminary.

1/ Deflated by Whole Kingdom CPI index excluding Bangkok-Thonburi (using Whole Kingdom CPI including Bangkok would yield basically the same results). Individual regions are deflated by their respective CPIs.

Note: Numbers do not sum exactly to Whole Kingdom total because Whole Kingdom figures were deflated by CPI excluding Bangkok-Thonburi.

Source: See Appendix Table A-9 and A-11.

Appendix Table A.11: CONSUMER PRICE INDEX FOR URBAN AREAS BY REGIONS[1/], THAILAND
Base = 1976

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Whole Kingdom	60.1	61.3	66.2	79.5	93.7	97.9	101.2	110.2	118.8	136.6	159.0
Whole Kingdom excluding Bangkok-Thonburi [2/]	59.3	60.1	65.9	80.7	91.4	98.0	101.0	109.5	114.7	131.5	154.6
Northeast	62.7	64.3	69.2	84.0	89.2	98.8	100.5	108.7	113.1	130.6	154.9
North	54.4	56.6	62.0	77.0	92.6	96.8	101.2	110.1	116.7	131.3	151.4
South	57.6	58.3	64.7	80.9	93.2	98.7	103.1	110.3	116.3	132.6	157.4
Center (excl. Bangkok-Thonburi)	59.8	59.2	64.9	77.9	93.8	97.3	100.5	109.7	114.4	133.4	156.7
Bangkok-Thonburi	62.9	64.8	70.7	79.6	93.6	98.0	101.2	110.6	121.8	140.0	162.0

1/ CPI for December except 1970 and 1971 which is the average of Oct.-Dec.
2/ Whole Kingdom CPI excluding Bangkok-Thonburi was calculated by weighting the four regional CPIs with the number of households from the survey of farmers 76/77.

Source: The CPIs were constructed by linking two series reported in Bank of Thailand Statistical Bulletin, Dec. 1973, Dec. 1975, Dec. 1977, Nov. 1979 and April 1981.

Appendix Table A.12: REGIONAL EMPLOYMENT: JULY-SEPT., THAILAND
('000)

		1971	1972	1973	1977	1978	1979	1980*
Whole Kingdom	Total Employment	16,618.6	16,129.5	17,042.7	20,308.1	21,738.1	21,229.6	22,523.9
	Agri. Emp.	13,157.7	11,642.2	12,270.5	14,922.0	16,018.1	15,019.0	15,942.7
	Non-Agri. Emp.	3,461.0	4,487.3	4,772.2	5,386.0	5,720.0	6,210.6	6,581.2
North	Total Employment	3,967.8	3,729.5	3,918.4	4,413.6	4,779.8	4,827.5	4,878.4
	Agri. Emp.	3,467.0	3,042.3	3,274.4	3,692.4	3,827.5	3,869.3	3,888.3
	Non-Agri. Emp.	500.8	687.2	644.0	721.1	952.3	958.2	990.1
Northeast	Total Employment	6,184.9	5,745.2	6,254.4	7,380.1	7,940.4	7,562.3	8,226.4
	Agri. Emp.	5,592.3	4,661.4	5,085.4	6,496.5	7,184.6	6,733.9	7,230.3
	Non-Agri. Emp.	592.6	1,083.8	1,169.0	883.6	755.8	828.4	996.1
Center	Total Employment	3,297.8	3,411.2	3,489.3	4,271.7	4,418.2	4,206.7	4,433.5
	Agri. Emp.	2,300.4	2,379.5	2,342.2	2,828.1	2,936.1	2,519.6	2,724.4
	Non-Agri. Emp.	997.4	1,031.7	1,147.0	1,443.6	1,482.1	1,687.1	1,709.1
South	Total Employment	1,937.1	1,907.4	2,014.9	2,308.0	2,460.5	2,438.3	2,655.0
	Agri. Emp.	1,604.9	1,340.8	1,412.2	1,673.9	1,829.7	1,697.2	1,915.1
	Non-Agri. Emp.	332.2	566.6	602.7	634.0	630.8	741.1	739.9
Bangkok-Thonburi	Total Employment	1,231.0	1,336.3	1,365.8	1,934.4	2,138.9	2,194.7	2,330.7
	Agri. Emp.	193.1	218.2	156.3	230.7	239.6	199.0	184.6
	Non-Agri. Emp.	1,038.0	1,118.1	1,209.5	1,703.7	1,899.3	1,995.6	2,146.1

*Preliminary.

Note: These figures should be used with caution. Large annual fluctuations in the survey figures reflect changes in definitions, methodologies, and sampling procedures from year to year including:

(1) Prior to 1977, the survey figures were "blown up" based on the 1970 Census; since 1977 they were based on NSO population projections. The jump in employment total in 1973 resulted from adjustments for undernumeration of the 1970 Census.

(2) Between 1974-76 the definition of employment changed: previously in 1971-73 all unpaid family workers were considered employed. During 1974-76 unpaid workers who worked at least 20 hours per week were employed; those working less than 20 hours per week and who wanted more work were considered unemployed and those working less than 20 hours per week and who did not want more work were not included in the labor force. Furthermore, the definition of unemployment was expanded to include discouraged workers; previously in 1971-73 unemployed persons not looking for work due to the belief that no work was available were not in the labor force.

(3) From 1977 and onwards, the labor utilization framework was adopted (for details see Labor Force Survey publications). Definitions remained basically unchanged from 1974-76 except that unpaid family workers working at least 20 hours per week as well as those working less than 20 hours per week and who wanted more work were considered employed (as during 1971-73).

For purposes of evaluating employment growth rates between the periods 1971-73 and 1978-80, the following must be noted:

(a) From 1977 onwards the data were estimated based on population projections, not the 1970 Census.

(b) Since 1974, unpaid family workers working less than 20 hours per week and who did not want more work were not included in the labor force. It is possible to separate out this group using the survey tapes for 1977-80 (it is not possible to adjust 1971-73 data because this information is not published) and to put this group back into the employed labor force to be comparable to the earlier years. However, this group constituted less than one percent of the employed in 1980, and any adjustment would have negligible effect on growth rates.

Source: Labor Force Survey, 1971-73 and 1977-78 (Rounds 2); Labor Force Survey Tapes, 1979-80 (Rounds 2), National Statistical Office.

Appendix Table A.13 : SEASONAL EMPLOYMENT CHANGES IN NON-MUNICIPAL AREAS BY SECTOR, STATUS, AND REGION: THAILAND
JAN.-MARCH AND JULY-SEPT. 1979
('000)

Activity	North		Northeast		Center[1/]		South		Bangkok-Thonburi		Total[2/]	
	Jan-Mar.	July-Sept.	Jan-Mar.	July-Sept.	Jan-Mar.	July-Sept.	Jan-Mar.	July-Sept.	Jan-Mar.	July-Sept.	Jan.-Mar.	July-Sept.
Employed in Agriculture	2,463.1	3,846.3	3,495.1	6,715.1	1,919.7	2,487.7	1,540.4	1,675.0	183.3	188.4	9,601.5	14,912.5
of which: Employees	226.7	360.3	333.3	298.8	324.2	295.7	179.8	129.8	23.5	23.7	1,087.5	1,108.3
Unpaid family workers	1,038.9	2,232.9	1,198.0	4,246.6	784.0	1,326.5	627.8	767.7	105.7	108.1	3,754.4	8,681.8
Employer & own account	1,197.5	1,253.1	1,963.8	2,169.7	811.5	865.6	732.7	777.6	54.1	56.6	4,759.6	5,122.6
Employed in Non-Agri.	967.7	694.8	1,118.3	612.7	1,409.8	1,271.5	617.3	547.2	298.3	319.2	4,411.4	3,445.4
Mining & Manufacturing	311.0	178.6	390.3	140.3	556.8	487.7	228.6	185.1	115.7	120.3	1,602.4	1,112.0
Construction	99.9	64.4	130.5	43.9	131.0	104.6	72.4	50.4	26.1	27.1	459.9	290.4
Commerce	274.6	209.3	255.5	172.1	288.1	266.6	148.9	145.6	41.9	50.7	1,009.0	844.3
Services	224.9	197.0	270.1	213.4	322.8	317.1	120.3	121.8	90.7	93.5	1,028.8	942.8
Transport & Utilities	57.2	45.4	71.9	43.0	111.2	95.5	47.2	44.2	24.0	27.6	311.5	255.7
Unemployed	24.5	15.0	47.3	28.3	36.3	33.8	11.5	11.4	13.0	12.2	132.6	100.7
Outside the Labor Force	2,468.3	1,425.1	5,047.9	2,463.0	2,106.3	1,728.9	1,100.2	1,068.9	255.6	249.1	10,978.3	6,935.0
Housework	317.5	221.0	546.0	350.2	386.1	356.3	200.7	187.9	82.4	73.2	1,532.7	1,188.6
Waiting for Agri. Season	985.6	46.5	2,823.9	510.7	431.9	78.4	128.1	92.6	5.2	0.4	4,374.7	728.6
Students	804.8	791.7	1,239.6	1,199.3	938.0	927.9	570.8	553.7	124.9	126.2	3,678.1	3,598.8
Others	360.5	365.9	438.4	402.8	350.5	366.3	200.6	234.8	43.1	49.2	1,393.1	1,419.0
Population 11+	5,923.6	5,981.2	9,708.5	9,819.0	5,472.1	5,522.0	3,269.4	3,302.5	750.2	768.9	25,123.8	25,393.6

1/ Center excludes Bangkok-Thonburi.

2/ Total includes Bangkok-Thonburi.

Source: Labor Force Survey data tapes, 1979 rounds 1 and 2, National Statistical Office.

Appendix Table A.14: EMPLOYMENT BY INDUSTRY, THAILAND
(%)

INDUSTRY	April 1960	April 1970	Jan-Mar. 1971	July-Sept. 1971	Jan-Mar. 1973	July-Sept. 1973	Jan-Mar. 1975	July-Sept. 1975	Jan-Mar. 1977	July-Sept. 1977	Jan-Mar. 1979	July-Sept. 1979
Agriculture, Forestry, Hunting & Fishing	82.4	79.3	74.3	79.2	67.3	72.0	58.5	73.0	60.9	73.5	57.6	70.7
Mining and Manufacturing	3.6	4.6	6.7	4.1	10.0	7.7	14.1	7.6	12.2	6.8	13.5	8.3
Construction	0.5	1.1	1.6	1.1	1.8	1.5	1.8	1.1	2.7	1.6	3.4	1.9
Commerce	5.7	5.3	8.1	7.1	9.7	8.2	11.1	7.6	10.8	8.2	11.2	8.2
Services	4.8	7.1	7.8	7.1	8.4	8.1	11.3	8.4	10.6	7.7	11.2	8.6
Utilities & Transport	1.3	1.8	1.6	1.4	2.9	2.5	3.2	2.3	2.9	2.1	3.1	2.3
Unknown	1.7	0.9	-	0.1	-	-	-	-	-	-	-	-
Total Employed ('000)	100.0 (13,749)	100.0 (16,652)	100.0 (16,590)	100.0 (16,619)	100.0 (16,466)	100.0 (17,042)	100.0 (14,171)	100.0 (18,182)	100.0 (15,968)	100.0 (20,308)	100.0 (16,814)	100.0 (21,230)

Note: See Appendix notes on p. for changes in Labor Force Survey definitions and methodologies.

Source: Population Census 1960 and 1970; Labor Force Surveys 1971-77 Rounds 1 and 2; Labor Force Survey tapes 1979, Rounds 1 and 2; National Statistical Office.

Appendix Table A.15: THAILAND: RURAL NONFARM PRODUCTION AND EMPLOYMENT STUDY

GOVERNMENT SPECIAL PROGRAMS

Program/Objective Type of projects	Size of Program: Resources	Size of Program: Employment/Income Area coverage	Recent growth experience Duration	Mode of execution	Locational aspects: Contractors/Labor/ Material inputs	Seasonality and Technology used	Wages
TAMBON DEVELOPMENT PROGRAM 1975/76							
Longer-term program to strengthen local Govt., create seasonal employ. and income, and improve rural infrastructure. 60% roads, 18% irrig. 10% social infrastruct.	1975-76 Total bln.฿ 2.5 3.5 Per Tambon mln.฿ 0.5 0.6 Per project: (thousand ฿) Tambon 40 40 Sanit.Dist. 50 53 Province 110 110	Employment in 1976: Mandays 57 million, 3.8 million people employed 15 days on average; Income 1.75 bln.฿ or 20% of dry season income; Coverage 5000 Tambons.	April-June 1975 & 1976 Formally discontinued after Govt.change; Has influenced subsequent programs.	Organized and executed by local authorities (Tambon and provincial committee) directly without contracting or subcontracting.	When seldom contractors were used they were local. Local labor was used: small farmers and very few landless. Difficulty in hiring local labor in S&C. Local material.	Program was intended to be in dry season only but it often slipped till August. Technology was labor intensive to the extent of hampering quality of infrastr.	Generally higher than slack season supply cost of labor: 25฿ per day unskilled, 30฿ skilled (min.wage was 18฿&16฿); Earth workers (40% of employed) were paid piece rates.
PROVINCIAL DEVELOPMENT PROGRAM 1979-							
Intended as permanent program to foster rural devt. and meet basic needs in rainfed areas thru Employ/Income; 60% roads, 30% water res.devt.; 10% Soc.Inf.	1% of RTG budget; 1bln ฿ in 1979; 0.9bln ฿ in 1980; Allocated on population/income basis plus special needs. Average project bigger than TDP but less than 1 mln. ฿.	Employment similar to TDP (scaled down to less resources); All provinces were included; Various allocation criteria within provinces.	Since 1979; Shortfall of resources in recent years and program goes at much slower rate.	Designed and executed by local authorities under direction od line agencies. Contractors were occasionally used for infrastructure.	Contractors local. Labor local. Materials mostly local (recent instruction that all supplies should come through local traders).	Program was intended to be in dry season only but it often slipped into rainy period. Crude provisions to ensure labor intensive tech. hampered quality.	No firm data available but interviews suggest that wages higher than minimum wage were often paid.
RURAL EMPLOYMENT GENERATION PROGRAM 1980 & 1981-82							
Launched as temporary program in April 1980 to relieve drought effects via Employ/Income, infrastructure, and help to local Govt. 70% water infrast., 30% roads etc.	3.5 bln.฿ per year allocated on population/income/ag.land/damage basis; small projects.	Employment 4 million people per year; Income 2.3 bln.฿ per year. All provinces covered; less resources to South&Center in 1981 and 1982.	April-August 1980 January-June 1981 & 1982 Most prominent program extended into 1981 and 1982. Progressing well when compared with other programs.	Tambon council executed and District officer supervised projects. They seldom used contractors.	Contractors local if any. Mostly local in dry season; mixed in delayed projects. Materials local or locally supplied.	In 1980 large part of the program slipped into rainy season; dry season only in 1981/82. High labor intensity (wages were 70% of costs).	In first year high wages were necessary to attract labor in July and August. Minimum wages were offered in 1981/82, ample for N&NE low for C&S.
DROUGHT RELIEF PROGRAM 1977							
Temporary program in 1977 as response to drought; Objective to relieve water shortages, provide Employ/Income and better water infrast. and control. 80% water control projects, 20% direct water supply.	1.6 bln.฿ allocated on number of households/ extent of damage basis; Small projects (43.000 ฿ on average).	Employment 1.9 mln. Income 1.4 bln.฿. All affected areas were covered.	Dry season 1977/78. Program was discontinued and its role was taken over by REGP.	Provincial committee approved and Tambon committee executed projects. Some contractors were used.	Mixed local and outside contractors. Labor local; mixed in the South. Local materials where possible; trucks and equipment from outside.	3/4 of projects were completed by the end of dry season. Labor intensive techniques were employed via rigid DRP committee instructions.	No firm data is available on wages paid under the program.
NEW VILLAGE DEVELOPMENT PROGRAM 1979-1982							
Longer-term program to improve living standard of rural poor in sensitive areas thru Employ/ Income, meeting basic needs, and strengthen. village institutions. 50% infrastruct. 28% production & 22% institution devt. projects.	10 bln.฿ over 3-4 years 60% external 40% domestic financing; Actual resources for 1979/80 were much lower. Very small projects.	Employment small due to shortfall in resource allocation. Initial coverage 29 sensitive provinces (15 North, 10 N-East 4 South). Likely to be extended to other poor provinces.	Since 1979 but not progressing well due to few resources actually allocated to the program.	CDD is the executing agency for 80% of projects; MDU for 20%. Civil works done by force account; little scope for contracting.	Contractors local if any. Labor local whenever possible. Material inputs local when feasible.	Intention to execute projects in dry season was not always realized due to late deliveries and organizational problems. Labor intensive technology where appropriate and feasible.	No firm data is available.

Appendix Table A.16: PERCENTAGE OF INSPECTED ESTABLISHMENTS 1/ THAT COMPLIED WITH THE MINIMUM WAGE LAWS BY INDUSTRY AND SIZE OF ESTABLISHMENTS, THAILAND, 1978

	Whole Kingdom	Bangkok Metropolis	Other Provinces
Industry			
Mining and quarrying	95.17	-	95.17
Manufacturing	64.34	49.08	82.52
Electricity, gas and water	85.71	66.67	100.00
Wholesale and retail trade and restaurants and hotels	69.03	59.42	80.90
Construction	82.81	73.17	85.00
Transport, storage and communication	86.32	79.37	94.44
Financing, insurance, real estate and business services	87.69	80.49	100.00
Community, social and personal services	67.81	54.69	80.72
Unspecified industries	100.00	-	100.00
Total	68.65	54.58	83.33
Number of Persons			
Fewer than 5 persons	67.60	49.16	80.54
5-9	53.96	40.64	78.10
10-19	59.47	53.85	76.26
20-49	63.55	51.83	85.57
50-99	75.85	65.77	90.50
100-299	83.84	79.70	90.48
300 and over	93.58	95.08	91.67
Total	68.65	54.58	83.33

1/ The number of establishments inspected was 22,767 with 970,157 employees in 1978.

Source: Survey of Labor Statistics Branch, Labor Studies and Planning Division, Department of Labor; Reported in The Yearbook of Labor Statistics 1978, Department of Labor, Ministry of Interior.

Appendix Table A.17: ACCESS TO ROADS IN RURAL AREAS

SES 1975/76 Region Changwat	% of villages within 1 km. from road	more than 1 km. from road with access road	more than 1 km. from road without access road	using waterways
North-Upper				
Chiangrai	54.86	43.24	1.90	0.00
Phayao	33.98	64.52	1.50	0.00
Chiangmai	62.88	32.21	4.91	0.00
Nan				
Phrae	50.86	48.85	0.00	0.29
Maehongson	18.37	36.22	45.41	0.00
Lampang	47.46	52.54	0.00	0.00
Lamphun	34.63	62.99	2.38	0.00
North-Lower				
Kamphaengphet				
Tak	65.82	27.64	4.72	1.82
Nakhonsawan	52.59	39.96	1.84	5.62
Phichit	23.53	72.79	2.02	1.65
Phitsanulok	46.86	51.73	1.41	0.00
Phetchabun	34.88	61.34	3.78	0.00
Sukhothai	35.55	58.94	5.05	0.46
Uttaradit	36.80	61.87	0.00	1.33
Uthaithani	48.13	51.87	0.00	0.00
Northeast-Upper				
Kalasin	43.93	56.07	0.00	0.00
Khonkaen	61.06	38.27	0.54	0.13
Nakhonphanom	33.47	66.12	0.41	0.00
Nongkhai	35.17	64.83	0.00	0.00
Mahasarakham				
Roiet	38.20	57.93	3.87	0.00
Loei	64.63	32.14	1.79	1.44
Sakonnakhon	70.58	29.30	0.12	0.00
Udonthani	80.34	14.26	5.20	0.20
Northeast-Lower				
Chaiyaphum	62.07	35.86	2.07	0.00
Nakhonratchasima	30.53	67.11	2.32	0.05
Buriram	50.65	42.33	7.02	0.00
Sisaket	34.42	65.58	0.00	0.00
Surin	28.21	69.51	2.28	0.00
Ubonratchathani	54.25	44.40	0.82	0.53
Yasothon	27.71	71.02	1.27	0.00
Center-West				
Kanchanaburi	21.64	68.57	9.79	0.00
Prachuabkhirikhan	47.79	51.33	0.88	0.00
Phetchaburi	39.84	55.33	4.02	0.80
Ratchaburi	61.13	28.49	3.56	6.82
Suphanburi				
Center-Middle				
Chainat	21.47	78.53	0.00	0.00
Nakhonpathom				
Ayutthaya				
Lopburi				
Samutsongkram				
Samutsakhon				
Saraburi				
Singburi				
Angthong				
Center-East				
Chanthaburi	16.26	82.42	0.00	1.32
Chachoengsao	11.41	36.15	4.74	47.70
Chonburi				
Trat	33.99	66.01	0.00	0.00
Nakhonnayok				
Prachinburi	54.31	39.21	5.70	0.80
Rayong	32.43	67.12	0.00	0.45
South-Upper				
Chumphon	55.03	44.54	0.21	0.21
Ranong	74.76	17.48	4.85	2.91
Suratthani	18.92	71.80	0.00	9.28
Phang-Nga	54.83	32.43	1.16	11.58
Nakhonsithammarat	35.71	48.42	1.39	14.49
Phuket				
Krabi	31.02	58.39	0.00	10.58
Trang	91.09	6.13	0.00	2.78
Phatthalung	25.52	71.23	0.00	3.25
Songkhla	69.63	28.57	0.36	1.44
South-Lower				
Satun	53.70	29.06	0.49	16.75
Pattani	37.29	62.71	0.00	0.00
Yala	28.97	71.03	0.00	0.00
Narathiwat	64.99	35.01	0.00	0.00
Greater Bangkok				
Bangkok				
Thonburi				
Nonthaburi				
Pathumthani				
Samutprakan				

Source: ARD data sheets, Office of the Accelerated Rural Development, Ministry of Interior, Bangkok, 1979.

APPENDIX B: Estimation of the Efficiency and Distributional Effects of Rice and Rubber Export Taxation

Rice

The taxation on rice in Thailand has been carried out through a complex system based on a rice premium, an export tax, a rice reserve ratio policy and occasional quantitative restrictions on rice exports. 1/ During the first two post-World War II decades, these taxes amounted to about 40-45% of the export price, a level of taxation that implied a tax of about 80-85% of farm-gate prices. 2/ During most of that periods, there was very little variaton in both world and domestic rice prices or in the level of taxation. The past decade and a half has seen much higher rates of taxation during booms in world rice prices in the 1966-69 and 1972-1974 periods (with export taxes equivalent to about 65% of world prices at the peak, implying farm-gate tax rates of close to 100%), and lower taxes during slumps in world rice prices in the 1970-1971 and 1975-1976 periods (with export tax equivalents of about 15% of export prices, implying approximately 22% tax on the farm-gate prices). 3/ During recent years, the level of taxation has been around 25-30% of world prices, reflecting a reduction in the level of taxation compared to the 1955-1966 period, but still implying a tax rate of about 40-45% of the

---

1/ The export tax is presently set at the rate of 5% of the export value. The rice premium, the dominant element in export taxation until recent years, is a specific tax which is differentiated by grade of rice and levied by the Ministry of Commerce. Since 1974, the revenue from the premium has been remitted to the Farmers' Aid Fund. The rice reserve ratio requires that exporters sell specified amounts of rice at discounted prices per volume of rice exported. The rice reserve ratio was an insignificant element in rice taxation prior to 1974. In recent years, however, the rice reserve ratio has become the major element in the export tax system. A useful review of these policies before 1975 can be found in Ammar Siamwalla, A History of Rice Policies in Thailand, Food Research Institute Studies, 1975.

2/ See D. Usher, The Economics of the Rice Premium (mimeo, undated), Sura Sanittanont, Thailand's Rice Export Tax: Its Effect on the Rice Economy, Ph.D. Thesis, University of Wisconsin, 1976; and Trent Bertrand, World Bank Staff Working Paper No. 385, 1980.

3/ See Trent Bertrand, World Bank Staff Working Paper No. 385, 1980.

farm-gate price of rice. 1/

The level of taxation on the rice sector implies a substantial burden on the rural economy. The income transfers and efficiency costs implicit in this burden can be roughly indicated, given estimates of the relevant supply and demand functions for rice on domestic and world markets. The most controversial element in these calculations, as far as the policy debate in Thailand is concerned, involves the elasticity of demand for Thai rice on world markets. The results of the calculation on the efficiency and transfer effects of rice taxation are also most sensitive to this perameter. In Table B.1, we provide estimates based on elasticities of demand for Thai rice of -4, -10 and -100. The low price elasticity of -4 would imply an export tax aimed at maximizing the implied monopoly power on world markets of 25% of world prices, roughly the figure that has been observed for most categories of Thai rice exports in recent years. 2/ The elasticity of -10 is an estimate provided in the work by Sura Sanittanont and probably provides the upper limit to the long-run elasticity for Thai rice exports. The elasticity estimate of -100 would be consistent with work 3/ that suggests that eliminating export taxes on Thai rice would reduce world prices by some 3%.

1/ The details of the calculation can be sketched out for a specific example. In April 1981, the tax on exports of one ton of 5% rice was 3,103 baht, comprising a 5% tax of 460 baht (on an assessed price of 9,200 baht), a premium of 700 baht, and a payment of 1,943 baht accepted in lieu of rice reserve ratio sales to the Public Warehouse Organization. This amounted to 28% of an actual FOB price of 11,330 baht. In the same month, the export tax on broken rice (A1 super, C1 and C3) was 884 baht, about 15% of the export price, with the export tax accounting for slightly less than a third of the tax, the premium about a third, and the rice reserve payment slightly more than a third. Since a ton of first grade paddy can be milled into 450 kilograms of 5% and 210 kilograms of broken rice, these taxes translate into a burden of 1,580 baht on a ton of paddy. In April 1981, the farm-gate price of first grade paddy in changwat Nakornsawan was 3,596 baht. Assuming that the tax burden was passed back to the farmer, this amounts to a 44% tax on the farm-gate price.

2/ It also corresponds to the estimate provided in Chung Ming Wong, "A Model for Evaluating the Effects of Thai Government Taxation of Rice Exports on Trade and Welfare," American Journal of Agricultural Economics, February 1978. However, this estimate is derived from an equation that seems poorly specified since the world price (of 5% rice) is viewed as being a function of, among other variables, the percentage of government to government sales in total Thai exports.

3/ See Dan Usher, "The Economics of the Rice Premium" (mimeo, undated) and Olarn Chaiprawat and Sayan Pariwat, An Econometric Model of World Rice Markets, Bank of Thailand, May 15, 1976.

Table B.1: ESTIMATES OF THE EFFICIENCY AND DISTRIBUTIONAL EFFECTS OF RICE EXPORT TAXATION, THAILAND, 1981

	Low Demand Elasticity	Medium Demand Elasticity	High Demand Elasticity
Estimate of the Elasticity of Demand for Thai Rice on World Markets	-4	-10	-100
Changes in Export Price as a Ratio of Export Tax	.44	.24	.03
		(billion baht)	
Tax Imposed on Foreign Consumers	2.64	1.44	.20
Government Revenues	6.00	6.00	6.00
Transfer from Farmers	8.40	11.40	14.55
Transfer to Nonfarm Consumers	5.04	6.84	8.73
Net Efficiency Loss:			
- Production	1.05	1.94	3.30
- Consumption	.04	.06	.08
Total Benefit of Export Tax	1.55	-.56	-3.28
		(million tons)	
Production of Paddy:			
- With Export Tax	17	17	17
- Without Export Tax	19.5	20.4	21.4

Underlying Assumptions for Calculations:

Elasticity of Domestic Supply = .6
Elasticity of Domestic Demand = .02
Domestic Production = 17 million tons
Domestic On-Farm Consumption = 6 million tons
Domestic Off-Farm Consumption = 7 million tons
Farm-Gate Paddy Price = 3,400 baht/ton
Consumer Price = 3,600 baht/ton
Export Tax on Paddy = 1,500 baht/ton

The most important conclusion evident from these calculations concerns the burden imposed on rice farmers from interfering with their access to world markets. Even if Thailand were able to exploit considerable monopoly power on world rice markets, the net gains from doing so are very modest relative to the income transfers imposed on farmers by the price-depressing effects of export taxation. The set of estimates based on the elasticity of foreign demand of -4 imply that Thailand would be able to increase world prices by about 12% by imposing an export tax of some 27% of world prices. This is an extreme assumption for a commodity that is substitutable for by other food grains for which Thailand exports only about one percent of world production. However, Thailand does account for some 23% of world exports and domestic markets in many important economies are often controlled and not well integrated with world markets. For the short run, such an estimate may therefore have some validity. Even in these circumstances, however, the gain from fully exploiting monopoly power on world markets is only 1.55 billion baht relative to the transfer of income from rice farmers of 8.4 billion baht. 1/ With elasticities of foreign demand of -10 to -100, a range which covers realistic longer-run elasticities of demand, the interference with rice markets leads to substantial net efficiency losses (from .56 to 3.28 billion baht) in combination with income transfers from rice farmers of between 11.4 and 14.5 billion baht. Since the efficiency losses due to distorting production incentives are almost exclusively borne by the rural economy, the corresponding total burden on farm households is in the order of from 10 to almost 18 billion baht from the effects of the product price distortions in rice markets.

It is also often argued that the benefits of the income transfers implicit in the system of rice taxation accrues to low-income wage earners. However, the real incomes of unskilled workers are mainly determined by the supply price of labor from alternative employment. The returns in rice production greatly affect this supply price. Given the extent of labor mobility which has been documented, the effect of the lower domestic prices for rice must be to reduce wage rates throughout the economy. This factor price effect of the rice taxation has important implications for the distributional results reported in Table B.1. If wage rates were reduced so as to keep the real wage rate constant with lower rice prices, this mechanism would transfer the benefits of reduced rice prices from low-income workers to their employers or to the consumers of the services on the products they produce. However, the real wage rate is likely to be decreased which implies even larger transfers from the rural economy and corresponding transfers from low-income unskilled laborers in general to higher-income groups. The heavy taxation of the primary occupation of the vast majority of low-income Thais is a major regressive feature of the present tax system.

1/ The optimal tariff with an elasticity of foreign demand of -4 would be 25% of the world price, which is approximately the level given by the tax rate assumed in Table B.1.

Rubber

The 'net loss' or 'efficiency cost' of price distortions resulting from rubber taxation depends on elasticities of supply that in turn are determined by responses in tapping intensity, new planting and replanting that will have both short-run and long-run effects. The short-run response may at present be fairly high because tapping intensities on traditional and over-age rubber trees that still account for the major share of rubber trees in Thailand [1/] are at present low and may respond significantly to improved price incentives. A recent World Bank report [2/] estimates this short-run response at .3. This would mean that an increase of farm-gate prices by 40% would add about 30 thousand tons to present production of about 540 thousand tons. The 'net loss' of the short-run tax effect for the rubber farmers is about 100 million baht - an estimate of the farm value of the additional output net of the cost of labor resources required to increase output by this amount. The major impact of increasing real rubber prices closer to world market prices would develop over the future as new planting and replanting decisions have an effect. The World Bank report notes a general view in the industry that planting rates would more than double in response to such price changes. Since returns to replanting would be affected in a similar way, a significant response through increased replanting could also be expected, although this would depend on changes in the public sector replanting program to respond to increased demand or on greater reliance on the private sector in the replanting effort. Alternative policy changes analyzed by the World Bank suggest that an extra 100 to 250 thousand tons of production could be obtained by the turn of the century relative to a projected output of a little more than one million tons of rubber if policy is not changed. These projections are based, however, on the assumption that replanting continues to be predominantly (about 90%) carried out under a replanting program restricted to about 50,000 hectares a year. Relaxing this assumption could change these projections and result in an even greater 'net loss'.

1/ The World Bank Report, "Agricultural Program and Policy Priorities: Tree Crops Annex", Draft Report No. 3705-TH, 1981, estimates that about 50% of rubber area is in traditional varieties.

2/ World Bank, "Agricultural Program and Policy Priorities: Tree Crop Annex," Draft Report No. 3705-TH, 1981. Data on the following calculations and references to the World Bank report on rubber below are based on this report.

REFERENCES

Profiling Studies on Rural Nonfarm Production and Employment Produced by the Thai Team

1. Prapertchob, Preeda, A Study on Rural Nonfarm Production and Employment in the Northeast Region: Kalasin and Chaiyaphum Provinces, Khonkaen University, Faculty of Agriculture, 1981.

2. Chayaputi, Pitaksit, S. Subhadhira, P. Udomsiang, P. Kachamart, S. Srisontisuk, A Study on Rural Nonfarm Production and Employment in the Northeast Region: Mahasarakham and Yasothon Provinces, Khonkaen University, 1981.

3. Krusuansombat, Somchai, S. Samrongwatana and P. Woradiloke, A Comparative Study on Rural Nonfarm Production and Employment in the Southern Region: Chumphon and Satun Provinces, NESDB, Development Studies Division, August 1981.

4. Pitiphat, Sumitr, A Study of Nonfarm Activities and Employment in Chainat and Singburi, Thammasat University, Department of Sociology and Anthropology, 1981.

5. Surarerks, Vanpen, Rural Nonfarm Production and Employment in Lower North Thailand: Kamphaengphet and Sukhothai, Chiangmai University, Department of Geography, Faculty of Social Sciences, November 1981.

6. Ittiwitya, Kitti, Progress Report on Short-Term Employment and Income in Thai Agriculture, NESDB, Development Studies Division, mimeo, 1981.

Papers from the Rural Off-Farm Employment Assessment Project 1/
Bangkok: June 1981

I. Conference Papers

Conference Paper No. 1. Land Characteristics and Tenure Arrangement in Selected Rural Areas in Thailand by Yongyuth Chalamwong and Tongroj Onchan.

Conference Paper No. 2. Lender Behavior in Financing Rural Nonfarm Enterprises by Tongroj Onchan.

Conference Paper No. 3. Subcontracting in Rural Areas of Thailand by Donald C. Mead.

Conference Paper No. 4. A Descriptive Analysis of Wealth, Income, and Credit in Rural Thailand by Yongyuth Chalamwong.

Conference Paper No. 5. Marketing of Rurally Produced Nonagricultural Products: A Report on Village Visits by James Boomgard.

Conference Paper No. 6. Profitability and Efficiency by Vinai Artkongharn.

Conference Paper No. 7. The Ready-Made Garment Industry in Rural Thailand: A Research Report by Tongroj Onchan.

Conference Paper No. 8. Entrepreneurship and the Performance of Nonfarm Firms by Preeyanuch Apibunyopas.

Conference Paper No. 9. Cash Flow Analysis of Farm Households in North and Northeast Thailand by Adelaida P. Alicbusan and Yupadee Siriwan.

Conference Paper No. 10. Financial Structure and Perception Toward Constraints by Saroj Aungsumalin.

Conference Paper No. 11. An Economic Analysis of Irrigated Farm Household Model in Khonkaen Province by Somsak Priebprom.

Conference Paper No. 12. An Economic Analysis of Employment in Kenaf, Cassava and Sugar Cane Production and Processing in Northeast Thailand by Jeerakiat Apibunyopas.

Conference Paper No. 13. Village Headman Questionnaire: Survey Results by Donald C. Mead.

1/ A joint Project of the Center for Applied Economics Research, Kasetsart University and Michigan State and Ohio State Universities.

Conference Paper No. 14. An Assessment of Changwat Level Furniture Production in Three Provinces of Thailand by James Boomgard.

Conference Paper No. 15. A Marketing Perspective for Village Farm Products: A Basis for Discussion by Merle Menegay.

Conference Paper No. 16. Distribution of Farm and Nonfarm Enterprises in Farm Households by Orasa Kiatying-Ungsulee.

Conference Paper No. 17. the Silk Industry in Thailand by Pradit Charsombut.

Conference Paper No. 18. An Analysis of Household Labor Supply for Off-Farm Enterprises by Yongyuth Chalamwong.

Conference Paper No. 19. A Descriptive Analysis of Cotton Weaving Industry in Rural Areas in Thailand by Sompong Orapin.

Conference Paper No. 20. Not Available.

Conference Paper No. 21. Village Industry Studies: Pottery Products Industry by Maythakul Kiatgrajai, Doosanee Songmuang.

Conference Paper No. 22. Employment and Underemployment by Sumala Sirichoti.

Conference Paper No. 23. Informal Credit for Farm Household in Chiangmai by Pichit Thani, Jamaree Pitackwong.

Conference Paper No. 24. Hand Tools Industry in Roi-et and Chiangmai by Sungvean Chanthongkaew.

Conference Paper No. 25. Rainfed Farm Household Modelling in Khonkaen by Nongluk Suphanchaimat.

Conference Paper No. 26. Results of Farm Household Modelling in Chiangmai by Rapeepun Jaisaard.

Conference paper No. 27. Firm Size and Productivity: A Case of Brick Industry in Thailand by Somchai Thepthana.

Conference Paper No. 28. Mat Production in the Northeast by Rangsit Poosiripinyo, Pradit Charsombut.

Conference Paper No. 29. The Soybean Curds Processing Industry in Selected Areas of Chiangmai, Khonkaen and Roiet Province by Vinich Veerayangkul and Merle Menegay.

Conference Paper No. 30. Not Available.

Conference Paper No. 31. A Farm Household Model in Roiet Province by Amnaj Thiravarich (only 2-page summary available).

Conference Paper No. 32. Institutional Support for Small Industrial Enterprise Development in Thailand by Jacques Amyot.

Conference Paper No. 33. The Fruit and Vegetable Processors of Northern Thailand - Focus on Traditional Pickling and Preserving Firms, by Merle Menegay, Nittaya Wongtada.

II. Working Papers

Working Paper No. 2. The Textile Products Industry in Rural Thailand by Tongroj Onchan, August 1980.

Working Paper No. 4. Mat Making and Fish Net Making in Northeastern Thailand by Pradit Charsombut, September 1980.

Working Paper No. 5. Agricultural Hand Tool, Animal Implement and Machinery Manufacturers in Towns within Chiangmai, Khonkaen and Suphanburi Provinces by Merle Menegay and Vinich Veerayangkul, September 1980.

Working Paper No. 19. The Kuaytiaw Processing Industries in Selected Areas of Chiangmai, Khonkaen, and Roiet Provinces by Vinich Veerayangkul and Merle Menegay, November 1980.

Working Paper No. 21. A Study of Cement Product Industry in 13 Provinces of Thailand: A Preliminary Report, by Saroj Aungsumalin, November 1980.

Working Paper No. 29. Small Industrial Enterprise Supportive Institutions by Jacques Amyot, 1980.

III. Research Papers

Research Paper No. 2. Rural Off-farm Employment in Thailand: Phase I Survey Results by Donald C. Mead and Pradit Charsombut, June 1980.

Research Paper No. 5. Subcontracting in Rural Areas of Thailand by Donald Mead, November 1981.

References

Anderson, Dennis, and Farida Khambata, "Capital Market Uncertainties and the Finance of Small-Scale Industry and Agriculture in Developing Countries," mimeo, July 20, 1981.

Arnold, Fred and Susan H. Cochrane, Economic Motivation Versus City Lights: Testing Hypotheses About Inter-Changwat Migration in Thailand, World Bank Staff Working Paper No. 416, September 1980.

Barker, R., H.E. Kauffman, and R.W. Herdt, Production Constraints and Priority for Research, International Rice Research Institute, Department of Agricultural Economics, Paper No. 75-8, 1975.

Bell, C.L.G. and P.B.R. Hazell, "Measuring the Indirect Effects of an Agricultural Investment Project on Its Surrounding Region," American Journal of Agricultural Economics, Vol. 62, No. 1, February 1980.

Bertrand, Trent, Thailand: Case Study of Agricultural Input and Output Pricing, World Bank Staff Working Paper No. 385, April 1980.

Bertrand, Trent and Lyn Squire, "The Relevance of the Dual Economy Model: A Case Study of Thailand," Oxford Economic papers, Vol. 32, No. 3, November 1980.

Binswanger, Hans P. and Vernon W. Ruttan, Induced Innovation: Technology, Institutions and Development, Johns Hopkins University Press, Baltimore, 1978.

Chaiprawat, Olarn and Sayan Pariwat, An Econometric Model of World Rice Markets, Bank of Thailand, May 15, 1976.

Chamratrithirong, Apichat, K. Archavanitkul and U. Kanungsukkasem, Recent Migrants in Bangkok Metropolis: A Follow-up Study of Migrant's Adjustment, Assimilation and Integration, Mahidol University, Institute for Population and Social Research, November 1979.

Chancellor, W.T., Survey of Tractor Contractor Operations in Thailand and Malaysia, University of California, Agricultural Engineering Department, 1970.

Chuta, Enyinna and Carl Liedholm, Rural Nonfarm Employment: A Review of the State of the Art, Michigan State University, Department of Agricultural Economics, Rural Development Paper No. 4, 1979.

Cochrane, Susan, The Population of Thailand: Its Growth and Welfare, World Bank Staff Working Paper No. 337, June 1979.

Cochrane, Susan and Yaffa Machnes "The Determinants of Employment Outside the Family and Off the Farm," mimeo, 1982.

Gibb, Arthur, Aspects of the Rural Town as an Urban Place: Return Migration, Entrepreneurship and Skill Levels in Central Luzon, U.S. Naval Academy, Department of Economics, Discussion paper 79-3 (revised), September 1979.

Goldstein, Sidney and Pichit Pitaktepsombati, Migration and Urban Growth in Thailand: Exploration of Interrelations Among Origin, Recency and Frequency of Moves, Chulalongkorn University, Institute of Population Studies, Paper No. 14, August 1974.

Guisinger, Stephen, "Investment Incentive Strategies for Thailand's Industrial Development," mimeo, October, 1, 1980.

Gupta, D. "A Critical Evaluation of Government Policies and Programmes of Rural Industrialization with Special Reference to the Punjab Region in North India," mimeo, undated.

Hayami, Yujiro and Vernon W. Ruttan, Agricultural Development - An International Perspective, Johns Hopkins University Press, Baltimore, 1971.

Hirunvanichargorn, Umpun, Locational Pattern of Rice Mills: A Case Study in Changwat Nakhon Pathom, Thailand, 1974, Thammasat University, Faculty of Economics, M.A. Thesis, 1976.

Ho, Sam, Small-Scale Enterprises in Korea and Taiwan, World Bank Staff Working Paper No. 384, April 1980.

Ingram, James C., Economic Change in Thailand 1850-1970, Stanford University Press, Stanford, California, 1971.

Jessadachatr, Phitsanes, A History of Sugar Policies in Thailand: 1937-75, Thammasat University, Faculty of Economics, M.A. Thesis, 1977.

Jongsuwat, Nongluck, Productivity Growth and Farm Machinery Adoption in Thai Agriculture, Thammasat University, Faculty of Economics, M.A. Thesis, April 1980.

Kaneda, Hiromitsu, Development of Small and Medium Enterprises and Policy Response in Japan: An Analytical Survey, World Bank: Studies in Employment and Rural Development No. 52, October 1980.

Kirakul, Krisada, Sugar Cane Procurement in the Eastern and Western Regions of Thailand, Thammasat University, Faculty of Economics, M.A. Thesis, 1975.

Laxminarayan, H., D.P. Gupta, P. Rangaswamy and R.P.S. Malik, Impact of Harvest Combines on Labor Use, Crop Pattern and Productivity, Agricole Publishing Academy, New Delhi, 1981.

Loohawenchit, Chesada, The Farm Machinery Industry: A Case Study of a Small Home Grown Industry in Thailand, Asian Regional Team for Employment Promotion, International Labour Organization, October, 1980.

Meesook, Oey Astra, A Study of Disparities in Income and Social Services Across Provinces in Thailand, Thammasat University, Faculty of Economics, Research Report Series No. 7, 1978.

Meyer, Richard L., Formal Credit for Farm and Non-Farm Enterprises in Rural Thailand, Workshop on Rural Finance, Kathmandu, April 7-9, 1980.

Meyer, Richard, C.B. Baker, Tongroj Onchan, Clifton G. Barton, Rural Financial Markets in Thailand: Assessment and Recommendations, Report to USAID, Thailand, May 19, 1978.

Panpiemraj, Kosit, "Poverty in the Northeast Rural Areas: Cause and Density of the Problem," NESDB, mimeo, 1981.

Pathnopas, Renu, The Economics of Rice Threshing Machines in Thailand: A Case Study of Chachoengsao and Suphanburi Provinces, Thammasat University, Faculty of Economics, M.A. Thesis, 1980.

Poapongsakorn, Nipon, The Animal Feed Industry in Thailand, Asian Regional Team for Employment Promotion, International Labour Organization, October 1980.

Prachuabmoh, Visid, J. Knodel, S. Prasithrathsin, and N. Debavalya, The Rural and Urban Populations of Thailand: Comparative Profiles, Chulalongkorn University, Institute of Population Studies, Research Report No. 8, December 1972.

Rajvongsuek, Sunthorn, An Analysis of the Competition between Kenaf and Cassava Production in the Northeast Thailand, 1967-1976, Thammasat University, Faculty of Economics, M.A. Thesis, 1977.

Sanittanont, Sura, Thailand's Rice Export Tax: Its Effect on the Rice Economy, University of Wisconsin, Ph. D. Thesis, 1967.

Siamwalla, Ammar, A History of Rice Policies in Thailand, Food Research Institute Studies, 1975.

Siamwalla, Ammar, C. Pinthong and V. Thosanguan, Agricultural Marketing and Pricing in Thailand, Bangkok, March 1981.

Somboonsub, Nopmanee, Rice Milling Technology and Some Economic Implications: The Case of Nakhon Pathom, Thailand, 1974, Thammasat University, Faculty of Economics, M.A. Thesis, 1976.

Sukharomana, Supachat, Soybean and Peanut Production and the Vegetable Oil Industry in Thailand: A Domestic Resource Cost Study, Thammasat University, Faculty of Economics, M.A. Thesis, 1979.

Suwannapirom, Suchada, Location and Distribution of Sugar Mills in Thailand: A Comparative Study of the Eastern and Western Regions, Thammasat University, Faculty of Economics, M.A. Thesis, 1975.

Tambunlertchai, Somsak, Employment Effects of Small and Medium Scale Industries in Thailand, Thammasat University, Faculty of Economics, Research Report Series No. 9, November, 1978.

Tambunlertchai, Somsak and Chesada Loohawenchit, Labor Intensive and Small Scale Manufacturing Industries in Thailand, Asian Regional Team for Employment Promotion, International Labour Organization, October 1980.

Thailand, Ministry of Agriculture and Cooperatives, Office of Agricultural Economics, Agricultural Statistics of Thailand, Crop Year 1976-77, 1978-79, and 1979-80.

Thailand, Ministry of Agriculture and Cooperatives, Office of Agricultural Economics, Cost of Cultivation Survey, 1978/79.

Thailand, Ministry of Agriculture and Cooperatives, Office of Agricultural Economics, Survey of Farmers, 1970, 1971-72, 1973-74, 1975-76, 1976-77 and 1978-79 (All in Thai). Unpublished data from the 1976-77 and 1978-79 surveys by changwats were provided to the mission.

Thailand, Bank of Thailand, Monthly Statistical Bulletin, December 1973, December 1975, December 1977, November 1979, April 1981.

Thailand, Ministry of Communications, Department of Highways, A Study of Rural Roads: Road Inventory Analysis, Bangkok, May 1981.

Thailand, Ministry of Interior, Office of the Accelerated Rural Development, Rural Survey and Research Division, Report on Basic Socio-Economic Data of Provinces in ARD Areas, 1975-76.

Thailand, Ministry of Interior, Department of Labor, Labor Studies and Research Division, Yearbook of Labor Statistics, 1978.

Thailand, Ministry of Interior, Department of Labor, Labor Studies and Research Division, Survey of Urban Employment Situation in Thailand, 1979.

Thailand, National Economic and Social Development Board, National Accounts Division, Gross Regional and Provincial Product, 1979.

Thailand, National Economic and Social Development Board, National Accounts Division, National Income and Regional Product, 1976.

Thailand, National Economic and Social Development Board, Plan for the Development of Rural Areas, 1981 (part of the Fifth Development Plan 1982-86). Translated by Vipat Dharapak.

Thailand, National Statistical Office, Agricultural Census Report, 1978, Changwat Volumes.

Thailand, National Statistical Office, Agricultural Census, 1963, Regional Volumes.

Thailand, National Statistical Office and Office of the Under-Secretary, Ministry of Education, Final Report on Education Statistics, 1975.

Thailand, National Statistical Office, Labor Force Surveys 1970-78 January-March (Round 1) and July-September (Round 2); Labor Force Survey Tapes, 1977-79, Rounds 1 and 2, and 1980, Round 2, were provided to the mission.

Thailand, National Statistical Office, Population Census, 1970.

Thailand, National Statistical Office, Population Census, 1960.

Thailand, National Statistical Office, Socio-Economic Survey, 1975-76; survey tapes were provided to the mission.

Thailand, National Statistical Office, Office of the Prime Minister, Statistical Yearbook, 1972-73.

Thailand, National Statistical Office, Survey of Migration to Bangkok, 1974-79.

Thosanguan, Vatchareeya, Marketing Pineapple, Vol. 5 of Report on Agricultural Pricing and Marketing in Thailand, Bangkok, March 1981 (in Thai).

Timmer, C. Peter and Walter Falcon, "The Impact of Price on Rice Trade in Asia", Trade Agriculture and Development, Tolley and Zadrosny (eds.), Ballinger Publications, 1975.

Tinakorn, Pranee, Public Institutions and the Marketing of Natural Rubber, Vol. 2 of report on Agricultural Pricing and Marketing in Thailand, Bangkok, March 1981 (In Thai).

Titapiwatanakun, Boonjit, Cassava Industry in Thailand, Thammasat University, Faculty of Economics, M.A. Thesis, 1974.

Trairatvorakul, Prasarn, Food Demand and the Structure of Thai Food System, Harvard University, Graduate School of Business Administration, Ph. D. Thesis, 1981.

Trongtham, Intima, Demand for Corn by Feed Industry in Thailand, Thammasat University, Faculty of Economics, M.A. Thesis, 1981.

Usher, Dan, "The Economics of the Rice Premium," mimeo, undated.

Vasuvat, Bimbhanda, Land Development in Thailand, Ministry of Agriculture and Cooperatives, Technical Paper No. 103, February 1974.

Wattanutchariya, Sarum, Economic Analysis of Farm Machinery Industry and Tractor Contractor Business in Thailand, Paper presented at the joint ADC/IRRI Workshop on Consequences of Small Rice Farm Mechanization in Asia, Los Banos, Laguna, Philippines, September 14-18, 1981.

Wong, Chung Ming, "A Model for Evaluating the Effects of Thai Government Taxation of Rice Exports on Trade and Welfare", American Journal of Agricultural Economics, February 1978.

World Bank, Thailand - Agricultural Credit Project, Report No. 2704-TH, February 15, 1980.

World Bank, Thailand - Agricultural Development Strategy Review, Draft Report No. 3108 - TH, November 25, 1980.

World Bank - NESDB, "Agricultural Pricing and Marketing", mimeo, 1981.

World Bank, Agricultural Program and Policy Priorities, Draft Report No. 3705-TH: Volume II - The General Report, and Annex 7 - Development of Tree Crops, December 1981.

World Bank, Development of the Engineering Industries in Thailand, Report No. 2647-TH, May 17, 1980.

World Bank, The Development of Regional Cities in Thailand, Report No. 2990-TH, June 30, 1980.

World Bank, Employment Aspects of Thailand's Development, Background Paper for Report No. 2059-TH, September 1, 1978.

World Bank, Income Growth and Poverty Alleviation in Thailand, Report No. 2566-TH, June 1980; and Background Studies of the Report, August 1980.

World Bank, Industrial Development Strategy in Thailand, Report No. 2804a-TH, June 5, 1980; and Background Papers to the Report, August 1980.

A World Bank Paper, Rural Enterprise and Non Farm Employment, January 1978.

World Bank Country Study, Thailand - Toward a Development Strategy of Full Participation, March 1980.