The general purpose of this study is to evaluate the role of agriculture in Indonesia in supplying food to the country's economy. Analysis of the general inter-relationship between the agricultural and non-agricultural sectors of a developing, densely-populated economy, and the sectorial interdependence viewed in relation to the supply and demand for food during the development process, provides a general framework of reference for the analysis of the food problems in Indonesia.

The data originate from two basic sources: (1) Primary data from the various institutions involved in and responsible for the food economy in Indonesia. Much of these data were collected in Indonesia, and in part they were an outgrowth of the writer's work there. (2) Secondary data from published sources.

Use of the food balance sheet shows that the common pattern of the Indonesian diet is characterized by a high starchy staple ratio and
a low per capita consumption of protective foods. Among the starchy staples, rice is the most important. Through a comparison of these results with the nutritional standards calculated on the basis of methods suggested by the Food and Agriculture Organization of the United Nations, the nutritional status of the Indonesian people is evaluated. By both qualitative and quantitative standards, the average diet of the Indonesian people is poor.

Demand for food in Indonesia will increase significantly in the near future, primarily due to the population and income effect. From use of Okhawa's demand equation, major shifts are expected toward the consumption of more rice and more protective foods. Any rise in per capita income will bring strong pressure to increase the proportion of starches that are supplied by rice.

To meet this growing demand, the need is to increase domestic production rather than commercial imports. Trends in the production of the six major farm food crops have been constructed and analyzed for the period of 1950 - 1965. With the exception of groundnuts, per capita production of these crops kept up with population growth. However, for the main food item, rice, the rate of increase of per capita production was lower than that of the per capita consumption. This gap resulted in the importation of huge amounts of rice.

Analysis of the conditions of food production leads to the
conclusion, that three factors are mainly responsible for the production gap: First, the prevalence of disguised unemployment in the food industry; second, the lack of adequate credit facilities and capital in the rural areas; third, the lack of an efficient marketing organization. Because of the inadequacies in these three important aspects of the institutional framework, the process of adapting new technologies and inputs to the production of food is slow.

Speed is crucial. In view of the population problem, the longer the present trends are permitted to continue, the more difficult it will be to close the production gap. Analysis of these three factors leads to the following conclusions: (1) Industrialization is a necessary condition for expanding food production and over-all economic development, in order to absorb the surplus agricultural labor force. (2) Marketing reform is needed to improve the institutional framework in the producing areas, in order to maximize the rate of growth of food production. This reform includes providing adequate and efficient credit facilities, promoting competition in the food market at the local level, and improving the infrastructure.
Food Supply and Economic Development in Indonesia,
Problems and Prospects

by

Saleh Afiff

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FOOD SUPPLY AND ECONOMIC DEVELOPMENT IN INDONESIA, PROBLEMS AND PROSPECTS

I. INTRODUCTION

Problems and Objectives

The need for knowledge of the influences of changes in supply and demand for food in the economic development of Indonesia has become acute. With huge imports of rice in the last decade, slow progress in the efforts to increase production, and rising food prices, administrators, policy makers, politicians, scholars and members of the general public have taken an increased interest in the economics of the food problem. In particular, they have seen the need for increasing food production to meet the growing demand.

In the past, domestic food production could not keep pace with this fast growing demand. Food deficits have been met by increasing commercial imports. This practice has, in turn, limited the country's ability to import capital goods needed for industrialization. Failure to meet the continually growing demand will result in lowering the nutritional level and quality of the diet of the people, and may also lead to a rise in the cost of living, resulting in cost inflation and its adverse effects on industrialization.

In the light of this serious situation, this study strives first of all to put the food problem in the proper economic context, and to
identify the limiting factors and the possibilities of solution of the food problem in Indonesia. It incorporates information on nutritional aspects as they may affect economic factors. The emphasis will be on relationships at the national level.

Political and military leaders of the country have expressed their view that the country should be self-sufficient in basic foodstuffs. This view, based on the international political situation and the country's experiences during World War II, is appropriate. These leaders believe that Indonesia is potentially capable of competitively producing its own basic food needs. As a result of these convictions, and the economically justifiable desires to preserve foreign exchange as much as possible for importing capital goods and to prevent inflation, the government has embarked on an over-all effort to increase food production. Yet the progress of this program has been relatively slow, as is evident from the quantities of rice imported.

What are the reasons for this slow development? A host of factors can be responsible for it. This study emphasizes the marketing sector, as one of the areas determining the allocation of resources. Thus, as a second objective, this study makes an assessment of the marketing organization and its economic effects on the production of food. It will analyze qualitatively the extent to which food production is hampered by deficiencies in the marketing organization.
There is concern among the leaders of the country in regard to the level and quality of the diet and of the occurrence of undernutrition and malnutrition among segments of the population. The third major objective of this study is to evaluate the nutritional status of the Indonesian population, using established criteria developed by the Food and Agriculture Organization of the United Nations. It will attempt to measure the gap between consumption and nutritional requirements, and will call attention to the relationships among demand, production, and the time needed to close this gap.

There is a need for firm guidelines for use in estimating how rapidly the consumption of food will increase in the near future. Uncertainty about national food requirements has existed, and in many cases a flat rate of growth of per capita consumption has been used without consideration for the underlying economic factors determining demand for food. The following quotation about the country's latest development plan is typical of such an approach: (52, p. 519)

Considering that the population increase is 2.3 percent yearly, then the target for rice consumption per capita is as follows: 1961 and 1962--100 kg.; in 1963--102 kg.; 1964--105 kg.; 1965--110 kg.; 1966--112 kg.; 1967 and 1968--115 kg. From these figures can be seen how much rice will be needed annually.

Thus although population growth is recognized as the major factor determining food requirements and can be determined quantitatively, the other factors are arbitrarily determined and reflected in the
increases in per capita consumption. The other major determinants are per capita income and income elasticity of demand. The faster the growth rate of per capita income (i.e., the faster economic development proceeds), the larger is the effect of income on the per capita consumption, if there is constant elasticity of income. The fourth objective of this study is to give a more realistic estimate of the food requirements of Indonesia through a consideration of the three basic determinants mentioned above.

A knowledge of food requirements aids in the formulation of a more realistic development plan for the agricultural sector. There is also a need to have a more specific knowledge of the potentialities of the agricultural sector to meet the food requirements. The fifth objective of this study is to analyze the performance of agriculture in the past through an appraisal of the trends of the most important food crops in the country. The factors which have contributed to this trend will be analyzed in depth. Based on these findings, the future trends of food output will be projected and compared with the food requirements of the same period, to give an indication as to the role of food imports in the near future.

This dissertation is expected to be of particular interest to three groups. First, policy makers may find that the study will help them to place their empirical knowledge of the country's food problem in a broader and more theoretical framework, and enable them to
better attack specific food problems. Second, scholars (economists, nutritionists, agriculturist and public administrators) may gain a clearer picture of the structure of the food industry in Indonesia, which could aid them in advising the government and in formulating their own research projects. Third, developed food exporting countries like Australia, United States, and Canada, may find that the study will help them to better estimate the future export demand for food and, if necessary, to plan aid programs to meet the food needs of the country.

Methods

With these purposes in mind three main steps have been utilized in this study. First, from the available literature, an analysis has been made on the general interrelationships between the agricultural and non-agricultural sectors of a developing, densely populated economy. This sectorial interdependence has then been viewed in relation to the supply and demand for food during the development process. The result is a general framework of reference for the discussion of the food problem of Indonesia. Second, from the literature on Indonesia, the most relevant information has been structured and synthesized into the text. Much of the background information has been obtained through this step. Third, the statistical data and other information which the writer brought from
Indonesia have been reexamined, and with data from secondary sources, have been recorded, summarized and analyzed.

The bulk of the information and data used in this study have been collected by the writer in Indonesia since 1957, and results from his continuing interest in the food problem of Indonesia. In part, this study is an outgrowth of his work as instructor of marketing and research associate at the University of Indonesia, and of his collaboration with Dr. Leon A. Mears of the University of Indonesia--University of California Economic Project, which included preparation and publication of several reports on the food problems of Indonesia.

In his capacity as research assistant at the University of Indonesia in the late fifties, the writer made field trips to areas within and outside Java. This assignment permitted him to obtain first hand information on the food problems of the regions visited. Later in his capacity as research associate, the writer participated in several seminars which were held to consider possible solutions of the food problem more scientifically. The participants of these government sponsored seminars were scholars of various disciplines, practitioners, and policy makers. These discussions provided the writer with the opportunity to view the food problem from different aspects.

Moreover, for ten months (1961-1962) the writer stayed in a rural area in West Java, and during this time had a chance to observe
closely the marketing of food at the village level. In discussing the role of markets, the writer has relied upon qualitative information obtained from personal interviews with farmers, leaders of farmers' organizations, middlemen and shopowners at the local level. It fills important gaps in the literature on the subject.

The part of the analysis which is most quantitative and specific is the estimation of per capita food consumption and the rate of growth demand and production. The sources of the statistical data, their reliability, and the various methods used for further calculations are presented either in a special appendix or are incorporated into the text.

**Some Omissions**

Two topics which others might feel should be included in a balanced treatment of the subject, have been ignored.

We have limited the discussion of the institutional factors affecting food production to the marketing organization and availability of credit in the rural areas. The fact that the study does not deal with the other institutional factors should not be taken to imply any under-valuation of their importance. The interdependence between these factors is so strong that a neglect of one of them will certainly limit the improvement of the other. However, in considering the factors affecting supply, we touch on the problems of poverty, small and
fragmented holdings, administrative inefficiency and corruption, shortage of skilled personnel, political instability, and ignorance and lack of education among farmers. Each of these basic issues is a topic worthy of a dissertation. A limitation of time and non-availability of data have prevented the writer from discussing them further.

A more substantial omission is the lack of any systematic discussion of the behavior of prices of food in Indonesia. Theoretically, food prices reflect the variation of supply and demand. Food prices in the past have shown tremendous increases in Indonesia. However, many of the increases were caused primarily by the acute monetary inflation prevailing in the country, as reflected by the augmented monetary supply and continued budget deficits. (See Table A-1 in the Appendix A.)

Furthermore, the true behavior of prices is blurred by government intervention in the food markets. The government subsidized rice prices to favored groups, such as government employees and members of the armed forces and their families. It also imposed multiple exchange rates and tariffs. Moreover, the lack of standardization and grading has made price studies difficult. Conclusions derived from them will, to a certain extent, be arbitrary and tentative.

Thus food prices as reported are not merely reflections of changes in supply and demand for food. Since it is very difficult to isolate each effect on the behavior of price studies, the discussion on
food prices has not been elaborated.

The Organization of the Study

The study is divided into eight chapters. Chapter II presents a general framework of reference to describe the role of agriculture in the over-all economic development of heavily populated, low-income countries. The emphasis is on the role of the agricultural sector in providing food to the economy, especially on the factors determining the demand and supply of food in such an economy, and their implications in the development efforts of the country. The second purpose of the chapter is to analyze the role of marketing in the sectorial interdependence during the process of development.

Chapter III presents background information about the history and the physical and human resources of Indonesia, and the structure of her economy. It is intended to provide an introduction to the major facets of the country, primarily for those who are not yet acquainted with Indonesia.

Chapter IV presents an analysis of the development of food consumption in Indonesia and its present state in the country as a whole, as well as in the major political regions. In addition, nutritional requirements are presented and compared with the per capita consumption. This study enables us to evaluate the nutritional status of the Indonesian population.
Chapter V presents the effects of income and population on the demand for food, and a projection of demand for the year 1975.

Chapter VI is divided into two parts to present the conditions of food production in Indonesia. The first part deals with the trends of production and imports of the six major farm food crops and fish; the second part, with the factors determining food production, and the prospects of increasing food production in the near future.

Chapter VII discusses the role of markets in the production of food through an assessment of the communication and transportation facilities, the marketing structures, and the marketing margins. It also analyzes the effect of deficiencies in this sector on food production.

The conclusions and implications of this study are presented in Chapter VIII. They include an integrated presentation of the results, an evaluation of the past performance of agriculture in Indonesia, and its outlook for meeting the demand for food in the near future.
II. THE FRAMEWORK

The purpose of this chapter is to construct a general framework of reference having the properties of inclusiveness and consistency, aiming to describe the role of agriculture in the over-all economic development, with special emphasis on its role in providing food for the non-agricultural sector. Also, the aim is to inquire into the underlying forces which facilitate those contributions in the context of a proper balance in the development of the agricultural and non-agricultural sector, with special emphasis on the role of marketing in the sectorial interdependence.

It is a historical fact that the development process in a country starts with the situation in which the bulk of the population and its economic activity are to be found in agriculture, while a small but hopefully growing industrial sector emerges. In such a setting the heart of the development problem may be said to lie in the gradual transformation of the economic structure, involving a relative decline of the agricultural sector of the economy, and a large absolute and relative growth in the industrial sector. As the major single sector of the economy, the agricultural sector must constitute the

\[1\text{In this study we shall define development as a process of change by which an economy is transformed from one with a low per capita income to one with a high and rising per capita income.}\]
foundation of such a transformation. As such, it is called upon to
perform vital functions in the development process. On the other
hand, the industrial sector has to perform functions to create condi-
tions favorable for increasing agricultural productivity. Hence, we
will begin this chapter with a summary of the important inter-relation-
ships between agricultural and industrial development.

**Inter-Relationships between Agricultural and Industrial Development**

In the rapidly growing literature on the history, theory, and
policy of economic development, there exists a general consensus
that agricultural development is a necessary condition for industrial
development. On the basis of comparative studies, Simon Kuznets
concludes: (58, p. 59-60)

At the danger of stressing the obvious, one may claim that
an agricultural revolution--a marked rise in productivity
per worker in agriculture--is a pre-condition of the indus-
trial revolution for any sizable region in the world; surely
so for any country in which (as is the case with many
underdeveloped or less developed countries today) the
product per worker in the agricultural sector is so dis-
tressingly low as to tie to the land, at low income levels,
a large part of the population and leave little margin for
the non-agricultural sector to grow upon.

Nicholls reached a similar conclusion in his studies of economic
history: "Until underdeveloped countries succeed in achieving and
sustaining (either through domestic production or imports) a reliable
food surplus, they have not fulfilled the fundamental pre-condition for
economic development" (75, p. 367). He noted that England and Western Europe were able to initiate an industrial revolution because an agricultural revolution had already provided a domestic food surplus which "sufficed until, through expanding exports of manufactures, they could supplement their rapidly increasing food needs by imports." He observed further that also Japan, "with a minimum of structural disturbance to an agricultural economy characterized by land shortage and labor surplus, established policies which created a food surplus which became the basis for its spectacular economic development" (75, p. 367).

Recognizing the importance of the agricultural sector in the less developed countries, economists are beginning to realize the irrelevancy of the one-sector growth model as developed by Harrod-Domar and others, if applied to the less developed countries. These models do not recognize explicitly the existence of a structural condition, commonly called dualism, prevailing in most of the less developed countries. The usual definition of dualism is "the existence of a sector or sectors in which the actual distribution of the capital stock and of complementary factors does not permit the market to be cleared and the optimal resource use to be effected" (86, p. 15). Under such conditions the general equilibrium theory, which is the corner-stone of the one-sector model of Harrod-Domar, becomes invalid, and a distribution theory based on an "institutional
hypothesis" must be applied, instead of the classical and neo-classical theory. Recognizing this important phenomenon which is spearheaded by Lewis, followed by Fei and Ranis, and others, economists start to formulate their growth-theoretic models in terms of at least two sectors, a commercial or industrial sector, and a non-commercial or agricultural sector. They stress the importance of agricultural development for industrial development.

**Contributions of Agriculture to Industrial Development**

The most important ways in which the agricultural sector contributes to industrial development are discussed extensively in the literature and have been emphasized by a score of writers. The following is a brief discussion of the most important contributions.

The most obvious and most essential contribution which agriculture must make to industrial development is the provision of additional agricultural products, which are demanded due to rapid population growth, a substantial rise in per capita income, a relatively high income elasticity of the demand for food, and industrialization. Meeting this demand with increased imports or reduction of agricultural exports, conflicts with the need to use limited foreign exchange to import capital goods. On the other hand, a failure to meet this demand will have an inflationary effect on the economy because of the importance of food as a wage good in the economy.
Wage increases due to food shortages cause a shift of the gains of the industrial sector to the agricultural sector, and presumably will result in the disappearance of incentives for expansion in the industrial sector.

Thus, for most developing countries, the over-all economic growth depends on the response of agriculture to the changes occurring in the domestic demand. The agricultural sector of the Japanese, British and North American economies, in the initial stages of industrialization, performed this function very well. The agricultural sector of the present less developed economies has to perform a much more gigantic task because of the unfavorable initial conditions and a much higher population growth rate.

The second contribution of agriculture to industrial development is the supplying of capital to help finance investment in industry and infrastructure. The transfer of capital from agriculture to other sectors may occur in different ways which could be divided into two groups. In the first, the government plays a direct role through taxation and market operations. In the second, the free market mechanism replaces government action.

In the first case, there is a compulsory transfer of capital from agriculture to the other sectors. The most common device is taxation on land or on agricultural exports, in which the burden of agriculture is far greater than the services rendered by government
to agriculture, as the residue is spent by government for the benefit of other sectors. This pattern was certainly followed by Japan.

Japan's success in taxing land as a device to absorb the surpluses of agriculture is frequently cited in the literature on economic development. If land taxation is applied now to the present less developed countries, difficulties which the Japanese administration did not face, occur. Inflexibility seems to be the main disadvantage, since "land valuation can hardly be kept up to date" (3, p. 10). A small amount of inflation will already result in a steady decline of the yield of the land tax in real terms, while "increases in the farmer's income due to rising productivity or higher prices may make no contribution to government resources" (3, p. 10). Japan's success in taxing land effectively occurred under a well developed, efficient, and strongly hierarchical system of government, which is not frequently found in the present less developed countries. The absence of such an administration makes it very difficult to tax land effectively. This is aggravated by the structure of cultivation in the present less developed countries, which is characterized by small holdings dispersed in a large area without adequate facilities for transportation and communication.

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2 See Allen (4), Johnston and Mellor (55), Fei and Ranis (21) and F. A. O. (3).
As a result of these difficulties in taxing land, governments of many less developed countries frequently employ other means of taxing away agricultural surpluses. The most popular means is probably the export duties or levies. They are mainly borne by export crop producers, and thus do not cover the whole agricultural sector. The main advantage is that less administrative skill is required to collect them. Another advantage of export duties and levies is the flexibility of this type of taxation.

A variant of the export tax is the purchase of farm products for exports by a state marketing board. By virtue of its monopolistic power, the board can purchase the products at prices lower than those ruling in the world market. The accumulated profit is used to finance development projects in other sectors. The crucial point of this type of taxation is the choice of the board's purchasing price. If it is too high, it might "kill the goose which lays the golden eggs." The successes of the West African Marketing Boards have frequently been cited in the literature as examples of siphoning off agricultural surpluses to finance economic development. The case of Argentina in the decade following World War II is an example of failure (55, p. 579).

In centrally controlled government systems such as those of

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3 See for example Allen (4), Johnston and Mellor (55).
Communist China or Russia, the transfer of capital happens through compulsory collection of grain at lower prices than those ruling at the free market.

The second group of methods of capital transfer involves lending or utilization of savings originating in the agricultural sector for financing industrial development through the market mechanism. The success of this transfer depends to a certain extent on the subjective preferences of the owners of the surplus for saving or consuming, and an efficient financial market through which investment decisions can be implemented. If the preference of the agriculturist is to consume the surpluses by building houses and initiating urban consumption habits, a potential valuable investment is practically wasted. But if the owner of the surplus is of the entrepreneurial type who invests part of his income in the industrial sector, then transfer of capital through the free market mechanism might be successful. This practice was prevalent in Japan in the early stages of the country's development, where the entrepreneurial landlord, as owner of the surpluses, preferred to invest them in the rural-based industry rather than to consume them (21, p. 164-171).

The third contribution of agriculture is to supply labor to the expanding industrial sector. In overpopulated countries such supply of labor to the expanding industry should not be too difficult (61, p. 406). Johnston and Mellor observe also that the experience of Japan
seems to indicate that the rate of investment in the non-agricultural sector was the limiting factor, and that transfer of labor to industry was not a major problem (55, p. 576).

On the other hand, a rapid rate of growth of the non-agricultural sector is essential for agricultural development. Prosperous agriculture with rising income for farmers is more feasible when the labor, which is surplus to the need of agriculture, is being drawn away to other sectors with higher productivity.

The fourth contribution of agriculture is to provide foreign exchange to import capital goods for the industrial sector. The export of agricultural products is the traditional contribution of agriculture. Many of the present advanced countries were developed largely on the basis of agricultural exports. In addition, exporting agricultural products is probably one of the promising means of increasing incomes, employment, and commercialization in parts of the agricultural sector.

Finally, agricultural development provides a stimulus to industrialization. In developing countries, there can be no chance for rapid self-sustaining growth of industry without a rapid rise in effective demand for manufactured consumer and industrial products. Rising incomes and productivity in the agricultural sector will contribute to the expansion of the industrial sector.

To sum up, because of the size and relative importance of the
agricultural sector in the economies of the contemporary over-populated less developed countries, it is called upon to perform vital functions in the development process of those countries. It provides food and raw materials for the rapidly growing population and industry, savings, forced or voluntary manpower, and foreign exchange. At the same time it acts as a stimulus to the industrial sector by providing effective demand for its products.

To perform these functions, the methods used depend to a certain extent on the economic system of the society involved. Under capitalism, the market is the primary organizational device, while under socialism the government is the main device. In a mixed economy, which seems to be the current trend, governments and markets both participate in the decision making. Since market imperfections are a major characteristic of less developed countries, they limit the effectiveness of the market mechanism as the only allocative device.

The Role of Industry in Agricultural Development

One of the essential contributions of industrial development to agriculture is the expansion of employment opportunities for the absorption of the growing redundant labor in the agricultural sector, to insure escape from the Malthusian trap. Basically the extent and speed of this labor reallocation process depends on the rate of growth
of the capital stock and technology used in the industrial sector, and on the efficiency of the labor market. It is clear that the more labor intensive the technology used, the larger the absorption capacity of the industrial sector will be.

Dovring mentioned two additional factors which determine the rate of change of the agricultural population: the total population growth rate, and the percentage of the agricultural population in the initial condition. Dovring has also shown that in the less developed countries, where the agricultural population is still large and the total population growth rate is high, very rapid industrialization would be needed to absorb all the annual population increment in the non-agricultural sector, and even more so to reduce the redundant labor in agriculture. Dovring calculated that in a less developed country, with 70 percent of the population in the agricultural sector and 30 percent from other industries, and with an annual population growth rate of 1.5 percent, effective employment in the non-agricultural sector will have to grow by nearly 3 percent to change the 70:30 position to 40:60 over a period of 50 years. If the population growth rate is 2 instead of 1.5 percent, the growth rate required for non-agricultural employment is 3.5 percent.

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4 For a more penetrating discussion on this important subject see Fei and Ranis (21, Chapter III).

5 On this subject see also Johnston and Nielsen (56).
These conclusions indicate the necessity to develop the non-agricultural sector at a relatively high rate, and the seriousness of the problems faced by the present less developed countries.

A reduction in the absolute numbers of people working in agriculture is one condition for raising the productivity of those who stay in farming, and for a prosperous agriculture. The consequences of the existence of a labor force redundant to agriculture's need will be discussed in more detail in a later section. In short, this group will form a drag for the sector, causing low labor productivity and widespread sharing of income, which diminishes incentives for greater individual effort. On the other hand, removal of these surpluses will result in a better land-labor ratio, which will encourage land consolidation and make the task of improving the institutional framework easier to accomplish than otherwise.

Another way in which industrial development stimulates agricultural progress is the expansion of the domestic market for farm products. If this increased demand is reflected by the marketing system at the farm level, then it may change the subsistent and stagnant character of agriculture. The demand stimulates the commercialization of agriculture and tends to integrate the urban and rural economy. The effect of the growth of the non-agricultural population on the expansion of the domestic market is illustrated in a numerical and interesting way by an F.A.O. report. Assuming equal family size
and a closed economy, the report estimates the expansion of the domestic market in terms of total number of families per farm family at different proportions of population living in agriculture. The report shows that when the non-agricultural population forms 80 percent of the total, then there are four families in agriculture to every one outside. Thus the domestic market for each farm family is 1.25 families—i.e., the farm family itself and one quarter of a non-farm family (31, pp. 130-131). As the agricultural population relatively declines, the market expands progressively. The rate at which this market changes is shown in Table 1 on the following page, reproduced from the F.A.O. report (31, p. 131). The table shows that for the potential market to double from the initial condition, the share of the agricultural population must fall from 80 to 40 percent. But the potential market will double again with the decline in the share of the agricultural population from 40 to 20 percent. Johnston, who used this example extensively in his analysis on supply and demand of agricultural products, concluded that the "significance of these arithmetic relationships is simply that the agricultural supply problem is fairly moderate at the early stages of development, so that the required increase in output per farm unit can probably be achieved by measures to promote increased technical efficiency in agriculture" (56, p. 283). This statement would probably be true if increasing productivity were mainly an economic problem, which it is not.
Increasing productivity in the early stages of development involves also the problems of improving the institutional framework, changing the social, cultural and religious constraints, and modifying attitudes and relationships within the local communities. All these non-economic factors, which presumably have considerable influence on the level of productivity, are more difficult to improve in the earlier stages of development than in a later stage.

Table 1. Total Number of Families per Farm Family (Indicating Relative Size of the Domestic Market) at Progressive Stages of Economic Development

<table>
<thead>
<tr>
<th>Percentage of labor force in agriculture Percent</th>
<th>Number of families to each farm family 100/1</th>
<th>Percent increase in potential domestic market (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>1.25</td>
<td>-</td>
</tr>
<tr>
<td>70</td>
<td>1.43</td>
<td>14</td>
</tr>
<tr>
<td>60</td>
<td>1.67</td>
<td>17</td>
</tr>
<tr>
<td>50</td>
<td>2.00</td>
<td>20</td>
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<tr>
<td>40</td>
<td>2.50</td>
<td>25</td>
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<tr>
<td>30</td>
<td>3.33</td>
<td>33</td>
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<td>20</td>
<td>5.00</td>
<td>50</td>
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<tr>
<td>10</td>
<td>10.00</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>20.00</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Food and Agriculture Organization of the United Nations (31, p. 31).

Another contribution of industrial development is that it makes available a greater variety of manufactured consumers' goods in the rural areas without undue pressures on foreign exchange reserves.
The ready availability of such goods constitutes a strong incentive for the farmer through raising his level of wants. These incentives are of great importance in breaking down the subsistence nature of agriculture, and, hopefully, will make farmers more money and market oriented.

In addition, the supply of the expanding industries presumably does not consist of consumers' goods only. It also extends to new and better agricultural products. These goods will presumably have a ready market in the agricultural sector, since the process of agricultural development is associated with an expansion of off-farm inputs such as chemical fertilizers, insecticides, farm tools, and equipment. The adaptation of these off-farm inputs might not happen automatically. Farmers must be made aware of the advantages of these goods through activities of the salesmen or extension services. At the same time, credit with favorable terms must be made available to the farmers.

Finally, industrial development creates infrastructures such as transportation, communication, and power networks which are conducive to agricultural development. The effect of improved communication and transportation on the mobility of factors of production, on market information, and on the opening up of new markets for agricultural products is well known, and will be elaborated in a later section.
For these reasons it is clear that agricultural and industrial development have much to contribute to each other, and hence to overall economic development. The degree of this interdependency varies with the country, the stage of its development, and the size and composition of its foreign trade. It is clear that in a country with a large foreign trade sector, the dependence of industrial development on agricultural development is somewhat reduced, if compared with the position in a closed economy. Still, if the country's export is large and consists mainly of agricultural products, this dependence is not greatly reduced, although the nature of the relationship is changed (100, p. 6). Under such a condition, export is the crucial factor. Capital goods, raw materials, and food can be imported in exchange for the exports, while capital may be derived from profits in foreign trade. In this way the foreign trade sector can facilitate industrial development.

There remain, nevertheless, serious disadvantages in developing an economy through agricultural exports. First, there are great difficulties in getting favorable terms of trade for agricultural exports, mainly because of the generally low prices and income elasticities of demand for agricultural products (62, p. 30; 55, p. 295). Since development always increases imports, this unfavorable trend forms a potential threat to the development process. Second, the newly developed industries will have difficulties in selling their products
domestically, because the low purchasing power limits the extent of the market. They will also have difficulties in selling them abroad because of the competition from the more experienced and established industries in the advanced countries who are already in the market. Agricultural exports are small in relation to agricultural production as a whole; the main output is foodstuffs for consumptive purposes. Thus, the demand generated from the export sector is not large, since the food sector is depressed because of the large food imports. Third, as experienced by many countries such as India, Burna, and China, the "growth promoting forces in the export sector do not spill over to the rest of the economy." As a consequence, the rest of the economy remains relatively stagnant (21, p. 296).

In view of these disadvantages, countries cannot rely for major development efforts solely on exports of agricultural products. The drive of any economy toward sustained growth must be in the form of balanced growth between the sectors, including the foreign trade sector. However, the attainment of a proper balance between the sectors is a persistently troublesome problem for developing nations. Assuming that there are two sectors, the agricultural and the industrial, the concept of sectorial interdependence is useful in throwing light on that difficult problem. Sectorial interdependence can be
viewed in many ways. Here it will be analyzed in relation to the supply and demand for food, which will be our major concern in the next section.

Supply and Demand for Food

Apart from changes in consumer preferences, the rate of growth of demand for food depends on the rate of growth of the population, the rate of increase of per capita income, and the income elasticity of demand for food. The economic significance of the growth of demand for food is large in less developed countries, because there are a higher rate of population growth and a higher income elasticity of demand for food in these countries than in the advanced countries.

In this section we will inquire into the underlying forces which determine the demand and supply of food in a developing economy, and the effect of an imbalance between supply and demand of food on the development process.

The Demand for Food

Of the three factors affecting the growth of demand for food, the growth rate of population is apparently the most important, especially

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6 See for example Johnston and Nielsen (26).
for the less developed countries. That population growth rates will rise with economic development is expected, but that they will reach the present high levels is not expected. This expectation is based upon the economic history of Western Europe and Japan, where population growth rates rose in the initial period of industrialization. However, these growth rates never greatly exceeded one percent for Western Europe, and never rose above 1.5 percent for Japan (3, p. 2).

The present average rate of population growth in all less developed countries is reported by the F.A.O. as well above two percent, and for individual countries, figures in excess of three percent are not uncommon (3, p. 2). These high rates need further examination.

The classical theory of population growth which is primarily associated with Malthus, held that any rise in incomes tended to increase birth rates and to decrease death rates, the latter with more certainty and force. It suggests that population growth rates, if not checked by deliberate action, will hamper economic development.

The course of events in Western Europe since Malthus has not supported this theory. As a result the Malthusian theory was rejected, and a more complicated demographic theory associated with economic development evolved.

This theory, which is called the demographic transition theory, postulates that an agrarian low-income society before it undergoes economic development has high birth and death rates. Death rates
are high as a consequence of poor diets, primitive sanitation, and the absence of effective medical practices. Social beliefs and customs, reinforced by the economic advantages of a large number of children to a peasant family, are responsible for the high birth rates. Children contribute at an early stage to agrarian production, and are the traditional source of security for parents in their old age. The cost of education, if any, is minimal because of the low level of education given. The existing high death rates, especially in infancy, imply that advantages can be attained only when many children are born (11, p. 9-10).

This theory postulates further that with economic development, death rates decline mainly because of the advances in medical knowledge and improved public health measures. Somewhat later the birth rates begin to fall. Coale and Hoover mentioned the following factors as being responsible for the decline: (13, p. 11)

The changing structure of production, with a declining importance of the family as a production unit, with the growth of impersonal systems for the allocation of jobs, and with the development of economic roles for women outside of the home, tends to increase the possibility of economic mobility that can better be achieved with small families and tends to decrease the economic advantages of large families. One of the features of economic development is typically increasing urbanization, and children are usually more of a burden and less of an asset in an urban setting than in a rural one. The whole process of economic change, moreover, weakens the force of traditional customs and beliefs.
This demographic transition theory is more or less a description of events in regions where the economy has been subject to changes from an agrarian peasant economy to an industrialized market economy, such as the Western European countries have. If this theory is applied to the present less developed countries, it can not serve for predicting the likely course of events. It appears feasible today to reduce the death rates without a major structural transformation, while the birth rates have remained essentially unchanged. As a consequence, the rate of natural increase exceeds "any recorded in the course of the demographic transition in the areas inhabited by Northern and Western Europeans and their descendants" (13, p. 14). These high rates form an important weight in the growth of the demand for food.

The other most potent factor influencing the rate of growth of demand for foods is the income elasticity of demand for food. High income elasticities for less developed countries are reported by the F.A.O. which, for example, estimated an elasticity of 0.9 for the Far East countries, excluding Japan. This rate is high when compared with 0.19 for northern America (92, p. 13). As a consequence of this difference, a given rate of per capita income has a considerably stronger impact on the demand for food than in the developed countries.

The mathematical relation between these variables was given by Okhawa (82), and can be expressed by the equation $d = p + gn$, where
d is the rate of growth of demand for food, \( p \) is the population growth rate, and \( n \) the income elasticity of demand for food. By using this equation, we see that the combined effect of population growth, rising per capita income, and high income elasticity of demand for food, result in a substantial rate of growth in the demand for food.

Thus, if a nation is expected to have a two percent increase in population and per capita income, and if the income elasticity of food is 0.7, then the annual rate of growth of demand for food is 3.4 percent. If the population growth rate is three percent instead of two, then the growth rate of demand becomes 4.4 percent. Since the rates used in this example are not far from reality, many of the less developed countries are facing the formidable task of increasing food production by three to four percent annually, or of using a large part of their foreign exchange earnings for importing food.

The above discussion is limited to the factors affecting the rate of growth of demand for food. Of equal importance are the factors influencing the pattern of food consumption. One of the most important is tradition. Conservatism in eating habits leads to preferences for food to which the consumers are accustomed, as rice for the South-east Asian, or maize for the Mexican. Habitual consumers are willing to pay a premium for the foods that form the basis of their traditional diet. Clearly these traditional preferences for certain
types of food will not be permanently affected by short run changes in the economic variables, such as year-to-year shifts in relative prices.

Within these forces of tradition, the most important factor influencing the pattern of food consumption is income. At low levels of income the diet consists mainly of starchy staples, such as cereals and roots which serve to satisfy the hunger of the consumer. Once hunger is satisfied, increases in income will result in a larger consumption of the so-called protective foods: animal products and vegetables. This relationship between income and pattern of consumption is elaborated by Bennett, who proposes the now well-known general principle "that as income rises, the starchy staples fall in importance as a source of food calories, while conversely all other foods rise in importance" (10, p. 212). Thus for most foods, per capita consumption rises as income rises, but the rate of change varies considerably for different food items and for the different initial levels of income.

Urbanization is another factor significant enough to influence the pattern of consumption. It can help bring about changes in the consumption pattern of the immigrant, since he learns of the consumption habits and standards of the urban people, and since urban living is a different way of life. The immigrant has a wider choice of foods available in the cities than in the rural areas, where people often have to eat whatever food is locally grown.
Changes in the relative prices of food may have an effect on the food consumption patterns. A distinction must be made between short-run and long-run changes. Traditional forces are presumably strong enough to nullify the effects of changes in the relative prices in the short run. The peculiar consumer preference enjoyed by rice in Indonesia, for example, places it in a strong competitive position. Only a prolonged physical shortage resulting in high price differentials between the food items is likely to cause a shift from the traditional pattern.

A knowledge of the rate of growth of demand for food and of changes in the pattern of food consumption is highly desirable in planning economic development. It is of obvious significance in planning production and organizing marketing. To meet the increasing demand for food and changes in the pattern of consumption, the marketing organization must make the necessary adjustments in the services offered to the consumer and the producer. Marketing facilities must be enhanced to allow an increased flow of agricultural products to markets. The greater demand for protective but perishable foods requires changes in the marketing facilities to prevent losses from spoilage. Thus there is a real need in developing countries to improve the physical facilities of the marketing system. However, the most vital function of the marketing system in the development process is to reflect those changes at the farm level in terms of
cash receipts of the producers.

The Supply of Food

Earlier we have stressed the necessity of adequate food supplies and the consequences of food shortages in a developing economy. In a closed economy the agricultural sector is called upon to produce enough food for the whole population. In an open economy, a nation may find it more economical to import some of its food needs, if its comparative advantage lies in non-food production, some of which it may export in exchange for food. However, even here, it is probably desirable to increase the domestic food output, since it may save scarce foreign exchange. Moreover, to rely on food imports makes the success of the development effort dependent upon exports, which for most less developed countries, consists mainly of agricultural products. We have seen the various disadvantages of primary reliance on agricultural exports.

Non-economic arguments are frequently added by policy makers in defense of reliance on domestic production rather than on imports. They argue that in the postwar world political situation, political and military considerations demand self-sufficiency in basic foodstuffs.

The writer holds that, as an analytical consequence of the inter-relationship between agricultural and industrial development, in the case of less developed countries with a dominant agricultural sector,
increasing the food supply is a domestic matter. Essentially it is a problem of raising the productivity of agriculture so that the rapidly growing population can be assured an adequate diet. When the productivity of agriculture is increased, the incomes of the agricultural population will be increased, relieving the farmers of their present poverty. It is in this way, too, that agriculture can make its fullest contribution to the over-all economic development.

We will start the discussion on food production by briefly outlining the factors which determine agricultural surplus, agricultural output in excess of agriculture's own consumption. In other words, agricultural surplus is that part of production which is available for supply to the non-agricultural population. As such, the agricultural surplus represents one of the real resource components which are contributed by the agricultural sector to fuel the expansion of the industrial sector.

The size of such a surplus obviously depends on the agricultural productivity, which determines the output available. At the same time it depends on the size of the agricultural population, given their per capita consumption. This per capita consumption depends on the income elasticity of demand for food of the agricultural population. The lower the income elasticity, the faster the surplus increases with rising production. The income elasticity depends to a certain extent on the size of the holdings. The smaller the holdings, the
higher the elasticity is likely to be. Thus, indirectly the size of the holdings determines the rate of change of the agricultural surplus.

Basically, however, the agricultural surplus depends on changes in the agricultural productivity. The increase of agricultural productivity is not only responsible for increased output available, but also enables the agricultural sector to release its redundant labor force for more productive employment in the non-agricultural sector. Thus it is important to examine the factors stimulating and retarding the growth of productivity in agriculture, which is our next major concern.

One of the striking features of the agricultural sector of the densely populated less developed countries is the existence of population pressure against scarce natural resources, mainly land. Under conditions of stationary technology, this pressure drives the marginal product of labor to very low levels, perhaps even to zero. Once the marginal product of labor is reduced to zero, an increase in the labor force through population growth or other causes cannot in itself provide an increase in production. This problem of rural overpopulation has long been recognized and forms the cornerstone of the classical growth theories leading to the pessimistic conclusions of Malthus and Ricardo.

In the postwar period, when the economists' traditional interest in growth reasserted itself with renewed vigor, this problem of low
marginal productivity became a subject of speculation and debate under the name of disguised unemployment. Since this concept is important in understanding the conditions of agricultural production, we will discuss it rather elaborately.

A report of the United Nations Committee of Experts on Measures for the Economic Development of Underdeveloped Countries considers disguised unemployment as the most important type of unemployment, and defines it as follows: (100, p. 7)

The disguised unemployed are those persons who work on their own account and who are so numerous, relatively to the resources with which they work, that if a number of them were withdrawn for work in other sectors in the economy, the total output of the sector from which they were withdrawn would not be diminished even though no significant reorganization occurred in this sector, and no significant substitution of capital. The term is not applied to wage labour; presumably employers will not employ a laborer for wages unless his labour increases the total product.

Ragnar Nurkse employs the same definition, although he expresses it in more technical terms than the United Nations definition. He states that the overpopulated less developed countries suffer from large scale disguised unemployment in the sense that "even with unchanged techniques of agriculture, a large part of the population engaged in agriculture could be removed without reducing agricultural output." In other words, "the marginal productivity of labor over a wide range is zero," and it may be even negative (80, p. 32).

As the above report of the United National Committee indicates,
widespread disguised unemployment is a notable feature of the economies of the less developed countries. This view is supported by economists A. W. Lewis, Nurkse, Rosenstein-Rodan, Fei-Ranis and many others (61, 80, 88, 21). However, there are economists who challenge the existence of disguised unemployment in the less developed countries, mainly on the grounds of the existence of peak seasonal demands for labor (83), on conceptual ambiguity (41, 106), and on empirical tests (92). However, those who support the existence of disguised unemployment have a ready answer for those challenges.

To answer the first challenge Fei and Ranis state as follows: (21, p. 13-14n)

Be that as it may, it is still true that such labour force is redundant and parasitic during the off-harvest season, which may account for 80 percent of the man-year. The crux of the matter remains how to reallocate such workers to insure a productive contribution to the economy all year round. Such reallocation is by no means easy, as it involves solving a whole constellation of socioeconomic problems. . . . If these rather formidable problems can be solved, meeting seasonal labor shortages back in agriculture can be viewed as a lesser technical problem—as demonstrated by the experience of the now advanced industrial countries.

T. W. Schultz, although not agreeing entirely with the existence of disguised unemployment, attacks the "peak seasonal demand for labor" argument by stating that such a demand does not in itself contradict the theory. He states further that it is not a theory "pertaining to seasonal unemployment," and that "labor shortages during
harvest and other peak work periods in agriculture in poor communities are not a clear test, because they do not show whether the marginal productivity of a part of this labor is or is not zero" (22, p. 61).

Both sides have made empirical tests proving their own position. However, the tests refer to different areas. Hence, a meaningful comparison of the results can not be made.

It is beyond the scope of this study to discuss this debate in detail. Theoretically, it is clear that excess population can be so great in relation to land and capital, that the marginal productivity of labor is reduced to zero. The question which immediately arises is who will employ these people if their product is zero, and how can these marginal people live if they really produce nothing? Nurkse's answer to the first question is that in many less developed countries "the wage-labor system, which Western economists are apt to take for granted, hardly exists," and that "the prevailing condition in subsistence farming is one of peasant family labor" (79, p. 75).

To the second question, Nurkse answers that the subsistence farmers live "by sharing more or less equally in the total product of the farm, which includes the product of the intra-marginal labour and of any land and capital goods the peasant may own." He adds that these "institutional arrangements are foreign to the economics of business enterprise, and so the condition which they make possible
may seem paradoxical. If the average product per person falls below "the physical level of subsistence," the outcome, according to Nurkse, is the Malthusian state of starvation which will check population growth (79, 75). These answers seem plausible enough, and they describe rather accurately the rural condition of Java, as the writer saw it. Disguised unemployment is a widespread phenomenon in the labor-surplus, less developed areas such as Java, where the population density is more than 1000 persons per square mile.

The existence of the disguised unemployed labor force is a highly significant phenomenon, in view of the fact that we have here a portion of the population which, while consuming agricultural output, is unable to make a productive contribution to it. Under such a condition it is essential to reallocate this redundant and parasitic labor force to higher productivity employments elsewhere at a rate sufficiently rapid to insure escape from the Malthusian trap. If cultivable land can be substantially increased through reclamation projects, such as forest clearing, drainage, and irrigation programs, such efforts may temporarily relieve the population pressure on land. If unexplored frontier land exists, additional acreage can reasonably be brought under cultivation, thus increasing food output while relieving the population pressure on the available land. However,

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7 See Hawkins (42) and ILO report (99).
these processes cannot continue indefinitely. Together with efforts to increase the productivity of the available land, employment opportunities must be created in the other sectors of the economy to reallocate the redundant labor in agriculture. As noted earlier, the industrial sector is looked upon to create the employment opportunities required for the absorption of the redundant labor force. In addition, the transfer of the redundant labor force will increase the agricultural surplus, given the level of consumption of those who remain in the sector, when it is accompanied by increases in productivity.

Raising the productivity of cultivation on an extensive margin with the amount of land relatively fixed, involves technical, social and economic problems. Essentially, they relate to the agriculturist’s entrepreneurial effort toward raising productivity. As experienced by many less developed countries today, this is not an easy task. Large numbers of individual agents in the economy must be persuaded, coerced, or somehow motivated to take the proper actions. Agriculturists must somehow be induced to expand their output, to seek employment outside the sector, and to save and invest productively. This initiative depends on the institutional environments which determine the attitudes, preferences, aspirations, and motivations of the agriculturists. Whether or not agriculturists are willing to increase their output depends on the form of land tenure, the availability of farm credits at reasonable rates, the stability of
farm prices, the state of perfection of the markets, the efficiency of
the marketing system, and a host of noneconomic forces which deter-
mine the distribution of the income received from the expansion of
the output. A proper state of these conditions is necessary to create
the incentive needed for expansion of agricultural production. Ade-
quate incentives at the farm level may not automatically lead to
increased efforts to expand production, but their absence will cer-
tainly mean that those efforts are unlikely to be made. Thus market
incentives are a necessary condition for raising agricultural produc-
tivity.

Of course there are factors other than the institutional ones
which impede production from increases up to the limit of effective
demand. Prominent among them are the lack of technical knowledge
of the agriculturist and the limitations of natural conditions. How-
ever, in many less developed countries the major factor which tends
to make agricultural output fall short of demand is deficiencies in the
institutional framework. Because of these imperfections, the rapid
growth in demand for food often does not exercise its full incentive
effect on production. An efficient marketing system is needed to
insure that the growing demand in terms of volume and variety is
actually reflected in cash receipts of the producer, which are not lost
en route. The following section will discuss in depth the role of
marketing in agricultural and over-all development.
This study views marketing in its broadest sense as the economic process by which goods and services are exchanged. The purpose of this process is to move goods and services from producers to consumers in such a way that it facilitates the maximum satisfaction of the consumers' wants and the organization, integration, and activation of economic pursuits. This concept of marketing is broader than the traditional definitions given in marketing textbooks. It takes into account the dynamics of the distributive sector in integrating the dualistic economy, and the power of this sector to direct production along the lines most suited to consumer wants, to expand markets and production, and to activate latent resources.

In defining the role of marketing in increasing the productivity of the agricultural sector, we will first discuss the concept of markets as viewed by economists and non-economists, and its importance for economic development. A discussion on marketing margins and their impact on development will follow.

Markets

An exchange of goods and services may be said to have its origin in the appearance of a surplus in production, as a result of advances in technology, productivity and specialization. In a primitive society, production in excess of subsistence for either immediate
or near future consumption is a surplus. Such surpluses could have value only in exchange.

It is generally accepted that the most highly developed and most efficient means of exchange is the market (47, p. 27). However, there is no one precise meaning of the term "market." To the economist the market is a specific institution with its own rules, upon which he has built a very powerful analytic structure. To the anthropologist, the historian, and to a certain extent to the marketing specialist, the market is a social institution and is often the market place, a meeting place where goods are transferred from one hand to another. Both concepts of markets are equally important in analyzing and understanding development processes in the rural areas of the less developed economies. Therefore, it seems useful to discuss in more detail the different meanings, interpretations, and implications of the term "market."

The Economist's Point of View of Markets

To an economist a market is a mechanism in the process of allocation of resources. Since economists purport to be scientific, they have made theoretical models of markets. A model for a perfect market is constructed in the classical economic assumption of perfect competition.

The classical theory of welfare economics postulates that a
market economy under the assumption of perfect competition and
perfect divisibility of all resources and products, leads to an optimum
allocation of resources, a situation where available factors of pro-
duction are so distributed among the competing uses for them that the
total output valued at prices consumers are willing to pay for, cannot
be increased, nor cost of production reduced. Analytically, the opti-
imum allocation of resources is represented by the fulfillment of the
marginal conditions.

Perfect competition in the strict sense of the term is in practice
unattainable, and thus optimum allocation of resources is also unattain-
able. However, this theoretical model is useful as a standard from
which to measure deviations in actual markets. One may say that the
more perfect the market, the better the allocation of resources—the
closer the actual production curve to the optimum production pos-
sibility curve. The question which immediately arises is what con-
ditions are required to secure the full benefit of vigorous competition
to bring an economy or an industry near to the economic ideal. Per-
fected competition requires perfect divisibility, perfect mobility, per-
fected knowledge, and small market transactions. Thus, the better the
knowledge of opportunities of the economic decision makers, the more
mobile and divisible the products and factors of production, and the
smaller the market transactions, the closer the economy or industry
approaches the economic ideal.
Referring to the problem of less developed economies, of the four conditions mentioned above, the last three seem to be of the utmost importance. While these three conditions depend on the stage of development of the economy, the first one does not. Attainment of perfect divisibility is as big a problem for an advanced economy as for one that is less developed. Therefore, we will limit our discussion to the last three conditions.

A sufficient and accurate knowledge of opportunities and of the requirements of the market is needed by the producers, consumers and marketing agencies. This knowledge will enable them to judge the opportunities and make economic decisions resulting in a better allocation of their resources. Better knowledge may be achieved if an efficient communication system exists.

Inadequate and crude communication facilities are one of the major characteristics of the less developed economy mentioned by Leibenstein (59, p. 41). This lack of communication exists not only because of insufficient media such as telephone and telegraph facilities, newspapers, radio, television, and means of transportation, but also because of institutional factors, such as level of education, illiteracy, and absence of one national language. In addition, lack of sufficient standardization and grading, and of uniform weights and measures intensifies the communication problem among the economic decision makers.
Mobility of factors of production is needed to secure the full benefit of competition. Immobility of factors of production prevents their movements toward their most profitable uses, thus hindering efficient allocation of resources. Here again, one of the characteristics of underdevelopment is immobility of factors of production. Labor immobility is reflected in the phenomenon of disguised unemployment, while sectorial differences in interest rates reflect the immobility of capital. Inertia and ignorance, increased by custom, habit, and attitude toward alternative employment and investment, are powerful deterrents to the mobility of capital and labor.

The condition of small market transactions ensures that many sellers face many buyers. Thus the individual buyer or seller acts as if he had no influence on price, and merely adjusts to a given market condition. In the rural areas of the less developed countries, especially in the marketing of agricultural products, the prevalence of monopsony has been cited frequently in the literature on economic development (69, 7, 111). Abbot observes that "local buyers' monopolies are characteristic of agricultural areas in underdeveloped countries with poor transport facilities, narrow markets, and meager supplies of capital" (1, p. 84). The factors responsible for monopsonistic situations are many, ranging from economic to cultural factors. Referring to the rural areas of Malaya, Dr. Wharton mentions seven power factors which facilitate monopsonistic gains.
They are the illegal, the legal, the economic, the technical or natural, the cultural, the psychological, and the informational or educational (111, p. 5-7).

Thus, in the less developed countries the three conditions which are required for optimum allocation of resources are far from perfect, preventing an optimum allocation of resources, and thereby limiting the actual production curve far within the maximum production possibility curve. It is true that not any economy at any time will reach the maximum possibility curve, but the actual frontiers of the less developed economy are unusually far below their potential. They are using what Meier called "inferior and pseudo-production functions" (69, p. 58).

The above discussion reveals that one of the requirements for expanding food production is that market imperfections be removed. With the same resources and existent state of technology, perfecting the market will lead to higher output through higher input productivities. In other words, removal of market imperfections which condition the productivity of the factors of production, will move the food sector toward a more efficient use of its resources.

The Market as a Social Institution

The second interpretation of the term "market" is given by anthropologists, sociologists, and to some extent by marketing
specialists. While for economists, the physical appearance of markets is not important, for the other group of social scientists, a market has a specific location where people meet for the purpose of transferring goods from one to another. They are not concerned primarily with the efficiency of the market in achieving optimum allocation of resources, but with the role that "market exchanges play in the mind of persons using the markets" (47, p. 218). An institutional analysis of the market is concerned with questions like "who meets whom, under what conditions, in what surroundings, for what kinds of contractual arrangements," and what commodities are customarily traded. Are there prohibitions interfering with exchanges, and "are there certain persons who may not use the market at all, or who may use it only under prescribed conditions and for specific forms of transactions?" (47, p. 219).

One of the most important functions of market places in the rural areas of the less developed countries is their role as communication centers. Market places provide regular meetings of large numbers of people, usually representing cross-sections of the population. As such, market places are extremely important for accumulating and disseminating information of economic as well as non-economic aspects, which might help the people in making economic decisions. In addition, as communication centers, market places might help to develop wants of the people attending the markets.
Contacts between city buyers and local sellers make the latter aware of the high standards and pattern of consumption of the former, resulting in a strong desire and temptation to enjoy as much of this attractive way of living as incomes permit. Presumably, this desire forms a strong incentive to produce more to satisfy the newly created wants.

Of course the two meanings of markets overlap in many instances. Paul Bohannan and George Dalton classify African societies on the basis of the role that the market place and the market mechanism play in each society. First, there are societies that have no market places, and the market mechanism, if any, is present in a few actual interpersonal transactions. Second, there are societies in which market places exist, and the market mechanism operates, but only "peripherally." In other words, the subsistence requirements of the members of the society do not depend to a significant extent on the market place or on the operation of the market mechanism. Third, there are societies in which market places exist and the market mechanism operates, serving as an integrative force in the economy, determining prices and income, and allocating resources. In this type of society the subsistence sector is practically non-existent (11, pp. 1-26). Although the authors are referring to African societies when they make the above classification, it should apply as well to other economies around the world.
To develop, an economy must move toward the third system, in which markets serve as integrative forces determining the economy. Such an economy is characterized by an expanding market sector and a shrinking subsistence sector, accelerating the development of incentives, which is crucial for economic development. As economic development proceeds, the economic significance of market places declines. The market mechanism "has affected more and more institutions and has outgrown the market place because the essential ingredients of production--land, labor, machines--cannot be transacted in a market place" (11, p. 26). Also, the significance of the market place as a communication center declines with the adoption of newspapers, radio, and television.

Crucial for the sectorial interdependence is the growth of three types of markets. They are intersectorial commodity, financial, and labor markets (21). In the intersectorial commodity markets, food and other agricultural products and the output of the industrial sector are exchanged. The sellers of food are those agriculturists who own surpluses. They form also potential buyers of the output of the industrial sector, which consists of goods for agricultural production, such as fertilizers, insecticides, and other equipment, and manufactured consumer goods. The latter group of commodities is sometimes referred to as incentive goods, since the availability of attractive and inexpensive goods presumably forms an
important stimulus to production and productivity. Thus, these markets serve as an indispensable vehicle for expanding the agricultural surpluses and industrial output.

We have indicated earlier that the agricultural sector is expected to provide capital to the growing industrial sector. This capital, of course, must come mainly from the proceeds of the sales of agricultural surpluses in the intersectorial commodity market. Whether the owners of these surpluses will save them or consume them depends entirely on their subjective preferences, and on the availability of a financial market through which savings decisions can be implemented. Financial intermediaries must be available to provide services such as savings deposits, government bonds, and industrial stocks, which presumably will encourage surplus owners to invest part of their proceeds productively, rather than to hoard or consume them.

Finally, an intersectorial labor market is needed to facilitate the reallocation of the redundant agricultural labor force to a more productive employment.  

Provision and expansion of these three markets will enhance the contribution that each sector can make to the others, and thus toward

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8 For a more penetrating discussion on the role of markets see Fei and Ranis (21, Ch. II).
over-all economic growth. The provision and expansion of commodity market opportunities will form an important stimulus for the producers in the industrial and agricultural sectors to increase their production. And here, of course, is where marketing comes in.

The distributive sector must develop along the appropriate path in response to market opportunities by "crystalizing and directing demand for maximum productive effectiveness and efficiency," and by securing that these changes in demand are reflected in cash receipts of the producers, thus "guiding production purposely toward maximum consumer satisfaction" (19, p. 218).

To perform these functions properly, the marketing system must consist of a set of institutions and operating practices that permits distribution of the output of the agricultural and non-agricultural sector at the lowest possible cost per unit of product. However, in the less developed countries, partly as a reflection of the production pattern in the agricultural sector, the marketing system is far from being capable of performing such functions. The cost of marketing is high, not because of more services offered to the consumer or producer, but mainly because of structural factors. This will be discussed in the section on marketing margins, which is next.
Marketing Margins

The importance of marketing margins lies in their effect on the price elasticity of demand for food at the farm level. High and inflexible marketing margins are a great source of grievance among farmers, consumers and administrators, in many less developed countries. In one respect these grievances are justified. When marketing margins are inflexible and high, the price elasticity of demand for food is less at the farm gate than at the retail or wholesale. This situation is of course a serious impediment to agricultural development, and makes implementation of policies aimed to increase incentives and stimulate production, more difficult and less feasible. We will discuss briefly the causes of high and inflexible margins in less developed countries.

The high margins in the less developed countries are not the result of the value of services to consumer and producer, as is the case in the developed countries. They are more the result of wasteful and inefficient handling and methods of distribution, high interest rates, and inadequate facilities for storage, transportation, and communication. In addition, partly due to the production pattern, the size of transactions is small. Food is produced mainly by subsistence-oriented small holders, who sell only a small part of their crop to the market. Coupled with lack of sufficient employment
opportunities in the rural areas, transactions are by necessity small. In addition, partly because of the small size of transactions, there is among the marketing agencies an apparent lack of specialization by product or by function. All of these reasons result in a high marketing margin not associated with services to the consumer or producer.

It is more difficult to find an explanation for the inflexibility of the margins. Under monopolistic and oligopolistic conditions, the grievance would be easy to understand. Under these circumstances the marketing agencies would be able within broad limits to exercise their power by fixing margins without reference to short-run changes in the market. Under competitive conditions, inflexibility of margins is probably the result of the desire of marketing agencies to maintain a stable income. If the desire is sustained by social forces and family relationships between the agents, then they can pursue price policies toward this end. Another reason for the inflexibility of margins might be the relative importance of fixed costs in the marketing operation. This is especially true if the products must go through a processing plant, where fixed costs form an important part of the total cost structure.

Depending on the product and the country, inflexibility and high marketing margins might be caused by other factors. The case of Indonesia will be discussed in more detail in a later section. Also, it is not possible to generalize on the trend of the marketing margin
during the early stages of development. However, if the marketing cost is high because of inefficient and wasteful marketing systems, a considerable reduction in the margin might be expected with development. In other cases, the gain in efficiency might be offset by more services demanded by the consumers or producers.

The crucial point in development is to lower the marketing margins without adversely affecting the services offered. As a result, the demand function faced by the producers will shift to the right, and there will be a higher price and income elasticity at that level.

Conclusions

In this chapter we have discussed the interrelationships between industry and agriculture, and the contribution that each can make to the other. The attainment of a proper balance between the establishment of industries and the expansion of agriculture is viewed from the demand and supply of food relationship. Among the factors affecting this relationship we have emphasized the role of the marketing sector in integrating both sectors, activating economic pursuits, and satisfying consumer wants.

We have shown that the combination of high population growth and high income elasticity for food makes the rate of growth in food requirements much greater in the less developed countries than in the
developed countries. The high rates of growth in food requirements due to these two factors in less developed countries are increased even more if the countries succeed in rapidly increasing per capita income.

These increases in food requirements are a challenge to the agricultural and marketing sectors of the economies. Whether agriculture can respond positively to the challenge or not depends on a host of factors. Although conventional inputs such as land, capital, and labor, are important factors, we have emphasized the role of the marketing sector in increasing agricultural production. On the other hand, marketing must adjust to the changing production and consumption pattern in terms of quantity and variety.

It is against this framework that we will study the performance of the Indonesian agriculture in the eve of changing food demands.
III. INDONESIA

Introduction

This chapter will present a background of Indonesia by discussing its history, the physical and human resource pattern, and the structure of the economy. It is intended to provide an introduction to the major facets of the country to those who are strangers to it.

The emphasis of this chapter is on analysis rather than on complete coverage. The discussions on the agricultural foundation and the human resource pattern of the country will be elaborated with a brief sketch of its history and the nature of its economy.

The Physical Setting

Geographically, Indonesia is an archipelago of about three thousand islands. Surrounded by the South China Sea, the Pacific Ocean, and the Indian Ocean, the archipelago stretches from the mainland of Asia to the mainland of Australia. Superimposed upon the map of the United States, it would reach from the Atlantic to the Pacific. Not all the area of the archipelago is under control of the Republic of Indonesia. It excludes the eastern half of New Guinea,

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9 If not otherwise stated, the data in this section came from (85), (22) and (53).
Portuguese ruled eastern Timor, the Malaysian states of North Borneo, and Serawak, and the independent state of Brunei in North Borneo.

The principal islands of Indonesia are Sumatra, Kalimantan (Borneo), Sulawesi (Celebes), Java, and West Irian (West New Guinea). The first four islands are the most important part of the country in terms of size, population, natural resources, and economic activity. West Irian, the largest island, is the most undeveloped region in the country.

Indonesia is located along the equator. Hence, days and nights are almost equal in length resulting in slight seasonal temperature differences. They range from a daily low of 74°F to a high of about 88°F in the coastal areas, and between 64°F and 80°F on the interior mountainous areas. Rainfall, however, varies greatly in timing, distribution, and amount, depending upon the location of the area, its relation to the monsoon winds, the altitude, and the relief of the area. Thus, in contrast to the temperate zone areas, rainfall rather than temperature determines agricultural activity in Indonesia.

Temperature and rainfall determine the fertility of the soil. High temperatures lead "to rapid chemical weathering of the parent rock, while heavy rainfall in excess of evaporation causes a speedy leaching of the soil" (85, p. 5). Since rainfall is heavy in many parts
of Indonesia, the leaching of soil become a serious limitation for agricultural activity. In Sumatra and Kalimantan it forces the cultivator to practice shifting cultivation in the production of food. However, this type of infertile soil seems to be suitable for the rubber trees, which have been planted in many parts of Sumatra and Kalimantan.

On the other hand, Indonesia has an ample supply of active volcanoes which enrich the soil of the surrounding areas with volcanic ash carried down by rivers. For example, the soil in Java is repeatedly replenished by lava and ash such that the island can produce a large proportion of the nation's food. In many parts of the outer islands where a large number of volcanoes exists, soil conditions are favorable for food production or other agricultural activities.

The natural resources of Indonesia--particularly the mineral and agricultural resources--are extensive, and are largely unexploited. The mineral resources have not been fully surveyed, but on the basis of present knowledge, they provide a large potential for foreign exchange earnings and industrialization.

Petroleum constitutes Indonesia's most important mineral resource, and is produced mainly for the export market. The leading production centers are located outside Java. They are South and Central Sumatra, and the Balikpapan and Tarakan districts in East Kalimantan. Production of petroleum has risen since the colonial
period from about 8 million tons in 1940 to 24.0 million tons in 1965. The prospects of expansion of the oil industry are good. Experts have estimated that the petroleum reserves in Indonesia exceed nine billion barrels (85, p. 9).

Tin is the second most important mineral resource in Indonesia. Most of the tin is produced in Bangka, Biliton, and Singkep, small islands located east of Sumatra. The reserves are still large. However, tin production shows a decrease from a postwar peak of 35.8 thousand long tons to 15.2 thousand long tons in 1965. This decline is mainly due to mismanagement of the mines, which are owned by the government. Most of this tin is exported unrefined to foreign countries, and forms an important contribution to the foreign exchange earnings of the nation.

Indonesian bauxite production appears to have a promising future. Production increased from 245 thousand tons in 1938 to 648 thousand tons in 1964. The production center is located outside Java on the island Bintam, off Singapore. Although plans are made to develop an aluminium industry in Sumatra, most of the bauxite presently produced is exported to Japan and the United States.

Coal is also produced on a small scale. The leading coal fields are located in Western Sumatra, while smaller ones are found in Java and Kalimantan. Production declined from a pre-war level of 2,000,000 tons to 648,000 tons in 1964. Huge coal reserves are
reported ranging from 200 to 500 million tons of coal and billions of tons of brown coal (85, p. 10 and 22, p. 330).

In addition to these minerals, small quantities of gold, silver, manganese, diamonds, phosphate rock, nickel ore and sulfur are also produced. Iron ore, a mineral vital for any heavy industrial development, is lacking in Indonesia. It is known that low-grade iron-ore deposits do exist in Borneo and Celebes, although they have not yet been exploited because of inconvenient location, limited size, and low iron content (85, p. 9).

Together with the agricultural raw materials, which will be discussed in a later section, these minerals form an important source of foreign exchange earnings and a basis for further industrial development.

**The People**

According to the 1961 census, Indonesia's population in October 1961 was 97.1 million (48). With an estimated annual increase of 2.2 percent, the total population at the end of 1965 can be estimated at 104.5 million. This makes Indonesia the fifth largest country in the world in terms of population. In this respect it is exceeded only by China, India, Russia, and the United States.

A well known feature of the population structure in Indonesia is the difference between the population densities of Java and of the
other islands. While the average density of Indonesia in 1961 was 51 persons per square kilometer, Java and Madura had a density of 477 persons per square kilometer. The population density on Java and Madura is the highest in the world for any comparable area. These two islands with about 7 percent of the land area of the country, have more than 65 percent of the total population. In the other islands, density is much lower, with an average density of 19.2 persons per square kilometer. These are averages and probably deceptive, since there is a wide range of densities from area to area. In Java, some districts have densities well over 1000 persons. Bennett reported that in the district of Malang the density in the most fertile part of the area is up to 2000 persons per square kilometer (9). In the outer islands the densities range from less than two persons in West Irian to 321 in Bali, while the average density is 33 in Sumatra, 7.6 in Kalimantan and 37 in Sulawesi. The extreme geographical maldistribution of the country's population can be seen in Table 2 on the next page.

In addition, urbanization in the postwar years has been most important, as can be seen from Table 3. As Pelzer noted, in 1930 Indonesia had only seven cities with more than 100,000 people--six of them in Java--while by 1961 it possessed twenty-one in that category, eleven in Java, six in Sumatra, and two each in Kalimantan and Sulawesi (85, p. 19). Motivations of the migrants to move to
cities are varied, but economic pressure in the depressed over-populated areas seems to be an important one. Unfortunately, with a few exceptions, no studies have been made on this important subject. A survey for the Djakarta area made in 1955 concluded that "the causes of migration were difficult to establish, yet it was sufficiently clear that these causes were mainly of an economic nature" (43, p. 20). Furthermore, the report indicated that there was "undoubtedly a correlation between the density of population of certain areas and the number of migrants leaving it" (43, p. 16).

Table 2. Population and Density by Island. 1961.

<table>
<thead>
<tr>
<th>Island or region</th>
<th>Number in thousands</th>
<th>Density per sq. km.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Java and Madura</td>
<td>63,059</td>
<td>477.0</td>
</tr>
<tr>
<td>Sumatra</td>
<td>15,739</td>
<td>33.0</td>
</tr>
<tr>
<td>Kalimantan</td>
<td>4,102</td>
<td>7.6</td>
</tr>
<tr>
<td>Sulawesi</td>
<td>7,079</td>
<td>37.0</td>
</tr>
<tr>
<td>Bali and Nusa Tenggara</td>
<td>5,558</td>
<td>76.0</td>
</tr>
<tr>
<td>Maluku</td>
<td>790</td>
<td>11.0</td>
</tr>
<tr>
<td>West Irian</td>
<td>758</td>
<td>1.8</td>
</tr>
<tr>
<td>Indonesia</td>
<td>97,085</td>
<td>51.0</td>
</tr>
</tbody>
</table>

Source: Central Bureau of Statistics (49, p. 5, 15).

The rapid growth rate of urbanization resulted in congestion in cities and related social problems. The high unemployment rate of
8.5 percent (49, p. 31) indicated that the employment opportunities could not keep up with population growth rates in cities, which intensified the social and economic problems of the urban areas.

Table 3. Increase of Population in Selected Towns. (End of Year)

<table>
<thead>
<tr>
<th>Town</th>
<th>1930 Census</th>
<th>1961 Census</th>
<th>Percent Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Djakarta</td>
<td>533.0</td>
<td>2,973.1</td>
<td>558</td>
</tr>
<tr>
<td>Bandung</td>
<td>166.8</td>
<td>972.8</td>
<td>583</td>
</tr>
<tr>
<td>Semarang</td>
<td>217.8</td>
<td>503.1</td>
<td>231</td>
</tr>
<tr>
<td>Jogjakarta</td>
<td>136.6</td>
<td>312.7</td>
<td>229</td>
</tr>
<tr>
<td>Surabaja</td>
<td>341.7</td>
<td>1,007.9</td>
<td>295</td>
</tr>
<tr>
<td>Tjirebon</td>
<td>54.1</td>
<td>158.3</td>
<td>293</td>
</tr>
<tr>
<td>Bogor</td>
<td>65.4</td>
<td>154.1</td>
<td>236</td>
</tr>
<tr>
<td>Malang</td>
<td>86.6</td>
<td>341.4</td>
<td>394</td>
</tr>
<tr>
<td>Palembang</td>
<td>108.1</td>
<td>475.0</td>
<td>439</td>
</tr>
<tr>
<td>Djambi</td>
<td>22.9</td>
<td>113.0</td>
<td>493</td>
</tr>
<tr>
<td>Medan</td>
<td>76.6</td>
<td>479.1</td>
<td>625</td>
</tr>
<tr>
<td>Pematang Siantar</td>
<td>15.5</td>
<td>114.9</td>
<td>741</td>
</tr>
<tr>
<td>Pontianak</td>
<td>45.2</td>
<td>150.2</td>
<td>332</td>
</tr>
<tr>
<td>Bandjarmasin</td>
<td>65.7</td>
<td>214.1</td>
<td>326</td>
</tr>
<tr>
<td>Samarinda</td>
<td>11.1</td>
<td>69.7</td>
<td>628</td>
</tr>
<tr>
<td>Menado</td>
<td>27.5</td>
<td>130.0</td>
<td>473</td>
</tr>
<tr>
<td>Makassar</td>
<td>84.9</td>
<td>384.2</td>
<td>453</td>
</tr>
</tbody>
</table>

Source: Central Bureau of Statistics (51, p. 12).
The level of education of the population at the beginning of World War II was very low. At best, only 10 percent of the population was ever able to read or write Latin script. Some authorities place literacy at the end of the colonial rule as low as 7 percent. After a concentrated campaign to eliminate illiteracy, the rate increased rapidly. The preliminary reports of the 1961 census indicated that 46.7 percent of the total population could read and write, while on January 1, 1965, the country was declared free from illiteracy in the age groups 13 to 45 years (53, p. 3).

In addition to this progress, strides are being made in improving and increasing the opportunities for secondary and higher education and for vocational training. The total number receiving primary and secondary education increased from about 2.3 million in 1940 to about 9 million in 1959-60. During the colonial period, the opportunity for higher education was narrowly restricted. In 1939, out of about seventy million people, only 209 Indonesians graduated from senior high school. At the same time, only 637 were studying in all faculties at university level. In the post-war period the number receiving higher education has greatly increased (95, p. 169).

The preliminary results of the 1961 census show that about 35.9 percent of the total population belong to the country's labor force (49, p. 29), as compared to 30 percent in 1930. This would indicate that the country's total labor force would be about 34.5
million. There are of course differences between the rural and urban labor forces. Out of the 34.5 million, 29.9 million belong to the rural labor force (49, p. 27). In other words, the working force in the rural areas consists of 87 percent of the total labor force. Of the 29.8 million in rural areas of Indonesia classified by major branches of economic activity, 81 percent are engaged in agriculture, including forestry and fishing; 5.9 percent in services; 4.1 percent in manufacturing; 4.9 percent in commerce, and the rest in construction, communication industries, and so on. The occupational distribution of the labor force in Indonesia by regions can be seen in more detail in Table 4.

The preliminary results of the 1961 census also indicate that 5.4 percent of the total labor force are unemployed—8.5 percent in the urban areas and 4.9 percent in the rural areas. The relatively low rural unemployment rate is deceptive in view of the widespread disguised unemployment as reported in the rural areas of Java. A Labor Force Sample Survey conducted by the government with some technical assistance from the International Labor Office, estimated that in 1958 there was an underemployment rate of one third in the agricultural field in the rural areas (99). Hawkins, using the published data of the report, dramatized it by stating that "even in the peak season there were only 7.37 million workers who averaged eight hours a day, and over a million averaging only two hours; in the
Table 4. Occupational Distribution of the Indonesian Labor Force* by Region, 1961 (Percent)

| Regions        | Agriculture | Forestry | Fishing | Mining and Quarying | Manufacturing | Construction | Electricity | Water and Gas | Trade Banking | Insurance | Transport Storage | Communication | Services | Others and unknown | Total |
|----------------|-------------|----------|---------|--------------------|---------------|--------------|-------------|---------------|---------------|--------------|-----------|--------------------|--------------|----------|-------------------|-------|
| Java and Madura |             |          |         |                    |               |              |             |               |               |             |          |                    |              |          |                   |       |
| Urban          | 7.9         | 0.1      | 18.0    | 6.0                |               |              | 0.7         | 20.3          | 9.8           | 35.5        | 1.7      | 100                |              |          |                   |       |
| Rural          | 78.1        | 0.1      | 4.9     | 1.3                | 0.1           | 5.7          | 0.1         | 7.8           | 2.3           | 11.0        | 1.9      | 100                |              |          |                   |       |
| Total          | 68.0        | 0.1      | 6.8     | 2.0                | 0.1           | 7.8          | 0.1         | 23.6          | 10.8          | 25.7        | 1.3      | 100                |              |          |                   |       |
| Sumatra        |             |          |         |                    |               |              |             |               |               |             |          |                    |              |          |                   |       |
| Urban          | 17.6        | 2.8      | 10.4    | 5.8                | 2.0           | 23.6         | 10.8        | 25.7          | 1.3           | 100        |          |                   |              |          |                   |       |
| Rural          | 85.8        | 0.7      | 1.9     | 1.0                | 0.1           | 3.1          | 1.1         | 4.4           | 1.9           | 100        |          |                   |              |          |                   |       |
| Total          | 78.4        | 1.0      | 2.8     | 1.5                | 0.3           | 5.4          | 2.1         | 6.7           | 1.8           | 100        |          |                   |              |          |                   |       |
| Kalimantan     |             |          |         |                    |               |              |             |               |               |             |          |                    |              |          |                   |       |
| Total          | 80.2        | 0.2      | 3.2     | 1.2                | 0.1           | 4.9          | 1.7         | 6.4           | 2.1           | 100        |          |                   |              |          |                   |       |
| Sulawesi       |             |          |         |                    |               |              |             |               |               |             |          |                    |              |          |                   |       |
| Total          | 77.2        | 0.2      | 4.8     | 1.1                | 0.1           | 4.3          | 1.9         | 8.1           | 2.3           | 100        |          |                   |              |          |                   |       |
| Other Islands  |             |          |         |                    |               |              |             |               |               |             |          |                    |              |          |                   |       |
| Total          | 83.6        | 0.1      | 4.2     | 1.2                | 0.1           | 3.2          | 0.8         | 4.7           | 2.1           | 100        |          |                   |              |          |                   |       |
| Indonesia      |             |          |         |                    |               |              |             |               |               |             |          |                    |              |          |                   |       |
| Urban          | 11.7        | 0.5      | 15.9    | 5.9                | 0.8           | 20.5         | 9.7         | 33.1          | 1.9           | 100        |          |                   |              |          |                   |       |
| Rural          | 81.0        | 0.2      | 4.1     | 1.1                | 0.1           | 4.6          | 1.0         | 5.9           | 2.0           | 100        |          |                   |              |          |                   |       |
| Total          | 71.9        | 0.2      | 5.7     | 1.8                | 0.1           | 6.7          | 2.1         | 9.5           | 1.9           | 100        |          |                   |              |          |                   |       |

*10 years and over.
Source: Central Bureau of Statistics (49, p. 35).
slack season the situation was reversed, with over 8 million averaging two hours a day and less than a half million working eight hours" (42, p. 256). Hawkins concluded that with such a large amount of underemployment it was feasible to carry on "mutual aid projects such as building schools, roads and irrigation systems, . . . without even short run reduction in crop yields and with increased returns in the future" (42, p. 257). Although not explicitly mentioned by Hawkins, it is clear that the marginal productivity of this unemployed labor is zero.

The History

The strategic location of Indonesia, its natural resources, the fertility of its volcanic soils, and the geographical features of the country—all these have profound effects on the course of its history. Situated on the trade route between East Asia on the one hand and South Asia and Europe on the other, Indonesia has been for centuries exposed to a diversity of cultural influences from outside, reflected in today's cultural differences between its various regions. Its natural resources offered some source of wealth to many foreign countries. In its early history, it was spice that attracted Western European nations to Indonesia, while in modern history it was oil, rubber, and tin which motivated Japanese invasion. The country's island character makes easy penetration from the outside by a nation with
considerable naval power. Four times in the history of Indonesia the country has been united under a common rule: during the ninth century under Shri Vijaja, the fourteenth century under Madjapahit, the 19th century under the Dutch, and under the present Republic.

Although the effects of Dutch colonialism are the most important and interesting for a better understanding of the present situation in Indonesia, we will start our discussion of the country's economic history with a short review of the pre-colonial era.

Even the Dutch writers on early Indonesian history agree that there was an extensive trade in the region before the era of colonization began, covering not only domestic but also foreign markets (60, 6). Indonesian products such as cloves, nutmeg, pepper, sandalwood, sapanwood, gold, precious stones, drugs, and medical products, were exported to Eastern Asia and South Asia and exchanged for textiles, money and uncoined metal, silk, porcelain, paper, copper work and slaves. Foodstuffs were exported from Java to the other regions in the archipelago (60, p. 99). Van Leur estimated that the total Javanese trade in food supplies within Indonesia amounted to a shipment of about twenty eight thousand tons of rice. This observation indicates that there were already food surpluses and specialization before the Dutch arrived in the seventeenth century.

Sea transportation at that time was very well developed. The rice trade was carried on by hundreds of small or medium-sized
vessels averaging from sixty to a hundred tons, while larger vessels were used for international trade.

The organizational ability and the technical knowledge of the nation at that time were not markedly inferior to those of Europe. Indonesia at that time had gunpowder and its navigation techniques, modes of land and water transport and techniques of manufacture and agriculture at that time were not poor if compared to those of Europe (45, p. 76).

These observations indicate that when the Dutch arrived in the seventeenth century, major parts of Indonesia were in full commercial swing, while the agricultural sector responding to trade opportunities was developing. The existence of regional and international trade indicates a developed trade mechanism, a sea and land transportation system, and presumably an efficient merchant class.

Geertz distinguishes three stages in the Indonesian colonial history, based on the politico-economic devices employed by the Dutch colonial government. They are the East India Company, the Culture System and the Corporate Plantation System. In institutional terms, Geertz calls them respectively the "adventurous capitalism" in the 18th century, the "state capitalism" in the 19th century and the "bureaucratic capitalism" in the twentieth century (34, p. 50). The following is a brief account on the three periods, emphasizing the period of the Culture System, which it seems was the most formative
stage of the present economic problem of which today's Indonesia is heir.

The Dutch East India Company was formed in 1602 as "a state-chartered far-eastern trade syndicate with considerable autonomy ('a state within a state') in order to counter the active competition of both Asiatic merchants and other European powers trafficking around the archipelago" (34, p. 50). At first the company was interested only in commerce, but soon, as frequently happened in those days, it turned toward political expansion to control the sources of supply. As Geertz stated, the company's "activities everywhere worked toward the same end: the reduction of indigenous chiefs to dependents and the substitution of tribute for trade" (34, p. 51). The following quotation from Geertz illustrates the activities of the company:

(34, p. 51)

In the Moluccas, the luckless source of cloves and nutmeg, the Dutch imposed restrictions of cultivation, collective punishment (for 'smuggling'), and forced labor exercised through the agency of humbled native rulers. In the pepper areas, Bantam-Lampong and, to a lesser extent, central Sumatra, treaties with harbor sultans established quotas and fixed prices. In the Priangan highlands coffee gardens were introduced with traditional aristocrats acting as the company's labor contractors. Immediately around Batavia and the adjoining northwest coast, there were nearly a hundred private sugar estates, leased from local lordlings now converted to Company employees, the proprietors of which (almost all Chinese) consequently exercised seignorial rights of the villagers who chanced to live on them.

Developments in Europe, not those in Asia, doomed the
company. After the Dutch fleet had been destroyed during the wars in Europe, the power of the Dutch as represented by the company was declining. The Indonesian harbor principalities used this moment of Dutch weakness to fight back the unpopular company. The time when the company could pay high profits to the owners had long passed, and the French revolution with its subsequent Napoleonic wars was the "coup de grace" for the company.

With the occupation of Holland by the French, Indonesia became involved in the war between France and Britain, which was won by the British, who occupied the archipelago from 1811 to 1816. After the defeat of Napoleon in Europe, the British returned the islands to Holland. The re-establishment of Dutch authority was achieved, however, only with great difficulty. Armed resistance against the return of the Dutch was especially pronounced in Java and Sumatra. As a result, not till the end of the 19th century was Holland able to control the whole Indonesian area (109, p. 57).

The Culture System was introduced in 1830 by Governor General van den Bosh. This system was an organization of production for export under which the colonial government forced the peasant cultivators of Java to allocate one-fifth of their land to the production of export crops, to transport them to designated places, and deliver them to the government officials as a kind of "tax." As an alternative, the peasant could work for sixty days for the
government on government-owned estates or other projects, such as building roads, bridges, and irrigation systems. The government officials who supervised the system were given a strong incentive to enforce and extend it as widely as possible by being rewarded with a percentage of the proceeds of the areas for which they were responsible. The bulk of the produce obtained by this forced cultivation and deliveries was shipped to Holland by the "Netherlands Trading Company," for sale there on behalf of the government. Holland benefited by the margin between the expenses of transportation and other costs and what was realized by sale.

To understand the main purpose of the Culture System, one should understand the economic conditions in Holland at the time the system was introduced. At the end of the Napoleonic wars, and after 20 years of foreign domination the once prosperous Holland had no merchants, no manufactures, no shipping, no capital, and no enterprise (33, p. 220). In other words, the Dutch economy at that time was at the brink of bankruptcy. To avoid further deterioration of their economy, the Dutch government employed every possible way to exploit Indonesia. The most efficient and successful device was the Culture System, which in the words of Wertheim "became the life-belt on which the Netherlands kept afloat" (109, p. 52).

In the literature on Indonesian economic history there is a general agreement with regard to the success of the Culture System
as a device for financing economic development in Holland (104, 33, 34, 45). Vlekke, a Dutch historian, estimated that between 1831 and 1877 the Dutch treasury received 823 million guilders from Indonesia. Thus the annual contribution of Indonesia in monetary terms to the Dutch economy averaged 18 million guilders, a very considerable contribution if compared to the Dutch budget, which never exceeded 60 million guilders in those years (107, p. 291).

What are the consequences of the Culture System in the Indonesian economy? There are two positive contributions of the system to the Indonesian economy: improvement of the infrastructure in the rural areas of Java, and the introduction of new crops. Within the framework of the labor-tax system, the government built roads and bridges, expanded irrigation facilities, cleared and improved large tracts of waste land, and constructed buildings. This infrastructure was improved with the purpose of laying the foundations for the private estate industry, and not for the improvement of the peasant economy, although the latter did obtain some benefits from it. As a result of the external economies created by the social overhead capital, private enterprises steadily multiplied. In other words, the improvement of the infrastructure by forced labor made Dutch private entrepreneurship, originally so hampered by lack of capital, progressively more feasible. Furthermore, Dutch entrepreneurs were also encouraged by the availability of skilled labor in handling export
crops introduced during the Culture System.

The second contribution of the Culture System was the introduction of new export crops. Sugar, coffee, and indigo were the main products produced in Java during the Culture System, besides tea, cinnamon, tobacco, pepper, palm oil, and quinine.

In terms of long-run growth potential as well as in short-run suffering and humiliation of the Indonesian people, the drawbacks of the Culture System were various. The defects and evil consequences of the system were obvious, and have been emphasized by scores of writers (107, p. 292-293). The long-run impact of the Culture System on the Indonesian economy is more serious since it reduces the economy's growth potential. This will be discussed in the last part of this section.

The third stage, the Corporate Plantation System, was the era of the great private plantations, when the Culture System gradually gave way to the so-called liberal system. Private entrepreneurs saw opportunities for profitable investments in Indonesia, and became increasingly resentful of governmental monopoly as reflected in the Culture System. Using humanitarian arguments, they despised the system and attacked it successfully, although it provided the foundation, in the forms of improved infrastructure and skilled labor, for profitable investment in the estates. As a result of the efforts of Dutch and other Western enterprises, in 1937, Indonesia had some
$2,240 million, invested in plantations, mines, oil fields and refineries, commerce and finance (45, p. 79). However, this huge investment did not help the economy to a take-off toward industrial development and prosperity. Especially in the peasant sector, it left the people poor. This paradox clearly demands an explanation. The following is an attempt to analyse the effects of Dutch colonial rule from the period of the Culture System to the end of the era, on the growth potential of the Indonesian economy at the present time.

As the Culture System contributed to the formation of an infrastructure in the rural areas of Java, and an introduction of new crops through forced labor and crop selection, the Javanese peasants helped launch the estate sector by providing the foundation for it. However, they were not properly part of it, nor were they permitted to become so (34, p. 69). For example, Higgins reported that in the mid-nineteenth century the Dutch colonial government imposed a regulation forbidding sugar refineries to buy cane from Javanese sugar growers, thus forcing the latter to return to their traditional crop. Similarly, when later the smallholders' rubber became an effective competitor of plantation rubber, the colonial administration imposed a discriminatory tax on small holders' rubber to discourage them (45, p. 83). In other words, the peasants were not allowed to choose the best opportunity open to them by the introduction of new crops and improved infrastructure. Thus the growth potential in the two
positive effects of the Culture System was not harnessed to the overall Indonesian development. Considering the great size of the peasant sector, the negative effect of such a policy on the country's overall development was detrimental.

This effect was also accentuated by the rapid growth of the Javanese population. In the period of 1830-1900 the Javanese population increased from 7 million to 28.4 million—an average annual increase of approximately 2 percent during seventy years (34, p. 69). This growth rate persists through independent Indonesia. Thus, as Dr. Geertz wisely stated, "there is little doubt that it was during the Culture System period that the saying about the Dutch growing in wealth and the Javanese in numbers first hardened into a sociological reality." As a result, by the end of the colonial era the Javanese had "the worst of two possible worlds: a static economy and a burgeoning population" (34, p. 70).

There is a more serious effect on the resource allocation pattern of the Indonesian economy. The export sector, emerging as a consequence of the Dutch colonial policy, is typically composed of the processing and export of a small number of natural-resource specific commodities such as rubber, sugar, oil, and tin. Typically roads, railways, and other social overhead capital, as well as the financial and commercial institutions, are also oriented toward facilitating the raw-material export industries. As such, the export
sector in the Indonesian economy is an extension of the Dutch. As Dr. Geertz stated, "the large scale, well capitalized, rationally organized estate agriculture which by 1900 accounted for 90 percent by value's of Indonesia's export, . . . was essentially not part, save in a merely spatial or geographic sense, of the Indonesia economy at all, but the Dutch" (34, p. 61). Under such conditions, the "spill over effects" of the growing export sector in the sea of stagnation of the peasant economy are likely to be of very little significance. This is supported by the data that after 350 years of Dutch colonialism, "the Indonesians had been drawn into the modern sector of the economy to an astonishingly small degree." At the end of the colonial era, less than 10 percent of the labor force was employed in the modern sector, only about 5 percent of the Indonesian labor force was engaged in trade of any kind, a still smaller percentage were smallholders producing export products, and at least 80 percent of the population still gained its livelihood in the traditional sector (46, p. 65).

The question which immediately arises is why the growth promoting forces of the export sector do not spill over significantly to the rest of the economy. Investment in the export sector depends on the trend of foreign demand for the particular export

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10 A more penetrating argument is given by Fei and Ranis (21, p. 294-296).
product in the colony. If it is favorable, much of the profit will be reinvested in the same activities of the export sector. In the absence of a favorable trend of demand abroad, the profits will be repatriated to the metropolitan country, thus contributing to her growth. This source of capital seldom finds its way into the industrial sector of the colony for two reasons: first, there is a lack of effective demand arising from the essentially stagnant peasant sector; and second, it is against the interests of the metropolitan country.

The second reason applies with special force to Indonesia, due to the peculiarity of the structure of the Dutch economy. Holland was never able "to develop a manufacture export economy even remotely comparable to that of Britain, and so the interest of the Dutch in Indonesia remained overwhelmingly mercantilist to the end" (34, p. 48). Industrial development in Indonesia, it was feared, would lead to increased British or Japanese influence, since Holland could not supply the industrial goods needed. Thus, according to Dr. Geertz "the essential economic task was to maintain a decent differential between the import and re-export prices of East Indian agricultural products—a task which implied the developing of Dutch commercial institutions and the discouraging of Indonesian ones" (34, p. 49).

By following such a policy the Dutch were able to export agricultural products to the world market without changing fundamentally the structure of the Indonesian economy. Or as Dr. Geertz wisely stated,
they were able "to bring Indonesia's crop into the modern world, but not her people."

As a result of these developments, two distinct sectors emerged in the Indonesian economy, a Westernized industrial sector (plantations, mines, oilfields, and refineries), and a traditional rural sector engaged mainly in production of foodstuffs and other peasant agriculture, plus handicrafts or very small industries. The production processes of the first sector is relatively capital intensive, and there is a very limited degree of technical substitutability of factors of production. In other words, production is characterized by fixed technical coefficients. In the traditional rural sector, the products can be produced with a wide range of techniques and alternative combinations of factors. In other words, the sector has variable technical coefficients of production. In contrast with the Western sector, the rural sector is labor intensive rather than capital intensive. Thus the two sectors used two different production functions; this type of economic organization is termed "technological dualism."\(^{11}\)

One of the most important effects of technological dualism is its influence on the pattern of employment. The technologies adopted

\(^{11}\) For a penetrating argument on this subject see Higgins (44, p. 325-33).
in the Western sector were predominantly capital intensive. As such, employment directly generated by expansion of this sector was therefore also relatively small. Because of the rapid population growth rate in Indonesia, especially Java, employment opportunities in the modern sector were not provided at the same rate as that at which the population grows. As a consequence, the other sector, with a variable coefficient of production, became more labor intensive, since the increases in population had to seek livelihood in this sector. To absorb as much of the manpower as possible, given the fixed areas of cultivable land, methods of production remained labor intensive, resulting in low levels of technique of production and marginal productivity of labor. This problem was accentuated in Java by the limitations on crops selection imposed by the Dutch colonial government, which necessitated the absorption of the bulk of the population growth in the food sector of the economy. Thus, with continuing population growth, limited availability of capital, and fixed area of cultivable land--this combination of conditions caused a surplus of labor to arise in the traditional sector, and the marginal productivity of labor fell to zero. This phenomenon was less pronounced in the other islands of the country than in Java, since in those islands land is still relatively abundant. In addition, the Dutch did not succeed in discouraging the Indonesian peasants there to participate in the production of export crops. As a result
small-holder cultivation of export crops was increasing at an accelerating pace in the last 60 years before the great depression of the thirties. 12

In summary, the legacy which the Netherlands left to independent Indonesia was an economy characterized by technological dualism and regional imbalance, a huge and increasing population extremely maldistributed, and the lowest standard of living in South East Asia, still declining. On top of all this, during World War II and the war of independence, the Indonesian economy sustained severe damage and dislocation, which reduced its productive capacity to barely half that of 1941 (22, p. 311). In other words, Indonesia began its independent existence under severe economic handicaps.

After independence, with political controls in the hands of Indonesians, the government took a series of steps aimed at building a more balanced economic structure by encouraging Indonesians to participate in industry and trade. This plan was implemented through

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12 It is interesting to note that the above demographic development was in striking contrast to the way Japan utilized its rapid population growth in the early stages of her development. While Indonesia in the period of 1830-1940 absorbed the bulk of the population growth in the traditional rural sector, Japan in the first century of modernization maintained a relatively unchanging population in agriculture, while the population increased two and a half fold (98, p. 23). Thus all the increase in the labor force in Japan was absorbed in non-agricultural activities, due to the fact that Japan's early development process was essentially capital shallowing.
granting special privileges to Indonesians in commercial activities and large scale industry. The government's program was expanded in 1959 when Indonesia accepted as her goal socialism and planned economic development. But despite these intentions, the program showed only slow progress. It was hampered not only by the structural limitations in the economy, such as lack of capital and skilled labor, but also by the extremely unfavorable political conditions. The latter resulted in huge expenses of non-productive investments which finally crippled the whole economy in the middle of the 1960's. The abortive communist coup in September 1965 opened the eyes of the public to the mis-management of the pre-coup regime. The following quotations from "The Reporter" dramatically pictures the serious problem faced by the country at the present time (108, p. 46).

Not since the last days of Chiang Kai Shek regime in China has inflation ever hit a country or its urban workers so badly. The cost of living index soared from a base of 100 in 1957 to 348 in 1960, 36,000 in 1965 and 150,000 by July, 1966. Money in circulation amounted to 12 billion rupiahs in 1955. This quadrupled in the next five years, rose to 2,714 billion by the end of 1965, and to 10,000 billion by July, 1966. The continuous increase of money in circulation was largely caused by reckless government spending. In 1961 the budget deficit amounted to 23 billion rupiahs; by 1965 it had grown to 1,500 billion. The government spent more and more and the country earned less and less. Exports, excluding oil royalties, were worth 900 million dollars in 1951. They had dropped to $775 million in 1960 and to $424 million in 1965.
In addition, not told in The Reporter's report, is the huge foreign debt of $2,800 million which the country has to pay back within a short time at least in part.

The new regime is more development oriented. Realizing that inflation is the primary problem, the government is attempting to increase revenue and to cut expenditures, to improve economic services and to increase exports. High on the priority list of the present government is the increase in production of food, especially of rice, which in the last few years has become a major import item.

Although political stability is far from being reached, there is no doubt that, because of the potentialities of the natural resources of Indonesia and a development oriented government, the outlook for Indonesia's economic development is brighter in 1967 than it was two years ago.

The Agricultural Foundation

Agriculture is still the dominant sector in the Indonesian economy. From 1953 to 1958, it contributed an average of 55.6 percent of the nation's total output. In the non-agricultural sector, the service sector seems to play an important role, averaging a contribution of more than 20 percent over the same period, while the industrial sector averaged more than 10 percent. The contributions
of the other sectors in the economy can be seen in Table 5.

Table 5. Percentage Distribution of National Income by Sectors of the Indonesian Economy

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<td>Peasant food crops</td>
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<td>36.2</td>
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<td>7.1</td>
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<td>3.8</td>
<td>3.5</td>
<td>3.4</td>
<td>3.2</td>
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<tr>
<td>Livestock</td>
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<td>4.9</td>
<td>4.6</td>
<td>4.5</td>
<td>4.2</td>
<td>5.0</td>
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<td>2.9</td>
<td>2.9</td>
<td>2.8</td>
<td>2.6</td>
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<td>Forestry</td>
<td>2.3</td>
<td>2.2</td>
<td>1.4</td>
<td>1.4</td>
<td>1.3</td>
<td>1.6</td>
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<tr>
<td>Less export duties and</td>
<td>1.1</td>
<td>0.6</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.8</td>
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<tr>
<td>statistical tax</td>
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<td>56.0</td>
<td>55.0</td>
<td>52.6</td>
<td>56.0</td>
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<td>Industry</td>
<td>12.0</td>
<td>11.8</td>
<td>12.2</td>
<td>12.5</td>
<td>14.1</td>
<td>11.0</td>
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<td>19.3</td>
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<td>9.1</td>
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</tr>
<tr>
<td><strong>All Sectors</strong></td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>


As indicated in the table, by far the most important division in the agricultural sector is that of the peasant food crops, which contribute about 65 percent to agriculture's total. Production of the food centers around rice, the staple food of most Indonesians, but
corn, cassava, sweet potatoes, sago, peanuts, and soy beans are of marked importance as are numerous fruits and vegetables. Since this sector is the main concern of this study, it will be discussed in more detail in a later chapter.

Next in importance are the export crops, which contribute around 9 percent to the total national output. This contribution is divided between large-scale estates and smallholders. Production in this sector centers around rubber, copra, sugar, palm oil, tobacco, hard fiber, coffee, and tea. To a lesser extent the sector also produces pepper and other spices, kapok, and cinchona.

In terms of quantities, the relative importance of the estate and smallholder sector in the production and export of these products shows marked changes in the postwar period. While in 1928 the plantations contributed 67 percent of all agricultural exports and smallholders 33 percent, by 1960 the smallholders provided 62 percent and estates only 38 percent (84, p. 141).

In terms of value of exports, there were also marked changes in the relative importance of the products exported. While in 1928 sugar furnished about 23.8 percent of the total export value, at the present time no sugar is exported from Indonesia. The total sugar production has indeed declined heavily, while consumption has increased rapidly (84, p. 142).

On the other hand, the role of rubber in the country's export
earnings expanded gradually from 17.6 percent in 1928 to 44.9 percent in 1960. In 1960, 65 percent of the rubber exported was produced by the smallholder sector. Seventy-five percent of the smallholder's cultivation of rubber is located in Sumatra, and 24 percent in Kalimantan. However, 40 percent of the plantation rubber is located in Java, while only 1 percent of the smallholder's rubber is grown there (84, p. 146).

In total, agricultural exports provide about 60 percent of the country's total export; about two thirds of it come from rubber. Thus, the contribution of the agricultural sector in foreign exchange earnings depends to a large extent on the production and export values of rubber. However, compared with other countries such as Cambodia, Ceylon, and Burma, where the agricultural exports constitute more than 90 percent of the total export values, Indonesia is relatively well off. This favorable situation is due mainly to the role of the mining and petroleum sectors, which contribute about 40 percent of the country's foreign exchange earnings. In 1960 petroleum and tin alone contributed around 33 percent of the total earnings. On the other hand, there seems to be scope for increasing agricultural exports by providing more incentives to the producers, and improving the related facilities.

While crop production is the most important component of the agricultural sector, the raising of livestock is also of significance,
contributing 4.5 percent of the total net output. The total number of animals was estimated at about 21 million in 1961, cattle, buffaloes, horses, goats, sheep and pigs being the principal types. Goats and sheep together furnished 50 percent of the total animal supply, and cattle around 30 percent. The horses and buffaloes are reared to be used mainly for draft animals for agriculture and transportation. Livestock farming is mostly located in Java, Madura, Bali, Lombok, and the other islands of the lesser Sunda group (51, p. 80).

The poultry population, estimated at about 80 million chickens and 17 million ducks, is another source of animal protein (105, p. 27). However, this industry is entirely unlike that prevailing in the Western world. The villagers do not feed the birds, but merely allow them to scavenge.

As Indonesia is an island country, the fishing resources are considered of significant magnitude to supply the badly needed animal protein to the population. The total yield of Indonesian sea and inland fisheries in 1961 almost doubled the 1940 production--903 thousand metric tons in 1961 as compared to 460 thousand metric tons in 1940. Of the total in 1961, 521 thousand metric tons were from the seas and 381 thousand metric tons from inland waters. Experts believe that additional motorized vessels will increase significantly the production of sea fish, since the fishermen will be able to reach fishing grounds far from land without spoiling the catch.
before it is landed (84, p. 152).

Fish farming in Indonesia utilizes fresh water ponds, salt water ponds, and rice fields if the water supply permits. Expanding these types of fish cultivation all over Indonesia would probably solve the protein shortage now faced by Indonesia without necessitating the use of precious foreign exchange. Of course, to avoid spoilage, attention should also be given to improving terminal and processing facilities and fishing methods.

In sum, the predominance of the agricultural sector in Indonesia is unquestioned. In terms of numbers employed, income originated, and export earned, agriculture clearly occupies a position of prime importance and promises to continue to do so for a considerable time to come. As such, this sector will play an important role in the economic development of the country. The success or failure of the development effort of Indonesia depends to a large extent on its export of commercial crops, in order to supply the country with foreign exchange with which to import essentials and capital goods. At the same time, the country's development effort depends on the ability of the agricultural sector to supply food sufficiently to avoid utilization of foreign exchange for agricultural imports. One of the objectives of this study is to evaluate the latter function of the sector.
IV. THE STRUCTURE OF FOOD CONSUMPTION

Introduction

The purpose of this chapter is first, to analyze the development and present state of food consumption in Indonesia as a whole, as well as in the major political regions, and second, to evaluate the nutritional status of the population.

There are two ways of assessing food consumption levels by food balance sheets and by food consumption surveys. A food balance sheet estimates the availability of various foods for human consumption as purchased at the retail level or as brought into the kitchen. The total production of individual commodities is adjusted for imports and exports, for changes in stocks, for any quantities used for animal feed, seed and manufacturing, and for the amounts wasted on farms and during distribution up to retail level. The availability of each product is expressed in per capita terms, based on mid-year population figures. Finally, the net food per capita availability of each product is shown in calories and nutrients, based on the extraction factors of each commodity.

The food-balance-sheet approach to estimating the average per capita consumption is an indirect one, since for the most part averages are estimated as residuals. Thus, following Sukhatme, the
per capita calorie per day availability can be expressed as (96):

\[ C = \sum (P + I + J_1 - E - J_2 - S - F - W - M)RN \frac{1}{(\text{pop}) \times 365} \]

where \( J_1 \) and \( J_2 \) represent the stocks at the beginning and at the end of the consumption year,

\( I \) and \( E \) represent the imports and exports

\( P \) is the total production

\( S \) is the quantity used for seeds

\( F \) is the quantity used for feeds

\( W \) is the quantity wasted

\( M \) is the quantity used for industrial purposes

\( R \) is the extraction factor

\( N \) is the corresponding content of calories or other nutrients.

The summation is over the food items included in the food balance sheet.

From these considerations we know that food-balance-sheet estimates are per capita national averages. As such, disparities in consumption between groups of the population will not be easily seen, while the extent of the dispersion around the average may vary from period to period. In addition, per capita food consumption as estimated through food-balance-sheet methods is, in fact, food available for consumption. After retail sale the extent to which food is wasted, misused, or used for other purposes is unknown. Thus the
availabilities as estimated through the food balance sheets are higher than the actual intake or ingestion.

Household food consumption surveys provide more complete and accurate information of food intake than does the food-balance-sheet approach. They provide information on the distribution of food consumption among the population if the surveys are nation-wide. However, good household surveys are expensive. They require a sizeable skilled staff, which is a scarcity factor in many less developed countries. In addition, the information obtained applies only to a small sample of the population. Thus, the high cost and the limited scope seem to be serious limitations in using this type of surveys for assessing food consumption levels. Moreover, experts agree that even the most expertly conducted studies are liable to biases of under- and overestimation (57, p. 269; 96, p. 470). Underestimation can occur when significant quantities of certain food items are consumed at other than regular meal times or "because they are not even thought of as food by people who eat them" (57, p. 269). Overestimation can occur if the presence of the surveyor in the kitchen provokes the housewife to prepare "company foods and delicacies not a regular feature of the family's meal" (57, p. 269).

The period of time covered presents a further difficulty in conducting household food consumption surveys. The accuracy of the survey depends on the length of the period covered. If it has
been carried out over too short a period, it will fail to take into account the variation in diet from season to season. According to Jones, this variation is particularly significant in poor agricultural populations (57, p. 269; 96, p. 470).

Altogether, it seems to be very difficult to obtain accurate data on food consumption through household surveys. Moreover, extensive household surveys have not been made in Indonesia, where food consumption studies are still in an infant stage, although pre-war studies were made by Dutch scholars covering only Java. Accordingly, we prefer to base our appraisal of food consumption levels on the data from food balance sheets, supplemented whenever available by data from household surveys. Furthermore, these data are invaluable in studying the country's food resources and needs, and for trade and marketing programs. They also provide rough estimates of consumption of certain food items area by area.

In evaluating the nutritional status of the Indonesian population, we shall distinguish its quantitative and qualitative aspects. The quantitative aspect refers to the body's requirement for energy to maintain essential bodily functions and activity. It is measured by calorie intake. Inadequacy of calorie intake is called undernutrition, and if continued over a long period, results in either loss of normal body weight or reduction in physical activity, or both. The qualitative aspect refers to whether or not a diet includes in sufficient
amounts the various nutrients, such as proteins, minerals, and vitamins, necessary for health. Inadequacy of the nutritional quality of the diet is called malnutrition. Depending on the degree of deficiency, malnutrition may result in clinical signs of specific deficiency diseases. Undernutrition and malnutrition are not mutually exclusive. People who are undernourished are likely to suffer from malnutrition, though the reverse may not hold (96, p. 466).

To evaluate the nutritional status of the Indonesian population, we need to know the average per capita calorie requirement. This same requirement is also needed to plan satisfactory diets, and to work out national production and consumption policies. However, standards for good nutrition for various groups of people in different physical and economic situations are still uncertain in many respects. There are a number of factors that make it exceedingly difficult to define nutritional requirements satisfactorily. Requirements of individuals vary with differences in measurable characteristics such as age and size. There are also individual variations among individuals of the same age, size, and activity, but with non-measurable differences in metabolism and skill.

The first serious attempt to establish an international standard of calorie requirements was made by an F. A. O. expert committee in 1949 and revised in 1957. The approach adopted was to define
standard requirements for a reference male and female, and then provide additional tables of factors to adjust for weight, climate, and age. The reference man and woman were of the age group between 20 and 30 years, weighing 65 and 55 kilograms respectively, living in a climate with mean annual temperature of 10°C and were physically fit, with average activity. The average calorie requirements per day for the reference man and woman are respectively 3200 and 2300 calories (25).

These calorie requirements, as described in the F.A.O. report, are far from perfect, but are based on the best knowledge at present available. They are generally accepted by nutritionists and have received wide approval from national authorities. However, it is necessary to realize the effects of the various sources of error on the requirement statistics and to appreciate the nature of approximation involved, before attempting to evaluate the nutritional status of the population.

The requirements of other principal nutrients—proteins, fats, minerals, and vitamins—are not yet so accurately established as those of calories. However, many important elements in protein needs are clear enough to set reliable minimum standards. Here again an expert group of the F.A.O. did pioneering work by proposing a tentative but highly interesting approach to the problem of establishing protein requirements. Average minimum requirements
are estimated in terms of reference protein per kilogram of body weight for various ages. The reference protein is a protein of high nutritive value such as that contained in eggs and milk. Since there are differences in protein quality, a device is introduced whereby "protein scores" can be assigned to the protein contained in various foods. To allow for individual variability in protein needs, the average minimum requirements should be arbitrarily increased by 50 percent. To allow for the quality of the proteins contained in the diet, an adjustment should be made on the basis of the protein score of the typical diet of the group being considered. The result is thus the average requirement per capita per day for the whole country in terms of grams of proteins (29).

The role of fats is the subject of much disagreement. Fats are the most concentrated source of food energy, but nutritionists have not been certain whether humans have a specific need for fat. An F.A.O. report indicates that fat to a certain extent facilitates the absorption of certain vitamins and helps to economize in the need for thiamine (28, p. 8).

Nutritionists have not yet determined minimum requirements for fat, but a report of the U. S. Department of Agriculture, "The World Food Budget 1970," postulates that sufficient fat to provide 15 percent of the calories required should be considered the minimum nutritional requirement (102, p. 24). This suggestion is supported
by Allen in analyzing the world's food shortage (5, p. 39).

This study will use the above requirements for calories, protein, and fat in evaluating the nutritional status of the Indonesian population, by comparing them with the availabilities derived from the food balance sheets. This method, however, could not evaluate the quality of the diet, which could not be measured in terms of a single nutrient. All nutrients must be taken into account. Several methods have been suggested by experts to evaluate the quality of a diet, or to detect any evidence of malnutrition in population groups. In addition to the food-balance-sheet methods and dietary surveys, a third type of investigation is suggested; that is a clinical-medical and biochemical investigation. In other words, this type of investigation examines the state of health of members of the population. There are two major objections against this approach. First, most clinical symptoms of malnutrition are non-specific and difficult to distinguish from signs of other diseases. Second, as is the case with dietary surveys, the scope of such a study is limited and expensive (57, p. 270).

One broad criterion introduced by the F. A. O. seems to be widely acceptable. Where more than 80 percent of the per capita calories are derived from the starchy staples and sugars, the nutritional quality of the diet is likely to be inadequate (32, p. 9). This rough yardstick is accepted by Sukhatme, Allen and Bennet (96, 5, 10). This study will use this criteria, mainly because not much
Composition of Diets

As extensive dietary surveys and clinical-medical investigations have not been made in Indonesia, this study has to use estimates of food consumption derived from food-balance-sheet methods. The data presented are in two main forms: (a) the daily per capita consumption of the different items in the complete diet expressed in calories, grams of protein and fat, and (b) the annual consumption of starchy staples expressed in kilograms of equivalent calories of rice. The factors of conversion of quantities of food items into kilograms of equivalent calories of rice and into calories are those devised by the Nutritional Institute of Djakarta, which differ slightly from those prepared by the F. A. O.

Availability of statistical data mainly dictates the period covered in this analysis. Food-balance-sheet estimates for the complete national diet are averages of the 1960-1961 period composed by the Ministry of Agriculture in Djakarta. For discussion of the starchy staple food consumption, the period of 1954-1961 was chosen, and per capita consumption of these food items can be calculated over the period. In calculating the per capita consumption of starchy staples for the country as a whole and for the different regions, we
have used the food-balance-sheet method, although the adjustments made for the different starchy staples are not the same. Comments on types of adjustments for each product are put into an appendix, together with sources and notes on statistical methods used.  

Unless otherwise stated, the term "starchy staple foods" as used in this paper refers to rice, corn, cassava, and sweet potatoes. As we will see later, sago plays an important role in the diet of the population in Maluku and West Irian, but production statistics over an extended period are not available. Recently the Agricultural Extension Service of the Ministry of Agriculture published rough estimates for the years of 1960 and 1961. Using these estimates enables us to include sago in the discussion of the national diet.

To minimize errors in inter-regional shipments, which are used for calculating availabilities of starchy staple foods in the different regions, larger regions than desirable are selected.

For purposes of better representation, much of what has been discussed in Chapter II is repeated in this chapter, but the arguments here are mostly supported by quantitative data.

The National Diet

As indicated by the food balance estimates shown in Table 6,

---

13 See Appendix B.
Table 6. Average per Capita per Day Consumption of the Different Foods in Indonesia (1960-1961).

<table>
<thead>
<tr>
<th>Food item</th>
<th>Calories</th>
<th>Protein in grams</th>
<th>Fat in grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>894</td>
<td>19.10</td>
<td>2.75</td>
</tr>
<tr>
<td>Wheat</td>
<td>15</td>
<td>0.45</td>
<td>0.10</td>
</tr>
<tr>
<td>Corn</td>
<td>222</td>
<td>5.40</td>
<td>2.40</td>
</tr>
<tr>
<td>Cassava</td>
<td>329</td>
<td>2.85</td>
<td>0.70</td>
</tr>
<tr>
<td>Sweet Potatoes</td>
<td>80</td>
<td>1.15</td>
<td>0.45</td>
</tr>
<tr>
<td>Potatoes</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sago</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Soybeans</td>
<td>36</td>
<td>3.70</td>
<td>1.90</td>
</tr>
<tr>
<td>Peanuts</td>
<td>35</td>
<td>1.60</td>
<td>2.60</td>
</tr>
<tr>
<td>Other Nuts and Pulses</td>
<td>13</td>
<td>0.90</td>
<td>0.10</td>
</tr>
<tr>
<td>Sugar</td>
<td>129</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Vegetables and Fruits</td>
<td>32</td>
<td>1.55</td>
<td>0.35</td>
</tr>
<tr>
<td>Coconuts</td>
<td>63</td>
<td>-</td>
<td>7.50</td>
</tr>
<tr>
<td>Fish</td>
<td>22</td>
<td>3.35</td>
<td>0.95</td>
</tr>
<tr>
<td>Meat</td>
<td>25</td>
<td>2.80</td>
<td>1.60</td>
</tr>
<tr>
<td>Eggs</td>
<td>3</td>
<td>0.30</td>
<td>0.20</td>
</tr>
<tr>
<td>Milk</td>
<td>1</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1914</strong></td>
<td><strong>43.25</strong></td>
<td><strong>21.70</strong></td>
</tr>
</tbody>
</table>

the average Indonesian consumed in the period 1960-1961, 1,914 calories, 43.25 grams protein, and 21.70 grams fat per day. It is important to note that these figures are national averages; they could range from the lowest physically possible intake to the maximum possible intake. Dietary surveys made by the Nutrition Institute in Djakarta, covering the area of Djakarta, South Sumatra, and Central Java, might give an indication of the wide range of food consumption patterns in Indonesia. The 1957 survey in Djakarta disclosed a range from 1309 to 1752 calories for labor families (17). The South Sumatra survey among farmers, made in 1959, indicated an average calorie and protein intake of 1792 and 44 grams respectively. It disclosed further that 31 percent of the people listed averaged less than 1500 calories and 20 percent averaged under 30 grams protein. In contrast, 15 percent ingested over 2400 calories, and the same percentage had diets with protein content in excess of 60 grams (90). The third survey, made in three villages in Central Java during the pre-harvest season in January 1962, reported even larger variations between individual diets. These can be seen in Table 7, where the results of that survey are tabulated.

One of the striking features of the Indonesian diet, as shown in Table 6, is the great importance of the starchy staple foods--wheat, rice, corn, cassava, and sweet potatoes. As a group, they contribute 81 percent of the total calorie intake, and 67 percent and 29 percent
of the protein and fat consumption respectively. The high level of starchy staple consumption is a characteristic of the less developed countries. It reflects the low per capita income, since these foods are ordinarily throughout the world the cheapest per 1,000 calories (10, p. 73). Bennet suggested that as income rises, the starchy staples fall in importance as a source of food calories, while conversely, all other foods rise in importance (10, p. 218). Because of this importance, the analysis of starchy staple food consumption will be discussed separately.

Table 7. Average Consumption of Calories and Protein Content of Diet for Different Economic Groups in Three Villages in Central Java, 1962

<table>
<thead>
<tr>
<th>Village</th>
<th>High Income Group</th>
<th>Medium Income Group</th>
<th>Low Income Group</th>
<th>Average All Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Calories per person per day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sudungdewa</td>
<td>1,532</td>
<td>1,396</td>
<td>1,269</td>
<td>1,405</td>
</tr>
<tr>
<td>Wetonkulon</td>
<td>2,015</td>
<td>1,148</td>
<td>770</td>
<td>1,119</td>
</tr>
<tr>
<td>Tawanghardjo</td>
<td>2,176</td>
<td>1,988</td>
<td>1,549</td>
<td>1,859</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Village</th>
<th>Protein content of diet per person per day in grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudungdewa</td>
<td>38.9</td>
</tr>
<tr>
<td>Wetonkulon</td>
<td>50.9</td>
</tr>
<tr>
<td>Tawanghardjo</td>
<td>53.9</td>
</tr>
</tbody>
</table>

Source: Nutrition Institute (81).
Next in importance as calorie supplier to the diet is sugar, which provides 6.7 percent of the total calorie intake. Sugar consists wholly of carbohydrate, and contributes no protein nor fat to the diet.

The high protein, low carbohydrate food groups of meat, fish, eggs, and milk products account for a minor part of the total calorie, as well as protein, consumption. They contribute less than 3 percent of the total calorie intake, only 15 percent of the protein content of the food supplies, and 8 percent of the fat intake.

Vegetables and fruits, another high quality but low-calorie food group, contribute a small percentage to the energy value and protein value of the diet.

Coconuts, although contributing only 4 percent of the total calorie intake, furnish the largest amount of fat among the other food groups, contributing about 34 percent of the total intake.

Nuts, pulses, and beans as a group supply less than 5 percent of the total calorie intake, 14 percent of the total protein intake, and about one fifth of the fat consumption.

In sum, the Indonesian diet is a textbook example of a diet in a less developed economy. The starchy staple ratio is high, while the consumption of the so-called protective foods, notably animal products, is extremely low. Low per capita income is undoubtedly the main explanation of this pattern of food consumption. At low
income levels, almost the whole sum available for food is spent on the cheaper starchy staples to satisfy hunger. It is only when there is a surplus above what is required to buy these basic needs that significant expenditures on the protective foods become possible.

Starchy Staple Food Consumption

The country's average annual per capita consumption of starchy staple foods in terms of equivalent calories of rice are shown in Table 8, on the following page. It is evident that the average per capita availability in the country as a whole increased slightly over the period 1954-1961. During the last four years, average consumption increased by more than 4 percent, if compared with the average of the first four years.

The regional picture showed wide variations between islands, ranging from a low average of 57 in Maluku to a high of 247 in Bali and Nusatenggara. The extremely high availabilities in the Bali and Nusatenggara regions is hard to explain and are suspected by government officials reporting the data, since there are no indications that major quantities of these foods are being used as raw materials or feed. The low availabilities in the Malulu and West Irian regions are due to the fact that sago production is not included in the computations. Sago is the main staple food in those areas; but since statistical data about sago over an extended period are not
Table 8. Estimated Annual per Capita Consumption of Starchy Staple Foods in Indonesia 1954-1961.
(kilograms in terms of rice calories)

<table>
<thead>
<tr>
<th>Year</th>
<th>Java</th>
<th>Sumatra</th>
<th>Kalimantan</th>
<th>Sulawesi</th>
<th>Maluku and West Irian</th>
<th>Bali and Nusatenggara</th>
<th>Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>155</td>
<td>145</td>
<td>168</td>
<td>155</td>
<td>49</td>
<td>266</td>
<td>162</td>
</tr>
<tr>
<td>1955</td>
<td>144</td>
<td>145</td>
<td>164</td>
<td>160</td>
<td>51</td>
<td>241</td>
<td>151</td>
</tr>
<tr>
<td>1956</td>
<td>151</td>
<td>146</td>
<td>166</td>
<td>157</td>
<td>76</td>
<td>223</td>
<td>154</td>
</tr>
<tr>
<td>1957</td>
<td>146</td>
<td>148</td>
<td>167</td>
<td>145</td>
<td>79</td>
<td>222</td>
<td>152</td>
</tr>
<tr>
<td>1958</td>
<td>165</td>
<td>145</td>
<td>167</td>
<td>178</td>
<td>35</td>
<td>231</td>
<td>164</td>
</tr>
<tr>
<td>1959</td>
<td>154</td>
<td>158</td>
<td>174</td>
<td>158</td>
<td>57</td>
<td>260</td>
<td>160</td>
</tr>
<tr>
<td>1960</td>
<td>161</td>
<td>171</td>
<td>178</td>
<td>156</td>
<td>60</td>
<td>240</td>
<td>167</td>
</tr>
<tr>
<td>1961</td>
<td>145</td>
<td>158</td>
<td>173</td>
<td>142</td>
<td>54</td>
<td>291</td>
<td>155</td>
</tr>
</tbody>
</table>

Average 1954-61 153 152 170 156 57 247 158

Source: See Appendix B.
available, even in Indonesia, it has been excluded from the calculation. Government officials of the Ministry of Agriculture estimated in 1957 that there were 10 million sago trees in the Maluku Islands, permitting a yearly harvest of one million trees, which represents a potential supply of food from this source of 285 kilograms per capita (66, p. 249). In 1963, however, when the Ministry of Agriculture composed the country's first balance sheet for the years 1960 and 1961, it gave a far lower estimate of the per capita availability of sago, which is around 50 kilograms. As the data in Table 8 indicate, there was a sharp decline from 79 kilograms in 1957 to 35 in 1958. This was mainly due to a decline in cassava production and in rice imports to the Maluku Islands. Cassava production declined from 97,000 tons to 43,000 tons, while rice imports decreased from 11,000 tons to 6,000 tons. Yet, despite the low per capita availability of starchy staples excluding sago, the writer has never read nor heard of any reports of famine in those regions. Presumably the availability of sago prevents this phenomenon, and is not as low as reported by the Ministry of Agriculture.

In the other islands the average per capita availability over the eight-year period ranged from a high of 170 kilograms in Kalimantan to a low of 152 and 153 kilograms for Sumatra and Java respectively.
Relative Importance in the Consumption of Starchy Staples

With the exception of Maluku and West Irian, rice is the most important starchy staple in the Indonesian diet. Rice contributes about 46 percent of the total calorie intake, as compared with 12 percent from corn and 21 percent from the roots (including sago and potatoes), while wheat contributes less than one percent.

Within the starchy staple food group, the importance of rice and the cereals in general is reflected in Table 9 on the following page, showing the availabilities of the various starchy staples during the period 1954-1961. Cereals far outweigh the roots as sources of food energy. Seventy-three percent of the starchy staple calorie contribution come from the cereals, while 78 percent of this part of the contribution come from rice. Because of this importance, the analysis of rice consumption will be attempted in a special section.

Of the cereals, maize is the second in importance. It is consumed regularly in Central and East Java, Nusa Tenggara and Sulawesi. Although the calorie content of maize is the same as that of rice, its nutritional quality is inferior to that of rice but superior to that of cassava and sweet potatoes. As we will see later, these rankings are also reflected in the prices of the different starchy staples.

Indonesia imports all of the wheat flour it consumes. Bread
Table 9. Average Annual per Capita Availability of the Different Starchy Staples in Indonesia 1954-1961 (kilograms in terms of rice calories)

<table>
<thead>
<tr>
<th>Year</th>
<th>Rice</th>
<th>Corn</th>
<th>Wheat</th>
<th>Total Cereals</th>
<th>Cassava</th>
<th>Sweet Potatoes</th>
<th>Total Roots</th>
<th>Total Cereals and Roots</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>88</td>
<td>31</td>
<td>1</td>
<td>120</td>
<td>34</td>
<td>8</td>
<td>42</td>
<td>162</td>
</tr>
<tr>
<td>1955</td>
<td>90</td>
<td>22</td>
<td>1</td>
<td>113</td>
<td>31</td>
<td>7</td>
<td>38</td>
<td>151</td>
</tr>
<tr>
<td>1956</td>
<td>91</td>
<td>21</td>
<td>2</td>
<td>114</td>
<td>31</td>
<td>9</td>
<td>40</td>
<td>154</td>
</tr>
<tr>
<td>1957</td>
<td>87</td>
<td>20</td>
<td>2</td>
<td>109</td>
<td>33</td>
<td>10</td>
<td>43</td>
<td>152</td>
</tr>
<tr>
<td>1958</td>
<td>90</td>
<td>27</td>
<td>1</td>
<td>118</td>
<td>36</td>
<td>10</td>
<td>46</td>
<td>164</td>
</tr>
<tr>
<td>1959</td>
<td>90</td>
<td>21</td>
<td>1</td>
<td>112</td>
<td>39</td>
<td>9</td>
<td>48</td>
<td>160</td>
</tr>
<tr>
<td>1960</td>
<td>98</td>
<td>24</td>
<td>1</td>
<td>123</td>
<td>35</td>
<td>9</td>
<td>44</td>
<td>167</td>
</tr>
<tr>
<td>1961</td>
<td>88</td>
<td>22</td>
<td>1</td>
<td>111</td>
<td>36</td>
<td>8</td>
<td>44</td>
<td>155</td>
</tr>
</tbody>
</table>

Average 1954-1961 | 90   | 23   | 1     | 115           | 34      | 9              | 43          | 158                     |

% of total       | 57   | 15   | 1     | 73            | 21      | 6              | 27          | 100                     |

Source: See Appendix B.
is probably the principal form in which wheat flour is consumed. Bread consumption has never reached any level of importance, as can be seen from Table 9.

Cassava or manioc, is the second largest energy contributor. It is grown and eaten throughout Indonesia, averaging annually about 34 kilograms in terms of rice calories over the period 1954-1961. Its popularity is derived mainly from the easy method of cultivation in warm humid climates as in Indonesia, even on impoverished soils. In addition, cassava can be harvested at the convenience of the grower over a period of months or even years. Large reserves may remain in the ground in times of ample food supplies or low prices, waiting until the dry season or until the prices are more favorable. As such they form a good reserve crop against famine.

Only the peeled root of cassava is edible. Ordinary methods of cooking are boiling, frying after slicing, or roasting. In Java dried cassava (gaplek) is very popular; however, the nutritional quality of the dried roots is not so good as that of the fresh ones, since many of the nutrients are lost during the drying process. One of the manufactured products of cassava is tapioca flour, which until recently has been exported.

Sweet potatoes contribute significantly to the calorie intake of the Indonesian people, averaging annually 9 kilograms in terms of rice calories over the period 1954-1961. They are considered a
"delicacy on the side," a snack eaten between meals, yielding in that way a significant number of extra calories.

Cassava and sweet potatoes are considered inferior foods compared with rice and maize. They are mainly calorie suppliers, since the protein content is low and of inferior quality. The diet must not rely mainly on cassava, since protein deficiency diseases are apt to occur. Nutritionists recommend the mixing of cassava with a protein food such as soybean, or even the leaves of the cassava plant.

Table 10 shows the wide variation in the patterns of starchy staple consumption in Indonesia. While on the average of the eight years covered, cereals accounted for 73 percent of the starchy staple calories available in Indonesia, they ranged from as high as 84 percent in Sumatra to as low as 59 percent in the Bali-Nusatenggara regions. If sago is taken into account in the Maluku Islands, the cereal consumption in that area will probably account for less than a quarter of the starchy staple diet.

In Java and Sulawesi much less rice is eaten than in Sumatra, but the starchy staple intake in the three islands is about the same, because the people in Java and Sulawesi supplement their diet significantly with maize, cassava, and sweet potatoes. Thus, in Sumatra and Kalimantan, rice accounts for 95 and 93 percent respectively of the total available cereals, as compared with 77 and 69

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rice</td>
<td>Corn</td>
<td>Wheat</td>
</tr>
<tr>
<td>Java and Madura</td>
<td>81</td>
<td>27</td>
<td>1</td>
</tr>
<tr>
<td>Sumatra</td>
<td>117</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Kalimantan</td>
<td>110</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Sulawesi</td>
<td>87</td>
<td>36</td>
<td>2</td>
</tr>
<tr>
<td>Maluku and West Irian</td>
<td>14</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Bali and Nusatenggara</td>
<td>100</td>
<td>44</td>
<td>1</td>
</tr>
<tr>
<td>Indonesia</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: See Appendix B.
percent in Java and Sulawesi. Also, although sweet potatoes supply over 6 percent of the starchy staples in Indonesia, they are relatively unimportant in Kalimantan.

Finally, from the statistical data used in Table 10, there is some evidence of shifts in the starchy staple consumption pattern. In Java, while the cereal consumption over the eight-year period remained practically the same, there was a 15 percent increase in root consumption, especially cassava, as the availability of sweet potatoes remained constant in the two periods covered. In Sulawesi, over the same period, rice consumption declined by 5 percent while corn consumption remained practically constant. This forced the population to rely more and more on the roots, especially cassava, which increased 35 percent. In Kalimantan the situation was reversed. Over the same period, rice availabilities increased 29 percent, while cassava consumption declined with the same percentage. In Sumatra, rice consumption increased about nine percent, while consumption of cassava and other starchy staples remained practically the same. Thus, in Java and Sulawesi, roots are replacing cereals, while in Sumatra and Kalimantan, cereals are replacing roots.

Rice Consumption

The consumption of rice will be singled out in the discussion
because of its importance in the diet and in the Indonesian economy. As the most important wage good, the behavior of rice prices affects the wage rates and structure. Moreover, since rice is produced by the majority of the total population, changes in rice prices affect the welfare of a large portion of the population.

Because domestic production could not keep up with the growing demand, increasing large quantities of rice must be imported. These imports cost the country annually about 100 million dollars about 20 percent of the total foreign exchange earned annually. As such, rice is the most important agricultural consumer good imported in the country. In addition, rice affects political life in such a way that Dr. O. G. Roeder comments: "The price of rice and politics are inseparable in Indonesia" (87, p. 320). The significance of rice in Indonesia was dramatically emphasized by the Minister of Agriculture when he stated: "The rice problem for Indonesia is not merely an important issue but a matter of life or death" (89, p. 4).

This importance of rice in the Indonesian diet is the result of changes developing in habits and food cultivation, especially the great extension in the sawah system (irrigated rice fields) of the past two hundred years (91, p. 10). In order to know the trend of rice consumption in Indonesia, per capita gross domestic utilization is constructed. Thus production data will be adjusted only by import and
export quantities. However, since Indonesian prewar statistics are limited to the islands Java and Madura, no attempt can be made to determine the prewar trend for the country as a whole. The result of the postwar calculation is graphed on Chart I. The compounded rate of increase of per capita gross domestic utilization of rice over the period 1950-1965 is 0.65, which is reflected by the straight line on the chart.

The limited data available show differences in the per capita consumption of rice in the rural and urban areas. For example, Mears reported that the per capita consumption of West Java as a whole in 1955 was 102.5 kilograms, against an average of 124.8 consumed by low income groups in Djakarta (65, p. 52). The findings of a survey held in 1959 in the Jogjakarta region (Central Java) show a more striking difference in the consumption of rice in the rural and urban areas of the region. They were as follows: (113)

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Per Capita Annual Consumption in Kilograms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipality of Jogjakarta (urban)</td>
<td>89</td>
</tr>
<tr>
<td>Gunung Kidul (rural)</td>
<td>11</td>
</tr>
<tr>
<td>Sleman (rural)</td>
<td>65</td>
</tr>
<tr>
<td>Kulon Progo (rural)</td>
<td>58</td>
</tr>
<tr>
<td>Bantul (rural)</td>
<td>58</td>
</tr>
<tr>
<td>Average</td>
<td>56.2</td>
</tr>
</tbody>
</table>

The food-balance-sheet approach is probably more suitable for determining the trend; however, a lack of data does not permit the writer to use that method. The gross domestic utilization approach is sufficient to indicate the trend but not the level of consumption.

Source: See Appendix C.
The food-balance-sheet estimate for that same year in Central Java was 72 kilograms, which is much lower than the per capita consumption of urban Jogjakarta.

Historical, physical, social, economic, and political factors combine to determine where and in what proportions rice is consumed in Indonesia. With the probable exception of the people in the Maluku and West Irian regions, Indonesians prefer rice to other starchy staple foods. They would, if able, eat rice as the central item of virtually all main meals throughout the year. This strong preference for rice must be reflected in the relative prices of rice and other starchy staples. Although the information at hand bearing directly on consumer preferences for rice and other staple foods is sketchy, we will attempt to quantify it.

Views concerning preferences are subjective, since they depend on the utility function of the consumer. More objective information concerning consumer preferences can be obtained through examining relative prices of the products investigated. Since only average yearly prices in the rural areas of Java are available, these data will be used in the following analysis. The data refer to 220 purposely selected markets (at most two subdistricts out of every district were

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15 This part is mainly based on the Johnston analysis of consumer preferences in Western Tropical Africa (54, p. 144-159).
chosen, excluding the principal towns throughout Java and Madura) 
(50, p. 231). No information can be given with regard to the nature 
of the market, the methods used in collecting the data, or the degree 
of confidence which can be placed in them. More qualifications of 
the results are considered below.

Relative prices of rice, maize, sweet potatoes, and cassava 
are summarized in Table 11. Note that the prices are expressed as 
a price per 1000 calories, and indices are computed on that basis for 
the different products. 16 Since rice is widely grown and is a rela-
tively homogeneous product, its average price has been used as the 
base for deriving the indices. The price relationships revealed in 
Table 11 suggest a definite tendency toward a consistent hierarchy of 
starchy staple food prices. Thus, in terms of annual average prices, 
rice ranks considerably above the others, whereas cassava, except 
in the year 1954, is consistently the cheapest staple. The position of 
sweet potatoes and maize does not show any consistency from year 
to year. But in five of the seven years covered, maize ranked 
higher than cassava. If we take the seven-year average for each 
product, we can rank them as follows:

---

16 The more detailed data on which Table 11 is based, together 
with the source, are shown in Table A-2 of Appendix A.
Table 11. Indices of Starchy Staple Food Prices in the Rural Areas of Java, 1954-1960 (Rice is 100)

<table>
<thead>
<tr>
<th>Year</th>
<th>Rice</th>
<th>Maize</th>
<th>Cassava</th>
<th>Sweet Potatoes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>100</td>
<td>31</td>
<td>36</td>
<td>46</td>
</tr>
<tr>
<td>1955</td>
<td>100</td>
<td>47</td>
<td>38</td>
<td>46</td>
</tr>
<tr>
<td>1956</td>
<td>100</td>
<td>52</td>
<td>43</td>
<td>45</td>
</tr>
<tr>
<td>1957</td>
<td>100</td>
<td>46</td>
<td>38</td>
<td>44</td>
</tr>
<tr>
<td>1958</td>
<td>100</td>
<td>42</td>
<td>37</td>
<td>43</td>
</tr>
<tr>
<td>1959</td>
<td>100</td>
<td>44</td>
<td>31</td>
<td>38</td>
</tr>
<tr>
<td>1960</td>
<td>100</td>
<td>45</td>
<td>33</td>
<td>42</td>
</tr>
</tbody>
</table>

1954-1960 Average 100 44 37 43

*Calculated from Appendix Table A-2.

Although the above price relationships are of considerable interest as an indication of consumer preferences, important qualifications must be made. The Johnston sequence of qualifying factors lists as the first the margin of error in the price data from which the indices have been computed. Considering the fact that statistical services in Java have a long history and are the best in the country, one can be confident that the prices are not too far from reality, and to a considerable extent the errors are compensating. However,
since bargaining is common in the rural areas of Indonesia, the average transaction prices may differ from the quoted prices.

Second, since price is determined by supply and demand, it is not a reflection of consumer preferences only, except when the cost of production of the different products is the same, resulting in closely similar supply schedules. Considering the fact that most of the four products are produced in a family-type farm where the most important variable input is family labor, and where off-farm inputs are negligible, one can assume that the cost of production of the four products per 1000 calories is equal. This assumption is not necessary, however, if we are satisfied with the following more precautious statement that the consistently high prices for rice are a result both of its relatively high cost of production and a strong position in the hierarchy of consumer preferences.

A third qualification is the use of annual averages of prices over a large area, such as the island of Java. Seasonal variation of prices is a unique characteristic of agricultural commodities. This variation is intensified in Indonesia because of a lack of storage facilities, the limited financial strength of the producers, and the size of the farm holdings. These variations impair to a certain extent the significance of price relationships derived from annual average prices. Moreover, communication difficulties result in geographical price differences. In other words, there is no one
market in Java where one price prevails throughout the island. The use of one average price for such a large area where different market conditions prevail, blurs the significance of the reported price relationship.

Because of these difficulties and qualifications, the analysis of relative prices must be arbitrary and uncertain. However, given the qualifications and uncertainties, the ranking of the starchy staples on the basis of their relative prices is suggestive enough. Rice ranks considerably above the other starchy staples in the price hierarchy.

Finally, it is interesting to note that although rice and corn have almost the same number of calories per unit of weight, rice ranks considerably higher than corn. This indicates that the rice eater in Indonesia is a habitual rice consumer who is prepared to pay a premium for rice. Food habits and customs are important factors governing demand, and place rice in a strong competitive position with other starchy staples.

The writer regrets that he could not extend his analysis to the other areas. He suspects that rice would have a stronger position in the hierarchy of consumer preferences in the outer islands, with the exception of the Maluku and West Irian regions. There is statistical evidence that during the period of 1954-1961 production of food did shift away from cassava to rice. This can be seen from Table 12.
As can be seen, this shift happened during high per capita imports into the region, and has led to a high per capita availability of rice. Land is in abundance relative to the population in Kalimantan, so that cultivated area can be expanded as long as lands are cleared; however, it is interesting that the newly cultivated land was planted in rice rather than in other starchy staples. The planted area of rice increased by about 25 percent in the period 1955-1961, as compared with less than one percent for Indonesia as a whole. This shift might be a reflection of strong consumer preference for rice, since otherwise with huge imports continuing to that area, additional land would have been planted with other crops.

Table 12. Annual per Capita Availability of Starchy Staple Foods in Kalimantan from 1954 to 1961. (kilogram in terms of Rice Calories)

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
<th>Imports</th>
<th>Total</th>
<th>Cassava</th>
<th>Maize</th>
<th>Sweet Potatoes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>110</td>
<td>11</td>
<td>121</td>
<td>52</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>1955</td>
<td>91</td>
<td>21</td>
<td>112</td>
<td>54</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>1956</td>
<td>79</td>
<td>25</td>
<td>104</td>
<td>60</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>1957</td>
<td>81</td>
<td>21</td>
<td>102</td>
<td>68</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>1958</td>
<td>96</td>
<td>21</td>
<td>117</td>
<td>52</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>1959</td>
<td>106</td>
<td>23</td>
<td>129</td>
<td>47</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>1960</td>
<td>121</td>
<td>22</td>
<td>143</td>
<td>32</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>1961</td>
<td>116</td>
<td>19</td>
<td>135</td>
<td>36</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: See Appendix B.
The Nutritional Status of the Population

As indicated earlier in this chapter, in evaluating the nutritional status of the Indonesian population, we shall distinguish its quantitative and qualitative aspects. Quantitatively we need to know the calorie, protein, and fat requirements, while qualitatively we will use a rule-of-thumb criteria suggested by the F.A.O. These requirements will be compared with our findings on food consumption in the previous sections. Our conclusions with regard to the nutritional status of the Indonesian population will be based on such a comparison.

The Quantitative Aspect

Until recently food requirements in Indonesia have been anybody's guess. Politicians, administrators, and planners have their own views on what the best requirement for Indonesia is. The most authoritative estimate was given by the Nutritional Institute of Djakarta, which recommended a 2200 calorie per day intake. This total appears to have been derived from recommendations for tropical countries by Lucius Nicholls (74). In more recent years, in an attempt to solve the country's mounting food problem more scientifically, the government has formed various committees to determine
the nutritional requirements of the nation. 17

With the conclusion of the 1961 population census, which provides a detailed age structure of the population, calorie requirements can be constructed on the basis of the F. A. O. scale. Table 13 gives the actual requirement scale for the population of Indonesia with environmental temperature of 25°C. and with reference weight of 55 kg. for men and 45 kg. for women. Following the methodology suggested by the F. A. O., we obtain the average per capita requirement applicable for Indonesia from the table by multiplying the actual requirement of each age and sex group by the proportion of the people in the different groups. As shown in the table, the per capita calorie requirement per person is 1952 calories per day.

Before we compare this finding with the availability of calories estimated according to the food-balance-sheet method, it is important to note the following: In calculating the requirements, we take into account differences between sexes and between age groups within sexes, but do not include differences in physical activity. The F. A. O. reference scale assumes that the average activity of all adults

17 The writer has helped one of the committees in collecting, processing, and analyzing food statistics, and has participated in the seminars in evaluating the reports of the various committees. In part the statistical data in this section is an outgrowth of the writer's work in Indonesia and of his collaboration with other members of the committee and participants of the seminar.
<table>
<thead>
<tr>
<th>Age Group</th>
<th>Population %</th>
<th>Reference Requirement Scale Calories per cap./day</th>
<th>Actual Requirement Scale Calories per cap./day</th>
<th>Per Age Group/day (Calories)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>male</td>
<td>female</td>
<td>male</td>
<td>female</td>
</tr>
<tr>
<td>Under 1</td>
<td>3.3</td>
<td>1,120</td>
<td>1,120</td>
<td>3,696</td>
</tr>
<tr>
<td>1 - 3</td>
<td>10.7</td>
<td>1,300</td>
<td>1,203</td>
<td>12,872</td>
</tr>
<tr>
<td>4 - 6</td>
<td>10.3</td>
<td>1,700</td>
<td>1,573</td>
<td>16,202</td>
</tr>
<tr>
<td>7 - 9</td>
<td>9.3</td>
<td>2,100</td>
<td>1,943</td>
<td>18,070</td>
</tr>
<tr>
<td>10 - 12</td>
<td>3.15</td>
<td>2,500</td>
<td>2,400</td>
<td>7,286</td>
</tr>
<tr>
<td>13 - 15</td>
<td>2.24</td>
<td>3,100</td>
<td>2,600</td>
<td>6,224</td>
</tr>
<tr>
<td>16 - 19</td>
<td>3.23</td>
<td>3,600</td>
<td>2,961</td>
<td>9,564</td>
</tr>
<tr>
<td>20 - 29</td>
<td>7.68</td>
<td>3,200</td>
<td>2,620</td>
<td>20,122</td>
</tr>
<tr>
<td>30 - 39</td>
<td>7.16</td>
<td>3,104</td>
<td>2,541</td>
<td>18,094</td>
</tr>
<tr>
<td>40 - 49</td>
<td>4.56</td>
<td>3,008</td>
<td>2,462</td>
<td>11,227</td>
</tr>
<tr>
<td>50 - 59</td>
<td>2.65</td>
<td>2,768</td>
<td>2,266</td>
<td>6,005</td>
</tr>
<tr>
<td>60 - 69</td>
<td>1.20</td>
<td>2,528</td>
<td>2,069</td>
<td>2,483</td>
</tr>
<tr>
<td>70 +</td>
<td>0.84</td>
<td>2,208</td>
<td>1,807</td>
<td>1,518</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>195,235</td>
<td>1,952</td>
<td></td>
</tr>
</tbody>
</table>

Source: Penentuan kebutuhan zat-zat makanan untuk Indonesia. Paper presented by a government appointed committee under the chairmanship of Dradjat D. Prawiranegara, to a seminar on nutrition, Djakarta, 1963. (mimeographed)
corresponds to the activity of the reference adults. The F.A.O. admits that differences in physical activities within one population group may lead to considerable variation in the average levels of requirements for the country. The same can be said of the other factors, the reference weight and the environmental temperature. Another source of error is due to the fact that the F.A.O. reference scale refers to the "physiological level," that is, to calories from food actually consumed (25, p. 50). Our food-balance-sheet estimate refers to food available at retail level. Thus, before making the comparison, we must make allowances for loss of edible food in the home during storage and processing, and loss as wastage on plates or as feed for animals. The F.A.O. committee on calorie requirements concluded from the available data "that in most countries edible food waste does not exceed 10 percent of the calories at the retail level" (25, p. 51). Accordingly, it has been common practice to compare consumption figures with requirements adjusted by the addition of 10 percent for waste. 18

The effects of the various sources of error on the requirements

18 This proportion might be too high for Indonesia. Considering the poverty of the majority of the population, it is more likely that the proportion wasted is lower. However, we will use this percentage since no data are available to suggest another figure and also since "it might be a safe figure to adopt, especially in view of the more liberal food supplies likely to be available in the future" (25, p. 51).
statistics are stressed here, because it is necessary to appreciate the nature of the approximation involved before attempting to evaluate the nutritional status of the Indonesian people. On the other hand, the F.A.O. reference scale is based on the best knowledge available at present, and has received wide approval from specialists in the field, as well as from national authorities.

If we adjust above per capita calorie requirement by the addition of 10 percent to bring it up to the retail level, then the average requirement becomes 2148 calories. We can conclude that, compared with the 1,914 per capita availability, the level of energy supply in Indonesia was below the recommended level. This energy deficit amounts to 234 calories. In terms of rice supplies, the deficit amounts to approximately 2.6 million tons. This energy gap may persist throughout the year or be particularly felt in the preharvest season. Again, it may be shared by the majority of the population, or fall heavily on the population group with the lowest per capita income. The rich will eat all they need and perhaps more, but the ability of the poor to eat is limited by their income.

Table 14 is an estimate of the average per capita per day protein requirement in terms of grams of reference protein, which

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For a more penetrating discussion on these sources of error, see Sukhatme (96, p. 472-474).
Table 14. Reference Protein Requirements in Indonesia

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Population Male</th>
<th>Population Female</th>
<th>Body Weight Male</th>
<th>Body Weight Female</th>
<th>Reg./kg</th>
<th>Ave. Requirement Male</th>
<th>Ave. Requirement Female</th>
<th>III x V Male</th>
<th>III x V Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III x V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 1</td>
<td>3.3</td>
<td>8.8</td>
<td>1.40</td>
<td>12.32</td>
<td></td>
<td></td>
<td></td>
<td>40.66</td>
<td></td>
</tr>
<tr>
<td>1 - 3</td>
<td>10.7</td>
<td>11.0</td>
<td>1.20</td>
<td>13.20</td>
<td></td>
<td></td>
<td></td>
<td>141.24</td>
<td></td>
</tr>
<tr>
<td>4 - 6</td>
<td>10.3</td>
<td>15.9</td>
<td>0.90</td>
<td>14.31</td>
<td></td>
<td></td>
<td></td>
<td>147.40</td>
<td></td>
</tr>
<tr>
<td>7 - 9</td>
<td>9.3</td>
<td>20.6</td>
<td>0.77</td>
<td>15.86</td>
<td></td>
<td></td>
<td></td>
<td>147.50</td>
<td></td>
</tr>
<tr>
<td>10 - 12</td>
<td>3.15</td>
<td>2.75</td>
<td>26.8</td>
<td>28.4</td>
<td>0.73</td>
<td>19.56</td>
<td>20.73</td>
<td>61.61</td>
<td>57.00</td>
</tr>
<tr>
<td>13 - 15</td>
<td>2.24</td>
<td>1.90</td>
<td>37.5</td>
<td>44.2</td>
<td>0.80</td>
<td>30.0</td>
<td>35.36</td>
<td>67.20</td>
<td>67.20</td>
</tr>
<tr>
<td>16 - 19</td>
<td>3.23</td>
<td>3.24</td>
<td>48.1</td>
<td>45.1</td>
<td>0.80</td>
<td>38.48</td>
<td>36.10</td>
<td>124.30</td>
<td>117.00</td>
</tr>
<tr>
<td>20 - 24</td>
<td>3.00</td>
<td>5.10</td>
<td>53.8</td>
<td>45.2</td>
<td>0.50</td>
<td>26.90</td>
<td>22.60</td>
<td>80.70</td>
<td>115.26</td>
</tr>
<tr>
<td>25 +</td>
<td>21.09</td>
<td>20.70</td>
<td>55.7</td>
<td>45.9</td>
<td>0.50</td>
<td>27.85</td>
<td>22.95</td>
<td>587.36</td>
<td>475.26</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td></td>
<td></td>
<td>2,229.49</td>
<td></td>
</tr>
</tbody>
</table>

Per Capita requirement. 22.29 grams reference protein

is 22.30 grams. This figure is then increased by 50 percent in order to allow for individual variability in requirements, as recommended by the F.A.O. Committee on Protein Requirements. Furthermore, it is adjusted by the need of additional proteins for women during pregnancy and lactation. Two more necessary adjustments are needed before we are able to compare it with the availability. First the average requirement in terms of the reference protein has to be expressed in terms of the proteins contained in the food supplies of the country. The protein score of Indonesia is 80; thus the corresponding coefficient is 1.25. By multiplying the coefficient with the requirement in terms of reference protein, the per capita requirement is expressed in terms of mixed protein or proteins in the food supply. Second, as in the case of calorie requirement, the protein requirement must be adjusted by the addition of 10 percent to bring it up to the retail level. The result of all these calculations and adjustments is a requirement of 47.6 grams mixed protein.

Compared with our food balance sheet estimate, the protein deficit is 4.35 grams. The protein score 80 indicates that the ratio between animal protein and plant protein is 1 to 3. In other words, of the 47.6 grams mixed protein required, less than 12 grams must

\[20\] The method of calculation is shown in detail in the F.A.O. report (25).
come from animal products. Compared with the balance sheet estimate which shows only 6.55 grams of animal protein, the protein deficit is more serious than indicated by the 4.35 gram deficit.

Fat requirements are easier to calculate, although they are of a more arbitrary character. As mentioned earlier, fat requirements are expressed in terms of the amount that would provide 15 percent of the reference standard for calories. For Indonesia this amounts to 36 grams fat. Compared with the estimated fat consumption, Indonesia has a fat deficit of 14.3 grams. 21

Thus, per capita consumption of the three nutrients in Indonesia is below the standard required. These deficits are summarized in the following table, together with per capita requirements and consumption.

<table>
<thead>
<tr>
<th></th>
<th>Per Capita Requirement</th>
<th>Per Capita Consumption</th>
<th>Deficits in Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>2148</td>
<td>1914</td>
<td>11</td>
</tr>
<tr>
<td>Proteins</td>
<td>47.6</td>
<td>43.25</td>
<td>9</td>
</tr>
<tr>
<td>Fats</td>
<td>36.0</td>
<td>21.70</td>
<td>40</td>
</tr>
</tbody>
</table>

21 There are reasons to believe that these figures are underestimated, since coconut and other vegetable oils, an important source of fat, are widely used in shortenings. The U.S.D.A. estimated that from vegetable oil only, 16.2 grams fat per day are consumed. If this amount is added to the per capita fat consumption used in this study, Indonesia does not have a fat deficit (104, p. 6).
The Qualitative Aspect

In the absence of agreed standards of nutritional quality, we will use the indicator suggested and used by the F. A. O., the proportion of total calories derived from cereals, starchy roots, and sugars (32, p. 9). A ratio exceeding 80 percent for this indicator was taken as clear evidence of malnutrition. This ratio for Indonesia amounts to 88.7 percent.

Since undernutrition and malnutrition are not mutually exclusive, and since undernourished people are more likely to be malnourished, the quality of the diet can be inferred also from the nutrients gap mentioned earlier. Especially, the low level of animal proteins in the diet suggests the low quality of the diet.

The above statistical analysis of the nutritional status of the population seems to be supported by the few dietary surveys in Indonesia. Protein deficiency diseases are reported, especially in areas where cassava forms the largest supplier of calories (26). This prevalence is especially true in the area of Jogjakarta where the per capita rice consumption is 11 kg. per year (See table on page 116).

The Ideal Menu

Based on calorie and protein requirements, an ideal menu was
constructed by an official government committee of experts consisting of economists, nutritionists, agriculturists, and statisticians. In composing the menu, the committee took into account the following considerations: 1) the nutritional requirements, 2) acceptability, 3) nutritional quality, 4) keeping qualities, 5) potentialities of producing the specific foods in great quantities in Indonesia, 6) economic considerations such as the relationship between price and purchasing power, and 7) religion. In variety the ideal menu did not differ very much from the average menu, as estimated through the balance sheet. However in relative importance both show differences. This can be seen from Table 15, where the ideal menu is compared to the existing one. The ideal menu suggests less rice and root consumption but more than double consumption of maize, animal products, and fruits and vegetables. In the starchy staple consumption pattern, the shift to more maize and less rice is primarily based on a bright prospect of corn production and on the belief that growth of rice production is very slow.

Expenditure on Food

The data on this subject is limited, but the few available are illuminating enough to warrant important conclusions. They relate to two areas in Java and to two different periods by means of a pre-war budget study in Java and a postwar one in Jogjakarta.
Table 15. Actual and Ideal Menus (in kilograms)

<table>
<thead>
<tr>
<th></th>
<th>Actual Menu&lt;sup&gt;a&lt;/sup&gt; 1960-1961 average</th>
<th>Ideal Menu&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>92.7</td>
<td>81.0</td>
</tr>
<tr>
<td>Corn</td>
<td>21.9</td>
<td>45.0</td>
</tr>
<tr>
<td>Roots</td>
<td>111.6</td>
<td>54.0</td>
</tr>
<tr>
<td>Animal products</td>
<td>11.9</td>
<td>30.2</td>
</tr>
<tr>
<td>Fruits and Vegetables</td>
<td>35.0</td>
<td>72.0</td>
</tr>
</tbody>
</table>

<sup>a</sup>Calculated from food balance sheets 1960 and 1961, estimated by the Ministry of Agriculture, Djakarta.

<sup>b</sup>Adapted from a report of a government appointed committee, "Penentuan barbagai bahan makanan jang memenuhi keperluan zat makanan, jang terdapat di Indonesia," Djakarta, 1963.

The Djakarta survey covered only the municipal employees of the city, whose income averaged less than 100 guilders a month. The result of this survey is summarized in Table 16. The lower part of the table shows the expenditure proportions by income level. It is apparent that the most important expenditure group was that for food. It decreased in significance as income rose, although in absolute terms food expenditures increased with income. Thus the proportion of the total income spent on food decreased with increasing income.

Table 16 also reveals the food budget, which clearly reflects the importance of rice in terms of food expenditures. The proportion of rice in the total food expenditure dropped rapidly as income
Table 16. Average Monthly Food Expenditures in Djakarta, 1937 (in guilders)

<table>
<thead>
<tr>
<th>Expenditure group</th>
<th>Income per day in cents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Uncooked Rice</td>
<td>3.47</td>
</tr>
<tr>
<td></td>
<td>56%</td>
</tr>
<tr>
<td>Jajanan &amp; Prepared Rice</td>
<td>0.99</td>
</tr>
<tr>
<td></td>
<td>16%</td>
</tr>
<tr>
<td>Meat, Fish &amp; Eggs</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>Fresh Vegetables &amp; Fruits</td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td>7.5%</td>
</tr>
<tr>
<td>Spices, salt, tea &amp; coffee sundries</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>5.5%</td>
</tr>
<tr>
<td>Coconut Oil</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>2.5%</td>
</tr>
<tr>
<td>Farinaceous Products</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>1.5%</td>
</tr>
<tr>
<td>Sugar</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>1%</td>
</tr>
<tr>
<td>Total Food</td>
<td>6.20</td>
</tr>
<tr>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>Proportion of food to total expenditures</td>
<td>60.5%</td>
</tr>
</tbody>
</table>

rose. On the other hand, the proportion of protective foods to total expenditure increased rapidly with rising income.

The second survey covered a wider area, the regency of Jogjakarta, and was held in 1959. Before we analyze the findings of the survey, it is important to note that Jogjakarta belongs to the most densely populated area in Java, with an average density of 707 persons per square kilometer. Of the four subregions, Bantul has the highest density figure of about 1190. The region is a food deficit area, averaging 56 kilograms of rice per capita consumption (see table on page 116) and is a major cassava consumption area. If the consumption pattern can be used as an indication of welfare, then the Jogjakarta region belongs to one of the poorest areas in Java, especially the Gunung Kidul subregion, where only 11 kilograms of rice were consumed in 1959.

The results of the survey are summarized in Tables 17 and 18. As in the Djakarta survey, the proportion of income for food expenditure is the largest, and decline when income rises. A variation is, though, that from the lowest to the second lowest level of income, food expenditure increases rather than declines. This might be considered as an indication that when incomes first begin to rise above the subsistence level, the more expensive foods are largely additional to the basic diet.

Table 18 shows consumers' expenditures by subregions. As it
shows a finer breakdown of the food budget, it shows differences in the rural and urban consumption pattern. The dominance of roots in the poorest area (Gunung Kidul) is sharply contrasted to the dominance of cereals in the food budget of the other regions. Animal products are practically absent in the rural area consumption pattern, as compared to 11 percent in urban Jojakarta. All of these data are sufficient to indicate that as soon as income rises, better food is consumed; cereals replace the roots, and protective foods replace some of the cereals.

Table 17. Proportions of Food Expenditures by Income Level, Jogjakarta 1959

<table>
<thead>
<tr>
<th>Average annual Income in Rupiahs</th>
<th>Food expenditures as percent of total in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>899</td>
<td>68</td>
</tr>
<tr>
<td>2,081</td>
<td>71</td>
</tr>
<tr>
<td>3,029</td>
<td>70</td>
</tr>
<tr>
<td>4,160</td>
<td>67</td>
</tr>
<tr>
<td>5,324</td>
<td>65</td>
</tr>
<tr>
<td>21,027</td>
<td>35</td>
</tr>
<tr>
<td>36,513</td>
<td>43</td>
</tr>
</tbody>
</table>

Source: Wirjosudarmo (113).

The above findings of the two surveys seem to confirm once more Engel's familiar law that the proportion of the total income
Table 18. Proportions of Food Expenditures by Subregions, Jogjakarta 1959

<table>
<thead>
<tr>
<th>Average annual income in Rupiahs</th>
<th>9,091.46</th>
<th>2,963.05</th>
<th>4,212.15</th>
<th>4,867.91</th>
<th>4,486.81</th>
<th>4,132.48</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Jogjakarta</td>
<td>0.40</td>
<td>0.16</td>
<td>0.56</td>
<td>0.54</td>
<td>0.55</td>
<td>0.45</td>
</tr>
<tr>
<td>Gunung-Kidul</td>
<td>0.00</td>
<td>0.48</td>
<td>0.02</td>
<td>0.09</td>
<td>0.08</td>
<td>0.17</td>
</tr>
<tr>
<td>Sleman</td>
<td>0.04</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Kulonprogo</td>
<td>0.06</td>
<td>0.00</td>
<td>0.02</td>
<td>0.01</td>
<td>0.00</td>
<td>0.01</td>
</tr>
<tr>
<td>Bantul</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Rural Average</td>
<td>0.19</td>
<td>0.09</td>
<td>0.17</td>
<td>0.12</td>
<td>0.15</td>
<td>0.13</td>
</tr>
<tr>
<td>Cereal</td>
<td>0.13</td>
<td>0.14</td>
<td>0.12</td>
<td>0.13</td>
<td>0.10</td>
<td>0.12</td>
</tr>
<tr>
<td>Roots</td>
<td>0.09</td>
<td>0.02</td>
<td>0.04</td>
<td>0.03</td>
<td>0.04</td>
<td>0.03</td>
</tr>
<tr>
<td>Fish &amp; Seafoods</td>
<td>0.08</td>
<td>0.11</td>
<td>0.07</td>
<td>0.08</td>
<td>0.08</td>
<td>0.09</td>
</tr>
<tr>
<td>Meat &amp; Egg</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Milk &amp; Milk Product</td>
<td>0.19</td>
<td>0.09</td>
<td>0.17</td>
<td>0.12</td>
<td>0.15</td>
<td>0.13</td>
</tr>
<tr>
<td>Vegetables &amp; Fruits</td>
<td>0.13</td>
<td>0.14</td>
<td>0.12</td>
<td>0.13</td>
<td>0.10</td>
<td>0.12</td>
</tr>
<tr>
<td>Prepared food</td>
<td>0.19</td>
<td>0.09</td>
<td>0.17</td>
<td>0.12</td>
<td>0.15</td>
<td>0.13</td>
</tr>
<tr>
<td>Drink</td>
<td>0.13</td>
<td>0.14</td>
<td>0.12</td>
<td>0.13</td>
<td>0.10</td>
<td>0.12</td>
</tr>
<tr>
<td>Total Food</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Food as percent of total expenditures: 56 67 67 63 60 63

Source: Wirjosudarmo (113).
spent on food decreases with the rising income. They also confirm
the proposition that when income rises, better foods will be consumed,
replacing the inferior ones: rice will replace the roots. At higher
income levels, more protective food will be consumed as soon as the
saturation point for rice consumption is reached.

These conclusions are of obvious significance in planning
production or organizing marketing. They give an indication of the
food supply needed to avoid inflationary trends for any given rise in
incomes in the course of economic development of the country.

Conclusions

This chapter has shown that the average Indonesian diet is
inadequate in terms of quantity and quality. This lack is indicated
by the calorie gap of more than 200 calories a day, by the very high
proportion of calories derived from the carbohydrates, and by the
very low consumption of animal protein and fat.

Per capita availability of starchy staples shows variations
between regions or islands. These variations arise from a wide
assortment of interdependent factors which are physical, social,
economic, and perhaps political. Due to the geographical features of
Indonesia, the physical factors such as location, climate, soils, and
vegetation, strongly influence the consumption pattern of a region
through their effects on agricultural production. This influence is
especially felt in areas where limited transportation facilities force the people to depend on locally produced food.

Rice is the most important staple in the Indonesian diet, followed by corn, cassava, and sweet potatoes. Between regions, the importance of rice shows significant variations. In Maluku and West Irian rice is not so important a staple as in the other regions. In Java and Sulawesi, less rice is eaten than in Sumatra and Kalimantan. Variations within a region are also great, as is shown for the Jogjakarta region.

Differences in the relative importance of rice are also shown for the urban areas, as contrasted with the rural areas. Higher incomes, better education, and probably the existence of imitative consumption in the cities, might cause these differences.

We have attempted to quantify the peculiar preference of the Indonesian rice-eater by using the price relationships of the starchy staples as the indicator. Although conclusions of the analysis are tentative and arbitrary, it has been suggested that the consistently high prices for rice are partly a result of a strong position in the hierarchy of consumer preference. In addition, we have stressed the importance of rice in the Indonesian economy and in the development effort of the country.

Finally, the few budget surveys available seem to confirm the Engels and Bennet law. The first refers to the relationship between
level of income and the proportion of income spent on food. The second refers to the level of income and the starchy staple ratio.
V. THE DEMAND FOR FOOD--INCOME AND POPULATION EFFECT

Theoretically there is a host of factors affecting the demand for food. Prominent among these factors are population growth, income growth, and the related income elasticity. The discussion in this chapter will center around these three variables, assuming no changes in the other factors affecting the demand for food, especially the price relationship among products.

The primary purpose of this chapter is to estimate the rate of growth of demand, and to project the demand for food on the basis of the assumptions made for population and income growth. Although we omit other variables, the results, especially if viewed over long periods of economic development, form significant guidelines for estimating how rapidly the consumption of food may increase in the near future. As such, these calculations give rough estimates on the required rate of growth of food supplies, and rough indications of the prospects of meeting these increases with domestic production, in the light of the changes in the three variables.

The methodology used in this chapter is primarily based on Okhawa's equation mentioned in Chapter II. In making the projections we draw heavily on reports of the F.A.O. and other experts. Thus, we do not intend to make our own estimates on the variables involved,
but shall use those already published, after examining them critically. We shall present them, wherever necessary, in different forms to suit our purposes.

**Population Effect**

In the decades between the census of 1930 and 1961, the population of Indonesia grew by some 58 percent, or 1.5 percent annually. However, the growth rate of the decade 1950-1960 is 2.1 percent, while that of 1958-1964 is 2.2 percent. These figures indicate that the Indonesian population has grown at an increasing rate.

Projections of population for the three decades following 1960 were estimated by Dr. Widjojo Nitisastro, an Indonesian demographer. These estimates, spaced by 15 yearly intervals, are presented in Table 19. As can be seen from that table, the growth depends on the assumptions made on fertility and mortality. Under the first three assumptions (columns 1-3), Indonesia's population will more than double in the next three decades. Under the assumption of slowly declining mortality and declining fertility, the population will number slightly below 180 million people (77).

The compounded growth rates are calculated and shown in the lower part of the table. As expected, among the four possible outcomes, the combination of rapidly declining death rate and declining fertility results in the highest growth rate, while the combination of
Table 19. Projected Population of Indonesia According to Alternative Combinations of Fertility and Mortality (Base year: 1960)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1975</td>
<td>1990</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Java</td>
<td>85.7 (in millions)</td>
<td>127.9</td>
<td>89.9</td>
<td>146.2</td>
</tr>
<tr>
<td>Outer Islands</td>
<td>46.0</td>
<td>68.7</td>
<td>48.2</td>
<td>78.5</td>
</tr>
</tbody>
</table>

Growth Rates $^a$

<table>
<thead>
<tr>
<th></th>
<th>1960-75</th>
<th>1975-90</th>
<th>1960-90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Java</td>
<td>2.10</td>
<td>2.80</td>
<td>2.40</td>
</tr>
<tr>
<td>Outer Islands</td>
<td>2.45</td>
<td>3.30</td>
<td>2.80</td>
</tr>
<tr>
<td>Growth Rates $^a$</td>
<td>2.00</td>
<td>2.30</td>
<td>2.10</td>
</tr>
</tbody>
</table>

$^a$Calculated by the writer.

Source: Widjojo Nitrsastro (77).
slowly declining death rate and declining fertility results in the lowest growth rate. The higher growth rates in the period of 1975-1990 indicate also that given the assumptions made, Indonesia's population could grow at an accelerated rate.

The effect of these population growth rates on the rate of growth of demand for food is proportional. In other words a two percent increase in population results in a two percent increase in total demand. Thus, because of population increases only, the annual rate of growth of demand for food in Indonesia, other things being equal, ranged from 2 to 2.4 percent, depending on the assumptions made. In 1975 the effect of the population growth only, will result in an increased demand for food of 35 to 43 percent of the total demanded in 1960.

**Income Effect**

The importance of income in influencing per capita food consumption was stressed in Chapter II. To measure the influence of income on the rate of growth of demand for food, we need to know the rate of growth of per capita income and the income elasticity of demand for food and of the different food items. The Indonesian data on these variables are rather limited and not so reliable as the population data. Fortunately, the F.A.O. has recently undertaken a systematic analysis of the relationship between income and food
consumption (23). As an indicator of the growth rate of income, the F. A. O. uses the GNP rate, assuming that both rates are equal. This growth rate, which covers the period of 1958-1970, is estimated under two assumptions. The low assumption is broadly in line with the trends of the fifties, while the high assumption would correspond to the progress "considered feasible under favorable conditions" (23, p. A-5). For Indonesia the low and high assumption rates were respectively 0.9 and 2.3 percent. We will use these rates as a basis for our calculation of the growth rate of demand for our projections. However, in addition to those rates, we will use a third medium rate, 1.4 percent, which is the target of the national development plans.

The same F. A. O. study estimated the income elasticity of food and of different food groups. The basis of the estimates is a combination of time series analysis, international comparisons, and consumption surveys. It is important to note that the coefficients of elasticity as shown in Table 20 relate to quantities purchased, and not to food expenditures.

The effects of the rate of increase in income on the rate of growth of demand for food are shown in Table 20. If we compare the population and income effect on the demand for food, then we can see that the first is much larger than the second, except in the case of 2.3 percent annual growth rate of per capita income for protective foods such as meat, eggs, and milk.
Table 20. Annual Rate of Growth of Per Capita Demand

<table>
<thead>
<tr>
<th></th>
<th>Income elasticity of demand&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Annual rate of growth of per capita income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.9</td>
</tr>
<tr>
<td>Cereals</td>
<td>0.5</td>
<td>0.45</td>
</tr>
<tr>
<td>Starchy Roots</td>
<td>0.2</td>
<td>0.18</td>
</tr>
<tr>
<td>Pulses and Nuts</td>
<td>0.3</td>
<td>0.27</td>
</tr>
<tr>
<td>Sugar</td>
<td>1.5</td>
<td>1.35</td>
</tr>
<tr>
<td>Vegetables and Fruits</td>
<td>1.0</td>
<td>0.90</td>
</tr>
<tr>
<td>Fats and Oils</td>
<td>1.2</td>
<td>1.08</td>
</tr>
<tr>
<td>Milk and Products</td>
<td>3.0</td>
<td>2.70</td>
</tr>
<tr>
<td>Meat</td>
<td>1.6</td>
<td>1.44</td>
</tr>
<tr>
<td>Eggs</td>
<td>2.0</td>
<td>1.80</td>
</tr>
<tr>
<td>Fish</td>
<td>1.0</td>
<td>0.90</td>
</tr>
<tr>
<td>Calories</td>
<td>0.54</td>
<td>0.49</td>
</tr>
<tr>
<td>Animal Protein</td>
<td>1.23</td>
<td>1.11</td>
</tr>
</tbody>
</table>

<sup>a</sup>Adapted from the Food and Agriculture Organization of the United Nations (23).

The annual per capita calorie and protein intake in the 1960-1961 period were 11 percent and 45 percent respectively lower than the per capita requirements. Under the assumption of the low, medium, and high growth rates of per capita income and the related annual growth of demand, it will take 22, 12 and 9 years respectively to fill the calorie gap, and 54, 35 and 21 years to fill the animal protein gap. The other basic assumption is that the age structure and
the average bodyweight of the Indonesian people do not change over
the period covered.

As expected, the annual rate of growth of demand for the
cereals is the highest within the starchy staple food group. Unfor-
tunately, the data as presented in the table do not give a breakdown
of the cereals, corn, and rice. However, considering the relative
popularity of rice, one could expect a higher income elasticity of
demand for rice than for corn. The computed annual rate of growth
of per capita domestic utilization of rice for the period 1950-1965 is
0.65 percent, which is higher than the rate of growth for demand
under the assumption of the low income per capita growth rate.
This per capita income growth rate of 0.9 is the result of the calcu-
lation of the trend rate of the fifties. As such, both rates of growth
of gross domestic utilization and income are comparable. Thus, if
income is the only factor which determines the rate of growth of
demand, then the elasticity of demand can be estimated by dividing
0.65 by 0.9 which is 0.72. The finding of this rather rudimentary
method of estimation is not supported by Mubyarto’s estimate for the
Krawang region, which is 0.488 (72, p. 114). However Krawang is a
well known surplus region, with a per capita production of more than
200 kilograms of rice. In other words, its rice consumption is better
satisfied than that of Indonesia as a whole. Unfortunately, quantity
elasticities for the other regions are not available. However,
Mubyarto estimating expenditure elasticities of the cereals for the Jogjakarta region, finds a range of from 0.5 to 2.387 in the three sample areas covered by his studies (72, p. 115). The high elasticity of income is found in the poorest areas of the region with a low per capita rice consumption. The people of the Gunung Kidul sub-district of the Jogjakarta regency consumed only 11 kilograms of rice per capita per year. Compared with the other areas in the region, which ranged from 58 to 89 kilograms per capita, the figure for the Gunung Kidul is indeed very low. Under such circumstances, demand for rice would appear to be far from satisfied.

On the other hand, the income elasticity of demand for corn, the other cereal, is probably much lower than the 0.5 suggested by the F. A. O. study for cereals. This low elasticity is mainly because corn ranks low in consumer preferences. In the Outer Islands corn is not popular at all, while in the urban areas of Java, corn is considered as an inferior good, although still superior to the starchy roots. Thus the elasticity coefficient for corn ranges between 0.5

---

22 It is important to note that expenditures elasticity is usually higher than the quantity elasticity, since the latter leaves out higher quality products and other more expensive varieties. For example Mubyarto estimated that the coefficient elasticity for rice in Krawang is 0.445 for expenditures, while it is 0.488 for quantities (72, p. 114).
and 0.2. 23

The annual rates of growth of per capita demand for the non-starchy staples, excluding the pulses and nuts, are high, and with few exceptions exceed one percent. In the case of vegetables, fruits, and animal products, these rates are strong indications that with prosperity, more and more protein-rich foods will be consumed. Thus, with economic development, the demand for protective foods will increase more rapidly than for the starchy staple foods. In the case of sugar, the high rate of increase is regrettable from the nutritional point of view, since sugar does not add to the quality of the diet.

The low rate of growth of demand for pulses and nuts suggests a high per capita consumption. Of this group, peanuts and soybeans are the most important. Per capita consumption in the period 1960-1961 is 6.6 kilogram annually, which is higher than the Japanese average of 6.3 kilograms annually for the period 1959-1961. (104, p. 7). This group provides more than 14 percent of the protein intake. Increases in consumption of these foods will result in improvement of the quality of the diet.

23 The writer regrets that he could not support the above arguments with quantitative data. However, the range of the coefficient elasticities suggested above can be used as indicative estimates.
The Combined Effect

The combined effect of population and income growth rates on the demand for food can be estimated by using Okhawa's equation. The annual rates of growth in food requirements of the different food groups are given in Table 21 under the different population and income assumptions. The low, medium, and high assumptions for the population growth rate are 2, 2.2 and 2.4 percent respectively. It is evident from the table that the combination of high population growth and high income elasticities for the various food groups makes the rate of growth of demand for food much greater than in a more advanced economy, where the population growth rates and elasticities are low.

The Projected Demand 1975

In making these projections, the writer had to limit himself to the demand for the major farm food crops in Indonesia. They are rice, corn, cassava, sweet potatoes, peanuts and soybeans. In addition, the demand for fish as a representative of the animal protein source will be projected for the year 1975. The results are shown in Table 22. Thus by 1975 the demand for cereals, roots, pulses and nuts, and fish is expected to increase by 35 to 69, 35 to 53, 35 to 58 and 35 to 98 percent respectively. The expected
Table 21. Annual Rates of Growth of Demand for Food Groups under Different Rates of Population and Income Growth

<table>
<thead>
<tr>
<th>Food Groups</th>
<th>Income growth rates</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.9</td>
<td>1.4</td>
<td>2.3</td>
<td>0.9</td>
<td>1.4</td>
<td>2.3</td>
<td>0.9</td>
<td>1.4</td>
<td>2.3</td>
<td>0.9</td>
<td>1.4</td>
<td>2.3</td>
<td>0.9</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>Population growth rates</td>
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<td>2</td>
<td>2.2</td>
<td>2.4</td>
<td>2</td>
<td>2.2</td>
<td>2.4</td>
<td>2</td>
<td>2.2</td>
<td>2.4</td>
<td>2</td>
</tr>
<tr>
<td>Cereals</td>
<td>2.45</td>
<td>2.65</td>
<td>2.85</td>
<td>2.70</td>
<td>2.90</td>
<td>3.10</td>
<td>3.15</td>
<td>3.35</td>
<td>3.55</td>
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<td>3.35</td>
<td>3.55</td>
<td>3.15</td>
<td>3.35</td>
</tr>
<tr>
<td>Starchy Roots</td>
<td>2.18</td>
<td>2.38</td>
<td>2.58</td>
<td>2.28</td>
<td>2.48</td>
<td>2.68</td>
<td>2.46</td>
<td>2.66</td>
<td>2.86</td>
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<td>2.66</td>
<td>2.86</td>
<td>2.46</td>
<td>2.66</td>
</tr>
<tr>
<td>Pulses and Nuts</td>
<td>2.27</td>
<td>2.47</td>
<td>2.67</td>
<td>2.42</td>
<td>2.62</td>
<td>2.82</td>
<td>2.69</td>
<td>2.89</td>
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<td>2.89</td>
<td>3.09</td>
<td>2.69</td>
<td>2.89</td>
</tr>
<tr>
<td>Sugar</td>
<td>3.35</td>
<td>3.55</td>
<td>3.75</td>
<td>4.10</td>
<td>4.30</td>
<td>4.50</td>
<td>5.45</td>
<td>5.65</td>
<td>5.85</td>
<td>5.45</td>
<td>5.65</td>
<td>5.85</td>
<td>5.45</td>
<td>5.65</td>
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<tr>
<td>Vegetables and Fruits</td>
<td>2.90</td>
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<td>3.30</td>
<td>3.40</td>
<td>3.60</td>
<td>3.80</td>
<td>4.30</td>
<td>4.50</td>
<td>4.70</td>
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<td>4.50</td>
<td>4.70</td>
<td>4.30</td>
<td>4.50</td>
</tr>
<tr>
<td>Fats and Oils</td>
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<td>3.48</td>
<td>3.48</td>
<td>3.68</td>
<td>3.88</td>
<td>4.76</td>
<td>4.96</td>
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<td>4.96</td>
<td>5.16</td>
<td>4.76</td>
<td>4.96</td>
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<td>5.24</td>
<td>5.44</td>
<td>5.64</td>
<td>5.68</td>
<td>5.88</td>
<td>6.08</td>
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<td>5.88</td>
<td>6.08</td>
<td>5.68</td>
<td>5.88</td>
</tr>
<tr>
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<td>4.00</td>
<td>4.20</td>
<td>4.80</td>
<td>5.00</td>
<td>5.20</td>
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<td>6.60</td>
<td>6.80</td>
<td>7.00</td>
<td>6.60</td>
<td>6.80</td>
</tr>
<tr>
<td>Fish</td>
<td>2.90</td>
<td>3.10</td>
<td>3.30</td>
<td>3.40</td>
<td>3.60</td>
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<td>4.50</td>
<td>4.70</td>
<td>4.30</td>
<td>4.50</td>
</tr>
<tr>
<td>Calories</td>
<td>2.54</td>
<td>2.74</td>
<td>2.94</td>
<td>2.76</td>
<td>2.96</td>
<td>3.16</td>
<td>3.24</td>
<td>3.44</td>
<td>3.64</td>
<td>3.24</td>
<td>3.44</td>
<td>3.64</td>
<td>3.24</td>
<td>3.44</td>
</tr>
<tr>
<td>Animal Proteins</td>
<td>3.23</td>
<td>3.43</td>
<td>3.63</td>
<td>5.72</td>
<td>3.92</td>
<td>4.12</td>
<td>4.80</td>
<td>5.00</td>
<td>5.20</td>
<td>4.80</td>
<td>5.00</td>
<td>5.20</td>
<td>4.80</td>
<td>5.00</td>
</tr>
</tbody>
</table>
Table 22. Indices and Quantities of the Projected Total Demand by Major Food Groups (1960-1975)

A. Indices

<table>
<thead>
<tr>
<th>Food Groups</th>
<th>Income Growth Rates</th>
<th>Population Growth Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.9</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2.2</td>
</tr>
<tr>
<td>Cereals</td>
<td>144</td>
<td>149</td>
</tr>
<tr>
<td>Starchy Roots</td>
<td>138</td>
<td>140</td>
</tr>
<tr>
<td>Pulses &amp; Nuts</td>
<td>140</td>
<td>143</td>
</tr>
<tr>
<td>Fish</td>
<td>154</td>
<td>165</td>
</tr>
</tbody>
</table>

B. Quantities (in 1000 tons)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>15,941</td>
<td>16,384</td>
<td>16,826</td>
<td>16,494</td>
<td>17,048</td>
<td>17,491</td>
<td>17,601</td>
<td>18,155</td>
</tr>
<tr>
<td>Starchy Roots</td>
<td>18,942</td>
<td>19,491</td>
<td>20,040</td>
<td>19,216</td>
<td>19,765</td>
<td>20,452</td>
<td>19,765</td>
<td>20,314</td>
</tr>
<tr>
<td>Pulses &amp; Nuts</td>
<td>857</td>
<td>869</td>
<td>894</td>
<td>875</td>
<td>900</td>
<td>924</td>
<td>912</td>
<td>936</td>
</tr>
<tr>
<td>Fish</td>
<td>1,294</td>
<td>1,327</td>
<td>1,369</td>
<td>1,386</td>
<td>1,428</td>
<td>1,470</td>
<td>1,579</td>
<td>1,621</td>
</tr>
</tbody>
</table>
absolute quantities for the four food groups demanded by 1975 are shown in Table 22.

In interpreting the data, one must make the following reservations. First, these projections are calculated through compounding the rate of growth of demand over a period of 16 years. Second, in projecting the demand over that period we are assuming a constant income elasticity of demand. This assumption is realistic enough if the income range is sufficiently narrow. Thus, the projection under the high income growth assumption should be interpreted with this qualification in mind. 24 Third, it is important to note that these are projections and not forecasts. As such, they are merely reflections of the assumptions made. By stating the assumption as explicitly as possible one can easily reevaluate the effect of a change in the assumption.

Summary

With a liberal margin for the uncertainties and deficiencies, and the arbitrariness of the methods and data used, it appears reasonably safe to say that the demand for food and the different

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24 It is interesting to note that in comparing the results with the F.A.O. findings which used changing income elasticities, the differences, if any, are not significant. This agreement strengthened our position that within the income range used in this study the assumption of constant income elasticity is realistic enough.
food groups will increase substantially in the near future. This
trend is reflected in the annual high rates of growth of demand for
food and the projected estimates for 1975.

The question which will be discussed in the following chapter
is whether domestic food output can meet this demand. What are the
prospects of the agricultural sector for meeting this rising demand?
Does Indonesia have to import food in the near future, or can she
be self-sufficient in food and thus conserve the foreign exchange for
capital imports?
VI. THE SUPPLY OF FOOD

The purpose of this chapter is to analyze the development and present state of food production in Indonesia as a whole, as well as in the major political regions, and to evaluate the potentialities of the agricultural sector in meeting the changing demand for food. We shall begin with a descriptive analysis of the trends of production and imports of the major farm food crops: rice, corn, sweet potatoes, and cassava as the major calorie suppliers; and groundnuts, soybeans, and fish as the major protein suppliers. Because of their importance in terms of output and acreage, their trends are representative of changes in food production as a whole. Among these food groups, rice is the most important, and as such will be discussed in more detail than the other crops.

Next, we shall analyze the conditions of production to enable us to assess the major determinants of food production, and the prospects of increasing food production in the near future, under varying conditions with respect to resource endowments and varying national efforts over time. As the quantitative data on this subject is limited, our study will show more of the qualitative aspects. However, wherever possible, the qualitative analysis will be supported by quantitative data.
Description and Analysis of Trends of Food Production

The descriptive analysis of the trends presented in this chapter will be conducted on the major farm food crops and fish. The trends are measured in average annual compounded rates of change, so as to facilitate comparison and bring out relationships more clearly. To calculate these trend rates, the least square method is used, while the graphs are charted on semi-logarithmic scales. The trend rates of yield will be derived from the production and area trends, rather than calculated independently.

Time coverage for output extends from 1950-1965 except for fish, which covers the period of 1950-1963. For area, the period covered is one year less than the output coverage. However, when regional trends are analyzed, the coverage can not be extended beyond 1961. In addition, since prewar data for the Outer Islands do not exist, analysis of that period will be limited to Java only.

The Production of Food

According to the United Nations index numbers, food production in Indonesia increased slightly in the postwar years. Compared with

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25 Sources of the statistical data used in this section are put together in Appendix C.
the 1952-1956 average, production of food increased only 11 percent in 1960-1964. However, the per capita production of food over the same period declined 7 percent. This decline was not caused by the major farm food crops, but by the decline of the main cash food crops such as sugar and copra, which in the post war years showed a tremendous decline. As we shall see later in this chapter, the per capita production of important food items such as rice, corn, cassava, sweet potatoes, and soybeans, increased slightly in the period of 1950-1965.

However, increases in demand are determined not only by population growth, but also by other factors, especially income. Apparently these other factors affected the demand in such a way that domestic food supply could not meet it, so that the country was forced to import huge quantities of food, mainly rice. A serious consequence of this lag was that in the decade of 1951-1961, the country's food import amounted to an annual average of 20 percent of the total value of all imports.

The Production of Major Farm Food Crops

During the postwar years, harvested acreage and output of the principal Indonesian food crops increased steadily. The annual

26 Calculated from the United Nations index numbers as published in (101).
average compounded rates of increase over the period 1950-1965 were as follows:

<table>
<thead>
<tr>
<th>Crop</th>
<th>Output</th>
<th>Harvested Acreage</th>
<th>Per Capita Production</th>
<th>Contribution of Yield to Output (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>4.52</td>
<td>1.67</td>
<td>2.36</td>
<td>63</td>
</tr>
<tr>
<td>Cassava</td>
<td>3.76</td>
<td>3.79</td>
<td>1.50</td>
<td>0</td>
</tr>
<tr>
<td>Sweet Potatoes</td>
<td>5.33</td>
<td>4.73</td>
<td>3.17</td>
<td>12</td>
</tr>
<tr>
<td>Rice</td>
<td>2.41</td>
<td>1.58</td>
<td>0.25</td>
<td>34</td>
</tr>
<tr>
<td>Soybeans</td>
<td>2.91</td>
<td>3.45</td>
<td>0.75</td>
<td>-16</td>
</tr>
<tr>
<td>Groundnuts</td>
<td>1.38</td>
<td>1.92</td>
<td>-0.76</td>
<td>-39</td>
</tr>
</tbody>
</table>

The third column indicates the rate of growth of per capita production. It is evident from the data that with the exception of groundnuts, production increased more rapidly than population. However, for the most important food crop, rice, the rate of increase of per capita production is very slight.

To show the year to year fluctuations of the production of these crops, Chart II is presented here. It appears that the year 1961, in which a new level of output was reached for corn, was the turning point for this crop. The other crops seem to follow more or less the old trends of the 1950's.

The Production of Rice

Rice is produced throughout Indonesia under three different types of cultivation, the wet or sawah cultivation, the upland or dry cultivation, and the shifting cultivation. Wet cultivation seems to
Chart II. Output and Trend Lines of the Six Major Farm Food Crops, 1950-1965, Semilogarithmic Scale*

* Vertical scales for this chart are omitted so as to group the series as closely as possible, thereby facilitating comparison of trends.

Source: See Appendix C.
dominate the scene. On Java and Madura, 90 percent of the rice area belongs to the wet or irrigated rice cultivation, and the proportion for the Outer Islands is more than 60 percent. If water is in sufficient and regular supply, wet cultivation enables the farmer to practice multiple cropping. This was done in Java where on the average less than 20 percent of the area under wet cultivation was being double cropped, and thus increasing the productivity or output of land. This low proportion can be increased if irrigation facilities are expanded to those areas where the supply of water depends on the natural or climatic conditions (rainfall and floods), and areas where inefficient methods of conserving rainwater are practiced in the fields with low field dykes.

Upland rice accounted for only a small proportion of the total rice production, and of the planted area of the country, which for 1960 were 12 and 17 percent respectively. Included in this proportion is land under shifting cultivations, which is not shown in separate statistics.

Shifting cultivation is not practiced any more in Java and Madura, but is still common in the jungles of Sumatra and Kalimantan, where population density is low, and where the soil

27 Calculated by the writer from available and planted rice area, as published in (52).
conditions are so poor that they do not permit permanent cultivation.

The relative importance of the islands in terms of rice production and area sown can be seen in Table 23 for the year 1960. As the data indicates, Java and Madura are the main producers of rice, supplying about 60 percent of the total output, and in which about 60 percent of the total area sown was located. However, in terms of sown area on dryland, the Outer Islands provided 60 percent of the total dry area under cultivation.

Rice production for the country as a whole in the postwar period increased steadily at an annual average growth rate of 2.41 percent, while the area harvested expanded at an average rate of 1.58 percent. Thus, 66 percent of the increases in production were due to area expansion, and the balance to yield improvements.

Between Java and Madura on the one side, and the Outer Islands on the other, the rate of growth of rice production and area harvested manifest marked differences, and is shown in the following tabulation:

<table>
<thead>
<tr>
<th></th>
<th>Production</th>
<th>Area</th>
<th>Contribution of Yields in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Java and Madura</td>
<td>2.35</td>
<td>1.28</td>
<td>46</td>
</tr>
<tr>
<td>Outer Islands</td>
<td>4.05</td>
<td>3.26</td>
<td>19</td>
</tr>
<tr>
<td>Indonesia</td>
<td>2.41</td>
<td>1.58</td>
<td>34</td>
</tr>
</tbody>
</table>

From the data one can see that rice output and area expanded more rapidly in the Outer Islands than in Java and Madura. But the
Table 23. **Production and Planted Area of Rice by Regions and by Type of Cultivation, 1960**

<table>
<thead>
<tr>
<th>Region</th>
<th>Wet Cultivation</th>
<th></th>
<th>Dry Cultivation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planted area (1000 ha)</td>
<td>Production (1000 tons of stalk paddy)</td>
<td>Planted area (1000 ha)</td>
<td>Production (1000 tons of stalk paddy)</td>
</tr>
<tr>
<td>Java and Madura</td>
<td>4,247</td>
<td>9,301</td>
<td>336</td>
<td>423</td>
</tr>
<tr>
<td>Sumatra</td>
<td>949</td>
<td>2,961</td>
<td>497</td>
<td>960</td>
</tr>
<tr>
<td>Kalimantan</td>
<td>396</td>
<td>700</td>
<td>273</td>
<td>314</td>
</tr>
<tr>
<td>Sulawesi</td>
<td>445</td>
<td>1,009</td>
<td>91</td>
<td>119</td>
</tr>
<tr>
<td>Maluku and West Irian</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Bali and Nusatenggata</td>
<td>323</td>
<td>905</td>
<td>152</td>
<td>164</td>
</tr>
<tr>
<td>Indonesia</td>
<td>6,360</td>
<td>14,876</td>
<td>1,354</td>
<td>1,984</td>
</tr>
</tbody>
</table>

Source: See Appendix C.
annual contribution of yield improvements toward increases in production is much larger in Java than in the Outer Islands. This is again a reflection of the different population pressures in the two areas.

Changes in crop acreage can be attributed to three possible sources: double-cropping of land already under cultivation, using lands not previously cultivated for rice, and opening of new lands. In Java and Madura, the extension of double-cropping seems to be the largest factor contributing to acreage expansion. Thus, while the irrigated rice fields in Java and Madura covered an average area of 3,390 thousand hectares in the period of 1939-1941, the average for the period of 1959-1961 was 3,485 thousand hectares, showing an increase of only 95 thousand hectares. On the other hand, the harvested area over the same period increased by about 250 thousand hectares. As a consequence of these increases in double-cropping, the annual yield per hectare rose, as reflected by the data. On the other hand, the acreage of the non-irrigated rice cultivation declined from an average of 366 thousand hectares to 337 thousand (51, p. 48-49).

For the Outer Islands, acreage increases are probably due to the three sources mentioned above. As prewar data for the Outer Islands are not available, comparison must be made over a shorter period of time. The averages for the irrigated and non-irrigated
rice fields in terms of thousand hectares are as follow:

\[
\begin{array}{lll}
\text{Year} & \text{Irrigated} & \text{Non-irrigated} \\
1950-1954 & 1473 & 776 \\
1956-1960 & 1769 & 867 \\
\end{array}
\]

Thus irrigated fields increased by 19 percent, while non-irrigated harvested area increased by 12 percent. Nothing definite can be said about the sources of increases of the irrigated fields, since there are no data available on land-utilization on the Outer Islands over an extended period of time. However, in view of the low land-man ratio, one could expect that part of these increases are due to the opening of new lands previously not under cultivation.

Analysis of rice production on Java and Madura can be extended to the prewar period. Production and acreage data are graphed on Chart III. Several interesting conclusions can be drawn from that chart. First, production in the prewar period reached a turning point in 1934. The output in the years following 1934 never went below the 1933 level, while the rate of increase was greater than in the preceding years. This can be seen from the slope of the trend of the two periods. This was mainly due to government efforts to increase production, to limit imports and thus to preserve foreign exchange, which was seriously depleted during the depression years. As we shall see later, these increases were accompanied by decreasing quantities imported (See Chart IV).

Source: See Appendix C.
Chart IV. Imports of Rice, 1911-1939 and 1947-1964, Semilogarithmic Scale

Source: See Appendix C.
Second, production in the postwar years increased rapidly after 1950, when relative peace was achieved in the country. But, as the chart indicates, production after 1954, when the prewar level was reached, seemed to level off. The rate of increase in the latter part of the 1950's is much lower than in the earlier part.

Third, expansion of acreage of the irrigated fields in the prewar period proceeded continuously without significant turning points, as was the case with production. But the non-irrigated acreage declined sharply after 1927. This was the period when the Dutch colonial government started to improve and expand the irrigation facilities in Java and Madura.

Fourth, in the postwar period the acreage trend followed very closely the production trend of the same period. However, acreage for dry cultivation seems to be reversed and increased rapidly, although the prewar level was not yet reached in 1961, date of the latest data available. This might be an indication that increasingly marginal lands are used for rice cultivation.

As per capita rice production increased only 0.25 percent annually, rice production did not lag behind the population, but could keep in step with the growth rate of the latter. However, demand for rice is not determined by population growth rate only, but also by other factors. In the previous chapter we have shown that per capita gross domestic utilization, which we used as an
indicator to measure the growth rate of demand for rice, grew 0.65 percent annually. Thus, using Okhawa's demand equation, we see that annual rate of growth for demand was 2.81 percent, which was 0.41 percent higher than the rate of growth of rice output. This gap was filled by imports, the second source of supply of rice.

Since 1875, except during the war years, Indonesia has always been a net importer of rice. Indonesia's imports since 1911 are graphed in Chart IV. Two important conclusions can be drawn from that chart. First, the trend of Indonesia's import in the 1930's was declining at a rapid rate. The average annual import in the period of 1926-1929 was 571 thousand metric tons, while that of 1936-1939 was 233 thousand tons. Thus in one decade imports declined by 42 percent. This development was accompanied by rapid increases in rice production in Java and Madura, rising to nearly 15 percent in the decade.

Second, the level of imports in the postwar years has shifted

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28 Rate of growth of population over the same period, 1950-1965 was 2.16%.

29 As statistical information in prewar Indonesia was limited to Java and Madura, analysis could not be extended to the Outer Islands. Wiekizer-Bennet, however, observed that Java and Madura "had closely approached a net export status by 1939" (109, p. 93). In other words, the imports on the eve of World War II were mainly for consumption in the Outer Islands. In 1937 Java was a net exporter of rice of 10 thousand tons, but again in 1938 became a net importer of 14 thousand tons (109, p. 93).
to a new level in the years following 1956. Since that year, the volume of imports never has fallen below 550 thousand tons, while in the 1960's the level of one million tons was reached. In terms of value, imports reached the 100 million dollar level in 1956, and in each of the five years since 1959, imports cost the country more than 100 million U. S. dollars.

The Production of Corn

After rice, corn is the only other important grain grown in Indonesia. Seventy percent of the total corn output is produced on Java and Madura. Within Java and Madura, the central and eastern part of the islands produce the bulk of it, supplying about 50 percent of the total output. Other important corn growing regions are South Sulawesi, Bali and Nusatenggara, where approximately 10 percent of the total output is produced. Only relatively insignificant quantities are produced in the other parts of the archipelago.

Postwar corn production shows a marked increase of 4.52 percent annually. The year 1961 seems to be the turning point of corn production, as since that year production has reached new levels. In the years preceding 1961, the increases were not spectacular, as were those of the years following 1961. This improvement was mainly due to the development and successful application of high-yielding seeds. Their success is reflected in the 63 percent
contribution of yields increases to output.

Prior to World War II, significant quantities of corn were exported, amounting to an average of more than 120,000 tons a year in the period of 1934-1938. In the immediate postwar years, export of corn is negligible, the highest being 38,000 tons in 1950, while in the period following 1954, none is exported. According to a report of the USDA, because of the tremendous increases in the 1960's when prewar production levels were surpassed, Indonesia started to export corn again in 1965 (103, p. 17). If the production trend continues, given the domestic per capita consumption, corn exports might become a significant foreign exchange earner in the near future.

The Production of Cassava

In terms of harvested area, cassava ranks as the third most important food crop in Indonesia. As is the case with rice and maize, most of the cassava is grown in Java and Madura. More than 75 percent of the total output is produced in these islands, while the rest is scattered around the archipelago with the Nusatenggara region as the most significant producer.

Output of cassava in the postwar years increased at the same rate as acreage, so that yield contribution was zero. This crop is grown in dry land unsuitable for rice cultivation, and the high
acreage rate of increase indicates the use of marginal land for cassava, especially in Java and Madura. Production of cassava is probably stimulated by its excellence in functioning as a reserve crop in time of famine, and the high yields of cassava per unit of land in terms of calories, coupled with the low cost of production and the marginal requirements for soil conditions.

Cassava products in the form of tapioca flour were exported from Indonesia in significant quantities in the prewar period, averaging about 240 thousand tons a year. The postwar period shows a marked decline of these exports, averaging about 100 thousand tons annually in the period of 1959-1960. If the trend rate of increase of output continues in the near future, with government cooperation and encouragement, probably Indonesia could increase its tapioca exports. This is a realistic expectation considering that the income elasticity of demand for cassava is very low.

The Production of Sweet Potatoes

Most of the sweet potatoes grown in Indonesia are on the islands of Java and Madura, which supply about 50 percent of the total output. Next in importance is the Nusatenggara region, which supplies about 20 to 25 percent of the total, followed by Sumatra and Sulawesi.

The postwar years show marked increases in production and
acreage, averaging 5.33 and 4.73 percent respectively. However, these changes in output are accompanied by the same changes in acreage, so that yield increases contribute to output by only 12 percent.

The Production of Soybeans

As is the case with the previous crops, Java and Madura are the main producers of soybeans, supplying about 90 percent of the total output. The contribution of the Outer Islands is negligible and scattered around the archipelago, with the Nusatenggara region as the most important producer.

The annual rates of increase of production and acreage are 2.91 percent and 3.45 percent respectively, indicating a declining yield per unit of land. Indeed, compared with yields in the United States, Japan and Thailand which are 1.6, 1.3 and 1.1 tons, respectively, Indonesia's yield of 0.68 is very low. Considering the high yields in Thailand, where climatic conditions are more or less the same as those of Indonesia, there is a wide scope for increasing these yields.

It seems that the government has not yet realized the potentials of soybeans as a cheap source of protein. As such, they are significant substitutes for, or complements of animal proteins. Soybeans also have potential as a foreign exchange earner. Indonesia is the third
largest producer in the world, surpassed only by the United States and Mainland China. In view of the nutritional value of this crop and its potential as a foreign exchange earner, the government should pay more attention to this small sector of the food industry.

The Production of Groundnuts

Besides the soybean, the groundnut is the principal Indonesian foodstuff which supplies a significant amount of protein to the diet. Java and Madura, as in the case with the other food crops, are the main producers of groundnuts, supplying about 90 percent of the total output. Production in the Outer Islands is scattered and insignificant, with the Nusatenggara region the most important producer.

The annual rates of increase of production and acreage are 1.38 percent and 1.92 percent respectively, indicating a negative contribution of yields toward increases in output. This is one of the food crops which shows a declining per capita production, indicating a production lag behind population growth. Yet despite these developments, Indonesia still exported groundnuts at an average of 7 to 8 thousand tons annually in the period of 1960-1962. This average is much lower than the prewar average of 17 thousand tons.

As with the case of soybeans, the government in the postwar years has not yet realized the potentialities of groundnuts for improving the diet and for earning foreign exchange. Since soil
requirements are not high, and this crop does not compete significantly with rice, the marginal investment needed to boost groundnut production might be small.

Most of the groundnuts produced are for human consumption, eaten in roasted or boiled form, while those exported are shelled or unshelled. But no groundnuts are exported in the form of peanut oil, since no processing industry exists.

The Production of Fish

Fishing is an important industry throughout Indonesia. The four major islands produced significant quantities of fish amounting to more than 840 thousand tons in 1961 out of the total catch of 906 thousand ton. It is interesting to note that in contrast with the farm food crops, the islands of Java and Madura are third in importance preceded by Sumatra and Kalimantan.

In the postwar years, fish production has shown marked increases. The average annual compounded rate of increase of fish production for Indonesia as a whole is 4.7 percent. It surpasses the population growth rate, indicating an increasing per capita availability of fish in the country.

Fish is the second food item imported in significant quantities in Indonesia. However, in recent years its significance as an import is declining, while in the prewar years more than 70 thousand
tons of fish were imported, less than 15 thousand tons were imported in the early sixties (51, p. 84).

These developments were mainly due to changes in the condition of production. The number of vessels expanded greatly in the 1950's, especially in the last part of it. Between 1957 and 1961 the number of motorized fishing vessels rose from 895 to 2,211. In addition, the number of sailing vessels over the same period rose from 138,000 to more than 195 thousand vessels (51, p. 84).

The fishery resources within the boundaries of the archipelago are undoubtedly considerable. In addition to the seas surrounding the islands, the inland rivers, lakes, irrigation systems, irrigated agricultural lands, ponds, and dams form an important source of fish. Fuller utilization of these resources would greatly increase the protein supply. Addition investments in this industry are certainly needed. Increasing the number of vessels, especially the motorized boats, will increase the production tremendously. Motorized vessels will enable the fishermen to enlarge their area of operation to include waters unreachable by sailing boats without spoiling the catch before it is landed.

These improvements in factors of production must be accompanied by changes in the marketing organizations. In view of the perishable character of fish, cold storage and refrigerated transportation facilities seem to be the most crucial changes needed.
In addition, human investment in this industry is of the utmost importance, not only to improve the skill of the fishermen but also to enable them to maintain the new production factors and marketing facilities. Especially the latter is crucial, since motorized vessels, cold storage, and refrigerated trucks need constant skilled maintenance personnel to enable the fishermen to operate on a continuous basis. It appears that in the past this latter need has been neglected, with the result that many of these facilities break down within a shorter time than they would if maintained carefully. In addition, supplies of spare parts for these new facilities must be made available on a continuing basis. New marketing agencies must be established to facilitate the distribution of these spare parts. In the past the availability of spare parts has indeed been a major problem. Since it depends on the availability of foreign exchange to import these spare parts, and since the allocation of foreign exchange is determined by top government officials and not by the market, the supply of spare parts depends mainly on administrative decision with all its disadvantages.

Land

Land Utilization

A distinguishing feature of land utilization in Indonesia is the
sharp contrast between Java and the Outer Islands. Densely popu-
lated Java and Madura have a total land surface of 13,217 thousand
hectares. Farm or smallholders agriculture in 1961 accounted for
63.4 percent of the total area, and estate agriculture for 4.6 percent.
Of the 8,384 thousand hectares used for farm agriculture, irrigated
rice fields comprised more than 42 percent. In the Outer Islands,
on the other hand, almost 87 percent of the 135,939 thousand
hectares are forest land, and 0.8 percent estate agriculture (51).
Data on land utilization for farm agriculture in the Outer Islands are
not available. However, an authoritative estimate was given by
Pelzer for the year 1959, who estimated that 8.4 percent of the area,
comprising 11,365 thousand hectares, were utilized by smallholders.
Of this area, 1.5 million hectares are irrigated rice fields (84, p.
123).

As the above data show, the potential reclaimable land in the
Outer Islands is high; this is not the case for Java and Madura. The
latter islands have little if any land that can be added to the cultivated
area by encroaching on the forests. However, Pelzer argued that the
agricultural land use in Java and Madura has already passed its
"limit of safety," and the low proportion of land used for forests has
caused erosion and flood problems which "can be checked only by
reforestation of the most exposed land" (84, p. 121).

On the other hand, in the Outer Islands, with the exception of Bali
and Lombok islands, there are wide possibilities of expanding cultivated areas by deforestation and reclamation of swamp land. Especially the latter is excellent for rice cultivation.

Related to the differences in land utilization and population pressure is the difference in land-man ratios between the two areas. If we define arable land as land used for farm agriculture and plantations, the land-man ratios for Java and the Outer Islands are 0.14 and 0.34 respectively.

As a consequence of the population pressure and availability of potentially cultivable land, size of holdings differs in the two areas. In Java and Madura, the population pressure and the existing custom of inheritance which makes legitimate children heirs of the land, have led to a continuous fragmentation of the available land into small lots, and the formation of landless villagers. According to a survey undertaken in 1957, 78 percent of irrigated landowners had less than 0.5 hectare and 90 percent less than one hectare (84, p. 126). The average holding in hectares in Java and Madura by region was as follows: (93, p. 27)

<table>
<thead>
<tr>
<th>Region</th>
<th>Average holding irrigated land</th>
<th>Average holding dry land</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Java</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Central Java</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>East Java</td>
<td>0.6</td>
<td>0.5</td>
</tr>
</tbody>
</table>
For the Outer Islands no detailed and comprehensive surveys on average holdings have been made, but with a land-man ratio of 0.34 hectares per capita, and assuming an average family unit of seven, the average holding can be estimated as 2.38 hectares.  

The Javanese farmer is able to support himself and his family on their dwarf-size holding through multiple cropping and intensive cultivation, which have been made possible by the higher fertility of the soil, the availability of adequate and regular rainfall, and his ingenuity. This method of cultivation enables a given area to support a relatively large population, and has made Java the major producer of food in Indonesia. As mentioned earlier, taken as an aggregate area, Java in the prewar period was almost self-sufficient in rice. Even during the postwar period, the huge imports of rice are mostly consumed in the Outer Islands.

This should not be considered as a justification and agreement of fragmentation of landholdings in Java and Madura. There are certain disadvantages of these small holdings, especially when viewed from the standpoint of developmental effort. First, there are diseconomies of scale in the sense of not requiring the full services of

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30 The assumption of a size of 7 for a family unit is based on the Agrarian Law of the country.

31 For the period of 1954-1961, on the average 37% of annual total import is consumed in Java.
the average peasant family. This is probably the main source of underemployment, which will be discussed in a later section of the chapter. Second, the small size of the holdings limits the size of the marketable surplus. We have discussed in Chapter II the strategic role of marketable surpluses in the over-all development effort. In short, it determines to an important extent the contribution of the agricultural sector to economic growth. In addition, the smallness of the surplus limits the ability of the farmer to use off-farm inputs and to make monetary investments in his farm. Third, these dwarf-size holdings put high requirements on the marketing organizations, not only for the product, but also for the inputs which have to be channeled to these farmers. Fourth, the small size of the holdings reduces the bargaining power of the farmers in selling their products and in purchasing their inputs, including credits.

In view of these disadvantages, further fragmentation of land must be stopped. However, this is easier to say than to implement. Although attempts have been made to curb the process of fragmentation, none of them has been successful. The most recent one has been approached through a series of laws and regulations by the central government, aiming to reform the agrarian structure in Indonesia. The most important part of this law is the decision to set a minimum of two hectares of either irrigated or dry land per family unit of seven. On the other hand, a maximum is set to check excessively
large landholdings. This maximum depends on the density of the areas, and it ranges from 5 hectares for very dense areas (i.e., more than 400 persons per square kilometer) to 15 hectares for areas with densities less than 50 persons per square kilometer.

Since in Java and Madura more than 90 percent of the landowners have less than two hectares and only 0.41 percent has more than five hectares, the problem is mainly one of consolidating the holdings.

This redistribution of land to a smaller number of farmers involves a much larger and complex problem than the traditional redistribution of land to a larger number of landowners. This can be explained as follows: The arable land in Java and Madura in 1961 was estimated at about 8.4 million hectares (not including plantations); the rural population in Java and Madura according to the 1961 census was 53.2 million. If the law were completely implemented, there would be 4.2 million landowner families. If the size of the family is seven, as assumed by the law, then 29.4 million of the rural population belong to the land owning families.

As a result of the enforced law, more than 23 million would be left landless, thus increasing the problem of unemployment and under-employment in the rural areas.

32 The method of comparison is taken from Glasburner and Thomas (39).
At the moment the writer has no knowledge of the results of the implementation of these land reforms, and it is probably too early to evaluate the program. However, two-hectare holdings are closer to an optimum size than the present size. If employment is provided to the landless rural population through industrialization, development of handicrafts industries, or transmigration to the other islands, these land reform laws might bring positive results.

**Productivity of Land**

The productivity of land as measured by output per unit of land is primarily determined by the natural conditions of soil and climate, and by the level of technology used.

Table 24 shows the five-year averages of the yields of rice per hectare of land by region and by dry and wet cultivation. Several important conclusions can be drawn from that table. First, on the average the yields of wet cultivation are almost 70 percent higher than those of the dry cultivation. Since wet cultivation depends primarily on regular rainfall, this difference in yields is to a large extent a reflection of climatic conditions.

Second, the yields of the different regions for the dry as well for the wet cultivation show marked differences. It is remarkable that both yields in Java and Madura are lower than those of Sumatra, Sulawesi and the Nusatenggara region. A plausible explanation is as
follows: If it is assumed that the most productive lands—those with the most favorable soil, climate and location—are used first, then as cultivation extended into the less productive lands, yields per hectare would tend to decline. In Java and Madura over the decades acreage has been expanding to such an extent that it has passed the "limit of safety," tending to lower the average yield per hectare. This stage has probably not been reached yet by the Outer Islands such as Sumatra, where the highest yield per hectare is recorded.

Table 24. Average Yields of Rice by Region and by Method of Cultivation, 1956-1960. (in 100 kg of dry stalk paddy)

<table>
<thead>
<tr>
<th>Region/Province</th>
<th>Wet Cultivation</th>
<th>Dry Cultivation</th>
<th>Wet &amp; Dry Cultivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Java</td>
<td>22.15</td>
<td>11.92</td>
<td>21.46</td>
</tr>
<tr>
<td>Central Java</td>
<td>20.37</td>
<td>10.62</td>
<td>19.78</td>
</tr>
<tr>
<td>East Java</td>
<td>25.11</td>
<td>12.75</td>
<td>23.86</td>
</tr>
<tr>
<td>Total Java</td>
<td>21.46</td>
<td>11.92</td>
<td>21.83</td>
</tr>
<tr>
<td>Sumatra</td>
<td>31.34</td>
<td>17.36</td>
<td>26.53</td>
</tr>
<tr>
<td>Kalimantan</td>
<td>16.72</td>
<td>10.31</td>
<td>14.22</td>
</tr>
<tr>
<td>Sulawesi</td>
<td>23.46</td>
<td>16.12</td>
<td>22.13</td>
</tr>
<tr>
<td>Maluku and West Irian</td>
<td>-</td>
<td>11.73</td>
<td>11.73</td>
</tr>
<tr>
<td>Bali and Nusatenggara</td>
<td>29.62</td>
<td>11.17</td>
<td>23.95</td>
</tr>
<tr>
<td>Indonesia</td>
<td>23.58</td>
<td>13.93</td>
<td>22.16</td>
</tr>
</tbody>
</table>

Source: See Appendix C.
This argument probably could be applied with more force to the differences in the yields of dry cultivation. The rice fields in Sumatra consist mainly of those where shifting cultivation has been practiced. Under this method, areas of jungles have been cleared and burned and used for rice cultivation. After two or three years, on one piece of land when yields have started to decline, the farmer has left it to fallow for 10 to 15 years, enabling the soil to rejuvenate. The farmer has simply moved to another location in the jungle where he has repeated the simple process of burning and planting. This practice is still followed, and is possible because of the low population densities in those areas which permit a 10 to 15 year cycle of cultivation to be used on the land.

The differences between the regions in Java and Madura where technical, economic, and social conditions are similar, can be attributed to a large extent to natural conditions of soil and climate. However if we rank these regions according to fertility, population density, and percentage of arable land to total land and yields per hectare, then it becomes apparent that population density and the proportion of arable land to total land influence the ranking of yields (See Table 25).

Central Java, which has the lowest yield, also has the highest population density and the largest proportion of arable to total land. The latter is an indication that in Central Java the proportion of
marginal land used for cultivation is relatively large. On the other hand, West Java, with the least fertile soil condition but the lowest population density and proportion of arable land has a higher yield than Central Java. Still the yield of West Java is lower than that of East Java, which has the most fertile soil and next to highest population density and proportion of arable land.

Table 25. Ranking of the Three Provinces in Java and Madura According to Soil Fertility, Population, Density, Proportion of Arable Land to Total, and Yield of Rice

<table>
<thead>
<tr>
<th>Fertility</th>
<th>Population Density</th>
<th>Proportion of Arable Land to Total</th>
<th>Yield of Rice per Hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Java</td>
<td>Central Java</td>
<td>Central Java</td>
<td>East Java</td>
</tr>
<tr>
<td>Central Java</td>
<td>East Java</td>
<td>East Java</td>
<td>West Java</td>
</tr>
<tr>
<td>West Java</td>
<td>West Java</td>
<td>West Java</td>
<td>Central Java</td>
</tr>
</tbody>
</table>

The low yields in Kalimantan and the high yields of the Nusatenggara region are contradictory, to a certain extent, to above causal relationship. Kalimantan has the next to lowest population density in the archipelago, while Nusatenggara has the next highest density. If the causal relationship is valid here, the level of productivity of land should be reversed. However, it is known that Kalimantan has a very low soil fertility (85, p. 5), while the Nusatenggara region, especially Bali, has the highest soil fertility in
the country. In addition, it is also plausible that land utilization in Bali and other Nusatenggara regions has not yet reached the level of that in Java, where increasingly marginal land is used for cultivation. The author regrets that he could not support these arguments with more quantitative data.

In Table 26 the productivity of land in terms of yields of the six most important foodcrops in Indonesia is compared with that of other countries in South East Asia and two developed countries, Japan and the United States. Compared with the yields of these two countries, the productivity of land in Indonesia is low, but compared with the other countries of the region, the Indonesian yields are average. Although natural conditions of soil and climate are responsible for these differences in yields, the huge differences between the productivity of the land in Indonesia and that of the two advanced countries are to a large extent due to different levels of technology.

An F. A. O. study reported that these high yields are mainly the result of technological improvement. Somewhat more than 50 years ago (1909-1913), the yield of rice in the United States was between 17 and 18 quintals per hectare, approximately equal to the present yield in Indonesia. By 1958-1960 the yield in the United States had increased by 124 percent (31, p. 106). The yields in Japan, China (Taiwan) and Philippines over the same period increased by 54, 79, and 53 percent respectively, while those of Thailand and
India declined by 8 and 11 percent respectively.

Table 26. Five Year Averages of Yields of Various Food Items in Different Countries. (1959-1963) (in 100 kg)

<table>
<thead>
<tr>
<th>Country</th>
<th>Rice (paddy)</th>
<th>Corn</th>
<th>Sweet Potatoes</th>
<th>Cassava</th>
<th>Soybeans</th>
<th>Groundnuts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaya</td>
<td>24.88</td>
<td>6.50</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Philippines</td>
<td>12.05</td>
<td>6.28</td>
<td>50.0</td>
<td>51.8</td>
<td>-</td>
<td>5.80</td>
</tr>
<tr>
<td>Thailand</td>
<td>14.16</td>
<td>19.88</td>
<td>82.4</td>
<td>162.6</td>
<td>10.72</td>
<td>13.16</td>
</tr>
<tr>
<td>India</td>
<td>14.74</td>
<td>9.5</td>
<td>62.0</td>
<td>71.0</td>
<td>-</td>
<td>7.16</td>
</tr>
<tr>
<td>Japan</td>
<td>50.04</td>
<td>25.26</td>
<td>194.0</td>
<td>-</td>
<td>13.20</td>
<td>22.42</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>40.14</td>
<td>37.82</td>
<td>89.0</td>
<td>-</td>
<td>16.13</td>
<td>14.12</td>
</tr>
<tr>
<td>Indonesia</td>
<td>17.90</td>
<td>9.42</td>
<td>69.4</td>
<td>80.4</td>
<td>6.76</td>
<td>11.1</td>
</tr>
</tbody>
</table>


To make the same comparison for Indonesia as a whole is impossible, because Indonesian prewar data are limited to Java and Madura only. However, because of the concentration of rice production in Java, the changes of yields in this island reflect the changes of yields in the country as a whole. Between 1915-1919 and 1955-1959 yields in Java increased only by 8.8 percent, while between 1915-1919 and 1935-1939 they hardly increased at all. 33

The remarkable gains in yield of rice in the United States and

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Japan suggest that very large gains are possible in Indonesia through technological improvements. Moreover, these improvements can be achieved within a shorter time than experienced by Japan or the United States, since Indonesia can rely on the experience and results of the basic research done in these countries.

The fact that yields of rice in Java and Madura between the World Wars were unchanging is deplorable, and it reflects to a certain extent the interest of the government in export crops where large yields were gained during that regime. Independent Indonesia, realizing the importance of food, especially rice, in the economy, has tackled the problem more comprehensively and intensively. Although the problems facing the country were tremendous, gains in yield for rice and corn during the postwar period were recorded. Thus in the period of 1950-1965 the yield of rice and corn increased by 14 and 58 percent respectively. The increases in the yields of the cereals must be viewed in the light of the unfavorable economic conditions, especially the inflation which the country suffered during the period covered. The following is an attempt to analyze the changes in technology and their effects on the yield during the postwar period. The analysis will be limited to the cereals for which data are available. Due to their importance in the consumption and production pattern of the Indonesian economy these limitations will not significantly distort this study.
Improvement of Yield

While soil and climate greatly influence the yield of individual crops, levels of productivity can be elevated through technological improvements such as improved methods of cultivation, irrigation if needed, provision of improved seeds, fertilizers and pesticides.

Java, as well as some other parts of the Outer Islands, has long been known for its well regulated network of irrigation, which was for centuries the major form of land improvement. Even today in Java plans are undertaken to increase the irrigated areas. Two giant projects are near completion and will provide irrigation for more than 75,000 hectares of land. In addition, new dams have been built and old ones repaired, resulting in improvements and extension of irrigated fields.

Through irrigation an assured supply of water protects cultivation against the fluctuations of weather. This is especially important for rice cultivation, which needs large supplies of water. Drought constituted 20 percent of the total damage to wet rice fields in 1958, 32 percent in 1959, and 17 percent in 1960, while floods in the same years resulted in damages of 28 percent, 34 percent, and 40 percent respectively (72, p. 47). Irrigation not only helps to diminish damage by drought or flood, but also aids in the introduction of the multiple crop system, and a more efficient use of fertilizer inputs.
and labor force throughout the year.

A major drawback of irrigation projects is the high cost and long-maturing character of the investment. Therefore, the cost-benefit aspects of such projects must be studied seriously before decisions are made. This is especially true in view of the competing demands on scarce investment capital from many parts of the economy. Therefore planners and government officials are looking more and more for quick yielding techniques, such as the introduction of high yielding seeds, fertilization, and pest and disease eradication.

The use of high yielding seeds has resulted in increases of output of rice and corn. For rice, the most recent introduction of new seeds is expected to bring increases of 15 to 20 percent over the average yield. Research and experimentation still continue at the Rice Research Institute to develop new varieties which could produce higher yields in a shorter period of maturity (72, p. 48-49). For corn, increases to 500 percent of traditional yields have been reported recently, as a result of the introduction of new seeds (8, p. 2). These tremendous increases enabled Indonesia to export part of the output in late 1965.

Indeed, development and use of high yielding seeds has shown tremendous success in the past. A major problem seems to be the distribution of these seeds to the farmers at prices within reach of the farmers' limited financial resources. There is no doubt about
the response of the farmers toward the introduction of new seeds. However, inefficient distribution of the seeds and lack of adequate credit facilities for the farmers are the main factors responsible for the slow application of this new development in the rural areas.

Greater use of fertilizers appears to be the other logical means for providing rapid increases in the productivity of land. In general two types of fertilizers can be used, green manuring and chemical fertilizers. The first, although it is cheap, is in many cases rejected because it intervenes with the multiple cropping system.

Until recently Indonesia has had to import all its chemical fertilizers. Judging from the annual imports of fertilizers, we can conclude that consumption of fertilizers in the prewar period increased tremendously. A United Nations report calculated that total consumption in the decade of the fifties increased by more than seven times, while per hectare consumption increased by more than four times (73, p. 22). However, the absolute level of per hectare consumption is still very low, especially when compared with that of the advanced countries. In 1962, while Indonesia consumed 8.5 kilograms per hectare, Korea, China (Taiwan), and Japan consumed 175, 189.9 and 270 kilograms per hectare respectively (73, p. 22).

34 Compared with the 1938-1940 average, the 1959-1961 average of imported fertilizers increased by 100% (51, p. 117).
Unfortunately, as the data did not show any breakdown as to ultimate users, we could not evaluate the importance of these consumptions in the food crop industry.

There seems to be adequate evidence that the soil condition of the fields used for corn and rice cultivation, causes significant increases in output. The responses to be expected and the variability in responses which are likely to be encountered are large. Results of tests in experiment stations ranged from an increase of 20 percent to one of 100 percent, depending on the soil condition and the type of fertilizer used. C. van der Giesen estimates that over 600,000 hectares in the rice growing areas in Java would produce yields 20 percent higher from the application of 100 kilograms of Double Superphosphate, although there are areas in the Island where yields were increased more than 100 percent (38, p. 17). Mears, by combining estimates of the Rice Institute and the Soil Research Institute at Bogor, estimates that at least 3.4 million hectares of rice land throughout Java, Bali, Lombok, Sumatra and Sulawesi would react to the application of 100 kilograms per hectare of Double Superphosphate or Ammonium Sulphate, to produce increased yields of at least 500 kilograms stalk paddy per hectare (66, p. 220).

For corn, the result of the application of fertilizer, if coupled with improved varieties and methods of cultivation, is more spectacular. A test has shown that under these conditions the yields increase
by more than 10 times the traditional yield. Thus it is clear that
greater use of chemical fertilizers will spectacularly increase
production of the cereals.

In view of this potential and the availability of adequate raw
materials, the Indonesian government in the past has planned and
executed the construction of fertilizer plants. As a result, the first
chemical fertilizer plant producing urea with an annual capacity of
100,000 tons was inaugurated in July 1964. A single plant for the
production of superphosphate with an annual capacity of 100,000 tons
is now under construction, while a bigger one with a capacity of
producing annually 150,000 tons ammonium phosphate, 60,000 tons
urea, and 12,000 tons ammonium has already been contracted with
an Italian firm (27, p. 86).

The first plant became a reality in 1964 but the two other plants
are not finished yet. The annual production of 100,000 tons urea is
far from sufficient to meet domestic demand; thus Indonesia in the
near future still has to import significant volumes of fertilizers.

The response of the farmers to the introduction of fertilizer
is positive as soon as they realize and recognize the advantages that
can come from using it. Mears reports that throughout Java, and
to a slightly lesser degree in South Sumatra, the demand for ferti-
lizers by rice farmers often exceeds the supply (66, p. 224).
Mubyarto's observation supports this claim, emphasizing the fact
that only 40 to 50 percent of the total amount wanted by the farmers can be satisfied (72, p. 50).

The answer of the apparent contradiction between positive response of soil and farmers and the low per hectare consumption seems to lay in the unfavorable institutional framework of the rural areas. Here again, as in the case with improved seeds, the inefficient system of distribution is a major impediment to the greater use of fertilizers. Nothing is more revealing of this inefficiency than a statement by a prominent government official that the newly inaugurated urea plant has to export 10,000 tons to avoid overstocking (72, p. 51). Mears also reports that farmers might have to travel 10 to 20 kilometers to obtain the fertilizer from the closest wholesaler; in many cases they come home empty-handed, or must be satisfied with only part of what they needed (66, p. 224). Since planting cannot wait, prompt availability of fertilizers in the rural areas is a necessary condition for greater use of fertilizer. An efficient marketing organization is needed to supply the fertilizer at the right time, at the right place, at the right price.

Related to this problem is the price relationship between fertilizers and crops. The difference between the expected value of the increased output and the cost of the use of fertilizers is crucial in the decision-making of the farmer. To a large extent this expected gain determines the farmers' incentive to use fertilizer. Considering
the scale of operation of Indonesian food production, the cash expenditure for the purchase of fertilizers is relatively large, especially when the farmers have to pay it in advance. It is true that under certain conditions the profit of such an investment will be large. But the great uncertainties which the farmer decision-maker faces make fertilizer use a risky business. At the time that he must make the decision he knows for certain only the price of fertilizers. Other factors such as weather, soil response, and prices of output, which determine the payoff, are uncertain.

Of course, the attitude of farmers toward risk influences the decision-making process. The smallness of the holdings is a reflection of the financial position of these farmers. They are in general hard-pressed for cash, and could easily be bankrupted by a small loss. The loss of his farm would mean more than the monetary value of the farm. For the Indonesian farmer, a farm is not just a place to raise or plant things: farming for him is a way of life. Thus he does not gamble easily and has to act rather cautiously. The payoff must be large enough to make him decide to use fertilizers.

One positive step which the government can take to increase farmers' incentives for using fertilizers is to reduce the risk.

35 Mears calculated that under certain conditions the profit of using fertilizers can increase the yield by 200 percent (66, p. 221).
Guaranteed prices of the output eliminate one major uncertainty with regard to the monetary payoffs. A second possibility is to subsidize prices to reduce the cost of fertilizer. A third possibility is to provide credit at reasonable rates to the farmers. The latter is important if not vital, since the farmers' other source of credit is the merchant or money-lender, who charges high rates of interest which greatly reduce the payoffs of using fertilizers.

In Indonesia the government, in an over-all attempt to increase the production of rice and corn, has adapted the three alternatives simultaneously, at least by intent. A government agency was assigned to aid the farmers by providing them with improved seeds, fertilizer, and cash credit. The farmers who received this aid were expected to repay the agency in cash or in kind from their presumably increased yields. In addition, the agency is prepared to purchase the rice at a given price, thus guaranteeing the revenue of the farmer.

Theoretically, this is a sound program and should result in expansion of the use of fertilizer. However, the related logistic problems, the lack of skilled administrative personnel, the limited executive capacity of most of the civil services involved in this program, and the inflation resulted in a failure. Moreover, before the agency was given a chance to gain experience, it was dissolved by top level authorities, and replaced by another new agency. In 1964, however, a program, called the "BIMAS" project showed results
which have led to increases in yields of rice. We will discuss this project in a later section, since its success is due not mainly to the use of fertilizer, but to several other factors as well.

Another alternative which could increase the yields of land remarkably is the eradication of pests and diseases. These are a very serious source of damage to many food crops. For irrigated rice, rat damage alone amounted to 19 percent annually during the 1958-1960 period. Together with diseases it amounted to almost 40 percent of the total damage reported for those years (72, p. 53). Part of the needed insecticides and pesticides are produced in Indonesia. However, Mubyarto reveals that farmers still complain of lack of insecticides in rural Java.

Irrigation, fertilization and disease control will have only a limited effect on the productivity of land if not accompanied by improved methods of cultivation. In the past the majority of inventions and innovations which led to improvements in methods of cultivation, came from farmers themselves. Even now, self-discovery is still important in contributing to improvements. However, given the level of education of the farmers, the scale of operation, their limited resources, and their attitude toward risk, improvement of methods of cultivation is undoubtedly a slow process, which could not and should not be tolerated by development-oriented governments. To increase the speed at which new techniques of production are
developed, effective agricultural research programs must be conducted. The results of this research must be transmitted to the farmers through extension-education programs. On the other hand, leaders of these programs must be able to carry knowledge of the farmers' problems back to the experiment stations and research centers. So far this function has been carried out by the Agricultural Extension Service of the Ministry of Agriculture through direct information, demonstrations, and contests.

As no data are available on how much yield will increase with the application of new techniques, we can not quantify the importance of applying them. It will be sufficient to state that improved methods of cultivation will enhance the yield increases due to application of improved seeds, irrigation, fertilization, and eradication of pests and diseases. The combined effect of these five factors on the yields of rice and corn is known to be significantly high, ranging from 100 to 250 percent increases for rice and more than 500 percent for corn. These are the results of two projects aiming to introduce innovations in the production of both crops. The following is a brief discussion of both projects, since they show promise of providing a solution to the Indonesia food problem.

The rice project, which is called the "BIMAS" project, is an attempt to introduce new technology by providing improved seeds which respond highly to fertilizer use under controlled irrigation, use
of insecticides, and new row planting techniques which cut seed requirements in half. The project will also provide credits to the farmer to enable him to purchase the new inputs. In return the farmer has to deliver 50 percent of the increased yield to the farmers' cooperative, which will be the coordinating agency in each village. Half of this paddy will be in payment of the loan previously granted for the inputs, while the other half will be a direct sale for cash to the government. The uniqueness of this project is caused by two additional factors: the participation of students in the project, and the gradual approach taken by the leaders in initiating this project. "Highly motivated students" work with farmers in introducing this new technology. For the farmers the participation of students forms also an insurance of the availability of the new inputs at the right time and place.

The program was initiated in 1964 on a small scale trial of 11 thousand hectares, and expanded in the following years to 220 thousand hectares. The success of these attempts is reflected with the 100 percent increase of yields. This conservative estimate was given by Mears, but others report increases up to 250 percent (72, p. 52).

Encouraged by this success, the project in 1966 planned to cover an area of approximately one million hectares, with a potential

36 This part is based on a report from Mears (65).
increased output of approximately one million tons of milled rice. If this goal were realized, the additional production would save the country more than 100 million dollars, with a foreign exchange cost for inputs of only approximately 25 million dollars. This net saving of 75 million dollars could help improve the balance of payment problem now faced by the country.

The writer has no knowledge at the time of writing of the results of this decision, or whether the project was carried out in full scale or not. Mears, however, writing in the summer of 1966, argued that the extent of the project should be somewhat reduced, mainly because of logistical problems, inavailability of a sufficient number of students, and inavailability of foreign exchange to purchase the fertilizer in time before the planting period began in the fall of 1966. These reasons should be given more thought since in the past projects of this type have failed because of the rapidity and hugeness of the operation, and the limited executive capacity of the agencies involved. The scale of operation should be increased gradually to enable the officials in charge of the project to gain experience, to enable the distributing agencies to adjust themselves to the requirements of the project, and to enlarge the executive capacity of the agency.

The important lesson gained from the rice project is that through intensification only Indonesia can be self-sufficient with regards to rice supply, and thus save badly needed foreign exchange
for other purposes. As Mears calculated, for every 100,000 hectares added to the project there will be a net saving in foreign exchange of approximately eleven and one-half million dollars. This project deserves the full support of the government in the form of subsidies of input prices to the farmer, and eventually, guaranteed output prices.

The corn project is aimed at applying the inventions and innovations developed by the Bogor Research Institute in the cultivation of corn. In principal, the approach made by this project is the same as that of the rice project. It provides the necessary inputs and guidance to the farmers, while the output is partially guaranteed by the government in the form of purchases by the government. The farmers are committed to follow the new method of cultivation once they decide to participate in the program. The results of this project, as reflected by the increased yields, were tremendous. While the traditional yields range from 0.4 to 1.2 tons per hectare, the new project resulted in yields of 3.7 to 6.1 tons (8, p. 2). At this rate, the production of corn can be increased five-fold without expanding its area.

As we have noted earlier, corn production increased in 1964

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37 A major difference between the corn project and the rice project is the absence of student assistance in the corn project.
and 1965, making possible export of this crop in the late months of 1965. If the expected increases were realized, and considering the low income elasticity of demand for corn domestically, major reliance should be put on the export market in the very near future. It is wise to give more serious thought to this possibility at the earliest possible time to prevent disincentives in this growing and promising industry.

**Labor**

In terms of quantity, labor input is not a limiting factor in the production of food in Indonesia, as 33 percent of the agricultural labor force in Java and Madura are underemployed. Increasing the productivities of this group through fuller utilization will result in increases in food production.

Labor productivities are in general determined by the quality and quantity of the "materialistic agents"[^38] that collaborate with labor, and by the skill of labor. One of the most important materialistic agents in the production of food is land. Labor productivities can be increased through using more land and improving the quality of land. In view of the tremendous population pressure on land in Java and Madura, and the existence of unexplored frontier land in

[^38]: The term 'materialistic agent' is from Fei and Ranis (21, p. 59).
the Outer Islands, both alternatives should be given serious thought.

We have seen that the prospects of increasing output, at least for corn and rice, is bright. If the rate of increase in output is faster than the rate of growth of the agricultural labor force, then labor productivity in terms of output per unit of labor will increase over time. However, as discussed in Chapter II, the existence of a labor force with low if not zero marginal productivities is not conducive to economic development, since it limits significantly the contribution of the agricultural sector to the other sectors. It is a necessary condition that this underemployed portion of the labor force be provided other more productive employment opportunities. For Indonesia, there seem to be two alternatives: first, transmigration to the Outer Islands where land use can still be expanded; and second, industrialization.

Policies to influence transmigration of the population of Java and Madura to the Outer Islands started in 1905 and have been followed and are still pursued by governments in Indonesia. However, transmigration was seriously undertaken only during the thirties. The migrations were government-sponsored in the sense that the government subsidized the cost of transmigration and settlement. However, despite these subsidies and propaganda from the government, the transmigration program did not result in a significant movement of population from Java to the Outer Islands. In the
colonial era, the program never exceeded 60,000 persons a year, and later independent Indonesia was only able to transmigrate less than 25,000 a year (85, p. 23). Considering the rate of growth of population, these averages are not significant at all. 39

The effectiveness of transmigration as a solution to the Indonesian demographic problem was evaluated by Widjojo Nitisastro (76). In the next quarter of a century Java's population will double despite an outmigration of one million people in each five-year period. With regard to the rate of transmigration, this is the most reasonable assumption, although it surpasses the past trend rate. Even if the rate is multiplied by five, Java's population will increase by more than 30 million by 1990. 40 But outmigration of one million people annually is a superhuman task. The cost of transmigrating this one million people in terms of transportation and resettlement would certainly form a significant drain on the country's limited resources, with the consequence of limiting the development efforts in the other sectors. In addition, the gain in terms of reducing the population pressure in Java was, as the data indicated, not significant.

39 This apparent lack of mobility will be discussed in more detail in the next chapter.

40 See Nitisastro (76, Table 75).
Thus transmigration alone is not the remedy; neither would birth control be, although both would relieve the pressure. Both will be more helpful if accompanied by the creation of employment opportunities in the non-agricultural sectors, which is the second alternative.

This second alternative is an approach used in the past by the present developed countries when faced with similar problems. Indonesia today, however, is facing a more difficult problem than ever faced by any of the present developed countries in their economic history. This is mainly due to the high population growth rates of 2.2 percent and the initially high proportion of the agricultural population, estimated at about 70 percent. As Dovring calculated, to change this proportion to 40 percent with a population growth rate of 2 percent, a growth rate of non-agricultural employment of 3.5, 3 and 4 percent would be needed over 50, 70, and 35 years respectively (18).

Data on this subject for Indonesia is rather limited, but a comparison of the two census on occupational distribution might reveal somewhat the slowness of the rate of growth of non-agricultural employment in the last three decades. Where total labor force seems to have grown about 70 percent between 1930 and 1961, the total non-agricultural employment seems to have grown only 46 percent. This comparison is a strong indication that the country in the past did not
succeed in siphoning off the surplus labor force and putting it into more productive work. The longer this trend continues, the more difficult it will be for the country to develop successfully. The increases in production in the agricultural sector will be consumed in the sector mainly, thus depriving the economy of a potentially significant source of investment. As mentioned in Chapter II, the surpluses created by increases of output are an important source of capital for the non-agricultural sector.

Thus, industrialization in Indonesia is a necessary condition for development, and not merely an attempt to imitate the present industrialized countries. It is necessary because only through industrialization can the country provide sufficient employment opportunities for the increasing agricultural people, thus increasing their productivities and the productivities of the farmers left in the sector, and thus the income of the farmers. In other words, through industrialization income can be increased, and the mass of the rural population can be relieved from the poverty which they have already suffered for too long a time.

Moreover, through these increases in productivities and per capita income, the potential supply of capital increases. If successful, it can be channeled to the industrial sector. It is from this view that we reject capital intensive investments in agriculture such as tractors, harvesting machines, and other heavy machinery as used
in the present developed countries. The use of this capital intensive equipment reduces the savings which can be mobilized from increases in agricultural output, and thus limits the capital formation in the non-agricultural sector, with all the consequences mentioned above. Simple and labor intensive materialistic agents should be used to increase the productivities of labor.

Additional investment is essential for continual expansion of food output. Because of the scarcity of capital and the abundance of labor, the investments in agriculture must be directed toward projects with low capital-output ratio. This type of investment points to comparatively simple improvements in agriculture, especially to non-financial investments, rather than to expensive mechanization projects. Non-financial investments refer to capital formation without direct cash-outlay.42 In recent years much attention has been given to this type of investment in an attempt to utilize the under-employed labor force for capital formation in projects such as improving irrigation works, constructing bridges, digging ditches,

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41 Quantitative data on this subject is scarce, so that its discussion will be more qualitative.

42 The term "non-financial investment" is obtained from (30).
and draining. This work does not need to be done on an individual basis; it could also be done collectively. It would form an important feature of the community development programs of the Indonesian government.

There are projects which by their nature are capital intensive, and the technical superiority is sometimes so great that the use of labor intensive methods becomes absurd. The cash outlay of these investments is so large that they belong in the field of state investment. With this type of investment can be included railroad and road construction, building of new bridging, new irrigation projects, and huge drainage and reclamation programs.

The foregoing refers only to the formation of fixed capital. Working capital is also needed to increase food output. This is especially true in places where subsistence agriculture is transforming into commercial agriculture. The emergence of the latter is accompanied by an increasing use of off-farm inputs, such as new seeds, fertilizers, and pesticides, which in general raise the working capital requirements of the farmers.

The characteristics of food farming in Indonesia in terms of scale of operation and marketable surplus, require the farmer, especially the small one, to rely heavily on credits for his financial expenditures. Depending on the length of time needed, the farmer's need for credit can be divided into short and long run credit, and
depending on the purpose, it can be divided into production and consumption credit.

In general, the Indonesian farmer can rely on two sources of credit, institutional and non-institutional sources. To the non-institutional sources belong the middlemen, including the shop-owners and merchants, money lenders, well-to-do farmers and their families. In the colonial era and in the period immediately after the war, these sources were the most dominant. Their relative importance in recent years declines, although they still form the main source of rural credit. The exact prevalence of these credits is unknown and difficult to learn about, since the farmer is reluctant to answer questions on this subject, "fearing that he might bring difficulties to his trusted friend-in-time-of need." However, according to Mears, all reports from local administrators indicate that these loans are still common, especially in Java and Lampung (66, p. 147). The general complaint against these sources is the high rates of interest charged by the creditors, which forms a

43 An F. A. O. study indicates that the rural interest rates charged by these non-institutional creditors ranged from 50 to 100 percent. The same report indicates that these high rates are common in South East Asia. For example the rates in Cambodia, Philippines and India range from 80 to 120, 50 percent or more, and 25 to 400 percent respectively (31, p. 152-153). On the other hand, Metcalf, writing in 1952, reports that interest rates charged by local village money lenders ranged from 120 to 300 percent a year (70, p. 30).
considerable financial burden for the farmer debtors, and results in the dependence of the farmers on the creditors in marketing their produce. 44 From the viewpoint of increasing the food output of the country, the high rates of interest and the farmer's dependence on his creditors are serious impediments to rapid growth rates, since they diminish the incentives and limit the savings potential decisively. In view of this danger, the Indonesian governments in the past attempted to influence the cost and availability of credit in the rural areas by encouraging private institutions and by establishing public financial institutions and cooperatives to loan directly to the farmers.

To the private institutions belong the village banks, the village rice banks, and the Credit Cooperatives. The village banks, of which there were 6,923 in 1940, offer small loans to the rural population. They were mainly located in Java and Madura. These banks suffered a considerable setback during the war and the following revolution. In 1952 these banks had only 2,542 branches (51, p. 209). Although their number increased during the fifties to 4,456 in 1960, their function was gradually taken over by credit cooperatives. By law they and the paddy banks were to fill a need only until credit cooperatives were established (66, p. 148). They were open only

44 The role of the money lender-trader will be discussed in more detail in the next section.
once or twice a week, providing small cash credits mainly for production purposes, but also to a limited extent for consumption needs.

The village rice banks developed in Java at the beginning of this century out of the "traditional village grainery," which was an integral part of the old Indonesian communal life. They open also two or three times a year, providing loans in paddy for seed or food in the pre-harvest season, which are repaid in the harvest season, also in kind. According to Metcalf, the number of village rice banks reached its peak in 1917 with nearly 11,000, but after that date there was "a gradual decline in number owing to the development of transportation and the slow conversion to a money economy" (70, p. 29). In 1940 there were 5,451 village rice banks with advances of more than 110,000 tons of paddy. In 1960 there were 3,325 of them with more than 43,000 tons of paddy (51, p. 209). Thus the decline observed by Metcalf continued in the post-war years.

The commercial banks, as expected, play an insignificant role in the rural areas. The limited number operating in those areas are more interested in providing credit to the export-crop farmers, plantations, and large food farmers. By Western standards, they charge high interest rates, although compared with the
non-institutional creditors, their rate is much lower. These banks indirectly contribute to the financing of the food sector through loans to the merchants, money lenders, and other non-institutional creditors.

Cooperation by farmers to supply the needed credit to members is an approach that has aroused wide interest in Indonesia. With a government over-sympathetic toward cooperative movements, the development of credit cooperatives is considered the solution to the credit problem in the rural areas, so that rapid development of cooperatives should not be very difficult. This firm belief is based on the fact that for centuries the farmers have had the habit of rendering mutual assistance. All of this resulted in an over-all support and commitment of the government toward the establishment of cooperatives. Indeed, in the postwar years the number of credit cooperatives has increased considerably. In 1940 there were 478 credit cooperatives with a membership of 41,308, and by 1961 the number had increased to 8,573 with 1,023,331 members (51, p. 212). However, compared with the number of persons employed in agriculture (approximately 20 million) this number is still too small to replace

45 For example, in 1961 a commercial bank, gearing its operation to the tobacco farmers, charged an interest rate of 36 percent a year.
effectively the money lender-trader.  

As private institutions could not meet the demand for credit from the food producers nor compete successfully with the money-lenders-traders, the government stepped in by establishing state credit institutions, in an attempt to influence the availability and the cost of credits. The Cooperatives, Farmers and Fishers State Bank (Bank Koperasi Tani dan Nelajan Negara) was the state central institution for agricultural credit. The capital was furnished by the government. It accepted savings accounts and other deposits from farmers, cooperatives and fishers. Before the war (1940) it had 99 branches, of which 68 were on Java and Madura. In 1961 there were 116 branches, 70 of them located in Java and Madura. Their importance in the rural areas in terms of outstanding loans has been declining in the post war years. While in 1940, 40 percent of the outstanding loans went to the rural areas, this percentage in 1960 was only 12 percent (51, p. 202).

This limited success of these state banks is mainly caused by the conservative methods in evaluating credit requests. The interest rates, although still high if compared with Western standards, are low (12 percent annually) if compared with those of the private sector. Yet, despite these low rates these state banks have not been able to succeed in capturing the majority of the demand for credits. The

46 The role of cooperatives in the rural areas will be discussed in more detail in the next chapter.
main criticism against this type of banks is their use of traditional commercial techniques and requirements, and their urban locations, which in general are beyond the reach of the small farmers, the ones who most need the credits.

The foregoing reveals that although they show some progress, they do not yet play a dominant role in the provision of rural credit, despite the over-all government support to their development. The fact that their credit was much cheaper than the credit supplied by the non-institutional sources did not help them to drive out the money lenders. Leaders of cooperatives and other institutions believed that the limited resources made available for the credit institutions was responsible for their past failure to compete with the money lenders through lower interest rates. This might be true, but the writer

During a seminar on agricultural development held in late 1961 in which the writer participated, a participant reports that in his area in Central Java the State Bank charged only 12 percent a year, while a private commercial bank exacted 36 percent. However, despite this differential in interest rates, the private bank had more customers than the state bank because of the more realistic approach of the latter. Although both are located in the same city, the private bank used the method of sending his agents to the producing areas (villages) to offer the farmer cash credit at above rates, and the farmer's crop as security. On the other hand, the state bank operated on a strict commercial bank method and did not send its agents to the producing areas. In other words, the farmer has to go to the city to request a credit from the state bank. The participant attributed the differences in success of the two banks to the methods, despite the more favorable interest rates of the state bank.
could not accept this explanation as the only cause of their failure. The other factor which has led to the strong position of the money lender is the personal character in which the transactions are made, as compared to the impersonal character of transactions with most credit institutions, coupled with flexibility with regard to due dates and repayment schemes and the speed with which the credit requests are granted or rejected. In evaluating credit requests the non-institutional resources are less formal. They do not need administrative formalities, such as detailed application forms with their sometimes indiscreet questions (at least from the viewpoint of the farmer), and securities demanded, which are so much disliked by the farmers in general. Moreover, sometimes they have to travel long distances to apply for credit from institutional sources such as the state credit institutions.

A more serious disadvantage which limits the success of the institutional credit sources is their limitation in granting credits to production credit only. In other words, the other needs of the farmers to finance their consumptive needs in the preharvest season are not satisfied or can not be legally satisfied from these institutions. This limitation provides the money lenders an additional strength and market for their financial resources, since the rejection of consumptive credit may force the farmer into their arms.

The limitation to credit for productive purposes, although it
has its own merits, is not practical, since it is difficult to control what happens to the loan as soon as the farmer receives it. Moreover, where the majority of the farmers are still at the subsistence stage, it is difficult to distinguish credit for productive and consumptive purposes. The following example from an F. A. O. report illustrates the difficulties in distinguishing the two types of credit:

(24, p. 46)

There are numerous cases in which credit for hired labor is granted by credit institutions on the grounds that it is a part of the 'cost of production' of the crop, and should therefore be considered for productive purposes. Applying the same yardstick, a loan application by the farmer to buy food for himself and his family in the months preceding the harvest is rejected, as it is considered for consumptive purposes. It is difficult to see, however, that credit for labor performed by nonmembers of the farmer's family would be more productive than credit that enables the farmer and the members of his family to do similar or other useful work on his farm.

The writer agrees with the conclusion of above F. A. O. report which stated that "As long as the subsistence farming prevailing in developing countries has not been replaced by full-fledged market production, all credit to the small-and-medium sized farmer (and sometimes even to the bigger farmer) is bound to include the consumptive as well as the productive element." The report concluded further that "it will continue to be extremely difficult to draw a line approximately between these two elements" (24, p. 48).

To prevent the use of credit designated for productive purposes
for consumptive purposes, government agencies granted credit in kind to the farmer such as fertilizers, seed, and pesticides. However, since there is a basic need for cash consumptive expenditures, these agencies report that there were indications that the farmers were selling these inputs to commercial farmers as well as to large estates. Since these fertilizers are sold below market prices, often the farmer received a net profit out of this transaction. The best solution seems to be the provision of consumptive credits to the farmers till they become "full-fledged market producers."
VII. THE ROLE OF MARKETS IN FOOD PRODUCTION

The production of food depends not only on the inputs, but also on the institutional framework within which the producing units operate. In Chapter II we have emphasized the importance of a near perfect market and the behavior of the marketing margins on the production of food. The more perfect the market, the better allocation of resources and the closer the actual production curve to the maximum possible. The degree of market perfection depends to a certain extent on three factors: knowledge of opportunities, mobility, and the existence of large numbers of buyers and sellers.

The first three sections of this chapter are assessments of the above factors to detect the major weaknesses of the market sector which affect the production of food. The fourth section discusses analytically the marketing margins.

Knowledge of Opportunities

The knowledge of opportunities depends basically on the communication system of the economy. Its efficiency is determined by the media used and the existence of a common language among the participants of the market, through which the information is transmitted and disseminated.
The Communication Media

The communication facilities in Indonesia can be divided into two groups, publicly and privately owned. The most important of these two is publicly owned, since it controls completely the postal service, the telephone system, the telegraph, and television and radio services.

The postal, telegraph, and telephone systems are controlled and operated by one government agency responsible to the Central Government. This agency, through its regional subdivisions, operates on a nationwide basis and handles also the international traffic of this communication system. These services have grown considerably since World War II, as can be seen from Table 27 in which prewar data are compared with postwar data. However, the need for such services is far more than those available. This shortage is probably reflected in the ratio of facilities to total population. For example, in 1954 there were only 64 thousand telephones for the total population of more than 82 million people (105, p. 68).

Of more importance to the functioning of the market are the radio and television services, since the potentialities of these media to penetrate the rural areas are much larger. In 1961 there were 785,000 radio receiving sets in Indonesia (51, p. 184). Compared with the 1940 total, this number was an increase of more than seven
times. Even so, the ratio of number of sets to population is still small, and certainly needs additions if the country wants to improve the communication function of the economy. Moreover, these radio sets are concentrated in large cities. However, large loudspeakers installed in the center of villages makes it possible for additional numbers of people to hear the broadcasts.

Table 27. Changes in Number of Pieces of Mail, Telegrams and Telephone Calls in Indonesia

<table>
<thead>
<tr>
<th></th>
<th>Number of Domestic Mail</th>
<th>Number of Telegrams (domestic)</th>
<th>Telephone Calls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Long Distance</td>
</tr>
<tr>
<td>1939</td>
<td>113,609</td>
<td>1,044</td>
<td>1,604</td>
</tr>
<tr>
<td>1959</td>
<td>218,159</td>
<td>3,857</td>
<td>4,986</td>
</tr>
<tr>
<td>1960</td>
<td>221,831</td>
<td>4,307</td>
<td>4,888</td>
</tr>
<tr>
<td>1961</td>
<td>208,364</td>
<td>3,921</td>
<td>5,633</td>
</tr>
</tbody>
</table>

*1961 data are preliminary data.

Source: Central Bureau of Statistics (51, p. 182-183).

Communication media in the form of newspapers and periodicals are owned by the state as well as by private organizations. In 1961 there were 61 daily newspapers with a circulation of 692,500. In other words, the number of subscribers per 1000 inhabitants is seven, compared with the United States, Argentina, and Brazil which in 1959 had 328, 155 and 60 subscribers per 1000 inhabitants respectively. In addition to the newspapers, in 1961 there were 135
periodicals in the Indonesian language with a circulation of 1,260,700 (1, p. 30-31).

These are the media which in most developed countries are used for accumulating and disseminating information by the decision makers. In Indonesia these media as shown by the data are insufficient to perform that function. Moreover, these media are concentrated in the urban areas.

In a sense, they perform an important communication function in the economy. For example, the daily newspapers quote the prevailing consumer prices in the different markets in the city, so that they are important sources of information for the consumers as well as for the middlemen. The radio broadcasts price quotations for certain products every morning. The telephone, telegram and postal services can be used by everybody for a reasonable fee. The major weakness of this media is that knowledge of opportunities never reaches the rural areas through them. The farmer located in the rural area lives in isolation from these media, since he is too poor to buy a radio set, to use the telephone, telegraph and postal services, and too illiterate to read newspapers or periodicals.

The government, realizing the importance of market information for the farmers, has established services for collecting and disseminating market news. However, since the problem is structural in the sense of low per capita income and low level of literacy
of the farmer, the writer doubts the efficacy of this government effort. Moreover, the lack of standardization and grading in the food industry puts a serious limitation on any effort to improve the communication function of the economy. We will discuss this aspect in a later section.

The only facility left to the farmer to obtain the information he needs is through interpersonal communication. Conversations between and among farmers, marketing agencies, and government officials are probably the most important flow of information which the farmer receives and through which he transmits his information with regard to his decisions and wants.

The system of this type of communication is the marketing channel through which information is transmitted from consumers to producers and vice versa. The communicators in this system are the marketing agencies who bridge the gap of knowledge between producer and consumer. If the communicator blocks certain information which is disadvantageous for him--and he has the power to do it--then the flow of information might not reach the final decision makers, the producers or the consumers. This power is real, and originates from the monopoly-monopsony position of the middlemen at the local level.

There is no doubt that this type of communication is slow and unreliable. Understandably, distortions of the information happen
quite frequently, especially when the marketing channel is long and complex. However, coupled with improved facilities such as a means of transportation, interpersonal communications become more effective. Since the transportation conditions in Indonesia are poor, interpersonal communication is far from being ideal.

**Standardization and Grading**

To know and report price quotations, established standards, and grades and measures should be accepted by the parties concerned. In the food sector, depending on the areas, different measures and weights are used. The use of good scales is not widespread; instead, cans are used to measure weights. Between areas there are variations in the size of cans, which of course measure different weights. Moreover, the weight of a volume of a food product such as rice differs according to the variety of the grain and the size of the kernel. The weight also differs according to whether it is heaped or "struck" (1, p. 93).

Statutory standards and grades for the food products discussed in this study do not exist in Indonesia. This is even true for rice, the most important food with a more developed trading practice. A rough standardization and grading system is used by the trade. Buyers and sellers distinguish milled and homepounded rice by the whiteness of the grains, or they distinguish paddy according to
varieties. However formal nomenclature which has a fixed and common meaning on the products, is practically absent in Indonesia.

The absence of standardization and grading is one of the most important imperfections in food marketing in Indonesia, since to a large extent it prevents the market mechanism from reflecting back accurately to the farmer the preferences of the consumers and the values of different qualities of food items. Mears reported that in the rice sector "differences in price between high and low qualities of stalk paddy are often much less than their true worth might justify" and "in fact, it was frequently found that both good and inferior paddy were selling at almost the same price" (66, p. 89). Subjective valuations of this type are more frequently used in the other food products such as corn, cassava, and sweet potatoes.

Inconsistent weights and measures are serious inconveniences for sellers and buyers, especially for those who enter the market irregularly and do not know how to make allowances for potential small deceptions, and to those who want to compare prices quickly and accurately between markets before making any decision.

This absence of standardization, grading, and uniform weights and measures has aggravated the communication problem, simply because the common language which could be understood by buyers, sellers, and reporters is absent. Prices are not effective as the "signalling device" that informs each person of the economic decisions
of other people. Under such conditions, price quotations are less meaningful for the decision maker, and he will not respond properly. The large degree of uncertainty which faces the producer and consumer or seller and buyer limits the possibility of the producer to plan and produce the maximum quantity of the most profitable grades.

Mobility

Assuming that the decision makers have knowledge of opportunities, mobility basically depends on an efficient transportation system. Labor mobility depends also on the willingness of the laborers to move.

Transportation

Transportation facilities which suffered damage and deterioration during World War II and the subsequent war of independence have largely been rehabilitated and expanded in the decade of the fifties. Of the four means of transportation, railways, highways, water transportation, and airways, the third is of course the most important one, since a large reach of water separates the islands.

Railways provide a major means of transportations in Java and Madura, and are of some importance in Sumatra. With the exception of Sulawesi, which has a short railway system, the other islands have no railway transportation. At the end of 1961, there were
6,640 kilometers of railways in Indonesia open for traffic, 4,684 in Java, and 1956 in Sumatra. This length was shorter than that of prewar times, which in 1939 was 7,364 kilometers. The number of locomotives, and freight and passenger train cars was somewhat smaller in 1961 than that indicated in the prewar data. (See Table 28) More serious than the number indications are the age distributions of the locomotives. Of the 902 locomotives available in Indonesia, 637 are 35 years old or older (51, p. 171).

However in contrast with the prewar period when all locomotives belonged to the coal and wood steam locomotives, the present fleet consists also of 122 diesel locomotives and more than 100 oil steam locomotives. Maintenance of these modern locomotives seems to be a big problem, not only because of scarcity of skilled personnel, but also because of difficulties in obtaining spare parts, which have to be imported.

The number of users, however, has increased tremendously, and this has caused strains in the rolling stock available. Passenger traffic has grown from 1762 million passenger kilometers in 1939 to 7,255 million passenger kilometers in 1960, freight traffic has grown from 926 million ton-kilometers in 1939 to 1,159 million ton-kilometers in 1960 (51, p. 173-174).

Of the food items carried by rail, rice and sugar seem to be the most important. In the postwar years, more than 300 thousand
Table 28. Number of Locomotives, Freight and Passenger Train Cars in Indonesia

<table>
<thead>
<tr>
<th>Year</th>
<th>Steam Coal and Wood</th>
<th>Steam Oil</th>
<th>Diesel Electric</th>
<th>Diesel Hydraulic</th>
<th>Electric</th>
<th>Total Locomotives</th>
<th>Freight Cars</th>
<th>Passenger Cars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1939</td>
<td>1,057</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>13</td>
<td>1,070</td>
<td>27,185</td>
<td>3,309</td>
</tr>
<tr>
<td>1952</td>
<td>991</td>
<td>50</td>
<td>-</td>
<td>-</td>
<td>13</td>
<td>1,054</td>
<td>24,315</td>
<td>2,595</td>
</tr>
<tr>
<td>1960</td>
<td>873</td>
<td>108</td>
<td>62</td>
<td>60</td>
<td>13</td>
<td>1,116</td>
<td>24,209</td>
<td>2,979</td>
</tr>
</tbody>
</table>

Source: Central Bureau of Statistics (51, p. 171-172).
tons are transported by rail annually, but considering an annual production of more than 8 million tons, the proportion transported by rail is insignificant (51, p. 174). However, from personal observations, the writer believes that the weight of rice carried by trains is considerably more than the above figure, because much of it is transported in small quantities by passengers and is not registered in the freight cars. By transporting only small quantities, the passengers do not have to pay additional transportation costs.

Another important avenue of transportation within the islands is the roads. At the end of 1962, total road mileage was estimated at 80,848 kilometers, of which 14,375 kilometers were asphalted. The regional distribution of this road system is presented in Table 29. It is apparent from that table that Java, Sumatra, and Sulawesi have more roads than the other islands. But according to a report, the condition of these roads is very bad; 75 percent of them have reached the "acute" stage (53, p. 12).

Highway traffic in the immediate postwar years has expanded rapidly. Although statistical data on highway traffic and freight movement are lacking, expansion is evident from the increase in the number of motor vehicles. In 1963 there were 132,000 cars, 72,359 trucks and 19,000 busses, which were respectively 2.4, 4.4 and 2.4 times the total numbers in 1941. However a report indicated that only about 50 percent of the busses and trucks were
Table 29. Length of Roads by Type of Surface and Region, 1962 (in Kilometers)

<table>
<thead>
<tr>
<th>Region</th>
<th>Asphalted</th>
<th>Non-asphalted</th>
<th>Unspecified</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Java and Madura</td>
<td>9,538</td>
<td>19,287</td>
<td>-</td>
<td>28,825</td>
</tr>
<tr>
<td>Sumatra</td>
<td>3,674</td>
<td>13,296</td>
<td>10,875</td>
<td>27,845</td>
</tr>
<tr>
<td>Kalimantan</td>
<td>714</td>
<td>2,399</td>
<td>2,291</td>
<td>5,404</td>
</tr>
<tr>
<td>Sulawesi</td>
<td>743</td>
<td>2,944</td>
<td>7,483</td>
<td>11,170</td>
</tr>
<tr>
<td>Other Areas</td>
<td>706</td>
<td>4,501</td>
<td>2,397</td>
<td>7,604</td>
</tr>
</tbody>
</table>

Source: Central Bureau of Statistics (51, p. 168).
road-worthy. Here again, as is the case with railways, maintenance and inavailability of spare parts seem to be the biggest problems (53, p. 12).

As Indonesia is an archipelago, shipping is the most important means of transportation between the islands. The fleet in terms of numbers and Gross Registered Tons increased significantly in the late fifties. While in 1957 there were 117 vessels with 66.3 thousand G. R. T. for the Inter Islands and coastal service, in 1961 there were 260 vessels with 193.4 thousand G. R. T. (51, p. 175). These vessels ranged from 100 G. R. T. or more, with more vessels at the lower G. R. T. Thus from the 260 vessels, 92 ranged from 100 to 199, while 27 had a G. R. T. between 2000 and 4999. In addition to these vessels, there are numerous smaller ones primarily sailing boats, which have roamed the seas around the islands for centuries.

Despite these increases, water transportation needs more ships and facilities to increase the mobility of products and manpower. The total number of vessels has a passenger capacity of only 27 thousand people, while the 193 thousand G. R. T. is far from enough capacity to meet the demand for freight.

Although air traffic is new in Indonesia, its importance has increased significantly in the postwar period. Passenger traffic rose to 471 million passenger kilometers in 1964 from 159 million in 1952. Freight carried during 1964 rose to 8.4 million ton-
kilometers, from 5.3 million in 1952.

These are the main ways of transportation for which statistics are available. Besides these means, there are a host of others which probably are more important for the food producer, middlemen and consumers. They include human carrying poles on their shoulders, different sizes of carts drawn by oxen, water buffalos or horses, bicycles and pedicabs, and small boats for inland waterways. These carriers are mostly used for short-distance transportation. Their capacity differs according to size and strength. On the average, a man with a carrying pole could transport 60 kilograms, a cart half a ton, and a bicycle 100 kilograms. These means of transportation are especially important for short distances in the populous areas of Java and Madura.

An important proportion of the four major means of transportation are owned and operated by the government, and is thus subject to the bureaucracies which usually characterize government agencies. Poor planning and coordination, coupled with corruption in certain branches of the services, intensify the transportation problems of the country. Their almost monopolistic position in the trade enables them to be inefficient without being punished by the market.

However, the major weakness of the Indonesian transport economy is inadequacy of facilities, and the poor conditions of the
existing facilities. These shortages are reflected in the overcrowded busses and trains, and the necessity of reserving seats and cabins in planes and ships far in advance of the date needed. Long lines of people in bus and railway stations is a regular feature of the Indonesian transport economy.

For goods, the shortages of transportation facilities are more severe than for that of people, since goods, especially perishable food items, require additional facilities for efficient handling. During his visits to the Outer Islands in the late fifties and early sixties, the common complaint expressed by government officials and businessmen was the lack of transportation facilities to transport the surplus goods of their area to the deficit regions. For example, the South-Sumatran region can produce more pineapples than the regional demand absorbs, while in Djakarta, the capital of the country, there is a high demand for this product, which cannot be met fully by the surrounding agricultural areas. Transportation of this product to Djakarta would enhance the production in South Sumatra. But lack of transportation facilities limits the weight exported to Djakarta. Also, the risk of spoilage of the product before it reaches Djakarta is high, since cold storage facilities are not available. The same conditions are also reported for the transportation of fish and meat from the surplus areas Kalimantan, Sulawesi, and the Nusatenggara region, to the minus areas of Java and South Sumatra.
On top of these shortages are the bad conditions of the existing transportation facilities which prevent their use to their full capacity. Busses and locomotives lie idle in the repair shops, while only simple spare parts are needed to put them in running order again. The roads in certain areas are so bad that travel over short distances takes a longer time than normally should be needed. For example, during his visit to the North Sulawesi region, an area with rich fishing grounds, the writer observed a price differential of more than 500 percent between the major producing and consuming regions. The distance between these two regions is only 50 to 60 miles. But the condition of the road at that time was so bad that it took a truck more than five hours to travel the distance. Since the fish was caught far from the harbor, and the fishermen still use sailing boats, the additional five hours for land transportation is vital for its freshness of the produce. Because of this bad road condition the market for excellent tuna fish is limited to the local area, where a limited demand exists.

Nothing more revealing of the shortages of transportation facilities is the fact that fish caught alive are transported alive in water cans or strengthened bamboo baskets, to the consuming areas. The same can be said also for meat: cattle are herded to cities and slaughtered in the cities rather than in the producing areas.

The bad transportation conditions in Indonesia affect the
mobility of the produce and factors of production. Of course, with each product there are other specific factors responsible for the degree of mobility. The following is a more specific discussion of the factors affecting the mobility of rice, the most important food item, and labor, the major factor of production.

Mobility of Rice

Domestically produced rice in Indonesia is mainly consumed on the farms, but a proportion of the total output is transported outside the farm gate. Estimates on this marketable surplus have a wide range. Mears estimated that for Indonesia as a whole the proportion might range from 20 to 25 percent (66, p. 25). Mubyarto estimated that for the Jogjakarta region the marketable surplus was 47.7 percent, while Rukasah suggested that for the Krawang region, a surplus area in West Java, the proportion was 68 percent (72, p. 43). But the average proportion for West Java as a whole as calculated by the School of Agriculture Research Team was about 37 percent (2, p. 1). Assuming an average of 30 percent marketable surplus, at least 4 million tons of paddy (5 million stalk-paddy or 2.6 million tons rice) must be transported away from the farm gate. In addition, approximately 0.5 to 1 million ton of imported rice must be transported from harbors to the consuming areas.

This huge load forms a strain on the transport facilities.
However, rice is easier to transport than perishable products, and has a wider range of transportation facilities, from the most primitive to the most modern. Affixed data show that 350,000 tons of rice are carried by trains, while only 100,000 tons are transported by ships. The balance is transported by trucks, cars, busses, carts, bicycles, and human beings.

The cost of transporting these quantities of rice is high. Mears, basing his calculation on 20 percent marketable surplus, estimated that between 5 and 10 percent of the urban consumers' expenditure for rice goes to pay for transport cost (66, p. 75). But in his calculation Mears included only the direct cost of transport, disregarding the indirect cost in the form of inefficient handling. During his visit to one of the big harbors in Indonesia, the writer observed that a large part of the dock was covered with rice which had fallen out of the rice-sacks as a consequence of the use of hooks in handling them. In addition, poor planning and coordination result in bad arrangement of routes, so that less than a full load is

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48 In addition, based on personal observations, indications are that more than the above total weight must be transported by rail and sea. Much of the rice transported by small scale middlemen to the consuming urban areas is actually carried as "cabin baggage," for which no extra cost is charged. This is also the case on busses where small quantities of rice are transported and do not warrant any charge. In addition, the small sailing boats which roam the seas around the archipelago might carry tons of rice with them.
sometimes carried by ship, train or trucks. Moreover, the added cost of holding stocks because of delays in departure and arrival must be taken into consideration. Because of these indirect costs, the total transportation cost must be higher than indicated above.

In addition to these transportation limitations, the movement of rice is hampered by government restrictions. In an attempt to control the movement of rice, the government requires licenses for transporting it between provinces and sometimes between districts within one province. The price differentials resulting from these restrictions enable the "smugglers" to transport the rice illegally from surplus areas to the deficit areas. Of course, since the risks are higher, the cost of transporting rice illegally is much more expensive than otherwise. As a result, transportation costs have risen, and the final consumer has to pay higher prices, while the farmer receives lower prices for it.

As a result of these limitations, price differentials between provinces are high. This is especially true among the main consuming urban areas of the different islands. Mears reported that prices in the Outer Islands were two and three times higher than the prices on Java. He continued that these prices "for long periods of time... have remained above prices on Java by amounts that cannot be justified by transport cost alone" (66, p. 128). Within a province where inter-district movements are restricted, price disequilibrium
is found, although to a lesser extent.

These price differentials understandably form a serious disincentive for the farmers in the surplus areas against increasing their production. Removal of these barriers, by improving the transportation facilities and removing the restrictions imposed by the government, will certainly increase the demand faced by the farmers. Higher prices, if reflected at the farm level, will form a good incentive for the farmers to produce more rice, and encourage them to apply the more risky but improved methods of technology.

Mobility of Labor

The existence of a disguised unemployed labor force in the rural areas of Java and Madura is an indication of the lack of mobility of the Javanese population. However, experts in the field claim that mobility of the rural people in Java and Madura started to increase in the postwar period. Nitisastro reports that during the colonial era, despite vigorous government propaganda, Javanese peasants responded with little enthusiasm; in fact they showed a high degree of immobility. The picture during the postwar period was different. Nitisastro wrote that there is "no doubt that at present the Javanese rural population is much more mobile than they were before the war." He stated further: "Unlike before the war, the problem faced by the government agencies is not how to persuade
people to move, but instead how to keep up with the continuously increasing demand to be moved" (78, p. 211). This view was supported by Dr. Wertheim, a Dutch sociologist, who had worked on the government transmigration programs in the prewar period (110).

The greater mobility of the Javanese population resulted not only in an increasing demand for transmigration to the Outer Islands, but also in an increasing rate of urbanization. While the population between the two censuses increased by about 60 percent, the urban population increased by 393% (85, p. 19).

The reasons for this greater postwar mobility are manifold. Basically, the main reason is the increasing population pressure, which results in small landholdings, large numbers of landless agriculturists, low income levels, and the constant need for additional employment. Widjojo attributed the greater mobility, in addition to these factors, to "the population displacement during the revolution and the upsurge in the literacy rate." The revolution resulted in an intensive contact between village and city populations, when "the majority of the latter left the cities occupied by the Dutch armed forces, and when young men from both groups served in the army." This contact, according to Nitisastro, "affected the aspirations and mobility of the villagers." With literacy and a higher level of education, a knowledge of alternative opportunities widened, resulting in greater mobility (78, p. 212).
Yet despite this greater mobility, the number of transmigrations leaving Java never exceeded the prewar record. There are several reasons for this contradiction. First, transmigration depends on government subsidies, and they are subject to budget constraints. The extent of government involvement is indeed large. The following citation from Nitisastro describes briefly the government involvement in the program: (78, p. 205-206)

...after the necessary surveys have been completed the areas designated for settlements are cleared, and roads, irrigation works, and temporary housing units are built. The prospective settlers, who in the meantime are registered and selected by government agencies in Java, receive free transportation to the settlements, and two hectares of partly cleared land. Until the first harvest (six or eight months) they also receive food, clothing, household utensils, seeds, and simple agricultural equipment, all of which they must ultimately pay for.

Most of these settlements are located in South Sumatra; the rest are spread over Central Sumatra, Kalimantan, Sulawesi and Maluku. From the above citation, one can conclude that the financial support of the government is large. This should be viewed also from the competing demand of funds for other developmental purposes. Consequently, in the first place, budgets for financing this scheme have always been limited. Second, as in many other cases cited in this study, the executive capacity of the government agencies supervising this program was limited, while coordination between the agencies involved was far from satisfactory (78, p. 206). Third,
there was a lack of adequate transportation facilities, not only between Java and the Outer Islands but also from inland Java to the harbors. For the latter trip an overnight stop is sometimes necessary, although the distances in a small island like Java in terms of mileage are not long at all. This forms an additional financial burden, and has an adverse effect on the growth of spontaneous transmigrants, who migrate entirely at their own cost.

The four factors affecting the interisland mobility of labor are structural, and are unique in less developed economies. Something more than marginal adjustments is needed to increase the mobility. Huge investments in the transport sector must precede any serious attempt to improve the mobility of labor.

The mobility of labor to the urban areas is hampered by two main factors: the lack of transportation facilities and an organized labor market. Within one island, transportation limitations seem to be less important than in the case of transmigration from one island to another. The shorter distance to the cities enables the migrant to use a wider variety of transportation means such as the cart and the bicycle. The lack of demand in the labor market has created unemployment problems in the cities. In other words, urbanization proceeds faster than the growth of employment opportunities. This imbalance is evident from the high rate of unemployment, which in 1961 reached 8.5 percent.
These data reveal the willingness of agricultural workers to move to other occupations and regions. The population pressure has to a certain extent converted the typically strong attachment of the laborers to soil, family, and village, to a willingness to expose themselves to an unfamiliar occupation and region. The structural limitations in terms of transportation and cost reduce their mobility. Improvement and extension of these facilities will certainly result in greater mobility of the factor labor with all its favorable influences on the development effort of the country.

**The Marketing Structure**

Within the local markets, food producers have the opportunity to dispose of their produce to one of several kinds of buyers. While the types of buying agencies vary from one market to another, the most common classes include: 1) the assemblers; 2) local processing enterprises such as the rice mills or bean cake factories; 3) the small merchants; and 4) the cooperatives, if any. Depending on his location, the farmer could sell his produce also in the market places if he is willing to transport the produce by himself and to take the risk of bargaining with the established traders in the market place. The latter can be classified as local retailers, since they sell most of the produce in retail to the local consumers.
The Assemblers

The assemblers are perhaps the most important marketing agencies in the local markets. They buy from the numerous small farmers the sometimes minute surpluses, concentrate them into larger supplies, and sell them in larger quantities than those purchased. They go out to the farms and villages in search of a likely bargain to resell at prices that provide a margin adequate to cover expenses of operation and allow a reasonable net profit. Thus, their main task is to observe prices in the different markets and to be informed on the condition and quality of crops.

These assemblers operate either independently or as an integrated agency of the processors, of the wholesale middlemen in the regional and terminal markets, or of the government procurement agencies. The last group operate only in the rice sector, where government intervention is significant. The independent assemblers in general specialize in the other non-rice subsistence crops such as corn, cassava, and sweet potatoes. The cash crops, such as soybeans, onions, fruit and vegetables, are handled by the independent assemblers as well as by the integrated ones. Another distinction which should be made within this class of wholesale middlemen is to differentiate between those who take title of the goods, and those who do not take title of the produce in which they deal, but who negotiate
sales for their clients.

Assembly is not the only service performed by this class of middlemen, for transporting, grading, and financing are also essential. The lack of adequate transportation facilities increases the importance of the assemblers in performing their function. Depending on the area, the crop bought, and its final destiny, a variety of transportation means are used. However, in the first stages of the concentration process, these means are very simple. If the assembly function is performed by a woman, then a basket supported in a cloth sling on the hip or back, or carried on the head, is the only additional transportation needed. Men by virtue of their strength use carrying poles or bicycles, which enable them to carry heavier weights and to cover wider areas. The small quantities assembled by these agencies permit them to use this labor intensive method of transportation.

At the second concentration points where larger quantities are being transported to the regional markets, more sophisticated means of transportation are used. If a railroad goes through the area, then the train is frequently used. Otherwise busses, trucks, bicycles, carts drawn by horses, cattle, or water buffalos, and men carrying poles are used. In other words, where larger quantities are transported this function is not performed anymore by the marketing agencies but by the specialized transportation businesses.
Weighing, measuring, and grading are other important functions performed by the assemblers. Volume measures are more frequently used, although weight measures are not completely absent. To a certain extent the means of measuring depends on the produce traded. If the paddy farmer wants to sell his crop in the form of stalk paddy, then the weight of a bunch is usually the basis of transactions. But these weights are not measured in terms of kilograms or any other unit of weight. They are subjectively estimated by the buyers. More frequent is the practice of trading on the basis of the number of bunches.

If the farmer is selling his rice in terms of paddy or home-pounded rice, then the volume measure is used. The unit of measure is a can or basket with sometimes different capacities and weights. The disadvantages of this type of weighing and measuring for the efficiency of the industry are obvious. If volume measures are used, then the weight of paddy, for example, depends on the moisture content (which determines the conversion rate to rice), the variety, the proportion of foreign materials, and the proportion of empty husks. In addition it depends also on whether it is heaped or struck.

If the bunch is used as the unit of transaction, the same uncertainties are faced. Moreover, the difficulties in estimating the size of the bunch add to the problem. If homepounded rice is the basis of the transaction, then in addition to the problems mentioned, the
broken proportion of the rice kernels must be estimated, too. Under these conditions, transactions at this level are tremendously delayed because of the bargaining process on the weights or volumes.

A serious disadvantage of this method of subjective measurement is the bias involved in the process of measuring. Since this method depends on personal judgment, it will lead to underestimation or overestimation. The main reason for this bias is, as Allen stated, "a natural psychological tendency for people to avoid extremes, or to be unwilling to accept extremes" (4, p. 164). Thus, the moisture content of perfectly dried paddy, may be consciously or subconsciously underestimated by the buyer. It is important to note that this moisture content is determined by touch: the buyers judge by the feel of the hand whether the paddy is dry or damp. A moisture-tester as used by many developed countries will certainly solve the problem, but the cost of providing this instrument might be prohibitive. For this reason cheaper but more accurate methods must be developed to limit the biases.

A more serious disadvantage of the lack of objective standards for weighing and measuring the produce is the creation of opportunities "for the strong to take advantage of the weak and for the clever and unscrupulous to outwit the unwary and trusting" (20, p. 82). In the sales transactions between farmer and assembler, in general, the farmer is the weak participant, and the assembler is the strong
Complaints about unethical attitudes of the assemblers have been frequently mentioned in the discussion which the writer has had with government officials, leaders of cooperatives, and rice millers. Mears reported that in determining the moisture content of paddy, the "experienced trader can take advantage of the farmer, who is seldom able to judge for himself" (66, p. 139). The use of cans or baskets to measure volumes gives additional scope for abuses. A lower rim on the basket used, or a higher bottom in the can, will result in differences in the real quantity transacted. Alice Dewey described the practice of a trader in a market place in East Java, who used two different sizes of cans, a normal size for purchasing, and a slightly smaller size for selling. The difference in size is very small, but large enough to give the trader an additional profit. In the corn sector, which was studied by Dewey, the difference between the two sizes is such that the 10-volume normal size is equal to the 11-volume selling size. The difference is so small that the buyer does not notice it (16, p. 119).

These imperfections will be easily overcome if objective weighing machines and measuring instruments are available, although control will still be necessary.

In addition to the function of weighing and measuring performed by the assemblers, there is grading, in the sense of sorting the produce into lots of more homogeneous qualities. The greatest
standardization problem in the marketing of agricultural produce arises in this area of quality sorting. While the measuring of weights and volumes of produce creates subjectivities, biases and unethical practices, the measurement of grade factors is far more subjective, and gives more scope for biases and unethical practices. Since measuring grade factors in Indonesia basically are determined by "sensory techniques," they depend mainly on the grader's senses of sight, taste, smell and touch. Thus accurate grading, as stated by Abbot, "depends on the ability of the grader to maintain clear, firm, mental pictures and judgment of the various grades at all times and under all conditions" (1, p. 100).

As long as grades are determined mainly by the varieties of the produce, the determination sorting of them is easy and less subjective. For example, rice can be readily distinguished by varieties which command different prices. However, within one variety there are different grades which depend on color, foreign material, broken proportion and size of kernels, and taste and stickiness of the boiled rice. Of course, for other produce such as fruits and vegetables, and animal products such as meat and eggs, grading presents greater difficulties than it does for grains, because of the greater variations in the factors determining their quality.

These remarks must not be interpreted as inferring that there is no grading at all in the marketing of produce. A rough grading
system is followed by the trade, and the further the produce moves from the producer, the finer the grade. The agencies which grade are the middlemen. The farmers in general do not sell their produce on the basis of grades within a variety. For example, the farmers know that the bulu rice variety commands higher prices than the tjere variety, but they are in general indifferent or ignorant on the different shades of quality within one variety. The small size of the marketable surplus per holding makes them indifferent to the possibilities of grading, so that grading at the farm gate is not worthwhile.

The assemblers, on the other hand, are experienced traders and know the advantages of grading. Yet because of the subjectivity of the grading process, they tend to grade the farmer's produce conservatively to cover the possibility of losses because of misgrading when they resell their procurement. In addition, the unscrupulous assemblers deliberately undergrade in order to increase their profit. The lack of objective standards prevents the market from punishing these practices.

In the bargaining process, prices depend on the grades of the produce as assessed by the assembler, and the farmer is in a weak position. There are several reasons for this weakness. First, the farmer is ignorant with regard to the quality determining factor. This lack of knowledge may be due to low levels of education, a lack
of economic sophistication, poor communication facilities, or a lack of informative services from a third party such as government agencies or cooperatives. In any case, it creates a situation in which the middlemen can exploit the farmer by undergrading the produce. Second, it is the writer's impression that the farmer has a mixed feeling of respect and fear for the sophistication of the middleman. This psychological power seems to be capitalized by the middleman by dressing more urbanely than the farmer. Third, by controlling complementary factor inputs, especially credits, the assembler is in a stronger position than the farmer. By providing loans and advances to the farmer, the assembler in a sense forces the farmer to accept his terms. This will be discussed in more detail later in this section. Fourth, if the assembler is the only buyer in the area, which is not unusual, then his monopsonistic power practically forces the farmer to accept his terms.

With competition, the position of the farmer improves. However, his ignorance and the psychological power of the assembler over him prevent a maximum benefit from competition.

Another important function performed by the assemblers is financing. The transactions between farmers and assemblers are in general done on a cash basis, because farmers expect to be paid cash when they deliver their crops and livestock products. Thus the first part of the flow of produce from producer to final consumer is
financed by the assemblers directly or indirectly, directly if the assemblers finance it from their own sources, and indirectly if they rely on other sources, such as banks or middlemen, either from the regional or terminal markets or from processors.

Because of their financial weaknesses, many small farmers are forced to seek loans from outside in times of need, especially during the preharvest season. The financially strong assemblers, especially those who are integrated with processors or middlemen in the transit and regional markets, are willing to supply these credits to the farmer. The farmers become heavily in debt to them, and are often obliged to sell their products year after year to the same assembler, at prices less favorable than they would otherwise receive from the market. Thus the money-lending activities of the assemblers give them monopsonistic powers which enable them to grade and price the farmer's produce arbitrarily.

Thus by offering the three services, standardization and grading, financing, and transportation, the assembler is in a stronger position than the farmer in the bargaining process. This strength is increased significantly by the need of the farmer to sell immediately after harvest when prices are the lowest. He can not afford to wait for better prices because of the generally pressing need for cash, and the lack of storage facilities. If on top of this the farmer faces only one or a few assemblers, increasing the
monopsonistic or oligopolistic powers of the latter, then he is practically at the mercy of the assembler.

As a result of these imperfections, the changes in demand discussed in Chapter III are not reflected in the rural areas. The activities of these middlemen to protect their economic status form a serious blockage in the marketing channel. If we consider the marketing channel as the communication system in which the preferences of the consumer are transmitted to the producer, then these blockages hinder the smooth flow of information. The farmer's decision-making process can not be based on what the market prefers, with the consequence that optimum allocation of resources is not reached.

The Merchants

The second important purchaser of the farmer's produce is the local merchant in the village. His existence is a typical feature of an Indonesian village. He performs multiple economic services to the village community by supplying daily necessities, factor inputs to the farm community--especially credit--and by collecting the farmers' output for sale in the village or for further transportation to the regional or transit markets, or processors. 49 He performs

49 These three key functions are very well described by Wharton as "marketing, money-lending and merchandising" (111).
also the functions of standardization and grading, and financing and risk bearing in the marketing process. In contrast to the assemblers, he does not go to the farm gate for the produce. The function of transporting from the farm to his store is done by the farmer. In addition, because of his fixed location and his multiple economic functions, he has better storage facilities.

Before the war agencies of this type were the most dominant marketing organization in the rural areas. The majority of them were of Chinese origin, so that they were different in race and socially distinct from the peasant community which they served. The prevalence of their monopsonistic powers was adequately documented by Dutch (37, p. 147-148), American (36, p. 59) and Indonesian scholars (94, p. 245). Their monopsonistic powers were derived from the three key functions they performed for the village community. Geertz stated that "the Chinese shop owners with their greater know-how, larger capital supply, and more extensive commercial organization...ultimately gained a position of semi-monopsonistic control in the dry-crop economy, enabling them to press peasant incomes toward the minimum" (36, p. 59). It is clear that under such conditions the increases of farm output did not mean a proportional increase in the welfare of the farmer, since a substantial part, if not all of the additional value of the crop, went to the Chinese middlemen.
In the post-war years, marked changes have occurred in the relative influence of these agencies. The war, the revolution, and the birth of independent Indonesia drastically curtailed their direct negative influence on the farmer's welfare. Understandably, the government of independent Indonesia could not allow a group of foreign citizens to exploit her citizens, especially when the latter had fought and supported the war for independence.

Although several government measures had been taken to limit the monopsonistic powers of the shop owners, the most drastic one was issued in 1959. It was a decree that foreigners could not operate retail businesses in the rural areas outside the capital cities of the provinces, residencies, and districts, and that such businesses must be closed by January 1, 1960. The functions of these foreign retailers were to be transferred to cooperatives with exclusively Indonesian members. Since we will discuss the role of cooperatives in a later part of this section, it suffices at this stage, to stress the tremendous difficulties in establishing cooperatives in such a short time. The sudden departure of the Chinese operators from the villages left a gap in the rural marketing structure which could not be easily filled. The farmers, deprived of their traditional marketing outlet, their sources of credit and other factor inputs, and their daily necessities, were apt to move back toward subsistence. A lower level of living was inevitable. Where cooperatives have failed, and
where pressures for marketing services are mounting, Indonesian traders have developed and have filled the gap to a certain extent. The main weakness of this new class of traders is their limited supply of capital and their lack of experience and know-how, which limit their ability and efficiency in performing their marketing functions. The writer is convinced that with time their position will improve, but the danger exists that once they have tasted the power of monopsony and monopoly, they will maintain it and use it to exploit the farmer.

Considering the present village structure, one must realize that this danger is feasible and real. Once a trader succeeds in establishing himself in the village, no other merchant will enter the village and compete with him, mainly because of the limited market of the village. The purchasing power of a village community is so small that it can not support two or more shops to provide the basic needs of the people.

However, the monopsony power of the trader does not originate mainly because he is the only purchaser of the farmer's produce, but because he performs multiple services to the community, especially the three key functions of marketing, money-lending, and merchandising. As long as the farmer merely sells his produce to the merchant and buys his necessities on a cash basis, he is free to change buyers at will, since he is not tied at all to sell to the merchant in the village. However, once he buys his supplies on credit and
borrows additional money from the merchant, then he is obligated to sell his produce to the merchant till his debt is paid. Thus the critical source of the merchants monopsony power comes from his money-lending activities. To break this power, an efficient credit system must be organized in the rural areas of Indonesia. This is, however, easier to say than to do, and to date the "retail distribution" of credit among food producers is one of the unsolved problems of rural Indonesia.

The Cooperatives

The cooperatives are the third agency through which the farmer can dispose of his produce. Cooperation by farmers to improve their economic position is an approach that has aroused wide interest. The potentialities of cooperatives to check the powers of monopsony and monopoly among the rural middlemen are indeed large. In joining together to undertake marketing functions such as assembling, standardization and grading, transporting, financing, and selling, the cooperative associations form an alternative marketing outlet to those already available, thus raising the level of competition. The very existence of such a cooperative limits the degree to which other marketing agencies can keep down the prices, and thus offsets the monopsonistic power of the rural buyer. In addition, the cooperatives can play an essential role in raising the quality of the members'
products, and where proper price differentials between the grades exist, cooperatives can encourage the acceptance of standards and grades, thus limiting the subjectivity of grading, which has such an adverse effect on incentives.

Perhaps more important is the educational effect of cooperative effort on farmers. Cooperation familiarizes farmers with the problems of markets and business organization, and enables them, as producers, to see their problems more intelligently in the larger setting of the market economy. Being a member of a cooperative, the farmer will learn that marketing is not just a matter of transporting his products to the nearest local buyer and accepting any price the buyer offers. He will learn that there are alternative markets, and learn how to find the best markets for his products. Moreover, he can learn improved techniques of marketing, such as when to sell, how to prepare the produce for market (through grading or quality control), how to process, pack, store, and transport his produce, and how to secure price information and how to use it.

If the farmers already have basic skills such as reading, writing, and arithmetic, cooperatives facilitate and improve the transmission of further knowledge by participating in discussions between member farmers. Through this type of discussion, they can obtain additional knowledge on new inputs and technology. In summary, cooperatives have a big potential for changing the economic behavior
of the farmer in favor of development, and for strengthening his bargaining power.

With these advantages at work, there has been an inevitable attraction for the development of cooperatives. But as Indonesia has experienced in the last half century, establishing cooperatives in the rural areas because of their potential advantages is one thing, while competing successfully with other marketing agencies at the same level of the marketing channel is another thing. In addition to the inherent handicaps such as dependence on salaried labor and management, a lack of adequate capital and trained personnel, and a high rate of illiteracy and ignorance with which they must deal, they have to compete with the efficient money-lender buyer.

Abbot, in appraising this type of agency, argued that the close link between the source of credit and the sale of product is essential for the efficient operation of the agency, and is "the most practical and economical solution." He stated further: (1, p. 111)

The merchant buyer is best able to appraise the value of a future crop and can supervise repayment most conveniently during the course of his purchasing rounds. Where the amounts lent are small and the borrowers numerous and scattered, it is difficult to see how trading and lending activities can be separated without some increase in cost. The integrated credit and trading agency may remain the most efficient operating units under such conditions.

Thus one of the conditions for competing successfully with the money-lender buyers is that the cooperatives should offer the same
services against lower cost to the farmers that they do. The forming of this type of cooperative has been the subject of several studies outside Indonesia. A study made in 1956 by the Rice Committee of the Federation of Malaya reported that cooperatives should not be expected to compete successfully with village shops, which supply farmers their daily necessities as well as buy their produce and offer them credit (1, p. 112). The Food and Agriculture Organization of the United Nations commented on this subject as follows:

(30, p. 144)

The fact that cooperative marketing has not, generally speaking, made widespread progress in the underdeveloped countries is probably connected with the slow improvement of credit facilities. It has not yet been realized widely enough that credit is a vital factor linking all branches of cooperative movement, and is of particular importance in marketing societies. Agricultural cooperatives without a sound credit system are in no better plight than irrigated crops dependent on an imperfect system of water channels. Too easy credit can ruin a cooperative just as excessive water will drown a crop, but too little credit is as stunning as too little water.

The condition that cooperatives should perform at least the same functions as the money-lender trader is not an easy one to meet. At least they need managerial skill, know-how, and adequate capital to perform the integrated functions successfully. These requirements are scarcity factors and have competitive demand.

The progress of the cooperative movement in terms of number of members and of societies is shown in Table 30. The progress in
the post war years was impressive. However many of these cooperatives, if not the largest proportion, owe their existence to government support and initiative. First, the form of the assistance can take the form of outright financial contributions or subsidized loans such as the provision of working capital, credit at low interest rates, and allowing purchases from government agencies for credit without charge. Second, preferential treatment in the allocation of certain commodities for distribution is another form of government assistance. For example, consumers' cooperatives in the urban areas are given the right to buy and distribute essential goods at prices lower than the market prices. Farmers' cooperatives are allowed to buy farm inputs from government agencies at subsidized prices.

Table 30. Number of Cooperatives in Indonesia

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Societies</th>
<th>Number of Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940</td>
<td>639</td>
<td>47,764</td>
</tr>
<tr>
<td>1957</td>
<td>11,863</td>
<td>1,941,719</td>
</tr>
<tr>
<td>1958</td>
<td>14,146</td>
<td>2,198,525</td>
</tr>
<tr>
<td>1959</td>
<td>16,604</td>
<td>2,678,006</td>
</tr>
<tr>
<td>1960</td>
<td>27,652</td>
<td>5,276,278</td>
</tr>
<tr>
<td>1961</td>
<td>38,802</td>
<td>6,908,538</td>
</tr>
</tbody>
</table>


A third form of assistance which is very much used is the provision, without charge, of the services of special government
departments. This is largely accounted for by the lack of education among the members and their inability to cope with the problems of managing cooperatives. They rely mainly on the help of a government-financed specially-trained staff. A fourth form of assistance is the granting of monopoly and monopsony powers to cooperatives. The use of cooperatives as the sole seller or buyer of certain essential commodities or as the sole channel for the distribution of government credits is frequently practiced by government agencies.

Among the main reasons which have led to large scale government support and intervention toward the cooperative movement is the desire and intention of the government to organize the national economy on a cooperative basis as soon as possible, believing that such is conducive for achieving the development goals of the country in a minimum of time. Moreover top government officials believe that only cooperatives can break the traditional relationship between middlemen and farmers in the rural areas. The following quotation from a report by the Cooperative Board of Bandung (capital city of the province of West Java) is typical for the attitudes of other government officials toward this problem: (15, p. 368)

The merchants and middlemen, who are usually foreigners, control the capital resources, consisting of cash and of requisites for farming. They flood the villages with the ample supply of capital at their disposal, and the people are the victims. The result is that the people are forced to rent their land, and even in those cases where they are able to go on farming themselves, their activities
are controlled to a large extent by commercial credit in the form of seed, fertilizers, money and the like. The people are bound to the merchants, since they have to buy their agricultural supplies from them at arbitrary prices. The same situation prevails with regard to the sale of agricultural products. The merchants have complete control over the market prices for agricultural supplies and agricultural products alike. They lead a fine life in town, while the people live in poverty on their plots of lands.

These undesirable conditions of life have continued up to the present day, even after Independence. It was this reason that necessitated the founding of the Chibodas village cooperative, and the aim of the cooperative must be to improve these undesirable living conditions.

This report was made in 1954, and the following years were characterized by an increased influence of the cooperative movement in economic policy decisions. Especially in the last part of the fifties and early sixties, the general attitude toward cooperative organization among top government officials is that the cooperative nature of economic organization is a special formula for efficiency and success.

For example, during the 1958 harvest season of rice, farmers' cooperatives in each village in West Java were designated as the sole buyers of paddy. This was done through legal power by which the cooperatives were granted the exclusive right to market the paddy crop of the farmers. The hope was that this monopoly of the cooperatives would force the farmers to sell their products to the cooperatives, and would force the traditional money lender-trader out of business. Cooperatives in West Java are more highly developed than
those elsewhere, but their organization was not widespread enough to cover the whole province. Since this regulation was issued two months before the harvest season, it was necessary to create and organize quickly a considerable number of new cooperatives in villages where none had existed previously. Although civilian and military advisers were appointed to help in the management of both old and new organizations, the efficiency of the cooperatives was reported spotty, since for most of them buying and selling paddy was a new activity, while the short time for preparations permitted only limited training. 50

The inefficiency of the cooperatives was reflected in their failure to purchase the assigned quota of paddy for the government. Out of a quota of 900,000 tons paddy, only 324,687 tons were purchased. In the decade of the fifties this was the lowest tonnage purchased by the government (84, p. 136). Although this failure could not be attributed wholly to the cooperatives, their inefficiency and limited experience have been blamed by government officials. This example reveals that cooperation among farmers is not a magic word which can change the institutional framework in the rural areas overnight, despite huge government support to the cooperative societies.

The degree and extent of government intervention and

50 For more detail on this subject see (68).
supervision to strengthen government cooperatives is indeed a problem. The Indonesian government in its enthusiasm to promote cooperatives, which it considers for the good of the nation, goes too far in extending a helping hand. Criticism against government support is very well stated by Casselman as follows: (12, p. 48)

The active promotion or organization of cooperatives by the government usually works to the detriment of the movement. The usual result of this policy is the establishment of cooperatives before having developed the proper cooperative spirit and conviction among the membership.

The role of the government in relation to the development of cooperatives should not be static and indifferent. Considering the vital role of cooperatives in changing the economic behavior of the farmers, and the institutional framework, the level of education and literacy among farmers, and their ignorance and poverty, the government should encourage and assist the cooperatives in the early stages of development. However, it may be unwise to have large scale government support to such an extent that the cooperatives look more like a government institution than an institution controlled and sustained by the members themselves. The Indonesian government in employing the cooperatives to carry out part of its program of social and economic development, has frequently overlooked the cooperative structure, independent management, and democratic principles of organization. Members join the society not because of their conviction of the principles of cooperatives, but mainly because of the
privileges and support the cooperatives have obtained from the government, which can only be shared by joining the society. Only by joining cooperatives can people buy consumer goods at relatively low prices. By granting monopoly and monopsony powers to producers' cooperatives the farmers are forced to sell their produce to the cooperatives and to buy their input factors from the cooperatives, even if they do not agree with the prices, services and monopolies offered by the management.

There are indications that because of the large involvement of government intervention in the cooperative movement, people, especially those with a low level of education, tend to identify the cooperatives as a government organization. Moreover, members become apathetic and resentful of this excessive government control. In addition, the inefficiencies, dishonesty and corruption of the management result in a build-up of distrust and dislike of the cooperative movement.

For these reasons the number of cooperatives and members as shown in Table 30 should be judged critically, since most of them rely on government support, and have lost their true cooperative nature of organization. Probably this is another reason cooperatives misdistrust and dislike was reflected again and again by students during the two years (1961-1963) in which the writer taught marketing at the University of Indonesia.
in the past have not succeeded as had beer expected in improving the institutional framework of the country, along with their inability to compete successfully with the non-cooperative buyers, especially the money lender-buyer.

The Processors

The fourth type of buyers who prevail in the rural areas of Indonesia are the processors. Prominent among them are the rice millers, soybean-cake factories, coconut oil factories, and the tapioca flour manufacturers. We will limit our discussion to the processing of paddy which, considering the importance of rice, is a good representative of the other food items.

Stalk paddy and paddy are processed into rice by hand-pounding by large commercial mills and by small hullers. On Java a large portion of the rice produced is handpounded, while outside Java, greater use is made of the small hullers with considerably less hand-pounding.

The rice-milling industry in Java has been under strict government control since before the war, since it has a significant effect on the prices of rice and paddy. The degree of control has varied in the different periods, and the following is a brief summary of the historical development of these controls.

The governments of Indonesia have always followed a policy of
maintaining low and stable rice prices for the consumer, while simultaneously protecting the rice farmers against very low prices. In the early nineteen twenties the government attempted to stabilize prices through manipulating import and export duties of rice. The government intervened only when price fluctuations exceeded certain broad limits. During the depression period, world rice prices collapsed, and to protect the farmers, the government controlled the supply of rice through licensing all imports of rice. Thus the government isolated the domestic market from the international market at prices which constantly remained above world prices. Since all imported rice is milled rice, this control expanded the market of the rice milling industry in Indonesia. This stimulus was so big that in the period of 1930-1939 the number of rice mills in Java almost doubled, while the milling capacity increased almost four fold (66, p. 18).

This excessive expansion threatened the farmers in two ways. First, competition between mills for the limited marketable surplus induced the farmer to sell more, but caused him to have to buy in the preharvest season against higher prices. Then when the farmer's reserves were exhausted during the preharvest season, "there was no cheap import rice to be obtained, and he was forced to eat less

52 The following discussion is based on (66).
nutritious substitutes" (66, p. 21). Second, the competition between mills increased the practice of the unpopular pre-harvest loans, as the mills attempted to assure themselves a supply of paddy. The condition of the pre-harvest loan is that the farmer has to sell his crop to the creditor.

Government officials at that time believed that these two forces had limited the bargaining power of the farmer. To these threats the Dutch colonial government reacted by restricting the further expansion of rice mills. Independent Indonesia continued this policy. However, to eliminate the existing unfavorable conditions, the Indonesian government went further by requiring the rice mills to work for the government, while the purchasing of paddy from the farmer was done by government agencies.

This policy is a consequence of the desire of the government to control the supply of milled rice in the country in order to stabilize rice prices. The strategy of the government in trying to accomplish this objective is to build up plenty of stocks through domestic farm purchases and imports. The government purchases paddy during the harvest season when prices are low and disposes of it in the pre-harvest season when prices are high, against much lower prices. Thus the ability of the government to realize its objectives depends mainly on the adequacy of its stock. In practice, however, difficulties have arisen to the extent that government purchases of domestic
rice have fallen below expectations, and rationing of foreign exchange has held imports below the levels required to supplement domestic stock.

There are many factors responsible for the failure of the government rice purchases. A major one is the inefficiency of the government purchasing agencies, who have to compete with the more experienced private buyers. In addition, the government procurement agencies cannot buy at prices higher than those specified by the central government. Thus in general their best chance is to buy in the midst of the harvest season when prices are the lowest. However, this chance is often not used because of the limited executive capacity of most of the civil services involved in the rice purchasing program. To increase the chances of the government procurement agencies to buy successfully, the government has sometimes imposed restrictions on the movement of rice from the producing areas to the consuming areas. The results of these restrictions have been depressed prices in the rural areas, thus enlarging the chances of the government agencies to buy successfully.

The replacement of the middlemen or brokers of the processors by government buying agencies affected favorably the bargaining position of the farmers. Their knowledge that the government is willing to buy their paddy against the government prices announced in advance improves the position of the farmers in the market, since
they know a ready alternative. But the effectiveness of this measure is limited because of the lack of communication media, and the lack of credit services from government channels to supply the farmers the badly needed pre-harvest loans. As this type of loan is the source of monopsony powers of the private middlemen, existing conditions can be improved significantly if sufficient credit facilities are provided for the farmers.

Moreover, a lack of standardization and grading gives scope for unethical practices by government buyers who try to gain monetarily from the ignorance of the farmer on this subject. The government paddy price announced in advance is based on mill dry paddy for a period of one year. Different prices are paid for the different varieties. As the farmers easily recognize the different varieties, and as they are aware of the existing price differentials between them, scope for unethical practices by the middlemen in this area is limited. However, the farmers never sell their paddy in a mill-dry condition. Therefore, the government has fixed the standard moisture deductions for different degrees of dryness, such as a 3 percent deduction for store-room dry stalk paddy (i.e., about one month storing in storeroom), a 5 percent moisture deduction for village dry paddy (i.e., less than one month after harvesting), an 8-10 percent deduction for field dry stalk paddy (4 days after harvesting), and a 20-30 percent deduction for wet paddy (just harvested).
Rukasah, studying the Krawang area, reported that in reality "the purchasing agencies make larger deductions when buying from farmers." He concluded that due to deductions, the government price which is received by the farmers is much lower than the one announced in advance (2, p. 6). A simple moisture tester will eliminate these practices. Thus here again the problem is structural. Changing the type of middlemen facing the farmer helps partially, but can not solve the over-all problem.

The government attitude toward these mal-practices and inefficiencies is different. So far their attempt to improve the purchasing program has been limited mainly to changing the buying organizations. Rukasah reported the following (2, p. 2)

The changes in the buying organization have included almost a yearly change of the lowest agency (the actual buying agency). During 1958/59, the purchases from the farmers were made by the rural coops., during 1959/60, purchases were carried out by the Committee on Purchasing of Rice in the Village. During the year 1960/61, besides this committee, the Rice Millers were also allowed to buy paddy from farmers directly, for which purpose they used some commission agents. In the year 1962, paddy was purchased by the Paddy Producers Cooperative (Koperasi Penghasil Padi-KPP). This cooperative movement was founded generally in the month of February 1962, about two months before the main harvest time.

These yearly changes of buying organizations resulted in a discontinuation of their services before they had gained experience in the buying activities.

The effect of government intervention in the rice sector is less
favorable on the rice milling industry than on the farmer's bargaining power. As the result of the inefficiencies of the government procurement agencies, many of the mills are working below capacity, since they are not allowed to do their own procurement. The restrictions on transportation have intensified the problem for the industry. In the surplus areas the mills are working at near full capacity, while in the deficit areas the capacity used is relatively very low. Since most of the mills were built in the prewar period when no transportation restrictions existed, the location of these mills does not take into consideration the possibility of these restrictions. As a result, mills are located independent of the surplus or deficit condition of the area. Yet the government issued the restriction without considering the inequalities in the geographical distribution of the rice mills. As a consequence, the capacity of mills used in Java has ranged from 25 to more than 100 percent (66, p. 170). Understandably those with a running capacity of 25 percent have to fire a proportion of their labor force, thus creating unemployment in the already overcrowded rural areas. Of course the farmers in the deficit areas are better off than those in the surplus areas, since demand is relatively more limited in the latter areas.

The above discussion indicates that government controls on the rice milling industry have not been effective enough to increase the bargaining power of the farmer, while they tend to increase the cost
of rice milling. Also, the costs of monetary losses suffered by the government when inexperienced or irresponsible buying organizations have not been able to balance their accounts, must be considered in evaluating the government program. Since the problem is mostly structural, a direct approach to solving that aspect of it might be more fruitful.

Besides the rice millers there is another type of processors, the rice hullers. Their function is basically to skin husked rice that contains about 10-60 percent of paddy, to white rice, which is preferred in the urban areas. Husked rice is a product of the hand-operated rice huskers, which is the raw material of the hullers. Thus the marketing channel of rice from this source is longer than that of the rice mills, where rice is the product of the milling.

Rice husking is a kind of home industry. Its growth was a response to the growth of the hulling industry in the urban areas. The hulling industry developed after the rice milling industry had to work only for the government. In other words, it developed in response to the demand for polished rice (the end product of rice hulling or milling), which was unsatisfactorily met by the government controlled rice mills. The rice huskers buy directly from the farmers and sell the product to the local market or directly to the assemblers at the regional markets. The latter, after accumulating a sizable quantity, transport the husked rice to the rice hullers, who
are usually located in the urban areas.

Most of the paddy produced by the farmers is home-pounded for home consumption. Part of this rice is sold to the local market. Its importance depends on the price relationship between husked rice and home-pounded rice. If husked rice gives a better return, then the marketable surplus of paddy is mostly husked.

The nutritional values of the three types of rice is different. The least the rice is polished, the better is the nutritional value, since the germ, which contains the most important vitamins of the rice kernel, is retained in the home-pounded rice, but not in the white polished rice, the end product of hulling and commercial milling. As a consequence, the government has attempted to discourage the hulling industry by requiring licenses for the operation of the hulling factories. To date white polished rice is preferred over the brown hand-pounded rice by most of the urban people. Apparently, health is sacrificed for the white appearance of milled rice.

The Market Place

Finally, the farmers can sell their produce in the local market places. These market places are a unique feature of the rural as well as the urban areas, although their relative economic importance is less in the latter areas than in the former. Yet for certain
products, especially the perishable ones, they form the most important institution in both the rural and the urban areas. Housewives in both areas depend on these institutions for their daily purchases of vegetables, fruits, meat, fish, and other foods. Of course, the larger the size of the population served by the market places, the better organized and the more improved their facilities are. For example, in Tjirebon, a city with a population of more than 150,000 people, two major market places dominate the scene, among the numerous other small market places. The two major market places operate daily but at different times of the day, morning and afternoon hours.

The most important participants in the market place are the small scale retailers, who purchase their merchandise either directly from the farmer or from the assemblers if the market place is located further from the producing areas. These traders are numerous, since entry is easy and only small capital is needed. The retail transactions they make are usually small in size. Many of these traders work part time, and a small profit margin is already a net gain for their total income.

The large number of these traders within a limited space makes the market a competitive institution. The degree of competition is enhanced by the physical organization of the market place, where the same products are sold in a given portion of the market
Thus fish traders are located in one corner, while vegetable and fruit vendors are located in another corner. Thus the buyer who comes to buy fish can easily compare the prices offered by the different traders. However, here again the lack of standardization and grading puts the buyer in a disadvantageous position, since he is never sure whether the weight of the purchased produce is the right weight, as suggested by the seller.

If the location of the farmer is close to these markets, then he can transport his produce to the market place and sell it either to the traders or to the consumers. In general, the farmers are reluctant to deal with these local retailers. There are several reasons for this reluctance. First, "the farmer is awed by the sophistication" of the traders in the market place, and "he fears that he will be outwitted in bargaining and cheated of his proper profits" (16, p. 114).

Second, he prefers to sell his produce through the local assemblers, since the latter relieve him of the labor of carrying. Also, being more experienced in trading, the assemblers know in which market within the local area the demand is greatest and the price highest for the particular product. The farmer, ignorant of local market conditions, might pick the wrong market and sell his produce at lower prices than those he receives from the assemblers (16, p. 114).
Third, by selling directly to the traders in the market, the farmer performs the marketing functions usually performed by the assemblers. In other words, he has to finance, to transport, and to bear the risk of marketing the produce. This is quite a requirement for the inexperienced farmer, the extent of which reduces his incentive to bring his produce to the market place.

The farmer can also bring his produce to the market and sell it at retail to the consumer. But the risk of unsold products reduces his willingness to use this outlet. The fear of the farmer of having to bring his produce back home is reflected in the pricing policies followed by farmers as described by Van Gelderen: (37, p. 149)

Late at night or early in the morning the farmer arrives at the pasar (market place) with his tubers, his garden crops, his bamboo, his firewood, his plaited housewalls or wooden beams, his fruits and vegetables, after having carried them for quite a time, sometimes for hours. Towards evening he is threatened by the necessity of returning home with what is left unsold, which in many cases has meanwhile lost a great deal of its freshness and marketability. Faced by this prospect, he attempts to get rid of everything in the course of the day, and so the prices drop sharply as evening approaches.

During his 10-month stay in a rural area outside Bogor, the writer had the chance to observe personally these attitudes of the farmers who come to the market to sell their produce. The writer was impressed at that time by the difference in bargaining procedure between the farmers and the specialized middlemen. The farmer-trader in general was less talkative and convincing in making his
argument on the quality of his produce and the price he demanded than was the retail merchant in the market place. In addition, he was easily awed by authority in the bargaining process.

Consequently, it is not certain whether the farmer is better off to bring his produce to the market rather than to sell it to the local assemblers who visit him at his farm. If there are no credit ties between buyer and seller, then the farmer is still free to wait for a better bargain if he knows that there are other assemblers interested in his produce. In addition, in his locality he is more self-confident than in a market place which is dominated by the established traders.

With the increased road traffic between large cities, a farmer who is located beside the road can open his stall and display all his vegetables and fruits, roots, peanuts, corn, and other products, attracting attention from the passing traffic. However, not all off-side retail stalls are operated by farmers; many of them are maintained by middlemen. Here again one can easily see the different merchandising techniques used by the farmers and middlemen. The displaying techniques and services offered by the middlemen, such as wrapping, clean appearance, and location, are far better than those of the farmers. In addition, the middlemen offer better merchandise than the farmers do, since the former grade them before they display them on the roadside.
Marketing Margins

Because of the lack of data, the discussion of this important subject must be limited to the marketing of rice. This is not a serious limitation, considering the importance of rice in the production and consumption pattern of the food economy of Indonesia. To date not many studies have been done on this subject. Two findings, those of Mears and Rukasah, will be used as the basis of the quantitative discussion. While Mears makes interprovincial comparison of the marketing margins, Rukasah limits himself to the Krawang area, but makes temporal comparisons.

Mears' findings on marketing margins in the three provinces for the government channels and the private Channel in West Java, were summarized in Table 31. As is shown in the table, the farmer in East Java receives an exceptionally large proportion of the price paid by the consumer in the three provinces. If marketing margin is a criteria for marketing efficiency, then one can conclude that the efficiency of marketing in the government sector in West and Central Java is less than that in East Java. This greater efficiency arises almost entirely from the practice in East Java of bypassing the wholesale middlemen in distributing the rice to the consumers. Mears' explanation of the exceptionally higher margins for wholesalers in Central and West Java, as compared with the low
Table 31. Average Gross Margins in Distributing Milled and Handpounded Rice in Java (Cost Calculated by Adding Individual Costs) (In Percent of Retail Price)

<table>
<thead>
<tr>
<th></th>
<th>Government Channels</th>
<th></th>
<th>Private Channels: West Java Krawang to Djakarta</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sept. 1956 Conditions</td>
<td>Milled Rice, Half-White Tjere</td>
<td>Sept. 1955 Conditions -Tjere II</td>
</tr>
<tr>
<td></td>
<td>West Java</td>
<td>Central Java</td>
<td>East Java</td>
</tr>
<tr>
<td></td>
<td>Djakarta</td>
<td>Scharang</td>
<td>Surabaja</td>
</tr>
<tr>
<td>1. Net to farmer</td>
<td>53.9</td>
<td>56.4</td>
<td>71.7</td>
</tr>
<tr>
<td>2. Gross margin; transport to mill, assemblers and buying organizations commissions, administrative and bank cost</td>
<td>5.8</td>
<td>6.4</td>
<td>9.0</td>
</tr>
<tr>
<td>3. Gross margin of government agency including milling, transport, storage, inspection and supervision, allowing for proceeds of by-product sales.</td>
<td>15.9</td>
<td>17.7</td>
<td>24.9</td>
</tr>
<tr>
<td>4. Government loss on sale of domestic rice</td>
<td>(11.0)</td>
<td>(6.8)</td>
<td>(13.3)</td>
</tr>
<tr>
<td>5. Gross margin of wholesaler including transport</td>
<td>27.0</td>
<td>18.4</td>
<td>7.7</td>
</tr>
<tr>
<td>6. Gross margin of retailer including transport</td>
<td>8.4</td>
<td>7.9</td>
<td></td>
</tr>
</tbody>
</table>

Source: Mears (66, p. 134).
wholesale margins in East Java, was as follows: (66, p. 132)

East Java was able to benefit from this procedure (by-passing wholesalers) because generally it has had a sufficient supply of rice to balance demand at prices close to those used for the distribution and injections. If the rice supply were not adequate, merchants would tend to increase their price--in the absence of effective price control--until a price was reached at which demand and supply were balanced. . . . In contrast to East Java, the wholesaler's margins are unusually high in both West and Central Java. There injections are apparently inadequate to bring supply and demand at a price approaching the distribution or injection price and hence the merchants are able to realize the exceptionally large margins. . . .

Mears admitted that the direct delivery to retailers from government warehouses or mills might involve a larger unit expense than sales through a smaller number of wholesalers. However, according to Mears, this is partially offset by the fact that the actual delivery by the government is usually made in large bulk quantities to trucking companies, who consolidate the delivery orders of many individuals (66, p. 132).

A second conclusion which emerges from the summary table is the differences in margins between government and private channels in West Java. As the data indicates, the marketing margins in the private channels are lower than those in the government channels. The explanation of this difference lies in the fact that the government channel "includes the overhead and administrative costs" of the administering agencies, an item not involved in private channels (66, p. 133). Although Mears did not mention the difference in
processing between the channels, to a certain extent they effect the differences in marketing margins. The government channel uses exclusively large commercial and capital intensive rice mills, while the hand-millers use more labor intensive methods. Considering the scarcity of capital and the abundance of labor in Java and Madura, one could expect that milling is more expensive than hand-pounding. Thus in making the above comparison, one should consider the above qualifications.

A third conclusion which emerges from Table 31 is the high cost of wholesaling and retailing in both government and private channels. Traditionally, at least in advanced countries, retailing is much more expensive than wholesaling. This seems logical when one considers the larger cost of labor, equipment, services given, and risk involved in retailing. An explanation of the low retail cost and the high wholesale cost in Indonesia, in addition to the one just stated by Mears, can be given as follows: Wholesale establishments in Indonesia, especially in the regional and transit markets, are relatively more capital intensive than the retail institutions. The major cost items, in addition to capital cost, are the salaries of skilled personnel (bookkeeping) and wages for labor, rent, taxes, and equipment. On the other hand, the retailers are small-scale operators who do not need large capital outlays or salaried labors. In most cases they do not pay taxes at all, since the organization of the
tax services are not well developed yet. In addition, the large number of petty retailers provides competition that limits the margins the retailers can charge. The small number of wholesalers in the cities in many cases gives a wide scope for oligopolistic practices (2, p. 17). Moreover, a significant proportion of the retailers are part-time traders, who are satisfied with small margins.

A fourth conclusion which can be drawn from Table 31 is in regard to the different margins in assembling. Here again, if margins are a criteria of efficiency, then in the government channel West Java has the most efficient rural assembling function. Surprisingly, East Java has the highest cost of assembling the paddy from the farmers.

Finally, in interpreting the margins of Table 31, one should consider the fact that the data are averages in each province. As conditions are different within one province, variations among the margins are apt to be large. For example, the degree of monopsonistic powers, the length of the marketing channel, the availability of transportation and communication media, the availability of financial institutions for production credit, and the availability of reliable market information services all can affect the marketing efficiency of rice.

No study has been made yet about the attitude of margins over time. Rukasah, in analyzing the marketing margins in the Krawang area, concluded that the marketing cost over the period from 1955-1956 to 1961-1962 declined by about 10 to 20 percent. He attributed
this reduction to the higher paddy prices paid to the farmer, due to the inflation and the relatively constant transportation cost. The latter was possible only through huge subsidies by the government and by the fact that "much of the rice transported to Djakarta by small dealers was actually carried on the trains and busses, and for train, nothing was paid for transportation of the rice itself aside from human labor" (2, p. 17). That transportation cost is subsidized by the government can be reflected from the fact that while gasoline cost four Rupiah per liter, and did not change in the period 1956-1962, the retail prices of rice increased by about 15 times. Thus the reduction of marketing costs as observed by Rukasah was not due to inherent factors in the marketing mechanism, but mainly to the subsidies by the government, which in part were paid by the Indonesian taxpayer, who certainly is a rice consumer.

In Chapter II we indicated two behavior patterns of marketing margins which have an important effect on the supply of food: the level and the flexibility of margins. For the latter there was no quantitative data covering a long period of time to determine the flexibility of marketing margins. However we will attempt a qualitative analysis, which hopefully will give at least an indication of the behavior of marketing margins.

In any textbook on agricultural marketing, we read of the inflexibility of marketing margins, by which is meant that retail
prices vary proportionally less than prices received by farmers in conditions of rapidly changing demand or supply. In Chapter II we mentioned three possible factors which can cause inflexible marketing margins. They are the degree of monopoly and oligopoly in the marketing channel, the importance of fixed costs, and the desire of the marketing agencies to maintain a stable income. At the beginning of this chapter, we stated that the extent of monopolistic and oligopolistic powers of the middlemen is large. Under these conditions marketing firms would be able within limits to fix their margins without reference to changes in short-run market conditions. If the firm has the monopoly, it will be without rivals, while under oligopolistic conditions, competitors will be so few as to enable them to collude openly or tacitly. Moreover, the latter situation is indeed feasible because of the social status of the merchants in a hostile agrarian or village community, which treats them more or less as outsiders. This is especially true when racial differences exist between the class of traders and non-traders. The fixed-cost argument could not be applied so forcefully as in the more advanced countries, since processing and fixed capital outlays are relatively small in the marketing organization of Indonesia. The agencies which use significant capital outlays are the wholesalers-middlemen located in the regional and terminal markets, while processing activities are limited to certain products such as rice, tapioca flour,
bean cake, and coconut oil.

The third argument, the desire of middlemen to maintain a stable income, seems not to apply to the case of Indonesia, because of the lack of specialization and the existence of part-time traders. The numerous petty traders are in general satisfied with a few sales a day, since many of them are part-time traders.

Thus, of the three factors responsible for inflexibility of marketing margins, the most significant seems to be the existence of monopolistic or oligopolistic powers in the marketing structure. Although indications are strong that such powers exist in the marketing of agricultural products in Indonesia the writer can prove beyond the reasoning given above that these powers caused sticky margins.

The cost of marketing food has frequently been attacked by government officials, farmers' organizations, political parties, and even experts in the field. There is apparently a widespread belief that the cost of marketing is too high, and that the marketing system is inefficient. These criticisms, in the writer's opinion, are merely "repetitions of platitudes" rather than statements based on reliable data. For one thing, there are hardly such data for concluding that marketing costs are "too high" or that marketing is inefficient. Even in countries like the United States, it is hard to measure the efficiency of marketing, because of the lack of an objective basis.
In countries like Indonesia, the difficulties are increased by the structure of production, the numerous marketing channels with only marginal differences, the numerous varieties of middlemen who are in general not specialized and work only on a part-time basis, and the numerous varieties of processing possibilities. For example, rice may be put in the market as paddy, stalk paddy, handpounded, husked, or milled form. Handpounding might be done by the farmer, the assembler, or specialized agencies. Machine milling may be done by commercial rice mills or by rice hullers. Each of these characteristics affects the marketing cost.

Yet, despite these difficulties and lack of data, there seems to be a generally unanimous opinion that marketing costs are too high, and that this is too obvious to need detailed evidence. From speeches, talks with the leaders and members of farmers' organizations, and seminars held on this subject the writer has come to the conclusion that the criticism about the high cost of marketing takes two specific forms. First, it is based on charges that the marketing channel is too long, or more specifically, that there are too many different kinds of middlemen handling the same product in its flow from the producer to the final consumer. Each charges a fee or margin, and each involves unnecessary expense which finally contributes to the high marketing cost. The remedy suggested is to eliminate some of the middlemen to reduce the cost, in order to
enable the producer to receive a greater share of the price paid by the consumer.

Second, the criticism is based on charges that too many middlemen are performing the same function near the consumer, and too few middlemen work at the local level, and that the economic powers of these few are not equal. Specifically the complaints are that there are too many retailers, and that monopsony or oligopsony exists in the rural sector.

In advancing the criticism against the length of the marketing channel, one might commit three important errors. One error is the notion that many types of middlemen operating in the marketing organization are unnecessary. The second is that elimination of these marketing agencies will automatically lead to a reduction of cost. The third is the confusion about the difference between technical and economic criteria of efficiency.

The first is an error because it omits the fact that the very existence of a middleman in a channel indicates the need for his services in facilitating the flow of goods from producer to consumer. Those who need the services of these middlemen are willing to pay for them to such an extent that the middlemen can make a living by providing the services. Thus the existence of the middleman is in response to a demand for his services. If his services are not needed any more by the marketing system, then he will be bypassed
by the system and forced out of it. On the other hand, if his function is still needed by the system, then if he is forced out of it by legal action, then his function must be performed by some other agency, by shifting it backward or forward to the preceding or following agency in the channel.

It is here that the second error comes in: that an elimination of the middleman will automatically lead to a reduction of costs by integrating backward or forward in the channel the functions formerly performed by the eliminated middleman. This could lead to a reduction of costs, if, and only if, the functions can be performed more economically by those who take them over. This condition is not easily met. If the assemblers in the rural areas (frequent targets of attack) are eliminated, then the regional wholesalers or the farmers have to perform the assembling function. In either case, they must spend much of their time contacting each other. This is a tremendous task, considering the millions of farmers in the rural areas, the bad communication and transportation facilities, and the other institutional deficiencies.

The third error often committed is the confusion originating from using technical and economic criteria in criticizing the marketing efficiency. As is well known, the essential difference between technical and economic evaluation of efficiency is that "the former considers only the physical or financial efficiency with which
a particular task can be achieved, without assessing the indirect effects often experienced elsewhere in the economy, and quantitatively more important in terms of resources used, of pursuing the policy suggested by the technical criteria" (4, p. 167). Thus often critics neglect the effect of elimination of middlemen, necessary or unnecessary, on the other sectors of the economy. Considering the limited employment opportunities in the country, elimination of the middlemen will make greater the employment problems of the country.

The foregoing discussion should not be considered as a defense of the Indonesian marketing system. On the contrary, there is some truth in the criticism. However, further study is needed to prove quantitatively the criticism that marketing costs are too high because the marketing channel is too long. The causes of long marketing channels are manifold, but basically, they are the consequence of an underdeveloped economy. The lack of capital, skilled labor, and wage-earning employment opportunities, and the low per capita income are mainly responsible for this long marketing channel. The low per capita income of the consumers and farmers limits their ability to hold stocks. It forces the consumer to small quantities on a hand-to-mouth basis. The farmer and producer need the services of the small scale middleman, who collects at frequent intervals his small surpluses of produce. Thus, there is a demand
or need for agencies who can perform the essential marketing functions of storage, financing, risk taking, transporting and grading for the producer as well as for the consumer. Because of the small transactions at both the producer and consumer levels, the marketing process of concentration, dispersion, and equalization is performed by a huge number of middlemen.

Where alternative opportunities for employment are relatively limited, there are many people willing to enter small scale trading for low rewards. This situation is enhanced by the case of entry, since petty trading does not require much capital or special skills.

As a consequence of these forces, the channel of distribution is long. Produce goes through a number of middlemen before reaching the consumer. All this handling has a significant effect on the marketing cost. Within this long channel there may be middlemen who do not perform useful functions, and then elimination might reduce the marketing costs. However, each case ought to be handled on its own merits, since no generalization can be made for the different kinds of produce, and different areas and market structures.

There is certainly some truth in the criticism that cost of marketing is high because there are middlemen who have monopsonistic and oligoplistic powers. By controlling the credit supply these powers could prevail even in cases where there are many middlemen.

Many solutions and remedies have been suggested and applied
to remove these weaknesses from the marketing system. One of the most sweeping remedies has been the substitution of socialism for the capitalism which had characterized the Indonesian economy during the Dutch regime. This has been done for certain produce, especially rice, and it is indeed comparatively easy to effect economies in the marketing process by imposing government control on the number and kind of middlemen operating in the process. However, the lack of free competition prevents the market from operating properly, and allows high cost firms to continue to operate. This system sometimes imposes an even greater burden on the consumer or farmer.

More catastrophal is the case when the government eliminates certain types of middlemen without supplying substitutes for them, thus leaving a vacuum in the channel. This practice certainly will increase the burden on the consumers or the farmers.

Since the causes of the problem of high marketing costs are structural, those changes should be made first to remove the structural limitations which cause the high costs. A supply of adequate capital, availability of adequate wage-earning employment opportunities, an increase in the amount of skilled labor, and an improvement in the communication, transportation, and storage facilities might reduce drastically the marketing costs, provided that the consumers demand the same services.
VIII. CONCLUSIONS AND IMPLICATIONS

The distinctive feature of the Indonesian economy is the predominance of an agricultural sector. This sector is characterized by widespread disguised unemployment, high rates of population growth, technological dualism, a dominant peasant sector producing food for subsistence, and a regional imbalance of production pattern and geographical distribution of the population. This predominance in terms of number of persons employed, income originated and foreign exchange earned promises to continue in the coming decades, although as development goes, its relative importance will diminish.

Because of the size of the agricultural sector, its development must constitute the foundation for expansion of the country's economy. The sector is called upon to supply the manpower, capital, foreign exchange and food to the non-agricultural sector. In addition, the agricultural sector provides a market for industrial products, not only for consumer goods but also for a wide range of equipment and materials used in agricultural production.

As we are concerned primarily with the role of agriculture in supplying food to the Indonesian economy, we emphasize the relationship between the inadequate domestic supply of food and the slow rate of economic development, the increase in the undernourishment and malnutrition of major segments of the population, and possibly, to a
certain extent, starvation.

In Indonesia there is a growing demand for food because of the high rate of population growth, which is at present largely independent of the rate of economic development. Added to this, the increases in the per capita income and the high income elasticity of demand intensify the growth rate of demand.

Using primarily the food-balance-sheet method, we conclude that the common pattern of the Indonesian diet, like that of nearly all low-income nations, is the high starchy staple ratio—the proportion of total calories provided by cereals and roots—and the low per capita consumption of protective foods. The reason is that starchy staples are ordinarily the cheapest per 1,000 calories.

Among the various regions, per capita consumption of starchy staples shows variations arising from a wide assortment of interdependent physical, social, economic and political factors, which in turn, affect agricultural production. This is especially true in areas where limited transportation facilities force the people to depend on locally produced food.

Among the starchy staples, rice is the most important, followed by corn, cassava and sweet potatoes. Rice contributes to the diet—46 percent of the total calories, 44 percent of the total proteins, and 12 percent of the fat. However between regions the relative importance of rice shows significant variations. In the most eastern
parts of the archipelago (Maluku and West Irian), rice is not so important in the diet as sago. In Java and Sulawesi less rice is consumed than in Kalimantan or Sumatra.

During the next few decades marked changes are expected to occur in the composition of the Indonesian diet. With economic development and increasing per capita income, there should be a reduction of the starchy staple ratio, since more protective foods tend to be substituted for the starchy staples, that now supply more than 80 percent of the total calorie intake. Thus while the annual rates of growth of demand for cereals and starchy roots are 0.45 and 0.18 respectively (assuming an annual rate of growth in per capita income of 0.9), the rates for fish, eggs and milk are 0.90, 1.80 and 2.70 percent respectively.

In addition, considering the position of rice in the hierarchy of consumer preferences and its traditional popularity, we can expect shifts toward more rice consumption. Thus we can also take for granted that rice will continue to be the basis of Indonesian diets in the future despite percentage increases of protective foods and decreases of other starchy staples, especially the roots. These conclusions are important in directing efforts toward increasing agricultural productivity, which must be concerned in large measure with the production, processing and distribution of rice and of the protective food group.
By comparing the results of the food balance sheet computation on calorie, protein and fat intake, and the proportion of calories derived from the carbohydrates with the nutritional standards calculated on the basis of methods suggested by the F. A. O., we can evaluate the nutritional status of the Indonesian population. Calorie, protein and fat intake in Indonesia in 1960-1961 was below the recommended level by 11, 9 and 40 percent respectively. Our finding that 88.7 percent of the calorie intake is derived from carbohydrates (cereals, roots and sugar) indicates the poor nutritional quality of the diet. This is reinforced by the fact that animal protein forms only a small proportion of the total protein intake.

The significance of these gaps cannot be overstressed. Considered in terms of rice supplies, the calorie gap is as large as 2.6 million tons. However, these gaps between the intake and requirement levels should be interpreted with care, since within the country the intake, as well as the requirements, varies considerably. This gap will fall heavily on the low income groups, since those who can afford to buy, will eat all they need and perhaps more, while the poor, who form the majority, will generally not meet their full needs. Data from dietary surveys conducted in different parts of Indonesia and reports of the occurrence of protein deficiency diseases, show lower per capita calorie and protein intake for the low income groups.

In order to fill the calorie and protein gap by 1975, Indonesia
would need to aim at an annual rate of increase of per capita calorie and protein supply of 0.77 and 4.00 percent respectively. Should the population grow at a rate of 2.2 percent, the aim should be to increase the total calorie and protein supply of 2.97 and 6.20 percent a year respectively, which would require a rate of increase of per capita income of 1.42 and 3.25 percent.

If the rate of growth of per capita income continues the trend of the decade of the 1950's (0.9 percent), it will take 22 and 54 years respectively to fill the calorie and protein gap. If per capita income grows at a rate as expected by the development plan of the country, then it will take 12 and 35 years respectively to fill the calorie and protein gap.

If the Indonesian populations were to grow according to the projections under the medium assumption (2.2 percent), then by 1975 food supplies would need to be increased by 39 percent merely to sustain the population of the country at its present unsatisfactory level of diet.

To meet this growing demand, large increases in the supply of food could be provided through increasing imports or domestic production. However, because of the size of the agricultural sector and the country's natural resources, the provision of adequate supplies is basically a domestic matter. Meeting the rising demand with increased commercial imports of food would deprive the industrial
sector of the needed foreign exchange to import capital goods.

From the over-all development point of view, it is unlikely that development can proceed without activating the participation of the dominant agricultural sector. A stagnant agriculture would drag the development of the other sectors, not only through the increasing rate of food imports, but also by the lack of demand for the products and services of the non-agricultural sectors, and the wasting of the agricultural sector's potential savings fund.

Essentially, the problem is to increase agricultural productivity, so that the income of the agricultural population can be increased. This will stimulate demand for the manufactured consumer goods supplied by the industrial sector.

In the past, Indonesia has had to import food amounting to more than 100 million dollars a year to meet its requirements. This huge import and the poor nutritional status of the population are indications that the agricultural sector is not performing its function in supplying food to the economy.

However, in the period of 1950-1975, per capita production of the major farm food crops, rice, corn, cassava, sweet potatoes and soybeans increased annually by 0.25, 2.36, 1.50 and 3.17 percent respectively, while that of groundnuts declined by 0.76 percent a year. Per capita fish production increased by 2.54 percent. These six food items are the principle farm food crops in Indonesia and are
representative of change in the food production. In terms of these six food items with the exception of groundnuts and fish, the industry was able to keep pace with the population growth.

Yet since food consumption is not determined by population growth alone, rising incomes are expected to bring about a shift to more rice consumption. This is the result of the higher income elasticity of demand for rice compared with that for other starchy staples. From 1950 to 1965 the rate of growth of per capita rice consumption was 0.65, which exceeded the growth rate of the per capita production of the same period. This gap was filled by imports, which have amounted to more than 100 million dollars a year in the last decade. In frustration the government intervenes more and more in the free market. Coupled with the imperfections of the market, this intervention continues to widen the gap between production and consumption.

In 1963 occurred a reversal of policy aimed at changing the consumption pattern through mass education. This idea was recommended primarily by nutritionists and agriculturists, who constructed an ideal menu for the average Indonesian based on calorie, protein, and fat requirements. The following considerations were taken into account in composing the menu (shown in Table A-3 of Appendix A): 1) the nutritional requirements, 2) acceptability, 3) nutritional quality, 4) keeping qualities, 5) potentialities of producing the
specific foods in great quantities in Indonesia, 6) economic considerations and 7) religion.

This menu is closer to the production pattern than to the consumption pattern, as derived from the food balance sheets. The major difference is between the per capita corn and root production. (See Table A-3) The suggestion to shift to more corn but less rice consumption is primarily based on the bright prospects at the time of increasing corn production rapidly and the very slow growth of rice production. Also per capita production (adjusted for seed use and losses) is compared with the average consumption pattern of the 1954-1961 period, derived from the food balance sheet method. Per capita production of corn and roots exceeded the quantity demanded, while the total starchy staple food produced in the last two periods, exceeded the quantity demanded in terms of weight as well as calorie value. Only the per capita rice production in the three periods is below the per capita consumption. (See Table A-3)

The main problem in the food economy of Indonesia is the differences which exist between the production and consumption pattern. The policy implications of this problem are either to change the consumption pattern to conform to the production pattern, or vice versa. In the 1950's the government policy was directed toward changing the production pattern by encouraging rice production. At the same time, the government followed a policy of encouraging rice
consumption through consumer price stabilization schemes and dis-
tribution of rice to favored groups against prices lower than those of
the free market. The success of the latter exceeded that of the
former, so that production lagged behind consumption.

There would be advantages in changing the starchy staple con-
sumption pattern to the one suggested. First, it would lessen the
overwhelming dependence of the population on rice. Second, it would
reduce the consumer's resistance to alternative foods in terms of
rice shortages. Finally, it would conserve foreign exchange.

However, the ideal menu does not take into account consumer
preferences, which will be the main obstacle in promoting it among
the Indonesian people. The traditional popularity of rice puts it in
a strong competitive position. Consumers are willing to pay a
premium for rice, and as soon as they can afford it, they will sub-
stitute it for the other starchy staples. Thus to de-emphasize the
role of rice in the Indonesian diet will require a sustained effort of
consumer education, which will take time, and will use resources
which could be diverted to other purposes. Limitations in the coun-
try's communication facilities will hamper this educational program.

Thus changing the consumption pattern is a long-run solution
to the food problem in Indonesia. Since, because of the population
problem, speed is a vital factor in the process of economic develop-
ment, this is not the best approach in solving the food problem.
However, as the quantity, quality, and patterns of starchy staple consumption vary greatly between regions and within the same region, the government might be well advised to view food policies on a regional basis. In areas such as East Java, parts of Sulawesi and the Nusatenggara region, where corn has already gained acceptance by the consumers, its consumption should be further encouraged.

Next, an assessment of the factors determining food output is basic for the country's strategy for economic development. Food is produced under different conditions in Indonesia. The six major farm food crops are mainly produced in Java, the smallest among the five major islands. The young volcanic soil, the topography, and the river system which permit the people to irrigate the fields without modern engineering devices, and the ingenuity of the Javanese farmers have turned Java into the main food supplier of the archipelago. Throughout the Outer Islands, food is produced in limited quantities, with the exception of those pocket areas where the fertility of the volcanic soil permits intensive land-use following the pattern of Java.

Of the three conventional inputs, labor, land, and capital, labor is not a limiting factor in the production of food in Indonesia. In Java and Madura 33 percent of the agricultural labor force were underemployed. Raising the productivities of this group through
fuller utilization of their services will result in increases in food production.

One of the most important materialistic agents in the production process of food is land. Labor productivities can be increased through the use of more land and improvement of the quality of the land. In view of the tremendous population pressure in Java and Madura, and the existence of unexplored frontiers in the Outer Islands, both alternatives should be given serious thought.

As a consequence of the regional imbalance in the distribution of the population, the possibilities of extending areas under cultivation are larger in the Outer Islands than in Java. Agricultural land use in Java has already passed "its limit of safety." Dwarf sizes and fragmentation of holdings are distinctive features of the food industry in Java. In addition, the number of landless villagers increases steadily, enlarging the group of unemployed and underemployed people. Conversely in Sumatra, Kalimantan, Sulawesi and West Irian, the acreage of cultivable land can be increased through large scale reclamation and irrigation schemes, including dam construction and clearing of swamps and forests.

The logical solution of this dichotomy of land utilization in Indonesia seems to be to transmigrate the Javanese from their overpopulated island to the Outer Islands. Although the mobility of the Javanese has increased if compared with that during the prewar
period, transmigration programs in the past were not successful in moving the Javanese in significant numbers to the Outer Islands. The maximum number of people transmigrating to the Outer Islands annually was as small as 60,000. Even though, as has been estimated, one million people transmigrate annually, the Javanese population will rise by 38 million in 1990, while if there is no outmigration, the population will increase by 84 million. If the transmigration program succeeds, there will be a relative relief of the population pressure on Java, but to transmigrate one million persons a year is a superhuman task. The cost would be too high and would form a significant drain on the country's limited resources, while the gain in reducing the population pressure in Java would be great.

Although thus far the small number of Javanese transmigrants has helped increase food production through expansion of acreage under cultivation, the remaining Javanese with the low if not zero marginal productivity, form a tremendous waste of the country's resources. They limit the contribution of agriculture to the other sectors, since they limit the agricultural surplus which plays such an important role in the over-all economic development of the country. Increases in productivity, instead of being invested, will be consumed by the growing population, while incentives to increase productivity will be small, since the gain has to be divided among the members of the growing family. Thus it is a necessary condition
that this underemployed labor force be provided with more productive employment opportunities.

Employment opportunities must be created through the expansion of the non-agricultural sector, especially the industrial sector. Through industrialization the economy can siphon off the surplus agricultural labor force, thus increasing its productivities and the productivities of the farmers left in the agricultural sector. In Indonesia industrialization is a necessary condition for economic development, and not merely an attempt to imitate the economic structure of the present industrialized countries.

A third alternative to the problem of rural overpopulation is birth control. Until recently the government had never considered this policy seriously, since the leaders of the former regime believed that Indonesia could feed double its present population. According to the latest reports the present regime has accepted birth control as its official policy to help solve the population problem.

The three alternatives must be implemented simultaneously, with more emphasis on industrialization, in view of the interdependence between the agricultural and industrial sectors. Speed is important in carrying out these processes. The faster they proceed, the better will be the chances of success for the country's development effort.

Besides the extension of cultivable land, there are substantial
possibilities for increasing the production of food from the arable land now in use by raising the yield of crops per unit of land. For the most part, the investment and the fundamental research involved in the realization of these potentialities are expected to be far less than those needed for bringing new lands under cultivation.

The productivity of land as measured by yields of rice per unit of land shows marked differences among the regions and islands of Indonesia, due basically to the varied natural conditions of soil and climate and to the level of technology used. A comparison of yields, population density and fertility among the three regions in Java, points up the relationship between low yields and high population density. The yields, which are lower in Java and Madura than those of Sumatra, Sulawesi and Nusatenggara region, might be an indication that more and more marginal land is used in Java, where population pressure forces people to use less fertile soil.

The productivity of land in terms of yield of the six major farm food crops in Indonesia, is low if compared with that of Japan and the United States. Although ecological factors governing production are in part responsible for these differences, they are to a large extent due to the different level of technology used. This suggests that large gains in yields are possible in Indonesia through technological improvements, which can be achieved in a shorter time than that required by Japan or the United States, since Indonesia can rely on
the experience and results of the basic research done in these and other countries.

Improvement in yields is one of the approaches made by the Indonesian government in increasing food production. It has long been known that the use of fertilizers, improved seeds, better methods of cultivation, pest and diseases eradication, and improved irrigation will tremendously increase the yields of corn and rice. However, the application of these improved methods and inputs so far was limited by nontechnical factors.

The crux of the problem seems to be the process of transferring and spreading this knowledge and these improved inputs to the farmers, who, in the final analysis, are responsible for food production. Among the nontechnical factors which impede the expansion of the application of the new technology in food production are the lack of capital and the inefficient marketing organization. Of course there are other limiting factors, outside the scope of this study, such as ignorance and the lack of elementary education among farmers, political instability, a shortage of trained personnel, and administrative inefficiency and corruption.

Implementation of the new technology involves the increasing use of off-farm inputs such as new seeds, fertilizers, and pesticides, which in general raise the working capital requirements of the farmers. The characteristics of food farming in Indonesia in terms
of scale of operation and marketable surplus (cash income), necessitate that the farmer rely heavily on credit for his financial expenditures from institutional and non-institutional sources.

The general complaint against the non-institutional sources is that they charge high rates of interest which form a considerable financial burden on the farmer debtors, and cause them to depend on the creditors for marketing their produce. These impediments seriously obstruct the efforts for increasing food production, since they diminish the incentives and decisively limit the saving's potential. If credit is available only at high rates of interest, application of improved seeds, fertilizers, and pesticides are less likely to be profitable. If, as a condition of maintaining the loan, the farmers have to sell their products season after season to the same buyers at prices lower than general market prices, there is again a seriously reduced incentive to increase production for the market.

In view of these disadvantages, the government in the past attempted to influence the cost and availability of credit in the rural areas by encouraging private institutions, and by establishing public financial institutions and cooperatives, to loan directly to the farmers. However, despite the fact that the institutional credit was cheaper than the credit supplied by the non-institutional sources, the former could not compete with the latter.

There are several reasons for this paradox. First, the
institutional sources are less personal and use conservative commercial banking techniques in evaluating credit applications, and maintain rigid rules with regard to due dates and repayment schemes. Second, the fact that institutional credit sources in general do not grant credit for consumptive purposes, forces the farmers to the non-institutional sources. Third, the institutional sources lack sufficient funds to satisfy all the essential needs of all agricultural producers. As long as these deficiencies are not remedied, expansion of food production through application of new technology will be hampered.

The second factor which impedes the expansion of food production at a sufficient rate is the inefficient marketing organization. In Indonesia marketing of food is a problem with many aspects. The infrastructure is characterized by deficiencies of roads, railroads, warehousing, cold storage, communication, and other facilities. Apart from that, the marketing structure is dominated by monopolies and oligopolies. There is a lack of standardization and grading, and of reliable and speedy information services. These deficiencies affect the expansion of food production by limiting the flow of inputs to the farmers and by reducing the prices received by the farmers.

An inefficient distribution system and a lack of adequate supplies frequently result in the absence of new inputs at the time when the farmer needs them most. An efficient distribution organization
must be functioning to make it possible that the new inputs reach the cultivator at the right time and price. An adequate supply and inputs and sufficient means of transportation to move those inputs to the farm gates are necessary conditions. These prerequisites in Indonesia are in general not met, so that introduction of new technology is more difficult than otherwise.

To the farmer the prices that are significant are those he actually pays for the inputs and those he receives for his output. Because of the inefficiencies in the marketing system of both inputs and outputs, these prices are in general to his disadvantage.

The relation between the cost of applying the new technology and the expected value of the increased output is probably the most important economic factor influencing the decision of the farmer. Considering the small size of the holdings, and his financial weakness, the farmer is extremely cautious toward risky undertakings. Also he has to face numerous uncertainties. At the time he has to make the decision, only the cost of the inputs is accurately known. Although he has been told by the experts of the expected increase in output, the probability is large that the actual response will be smaller because of the weather and soil conditions. Moreover he is never sure what prices he will receive for the increased output. Even so, the generally cautious farmer will decide in favor of the new technology if the expected payoff is large enough.
From the foregoing it is clear that there is a need for marketing reform. The initiative of this reform may come from private enterprises, cooperatives, farmers' organizations, from consumers, or from the government. The goal of such a reform should be primarily to maximize the rate of growth of food production. More specifically the goal should be to develop a marketing organization which would ensure that the incentive effects of the growing demand for food reach the producer, and not be absorbed by the middleman.

In Indonesia, where the government has assumed the role of development agent, the initiative of marketing reform comes from the government. Under its direction the marketing reforms reduce the number of the same type of middlemen, shorten the marketing channel, replace one type of middleman with another, and control the marketing channels through direct government intervention and the allocation of monopoly powers to favored institutions. In addition, a favorite kind of reform is the establishing of new and expensive marketing facilities, such as warehouses in the rural areas and market places. These reforms are frequently implemented with no real understanding and knowledge of the marketing process, widespread belief in the unproductive nature of marketing activities and of the middlemen in Indonesia, and with traditional prejudices against middlemen. Consequently, legislators, administrators, politicians, consumers and farmers are not able to analyze the true
nature of the marketing process and the importance of the economic functions of the middlemen. Thus it is not surprising that the reforms do not result in the intended improvements. Indeed, many of these reforms have negative effects on the efficiency of the marketing organization.

Not much has yet been done on the clearly needed improvements essential for marketing efficiency, in establishing uniform measures and weights, and standardizing and grading of agricultural produce. Because of their importance in the marketing process, their acceptance by the trade will form a landmark in the direction of marketing improvements.

A major weakness in the marketing reforms introduced by the government is its almost dogmatic belief in cooperatives. On many occasions this attitude has led to the elimination of private middlemen through legal powers, and their replacement by cooperatives, with no regard for the fact that cooperatives cannot become established in a short time among farmers who have never been exposed to this type of organization.

Marketing reform is not an easy task and can not be introduced on the basis of doctrines and prejudices. It requires a careful analysis and understanding of the problems and the forces at work. Each case ought to be handled on its own merits, since no generalization can be made for the different kinds of produce, areas and market
structures. An integrated approach to the problem should be taken rather than on an adhoc basis which was the pattern in the past. The provision of adequate marketing facilities loses much of its impact if credit facilities are inadequate. The interdependence between these two factors is so close that neglect of one of them will reduce the effectiveness of the other.

In recent years there have been some indications that the Indonesian government has followed this approach, although still to a limited extent. This is apparent from the methods used in implementing the corn and rice projects designed to boost production of cereals. The farmers are offered a package of services which reduce the uncertainties they face in applying new technology. Simultaneously, they are offered inputs on a credit basis, guaranteed output prices and assistance in applying new cultivation. As we will see later, these projects also have their limitations.

As for the outlook, if the past trends in the production of the six major farm food crops and fish continue to 1975, then production at that year will be as shown in Table A-4 in Appendix A. The same table shows also the projected demand for the same year under the different population and income assumptions. By comparing the projected demand and supply of food in 1975, we can draw three conclusions. First, in 1975 the country will not suffer from shortages of roots. The production of roots in 1975 will not only be able to
meet the demand under the low, medium and high income and population assumption, but it will exceed by far the expected average demand. Second, the same conclusion can be drawn for the beans and nuts, and fish. However, for fish the expected output is slightly below the quantity demanded under the high income, and medium and high population assumptions. Third, the expected output of cereals is below the expected quantity demanded under each income and population assumption, and could not even meet the expected demand caused by population growth only under the medium and high assumptions.

Since cereals, especially rice, have a high position in the scale of preference of the consumer, those expectations form a serious threat to the development effort of the economy. Shortages of rice, even if other food items are available, will certainly disrupt industrial development, in view also of the fact that rice is the most important wage good in Indonesia. Thus attempts should be made either to meet this demand by increasing production or imports.

Indonesia's potentialities for increasing rice production are high, as to both the area planted and the yields. Extension of the cultivated areas of rice through the opening of new land is still possible in Sumatra, Kalimantan and the other islands. Cultivation on Java and Madura has already expanded beyond its optimum, but through fuller development of irrigation facilities and proper drainage,
production on the area planted can be increased through double
cropping. New irrigation facilities would enhance these areas not
only in Java but also in the Outer Islands.

Irrigation schemes and extension of new lands are long run
alternatives, which should not be ignored. However, since speed
is the vital factor, quick yielding alternatives should be emphasized.
Already known results of scientific research should be applied in
the rice fields. The institutional framework should be improved to
provide the necessary economic incentives to the farmer, so that he
in turn can increase the productivities of land through the adaptation
of the new technology.

As discussed in Chapter VI, there are two government spon-
sored programs at the moment to increase cereal production through
intensification. The initial results of these programs are encourag-
ing and show that the techniques used have tremendous potentialities.
Since these projects were initiated in the 1960's, their effect on the
15 year trend is not yet weighty enough to reflect the true trend of
the 1960's.

These projects have introduced a new method of cultivation
which combines on a mass scale all the factors giving higher yields.
Average increase in the yield per hectare for rice has been
conservatively estimated at 100 percent, and for corn at 500 percent. The expected production of cereals caused by these increases in yield can be estimated as follows: for rice, in Indonesia approximately 5 million hectares of irrigated area produced an average yield of 12.2 quintals of rice per hectare. If this new method is applied throughout the whole area, then production from the irrigated rice fields only will count for more than 12.2 million tons of rice. Since double cropping is possible, especially in Java, the output should be even higher. Thus if the method is applied to the average planted area of 1956-1960, which was more than 6 million hectares, then expected output of rice will be more than 14.5 million tons. Moreover if the irrigation projects now near completion are put into use, the area of double cropping will favorably increase the expected output.

There are approximately 3 million hectares of land used for the production of corn with an average yield of 0.9 tons per hectare. If the new method is applied to the whole area, then expected production will be about 13.5 million tons of corn. If we add to this quantity the expected output of rice of 14.5 million tons, then the total output of cereals as expected at the completion of the programs will be

53 As mentioned earlier, other estimates on the increase of yield were as high as 250 percent for rice.
around 28 million tons. This quantity is much higher than the expected demand for the year 1975.

It is clear that by the application of this new method only, Indonesia could become a surplus producer for cereals. In other words, the agricultural sector could increase its contribution to the economy not only in supplying more food, but also in saving and earning foreign exchange.

A crucial point is the speed with which these methods can be applied and adopted by the farmers. If the rate is as low as it has been in the past, the agricultural sector will probably consume the increases in production itself, and limit its contribution to the economy. The speedier the progress of these projects, the larger will be agriculture's contribution to the economy. This progress depends on the relative importance of the following limiting factors. First is the unsettled political and economic conditions of the country. The attempts of the new regime to control inflation and to stabilize the political situation of the country so far have succeeded relatively well. Roderich Macfarquhar from The New Statesman reported that the results of these attempts are encouraging. He stated that "inflation, which was 800 percent in 1965 and 500 percent in 1966, may be reduced to about 100 percent this year by sharp curtailment of government expenditure and waste" (64, p. 428). The recent inauguration of General Suharto as Acting President marked a
significant shift in Indonesian politics and opened the way for further stabilization, although the political problems faced by the country are still numerous, and the future is still uncertain.

Second is the limited supply of foreign exchange to import the needed fertilizers, pesticides, insecticides and sprayers. Mears estimated that to implement the program for each one million hectares, the needed foreign exchange is about 25 million dollars. Thus for the 6 million hectares, the needed foreign exchange is about 150 million dollars, which is somewhat more than the value of annual imports of rice. Under normal conditions, with an annual foreign exchange earning of more than 700 million dollars and an annual import of 125 million dollars of rice, this foreign exchange requirement is relatively not high. However, under present conditions, with an outstanding debt of 2.8 billion dollars and a significant portion due within a short time, and with a practically zero reserve on foreign exchange, the above requirement is high, and forms a serious limitation for the successful completion of the program. On the other hand, the completion of the fertilizer plant now under construction will increasingly diminish the foreign exchange requirements of this project.

The third limitation is the lack of executive capacity of the agency involved. If the growth rate is too fast or too ambitious, managerial and logistic problems will certainly arise, endangering
the successful completion of the program.

The fourth limitation is the lack of an efficient marketing organization which can guarantee a smooth flow of inputs to the farmers and outputs to the consumers. This might be the most serious bottleneck of the program, since it involves a process of institution building which cannot be solved within a short time. As in many other government-sponsored economic projects, the cooperative form of organization is the key agency in the rice and corn programs. The cooperatives are assigned to provide the farmers at the local level with the necessary inputs at the right time. These inputs are sold on a credit basis to the farmer. In return he has to pay back his credit not in cash, but with 50 percent of the expected increase in production. The farmer can sell the other half to the government through the cooperatives. This system of "pledging" part of the output in return for a loan is the same as the one used by the money-lender trader. This type of operation ensures the use of credit for productive purposes, while the return of loans to the cooperatives is better secured, since the loans are tied up with part of the crop which the farmer has to sell to the cooperatives. Since the need for credit for consumptive purposes is chronic, the system might give better results if, in addition to the credit in kind, cash credit is made available for the farmer.

The plan is to develop cooperatives in areas where such an
organization is absent. Developing efficient cooperatives among farmers who lack technical knowledge as well as business instinct is not an easy task, and is a long-run plan. Moreover, these farmers have recently witnessed the failure of cooperatives. As a result, and also partly on account of their ignorance about the principles and possibilities of cooperation, farmers are sceptical of this type of organization. Because of these reasons and others mentioned in the text, the development of cooperatives could not happen overnight.

In addition to the above limitations for the implementation of the rice and corn projects, there are several others such as transportation, the number of students participating, and the supply of seed. Although they must not be neglected, relatively they are less important.

The most serious limitation seems to be the lack of an efficient marketing organization, since improving this organization involves a process of institution building, which cannot be done within a short time. Because of the structural problems facing the country in developing cooperatives, the dogmatic approach of the Indonesian government in which cooperatives are designated as the only type of agency assigned to perform the marketing functions of the projects, must be avoided. There are still two other alternatives open for the government: the use of experienced private marketing agencies,
and state marketing agencies (business organizations owned and operated by the state). The strategy must be to select the best of these alternatives in each area. The writer admits that selection of the type of agency is not an easy task, and provides a large scope for corruption by the decision makers. However, the following guidelines can be used. In areas where efficient cooperatives already exist, if they are willing to participate in the programs, they should be selected. In areas where none such agency exists, an operating private agency should be selected. If the private agency is known to the public to have monopsonistic powers and has misused them in the past by exploiting the farmers, then a state marketing agency should be opened in the area, rather than a cooperative. A state agency can be established in a shorter time than a cooperative society, and it is much harder to control the practices of the monopsonistic middlemen than to establish a state agency.

This state agency must be operated on a business-like basis and be responsible to the project leadership. The personnel can be drawn from the present overstaffed government organizations. Of course, they have to go through a training period. In addition, since honesty is a very important qualification for this assignment, only

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54 This information can be obtained from the civil service in the area.
those who have shown dedication and respect to ethical standards should be selected. If needed to guarantee their efficiency, an incentive system in the form of annual bonuses should be introduced. Gradually these agencies can be replaced by the growing cooperatives.

The institutional limitations determine the speed of the implementation of the new method of cultivation. If these limitations can be overcome within a reasonably short time, Indonesia has promising prospects for producing her own basic food needs in the near future.
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APPENDIX A

Tab. A-1. Food Prices, Money Supply and Budget Deficits in Indonesia

<table>
<thead>
<tr>
<th>Year</th>
<th>Index of Food Prices (1958 = 100)</th>
<th>Money Supply (in thousand millions)</th>
<th>Budget Deficits (in thousand millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1955</td>
<td>55</td>
<td>12.2</td>
<td>-2.1</td>
</tr>
<tr>
<td>1956</td>
<td>62</td>
<td>13.4</td>
<td>-2.3</td>
</tr>
<tr>
<td>1957</td>
<td>69</td>
<td>18.9</td>
<td>-5.2</td>
</tr>
<tr>
<td>1958</td>
<td>100</td>
<td>29.4</td>
<td>-12.0</td>
</tr>
<tr>
<td>1959</td>
<td>118</td>
<td>34.9</td>
<td>-13.8</td>
</tr>
<tr>
<td>1960</td>
<td>143</td>
<td>47.8</td>
<td>-6.9</td>
</tr>
<tr>
<td>1961</td>
<td>199</td>
<td>67.9</td>
<td>-16.9</td>
</tr>
<tr>
<td>1962</td>
<td>600</td>
<td>135.3</td>
<td>-60.7</td>
</tr>
<tr>
<td>1963</td>
<td>1720</td>
<td>265.3</td>
<td>-117.1</td>
</tr>
<tr>
<td>1964</td>
<td>4779</td>
<td>676.1</td>
<td>-1.3</td>
</tr>
<tr>
<td>1965</td>
<td>7707</td>
<td>2,200.0</td>
<td>-53.7</td>
</tr>
</tbody>
</table>

Table A-2. Starchy Staple Food Prices per 1000 Calories in the Rural Areas of Java.* (In Rupiah Cents per 1000 Calories)

<table>
<thead>
<tr>
<th>Year</th>
<th>Rice</th>
<th>Maize</th>
<th>Cassava</th>
<th>Sweet Potatoes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>58</td>
<td>18</td>
<td>21</td>
<td>27</td>
</tr>
<tr>
<td>1955</td>
<td>73</td>
<td>35</td>
<td>28</td>
<td>34</td>
</tr>
<tr>
<td>1956</td>
<td>87</td>
<td>46</td>
<td>38</td>
<td>40</td>
</tr>
<tr>
<td>1957</td>
<td>95</td>
<td>44</td>
<td>37</td>
<td>42</td>
</tr>
<tr>
<td>1958</td>
<td>146</td>
<td>62</td>
<td>55</td>
<td>63</td>
</tr>
<tr>
<td>1959</td>
<td>154</td>
<td>68</td>
<td>49</td>
<td>60</td>
</tr>
<tr>
<td>1960</td>
<td>194</td>
<td>88</td>
<td>65</td>
<td>80</td>
</tr>
</tbody>
</table>

*Calculated from average annual prices per kilograms. See: Central Bureau of Statistics (52, p. 233).
Table A-3. Per Capita Production and Consumption of Starchy Staples (in kilograms)

<table>
<thead>
<tr>
<th></th>
<th>Rice</th>
<th>Corn</th>
<th>Cereals</th>
<th>Roots</th>
<th>Total starchy staples</th>
<th>Total starchy staples in terms of rice calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per capita consumption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1954-1960)</td>
<td>90</td>
<td>22</td>
<td>113</td>
<td>113.6</td>
<td>226.6</td>
<td>158</td>
</tr>
<tr>
<td>Recommended per capita</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>consumption (ideal menu)</td>
<td>81</td>
<td>49.5</td>
<td>130.5</td>
<td>64.8</td>
<td>195.3</td>
<td></td>
</tr>
<tr>
<td>Per capita production*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1950-1954</td>
<td>79.5</td>
<td>25.3</td>
<td>104.8</td>
<td>131.1</td>
<td>235.9</td>
<td>155.8</td>
</tr>
<tr>
<td>1955-1959</td>
<td>82.4</td>
<td>22.1</td>
<td>104.5</td>
<td>151.9</td>
<td>256.4</td>
<td>163.2</td>
</tr>
<tr>
<td>1960-1964</td>
<td>80.9</td>
<td>27.5</td>
<td>108.4</td>
<td>152.1</td>
<td>260.5</td>
<td>167.3</td>
</tr>
</tbody>
</table>

* Production data for cereals are adjusted for seed and waste.
  - Seed use is based on average of 1954-1961 which was 2.5% of production for rice and 2.9% for corn.
  - It is customary to use 5% as proportion wasted or used for feed, for rice and corn.
### Table A-4: Projected Supply and Demand for Food 1975 (in thousand tons)

<table>
<thead>
<tr>
<th>Food Groups</th>
<th>SUPPLY</th>
<th>DEMAND</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population and Income Effect</td>
<td>Per Capita Income Growth Rates</td>
</tr>
<tr>
<td></td>
<td>0.0</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2.2</td>
</tr>
<tr>
<td>Cereals</td>
<td>15,238</td>
<td>14,944</td>
</tr>
<tr>
<td>Roots</td>
<td>26,275</td>
<td>18,530</td>
</tr>
<tr>
<td>Beans &amp; Nuts</td>
<td>1,118</td>
<td>826</td>
</tr>
<tr>
<td>Fish</td>
<td>1,603</td>
<td>1,134</td>
</tr>
</tbody>
</table>
APPENDIX B

Sources and Notes on the Statistical Methods Employed in Chapter IV

General Sources


Stocks on hand: Jajasan Urusan Bahan Makanan (Food foundation) Djakarta.

Imports, exports, inter-regional shipments, population statistics:

Quantities of corn used for seed: Central Bureau of Statistics, Djakarta, Indonesia.

Conversion factors
a. into calories: Agricultural Extension Service, Ministry of Agriculture, Djakarta, Indonesia
b. others: Nutrition Institute, Djakarta, Indonesia


General Notes

1. Rice availability was obtained by adjusting production for seed use losses, stocks on hand, imports and exports, and inter-regional
2. Stock adjustments for rice included only stock in the rice mills and government warehouses in Java. No stock data was available for other islands.

3. Rice losses were estimated at 5 percent of gross production as suggested by the Agricultural Extension Service.

4. Rice seed was estimated as follows:
   - 64 kilograms per hectare of planted area for non-irrigated fields.
   - 50 kilograms per hectare of planted area irrigated fields.

   These estimates were made by the Agricultural Extension Service of the Ministry of Agriculture Djakarta.

6. Corn Availability was obtained by adjusting production with seed, exports, and inter-island shipments. Imports, industrial use, and livestock feed have been ignored, since corn is negligible.

7. Cassava availability was obtained by adjusting production for exports and inter-island shipments. Imports, industrial use and livestock consumption were assumed negligible, so no adjustments were made.

8. Sweet potato availability was obtained by using production without adjustment at all.

9. Population statistics are at mid-year.

10. 1961 statistics used in this chapter are all preliminary estimates.
11. Conversion factors:

1 kilogram stalk paddy is equal to 0.52 kilogram milled rice

1 kilogram Cassava fresh roots is equal to 0.26 kilogram tapioca flour.

Conversion to rice calories:

1 kilogram wheat flour = 1 kilogram (equivalent) rice calories

1 kilogram shelled corn = 1.048 kilogram (equivalent) rice calories

2.6 kilogram Cassava fresh roots = 1 kilogram equivalent rice calories

2.8 kilogram fresh sweet potatoes = 1 kilogram equivalent rice calories
APPENDIX C

Sources of Statistical Data used in Chapter VI

1. Production, planted and harvested area statistics:

   - for the Outer Islands from Agricultural Extension Service, Ministry of Agriculture, Djakarta.

   1962-1965 - U. S. Department of Agriculture, (103)

2. Production, yields, harvested and planted area statistics of rice:

   1920-1961 - for Java and Madura from the Central Bureau of Statistics, Djakarta


3. Imports of rice statistics:


4. Production of fish statistics: