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**LA THÈSE A ÉTÉ
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THE AGRICULTURAL SECTOR IN THE ECONOMIC
DEVELOPMENT OF IRAN

by

Mahmood Khataie

Thesis presented to the School of Graduate
Studies as partial fulfillment of the
requirements for the Ph.D. degree in Economics.

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ABSTRACT

The Agricultural Sector in the Economic Development of Iran

The thesis is designed to show, by means of theoretical considerations and empirical analysis, the place of the agricultural sector in the course of economic development of Iran during 1963-76. Although the work is consequently limited to the socio-economic conditions of Iran, there are implications and generalizations of interest for the other developing countries. It confirms that under general conditions agricultural development is a major factor, at least in the early stages of economic development, for overall development and sustained rate of growth. In fact, the contribution of agriculture to welfare is far more than that reflected in national income accounts. The latter concept by no means represents the level of satisfaction of the people.

However, it is not claimed that the unique and exclusive solution to the manifold problem of development of Iran is found in the agricultural sector. But, the significance of agricultural development for overall development is so crucial that even in the case of a country like Iran with the present high level of oil exports, it cannot be disregarded. It is asserted that a one-sided policy of industrialization is neither necessary nor sufficient for her economic development. What is needed is an overall simultaneous short run and long run consideration of all sectors and their components. It appears difficult to implement, but it is the real economic problems with which the planners have to deal.

The thesis accomplishes four major interdependent tasks:

Firstly, there is a presentation of the theoretical and empirical knowledge of the place of the agricultural sector in economic development and the methods for transforming and developing traditional agriculture. Theoretical analysis supports the significant role of agriculture in economic development. The historical review of economic development in present developed economies reveals that the agricultural sector has been a major factor in the course of economic development either under a capitalist or a socialist system. Studies of the world food situation show that the future world food supply is not bright. The food crisis of 1973 and 1974 confirms that the early optimism of the green revolution in the late 1960's has been exaggerated. The transformation of traditional agriculture is too complicated to be achieved only by implementing one of the existing theories. Each theory solves a part of the problem. There is a need to consider the different time and space conditions for each case of agricultural development.

Secondly, the economic situation of Iran with respect to the agricultural sector is analyzed. The economy of Iran has experienced a rapid economic growth for the past fifteen years. In constant prices, the gross domestic product has increased annually by 11%. Unfortunately, the progress of Iran has been accompanied by some negative aspects. The priority given to achieving the highest possible rate of economic growth has led to the collapse of the traditional activities including the agricultural sector. The economy displays the features of economic backwardness. There is lack of integration between sectors; the deficit

of nonoil balance of payments increases; disparities in incomes by region and class grow, bottlenecks proliferate; the risk of social unrest increases; and the recent high rate of inflation offsets considerably the effects of economic progress. The agricultural sector has suffered most from the past economic policies. As a consequence, the country has ceased to be a self-sufficient economy in agricultural products. In 1975 Iran imported 20% of its total food consumption. The dependency is still increasing. While some small farms cultivated by Iranian farmers who use domestic inputs have very high yields, it seems that the small-farming sector with 70% contribution to the agricultural value added in 1974 has been neglected. The projected demand for agricultural products during 1976-92 would increase by 4.5% per annum. The figure is determined through the projection of the critical variables that influence the long term demand, namely population growth, increase in per capita income, and rural migration. Technical studies show that despite the relatively limited agricultural potential of Iran, the country would be able to expand its agricultural production by the rate of demand increase, provided it follows certain development policies.

Thirdly, based on the two earlier tasks, it is attempted to justify the significance of agricultural development for solving the present economic imbalances of Iran and for providing a secure development path. On the qualitative aspects, the contribution of agriculture to the economy of Iran has been underestimated. This is either because of the distorted price structure of the market or the difficulty of imputation of monetary value to some aspects of the agricultural activity such as low social cost, low cost of utilities,

and environmental problems. The agricultural sector also plays a major role in spatial distribution of activities, provision of employment for the young population of Iran with a high supply of labor in the near future, and expansion of markets for manufactured goods. In order to show the effects of changes in quantifiable variables of each economic sector and to depict an image of Iran's economy in 1992 - the time of sharp reduction in oil exports - a macroeconomic model was built. The runs of the model under two sets of assumed economic policies - present development path and alternative path - confirm the need of an immediate reconsideration of present economic policies, particularly with respect to the agricultural sector. If the reconsideration is postponed, the transformation to a new order will probably not be an easy procedure, economically, socially, and politically.

Fourthly, some policies are proposed for the development of the agricultural sector. They incorporate the results of the quantitative model tempered by the qualitative understanding. A slower rate of economic growth with a higher contribution of the agricultural sector is proposed. With respect to agriculture, the policies consider the protection and expansion of agricultural resources, infrastructural aspects, maximum efficiency use of available agricultural resources, structural problems, population, income disparities, prices, and marketing.

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CHAPTER I

INTRODUCTION

Scope of the Thesis

For the last fifteen years, Iran has been enjoying a rapid rate of economic growth. This growth has been achieved through the development of all but the agricultural sector. The immediate consequence has been the failure of the economy to produce sufficient amounts of agricultural products to satisfy the increasing demand for food consumption resulting from the higher per capita income, the population growth, and the rural emigration. While less than two decades ago the economy was relatively self-sufficient in agricultural products, in 1975 1.9 billion dollars of foodstuffs were imported to cover the deficit of the domestic agricultural products. This compared unfavourably with the total nonoil commodity exports of only 0.6 billion dollars in the same year. In view of the rapid decline of oil exports by 1992, the increasing rate of dependency on food imports will require huge amounts of nonoil exports in order to avoid a likely deficit in the balance of payments.

The present course of development with an emphasis on attaining the highest rate of growth and the relative stagnancy of the agricultural sector is accompanied by other significant side effects which are closely related. First, in the rural areas, inhabited by more than half of the population, the average income per family is lowest with an ever increasing disparity when compared with urban areas. Second, the uncontrolled rural

emigration disturbs the habitation balance of the country and results in the abandonment of marginal resources which are important to agricultural production and to the protection of the environment. Without a rural hinterland the irreversible desolation of a large part of the country will be accelerated. Third, the inflation resulting from the objective of a very high rate of growth proves difficult to manage. It leads mostly to land and property speculation and diverts investment from the productive activities where the rate of price increases is likely to be controlled. Fourth, concentration of markets and centralization of decision making processes accelerate. They are accompanied by the inefficiency of the state organizations to understand the needs of people and to implement the development projects. Fifth, the national cultural heritage is in danger of falling into neglect. A rapid restructuring of social values not only prevents the possible use of the positive aspects of the existing social structure, but also creates some obstacles for future economic development through imposing very heavy social costs which could be simply averted.

The partial solution to the above tendencies and imbalances could be found in the development of the agricultural sector. This would be a major factor in avoiding the deficit of balance of payments, in increasing the welfare of the poorest group of the society, in spatial distribution of activities, in provision of employment opportunities, in expansion of markets for manufactured goods, and in preserving the positive aspects of national culture through a gradual change of social values.

In the past, the agricultural sector has been relatively neglected. However, the decreasing share of the agricultural sector in economic activities is a natural course of economic development, but it occurs more rapidly in Iran as a result of a continuous underestimation of the capacity of agriculture to contribute to the economy. In consequence, it does not receive the required development projects in comparison with the other sectors and its contribution to the gross domestic product again decreases. At the same time the overall effect of the neglect of the agricultural sector is reflected in heavy social and economic costs in the country.

The main argument for the lack of interest in the agricultural sector of Iran is the limitation of agricultural potential. However, this does not justify the non-utilization of the existing agricultural resources and the disregard of the people who live and hope to make a living in the agricultural sector. The present methods of water and land usage could be considerably improved to be consistent with the potential of new technology. The insufficiency of water resources is a main obstacle to development of agriculture. Additional harnessable water is almost as great as present water consumption. Therefore, increasing the efficiency of water usage on cultivable land as well as the development of other unexploited resources would, under certain conditions, provide the bulk of food requirements of the economy.

Taking a global perspective, the theoretical analysis with respect to the place of agriculture in economic development supports the argument for the development of the agricultural sector. Attention to industrialization must be diverted to the need for growth and development

in agriculture; if overall economic development is to be stimulated. From an empirical point of view, firstly, the studies of the course of development in present developed countries, Western European countries, the United States, Japan, Russia, and the achievements of China confirm the theoretical argument on the significance of agriculture in economic development. Secondly, the outlook for the future world food supply is not promising. If anticipated shortages should be realized, it will be important for developing countries to reduce their dependence for food requirements on the increasingly monopolistic world market.

Moving from the world-wide view to the specific case of Iran, it appears that a mere continuation of previous economic policies will, with the likely depletion of her oil resources by 1992 and the high rate of growth of her young population, endanger the achievements of the past fifteen years.

The thesis is concerned with the development of the above discussion to determine the place of agriculture in the process of economic development of Iran. Although it deals mostly with the case of Iran, it has theoretical implications. It provides a test for the hypothesis of the significance of agricultural development for the overall economic development and a sustained rate of economic growth in developing countries. It is not claimed that the unique and exclusive solution to the manifold problem of development has to be found in the agricultural sector. The development process involves all as well as the agricultural sector.

The implicit contribution of agriculture to welfare is far more than that reflected in national income accounts. The neglect of this point and pursual of a one sided policy of industrialization in many

developing countries have not assisted the expansion of the manufacturing sector and the growth of exports of manufactured goods, but they have caused these countries to become importers of agricultural products even where many of them had relative advantages of production. The significance of agricultural development is so crucial that even in the case of a country like Iran with present high level of exports it cannot be disregarded.

The policy implications of this thesis is to discover some alternative feasible path for the economic development of Iran. Particular policies are searched for which solve the problem of coordinating the growth of the agricultural sector with the other sectors in the framework of national objectives of the economy. The descriptive and quantitative analyses of Iran's economy through a national macroeconomic model are the major instruments for the achievement of this goal.

Methodology

This thesis, organized to deal with the agricultural sector in the economic development of Iran, requires four major interdependent tasks:

Firstly, the task is a presentation of the theoretical knowledge of the place of agricultural sector in economic development and the methods for transforming and developing traditional agriculture.

Secondly, an identification of the economic situation of Iran with respect to the agricultural sector and its existing tendencies is presented. The aim is to provide a sound background of the agricultural sector as a part of the economy -- its potentials, its constraints, its future problems, and the mechanisms which control it.

Thirdly, a general plan, with justifications, dealing with the significance of the agricultural sector in the economy of Iran is formulated.

Fourthly, policies for implementing the plan for the agricultural sector are suggested.

The way in which the tasks were conducted, particularly the last three, was simultaneously in a series of loops or successive approximations to the whole problem. The main purpose of the first loop, theoretical analysis, was the establishment of theoretical background to the subject which provided the guidelines for the whole work. At the same time the boundary and some generalization for the first loop were determined by the particular features of the case study in the form of three other loops -- agricultural sector of Iran, formulation and justification, and recommended policies -- and their consequent theoretical implications. In a similar way the last loop, the recommended policies, which was the final task of the thesis was determined gradually by the completion of three earlier loops -- theoretical background, identification, and formulation and justification. Again the final loop provided also some information for the earlier loops.

The approach by loops or successive approximation is explicitly delineated in the thesis as the text has been formulated to follow a linear kind of logic. The main loops achieved by each of these successive approaches are illustrated in simplified form by the Figure 1-1. These loops shape the classification of the thesis in the form of eight chapters.

The employed method for the analysis of the subject of each loop was selected according to the nature of the loop and the availability of the kind of information. In the first loop which was dealing with the theoretical background of the thesis, the main instrument was the theoretical-empirical analysis of the earlier works concerned with the place of agriculture in economic development. However, some generalizations of this loop were the result of the related analysis in other loops which in turn employed different methods.

In the second loop, identification of the case study, mostly a descriptive analysis, through extensive use of the earlier studies and personal experience as a former researcher in Iran, were employed to depict a clear image of the economy of Iran in relation to the main objective of the thesis, i.e., the significance of agriculture in economic development of Iran. In this way it became possible to find the imbalances and the tendencies of Iran's economy in her course of development.

The aggregation of the theoretical background and the characteristics of Iran's economy provided the necessary information to examine closely the objective of the thesis. This was the task of the

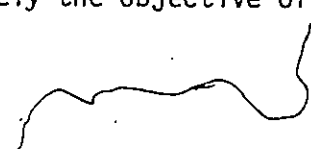
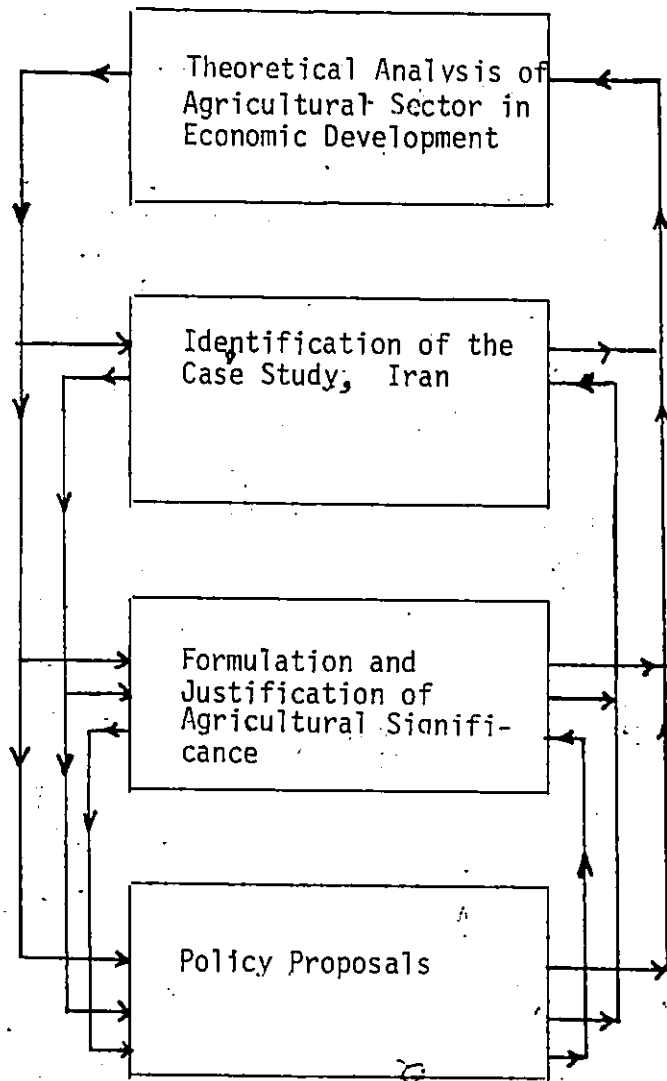


FIGURE 1-1.

Methodology of Study



third loop. Here two methods were used. First, on the basis of gathered information, theoretical or empirical, a national macroeconomic model was built to quantify the effect of changes of some variables and thereby to show quantitatively the **partial** significance of the agricultural sector in the economic development of Iran and the forecast value of major economic variables. Second, since some aspects of agriculture were of a qualitative nature or at least difficult to be measured, an explanatory analysis was used to present systematically the positive aspects of agricultural development. The implication of the third loop which confirms the high significance of agriculture in economic development could be used not only for the future path of economic development of Iran, but also for some generalizations in development economics.

The final loop, policy proposals, was a simple deduction and consequence of work done in earlier stages. The intent was not to draw a detailed and overall agricultural policy, but only to propose some policy guidelines as a result of the derived implications of the thesis. It is clear that the provision of detailed policy required an exclusive technical study which was out of the scope of the present thesis.

An Overview

The thesis consists of 8 chapters.

Chapter I "Introduction" presents a scope of the whole thesis, its methodology, and an overview.

Chapter II "Agriculture in Economic Development" deals with the theoretical aspects of the problem, with the empirical studies in different countries, and with the methods for transforming traditional agriculture.

Chapter III "Economic Development of Iran" considers the task of the identification of the problem. The main aim is to identify the present problems and the tendencies of the course of economic development of Iran in the major domains and in relation to the agricultural sector.

Chapter IV "Agricultural Sector of Iran" deals exclusively with the problems of the agricultural sector of Iran, its potentials and constraints, the productive pattern, and the evolution of the agricultural sector in the course of development.

Chapter V "Patterns of Supply and Demand for Agricultural Products" completes Chapter IV by estimation of the present supply and demand and the forecast of the future patterns in terms of values and quantities.

Chapter VI "Significance of Agricultural Development for the Future Economy of Iran" discusses the vitality of the development of the agricultural sector for the economy as a consequence of the previous chapters. For quantifying the significance of agricultural development, a national macroeconomic model is built which includes all major sectors of the economy.

Chapter VII "Agricultural Development Policies" is concerned with the general policies for implementing the proposals dealing with the agricultural sector.

Chapter VIII "Conclusion" presents in the form of a summary the findings of the thesis.

It is hoped the completion of the thesis in the form of the above chapters will provide first, in a global perspective, additional support for arguments of the significance of agriculture in economic development, particularly development in terms of well being of people. The earlier emphasis on the one-sided policy of industrialization and the measurement of development and welfare by an aggregate figure -- growth of the gross domestic product -- must be shifted to some approach to development with more emphasis on the agricultural sector. In some cases the contribution of agriculture to the economy is not easily measurable but it exists and cannot be ignored. Second, with respect to the case study, the thesis could be a basis for reconsideration of past economic policies and redefinition of final economic objectives of Iran. If reconsideration is postponed the transformation to a new order will probably not be an easy procedure, economically, socially, and politically. Third, the present national macroeconomic model and collected information would be a helpful means for future research in a field which undoubtedly needs more empirical and theoretical investigation.

CHAPTER II

AGRICULTURE IN ECONOMIC DEVELOPMENT

During recent decades there has been a transition in economic theories with respect to the contribution of the agricultural sector to economic development. Earlier emphasis on the growth of the industrial sector for development has shifted to an increasing concern with the agricultural sector and the need for improvements in agricultural production and productivity in the development process. Empirical studies of the development process of present developed countries and results of attempts to develop in developing countries demonstrate that agricultural development is a major factor, at least in the early stages of economic development, for overall development and a sustained rate of growth.¹ With the recognition of the significant role of agriculture in economic development various policies have been proposed for transforming the subsistence agriculture of developing countries to facilitate the process of development.²

¹See Bruce F. Johnston, "Agriculture and Structural Transformation in Developing Countries: A Survey of Research," Journal of Economic Literature 8 (June 1970), 369-404; Dale W. Jorgenson, "The Role of Agriculture in Economic Development: Classical Versus Neoclassical Models of Growth," Subsistence Agriculture and Economic Development, ed. Clifton R. Wharton Jr. (Chicago: Aldine Publishing Co., 1969), pp. 320-48; Jack Dunman, Agriculture: Capitalist and Socialist (London: Lawrence and Wishan, 1975); John W. Mellor, The Economics of Agricultural Development (Ithaca, N.Y.: Cornell University Press 1966); Herman M. Southworth and Bruce F. Johnston, eds., Agricultural Development and Economic Growth (Ithaca, N.Y.: Cornell University Press, 1967); and Lloyd G. Reynolds, ed., Agriculture in Development Theory (New Haven: Yale University Press, 1975).

²Yujiro Hayami and Vernon W. Ruttan, Agricultural Development: An International Perspective (Baltimore: Johns Hopkins Press, 1971), pp. 2-53.

The objective of the present chapter "Agriculture in Economic Development," is to develop the above discussion of the rôle of agriculture in order to give a theoretical and empirical ground as a framework for the subject of study, "The Agricultural Sector in the Economic Development of Iran."

The first task, therefore, is to define the types and the features of agriculture in developing countries which are of relevance to the thesis. In spite of great divergence, agriculture in developing countries enjoys many common features generally called traditional agriculture in the literature. The term 'traditional' implies potential and restriction which are of significance in theoretical discussions and in policy-making processes for overall economic development and particularly for development of the agricultural sector. The agricultural sector of Iran is also classified in the category of traditional agriculture, hence the knowledge of traditional agriculture not only clarifies the subject of the discussion, but also helps to grasp some general aspects of the agricultural sector in Iran. The particular characteristics of agriculture in Iran is discussed in Chapter V.

The second task is the study of economic development theories to show the place and significance of agriculture in economic development. If there is theoretically an important rôle for agriculture in economic development, then there will be strong support for the argument of agricultural development in Iran. The section also attempts to determine the most relevant development theory to the course of economic development in Iran.

Third, empirical studies are the facts of the economic world. Consequently, it is indispensable in any economic study. In view of the present work, it is necessary to review agriculture in the course of economic development of other countries. If empirical studies confirm that the agricultural sector has played an important role in the course of development of Western European countries, Japan, Russia, China, etc., then the economy of Iran, under general conditions, would not be an exception to the rule and has to follow the examined pattern of development.

Forthly, in the context of empirical studies, the prospect of the world food situation is another aspect relevant to the place of agriculture in the economic development of Iran. If the future of world food supply is not very bright and food markets are becoming monopolized, the agricultural sector in Iran and in any other developing country will play a more significant role and deserves more attention and concentration of development projects.

Fifthly, having studied theoretically and empirically the place of agriculture in economic development, there will be a section reviewing the theories which deal exclusively with the development and transformation of traditional agriculture. These theories determine the guidelines for the policies recommended for the development of the agricultural sector in Iran.

The conclusions of this chapter, in a form of answers to the above questions, will give a theoretical and empirical background to the subject of the thesis.

Traditional Agriculture

The nature of the existing agriculture is a determining factor in the process of overall economic development and should be taken into account in the strategy for the development of agriculture. Any theory of agricultural development which explains the expansion of the agricultural sector and the raising of its productivity has to consider the existing structure of the agricultural sector. Therefore, recognition of developing countries' agriculture, defined as traditional agricultures, and motivations of the traditional farmers are the first conceptual difficulties which recur throughout the agricultural development process.

Traditional agricultures vary considerably not only from one country to another country, but they vary from one area to another area within the same country. Variations result from the different geographical, economic, and cultural factors of different countries.³ The relationship between traditional agriculture and these factors is a mutual one so that the factors are also affected by the agricultural sector.

In spite of many differences traditional agriculture has common characteristics, economically, sociologically, and psychologically. On the basis of these common points traditional agriculture may be defined as that part of the agricultural sector which is made up of those farmers

³ Clifton R. Wharton Jr., "Subsistence Agriculture: Concepts and Scopes," Subsistence Agriculture and Economic Development, ed. Clifton R. Wharton Jr., (Chicago: Aldine Publishing Co. 1969), p. 15.

whose goal of production is for family food rather than for markets. These traditional farmers intermix closely family and business considerations. This is not to say that they do not think of costs and returns. Although their concepts of costs and returns are different from the ones in monetary terms, they allocate efficiently available resources given the technological possibilities and factors which they face.⁴

Criteria for Recognition of the Traditional Farmer

Some criteria are used to distinguish traditional farmers. The main common feature of these criteria is their attempt to identify the degree of relationship of the traditional farmer with the other parts of the economy.

In the economic context there are some criteria such as ratio of consumption to production, hired labor or purchased factor inputs ratio, level of technology, income and levels of living, and decision making freedom.⁵ W.W. Rostow's conception of the traditional society, with respect to the agricultural sector, considers mostly the level of technology, which is a ceiling on the level of output per head, as a suitable criterion to distinguish traditional agriculture.⁶ So does T.W. Schultz who regards the state of technology in traditional

⁴Mellor, The Economics of Agricultural Development, pp. 133-135.

⁵Wharton Jr., "Subsistence Agriculture," p. 15.

⁶W.W. Rostow, The Stages of Economic Growth (London: Cambridge University Press, 1960), p. 4.

agriculture which causes the low rate of return on investment in customary agricultural factors.⁷

From a sociocultural point of view the criteria include the factors such as degree of outside contact, nature of interpersonal relations and psychological differences, status and class differences, and leadership which is conferred by seniority of residence or ritual office. Nash points out that the family is a multipurposed social organization in traditional farming.⁸ Unlike a firm, it cannot liquidate itself if it makes poor calculations. According to Georgescu-Roegen's view, the peasant society is sociologically and institutionally different from what he calls the civil society to which conventional economic analysis applies. The failure to recognize this fundamental difference has led to the poor results of economic policies in solving the problems of underdeveloped agricultural economies.⁹ Firth defines traditional farmers as those who link purchases and consumers, resource allocation and product allocation, in a network of ties which are more personal and more directly perceptible than in a more developed complex.¹⁰

⁷T.W. Schultz, Transforming Traditional Agriculture (New Haven: Yale University Press, 1964), pp. 28-106.

⁸Manning Nash, "The Social Context of Economic Choice in a Small Society," Man 61 (1961): 189.

⁹Nicholas Georgescu-Roegen, "The Institutional Aspects of Peasant Communities: An Analytical View," Subsistence Agriculture and Economic Development, ed. Clifton R. Wharton Jr. (Chicago: Aldine Publishing Co. 1969), p. 62.

¹⁰Raymond Firth, "Social Structure and Peasant Economy: The Influence of Social Structure Upon Peasant Economics," Subsistence Agriculture and Economic Development, ed. Clifton R. Wharton Jr. (Chicago: Aldine Publishing Co. 1969), p. 25.

In the development context, as Wharton suggests, the characteristics of subsistence farmers are their unchanging adherence to established patterns of production. Some changes are observed, but the rate of change is very slow.¹¹ The development criteria have been a source of dispute for economists. It has been established that there exists normal response to economic changes and profit opportunities, whether it is a matter of production response, or the adoption of innovations. Although it is often found that farmers in traditional agricultures adjust themselves with the stable constraints, it should not be accepted that they are quick decision makers when the condition begins to change dramatically.¹²

Significance of Traditional Agriculture

The significance of traditional agriculture can be discussed on different grounds. First, by the number of human beings who are engaged in or dependent upon traditional agriculture. Hundreds of millions of people in traditional agriculture are living on a subsistence level. The major goal of economic policies should be to change the present situation and provide them the primary needs and minimum standard of living. The economic development in the past has been serving the population of developed urban areas. The traditional farmers have been squeezed into tighter and tighter corners by the more advantaged persons. They deserve to participate in any economic

¹¹Wharton Jr., "Subsistence Agriculture," p. 17.

¹²Gerald K. Helleiner, "Smallholder Decision-making: Tropical African Evidence," Agriculture in Development Theory, ed. Lloyd G. Reynolds (New Haven: Yale University Press, 1975), pp. 50-52.

advance which their society may achieve. The traditional farmers in developing countries have become the forgotten majority. As Georgescu-Roegen says: "The agrarian economy has to this day remained a reality without a theory."¹³ The wrong attitude to the world's basic industry can have disastrous results for humanity.¹⁴ Second, the significance of traditional agriculture could be determined in terms of its present contribution, possibilities, and controls over the resources of the economy. Traditional agriculture could be a resource reservoir for providing labour, food, and savings to the other sectors of the economy. In an open economy as Hla Myint points out the development of traditional agriculture could contribute to overall growth by increasing domestic food supplies; by providing a growing market for domestic manufactures; by contributing to domestic saving and capital formation; and finally by providing foreign exchange through agricultural export and import substitution.¹⁵

Agriculture In Economic Development Theories

It could be argued that resources are scarce and economic growth must come first and should be stimulated at the points at which it can come most easily.¹⁶ Gradually the growth of the whole economy will raise the level of living of those who are now subsistence farmers more than

¹³N. Georgescu-Roegen, "Economic Theory and Agrarian Economics," Economics of Underdeveloped Agriculture, ed. Tara Shukla (Bombay: K.K. Vora, 1969), p. 319.

¹⁴Dunman, Agriculture, p. 14.

¹⁵Hla Myint, "Agriculture and Economic Development in the Open Economy," Agriculture in Development Theory, ed. Lloyd G. Reynolds (New Haven: Yale University Press, 1975), p. 327.

¹⁶Erik Thorbecke, ed., The Role of Agriculture in Economic Development (New York: Columbia University Press, 1964), p.4; for a detailed study see Johnston, "Agriculture and Structural Transformation".

will any attempt to help them directly. Economic growth is basic and without it no amount of income redistribution or sentimental concern for the subsistence farmers can have much effect. Even agricultural development itself is dependent on the availability of industrial products such as fertilizers, implements, and pesticides.¹⁷

But the converse is also true. The health of industries is dependent on a productive agriculture, partly to feed the cities and partly as a market for manufactured goods. The faster those now engaged in subsistence agriculture increase their productivity and move more into commercial operation of their farms, the greater the demand for industrial goods will be and the faster the total economy can grow.¹⁸ Moreover, in a social context, although the emphasis on total economic growth and the optimum allocation of resources has its value, the time lag between rising levels of living in one part of a society and those in another cannot be too long without a violent revolution. A revolution which might endanger the past economic achievements and cause heavy economic costs for restructuring.

Earlier Economic Development Theories

Economic development has been discussed since the infancy of economics as a science. Mercantilists explained some development policies four hundred years ago. Later on Adam Smith and the other

¹⁷H.B. Chenery, "Patterns of Industrial Growth," American Economic Review 50 (September 1960): 624-54; C. Clark, The conditions of Economic Progress (London: MacMillan, 1957), p. 21; and S. Kuznets, "Quantitative Aspects of the Economic Growth of Nations," Economic Development and Cultural Change, Supplement 5 (July 1957).

¹⁸Stephen Enke, Economics for Development (London: Prentice-Hall International Inc. 1963), pp. 124-127; Dale W. Jorgenson, "The Development of a Dual Economy," Economic Journal 71 (June 1961): 309-34; John W. Mellor, "Toward a Theory of Agricultural Development," Agricultural Development and Economic Growth, eds. Herman M. Southworth and Bruce F. Johnston (New York: Cornell University Press 1967), p. 25; and William H. Nicholls, "An Agricultural Surplus as a Factor in Economic Development," Journal of Political Economy 71 (February 1963): 2.

so-called classical economists, Ricardo, Mill and Malthus, examined many aspects of economic development such as population growth and national economic welfare. But toward the end of the nineteenth century, economists became concerned mostly with price theory and income distribution.¹⁹

After World War II the new concern for development of backward regions caused an intense research in economic development. The recent concern has restored the interest in the early works in the subject. This is partly because these works have been written in the time of the development process of present developed countries. In spite of many differences between present developing countries and the developing economies in the eighteenth century, the analytical approach to development in these early works has been useful.

The new movement of theories of growth originated with essays by Harrod 1939²⁰ and Tinbergen 1942.²¹ In spite of intense concern for development, no clearcut theory in economic development has emerged. With respect to agriculture the views become even more controversial.

In fact the variability in the conditions of agricultural production makes it difficult to derive a general theory for agricultural development. The variability arises because of the different natural conditions of each region; the enormous numbers of decision makers who are different in

¹⁹Enke, Economics for Development, pp. 65-90.

²⁰R.F. Harrod, "An Essay in Dynamic Theory," Economic Journal 49 (March 1939): 14-34.

²¹L.H. Klaasen et al., eds., Jan Tinbergen Selected Papers (Amsterdam: North Holland, 1959), pp. 182-221.

training, habits and culture; and the performance of past development plans which change economic, cultural, institutional, and even the physical environments of agriculture.

Growth Stages Theories

The earlier growth stage literature was primarily a product of nineteenth century German economic historians.²² Germany was a late comer to industrialization, relative to Britain, and the promotion of industrialization and economic growth were regarded as major goals of German nationalism. With the rebirth of interest in economic growth during the last few decades, economists and historians following the patterns of earlier works in Germany have joined in the effort to satisfy the demand for a general development theory by dividing economic history into segments.²³

The two major traditions of growth stages theories in the nineteenth century German literature, Marxism and the German historical school,²⁴ have admitted the vital role of agriculture for overall development.²⁵ However, in the view of the German historical school, the progress in agriculture was generated through industrial expansion. The prescription of development through industrialization still has great appeal to the planners in developing countries.

²²Bert F. Hoselitz, "Theories of Stages of Economic Growth," Theories of Economic Growth, ed. Bert F. Hoselitz, (Glencoe, Illinois: Free Press, 1960), pp. 193-238.

²³Hayami, Agricultural Development, pp. 10-12.

²⁴Josef A. Schumpeter, History of Economic Analysis (New York: Oxford University Press, 1954), pp. 440-42.

²⁵Karl Marx, Capital, A Critique of Political Economy, ed. Frederick Engels (New York: The Modern Library, 1906), pp. 784-95.

In the 1930's Fisher developed the concept of primary, secondary, and tertiary production which was propagated further by Clark.²⁶ Fisher emphasized the secondary shift of employment and investment from the essential to secondary activities of all kinds and to a still greater extent into tertiary production which accompanies economic progress. In Clark's formulation the economic growth which accompanies this transformation is achieved, first, by increase in output per worker in any sector and, second, by the transfer of labor from sectors with low output per worker to sectors with higher output per worker.²⁷

The decline of professional interest in the Fisher-Clark stages during the last decade began, at least in part, by the emergence of Rostow's growth stages approach.²⁸ Rostow's approach starts from the empirical premise that deceleration is the normal optimum path of a sector, due to a variety of factors operating on it, from the side of both supply and demand. The problem of transition and hence of growth, therefore, becomes how to offset the tendency for deceleration in individual sectors in order to achieve growth in the total economy. On the supply side, Rostow introduces the concept of a sequence of leading sectors which succeed each other as the basic generators of growth. On the demand side, declining price and income elasticities of demand are introduced as technical factors dampening the growth rate of leading

²⁶Allan G.B. Fisher, Economic Progress and Social Security (London: MacMillan, 1945), p. 6; Allan G.B. Fisher, "Production, Primary, Secondary, and Tertiary", Economic Record 15 (March 1939): 33; and Colin Clark, The Conditions of Economic Progress (London: MacMillan, 1940), pp. 337-73.

²⁷Hayami, Agricultural Development, pp. 12-13.

²⁸W.W. Rostow, "The Take-Off Into Self-Sustained Growth," Economic Journal 66 (March 1956): 25-48; and The Stages of Economic Growth.

sectors and transferring them to sustaining or declining sectors. Technology plays an important role in both the emergence of new leading sectors and in the elimination of older sectors.²⁹

Rostow's system, like that of Marx, clearly specifies a dynamic role for the agricultural sector in the transition process. In an open economy the primary sector may act as the leading sector and carry the burden of accelerating growth. In addition, agriculture must provide food for a rapidly increasing population, provide a mass market for the products of the emerging industrial sectors and generate the capital investment and labor force for new leading sectors outside of agriculture.

Perkins and Witt,³⁰ Johnston and Mellor,³¹ and Hill and Mosher³² have also made use of a sequence of three stages in their respective attempts to analyze the process of agricultural development in the course of economic growth. Wharton, in a synthesis of those approaches, has suggested the characteristics that undergo major changes as an agricultural economy moves from stage I, static, through stage II, transitional, to Stage III, dynamic.³³ This delineation of three stages is more specific to agriculture. Stage II, which follows a period in which the preconditions which make change possible are fulfilled, is

²⁹ Ibid., p. 13.

³⁰ Maurice Perkins and Lawrence Witt, "Capital Formation: Past and Present," Journal of Farm Economics 43 (May 1961): 333-43.

³¹ Bruce F. Johnston and John W. Mellor, "The Role of Agriculture in Economic Development," American Economic Review 51 (September 1961): 566-93.

³² Forrest F. Hill and Arthur T. Mosher, "Organizing for Agricultural Development," Science, Technology and Development, Vol. 3, Agriculture (Washington: U.S. Government Printing Office, 1962), pp. 1-11.

³³ Clifton R. Wharton, Jr., "Research on Agricultural Development in Southeast Asia," Journal of Farm Economics 45 (December 1963): 1164-74.

characterized by expansion of agricultural output based on labor-intensive, capital-saving techniques, together with the normative proposition that there should be heavy reliance on technological innovations. Their Stage III, in which expansion of agricultural output is based on capital-intensive and labor-saving techniques, is related to a situation in which agriculture no longer bulks so large in the economy and the opportunity cost of labor has risen substantially.³⁴

In the context of growth stages theories Georgescu-Roegen discusses the significance of the certain stage of development in which the economy is operating. In an overpopulated agriculture when the geohistorical conditions of an economy are such that all available resources must be used in production as long as they increase output, the argument regarding the superiority of the large-scale production is poor economics. In overpopulated countries the fact that the marginal productivity of unskilled peasant labor is zero is fully consistent with the appropriateness of maximizing total net output with some workers earning more than their specific contribution to output. Such a feudal formula maximizes both material output and national welfare. Only after labor productivity curves have shifted upward sufficiently to equate the marginal productivity of the labor with its wage rate can capitalist development proper begin and the application of marginal principles become appropriate.³⁵

³⁴ John W. Mellor, "The Process of Agricultural Development in Low-Income Countries," Journal of Farm Economics 44 (August 1962): 700-12.

³⁵ Nicholas Georgescu-Roegen, "Economics Theory and Agrarian Economics," Oxford Economics Papers 12 (February 1960): 36-40. William H. Nicholls, "The Place of Agriculture in Economic Development," Agriculture in Economic Development, ed. K. Eicher and L.W. Witt (New York: McGraw-Hill, 1969): pp. 42-43.

Thus, it is a basic feature of overpopulated countries that enterprises, particularly agricultural ones, operated by feudal formula exist side by side with others managed according to marginal-productivity principles. The premature abandonment of the feudal formula in agriculture may not only reduce food production below its physical maximum, thereby undermining the meager food surplus needed to sustain industrial-urban development, but may destroy the basis for expanding that food surplus which is the initial principal source for financing capital formation. Moreover, a rural exodus into the cities, bringing irresistible social pressures to use labor beyond the margin: even in factory production; and by artificially forcing industrial wages upward toward the subsistence level, overprice labor relative to capital and encourage methods of industrial production which are unduly capital-intensive.

Dual Economy Theories

The western colonialism and the transfer of modern technology to establish nontraditional activities in less developed countries caused the appearance of two distinct traditional and modern sectors in their economies, i.e., dual economy.³⁶ The generality of the dualism for most developing countries was a good reason for economists, particularly those in the development field, to study the subject and try to find the theoretical explanation for such problem.

³⁶A distinctive form of dual economy is the plantation one whose roots go back to the seventeenth century and the expansion of colonial powers. The system based on production of one or a few particular crop in large scale operated initially by the foreigners. The development of plantation agriculture generated the high opportunity costs resulting from tying up of the most fertile land to specific plantation use. Furthermore, as the plantation crops were exported on terms of trade favourable to colonial powers, relatively few growth promoting linkages to the rest of the economy were created. In spite of some advantages of specialization in production of certain crops in terms of provision of foreign exchange, the diversification of these economies would be necessary for their ultimate development. Jay R. Mandle, The Plantation Economy (Philadelphia: Temple University Press, 1973).

The early studies of the dual economy emphasized only the lack of any relationship between the two sectors of the economy of developing countries. The Dutch economist, Boeke argued that there is a fundamental sociological difference between western and traditional societies.³⁷ While economic activity in the west and in the modern sectors in developing countries are based on economic needs, activities in traditional sectors are guided by social needs. Consequently the economic organizations and rationality of traditional society are different from those familiar in the western societies. The policy implication of such an argument is the futility of technological change in traditional activities including traditional agriculture. The introduction of new inputs and higher productivity causes an acceleration in the rate of population growth and a backward bending labour supply curve. This provides a rationalization for an industrialization policy which avoids investment in agriculture in favor of heavy industries and import substitutes.³⁸

Higgins questions the accuracy of Boeke's views of sociological differences as a base for the dual economy.³⁹ He suggests that the dual economy is a result of the creation of an enclave modern sector in the traditional economy. The new sector uses imported technology with a relatively high capital coefficient which is in contrast to the

³⁷Dutch Scholars, Indonesian Economics: The Concept of Dualism in Theory and Policy, Vol. 6 of Selected Studies Indonesia (The Hague: W. Van Hoeve Publishers Ltd., 1961), p. 170.

³⁸Hayami, Agricultural Development, p. 19.

³⁹Benjamin Higgins, "The Dualistic Theory of Underdeveloped Areas," Economic Development and Cultural Change 4 (1955-56): 99-115.

labor-intensive technology of the traditional sector. The level of activity in each sector is determined by different factors. While the traditional sector is affected by domestic variables, the modern sector responds only to the supply and demand of foreign markets and its growth has little impact on traditional activities.⁴⁰

The different characteristics of developed and developing economies resulted in two essentially unrelated growth theories for an advanced economy⁴¹ and for a backward economy.⁴² Neither of these theories were directly applicable to a dual economy which consists of two component parts, an advanced or modern sector and a backward or traditional sector. The attempts to find a theory for development of a dual economy led to the dynamic theory of dualism which tries to trace the increasing interaction between the two distinct sectors of an economy.

Lewis' well known article on "Economic Development with Unlimited Supplies of Labour" was a starting point in the dynamic aspects of growth in a dualistic economy.⁴³ He regards his model as a version of the classical growth theory which he believes it is the relevant theory for development of backward economies. He views Keynesian growth theory as

⁴⁰ Benjamin Higgins, Economic Development: Principles, Problems, and Policies (New York: Norton, 1968), pp. 17-20.

⁴¹ Harrod, "An Essay in Dynamic Theory," pp. 14-33; E.D. Domar, "Capital Expansion, Rate of Growth, and Employment," Econometrica 14 (April 1946): 137-47; J.S. Duesenberry, Business Cycles and Economic Growth (New York: McGraw Hill, 1958); A. Smithies, "Economic Fluctuations and Growth," Econometrica 25 (Jan. 1957): 1-52; Nicholas Kaldor, "A Model of Economic Growth," Economic Journal 671 (Dec. 1957): 591-624; and R.M. Solow, "Contribution of the Theory of Economy Growth," Quarterly Journal of Economics 70 (February 1956): 65-94.

⁴² W.A. Lewis, "Economic Development With Unlimited Supplies of Labour," Manchester School of Economics and Social Studies 22 (May 1954): 139-91; H. Libenstein, Economic Backwardness and Economic Growth (New York: John Wiley, 1975); P.N. Rosenstein-Rodan, "Problems of Industrialization of Eastern and South-Eastern Europe," Economic Journal 53 (June-September 1943): 202-211; and Ragnar Nurkse, Problems of Capital Formation in Underdeveloped Countries (New York: Oxford University Press, 1953).

⁴³ Lewis, "Economic Development With Unlimited Supplies of Labour."

a long and fascinating footnote to neoclassical growth theory and irrelevant to the problems of developing countries.⁴⁴

Lewis model has been elaborated by Fei and Ranis.⁴⁵ In their version of a dual economy, the traditional sector is characterized by disguised unemployment and underemployment; zero marginal productivity of labor; a positive institutionally determined wage rate which is equal to the average productivity of labour; and fixed land inputs.⁴⁶ Under these conditions Fei and Ranis argue that it is possible to transfer labor from the traditional sector to the commercial-industrial sector without reducing agricultural output and without increasing the supply price of labor to the industrial sector during the early stages of development. Agriculture in this system contributes both workers and surplus production in the form of a wage fund for the expansion of the industrial sector.

Absorption of disguised unemployment by the modern sector is a critical point of the Fei-Ranis model. Beyond that point the marginal productivity of labor in the traditional sector begins to rise above zero and transfer of one more worker reduces the output in the traditional sector. This results in a worsening of the terms of trade for the industrial sector which can only be offset by some combination of productivity growth and decline in the rate of population growth in

⁴⁴Jorgenson, "The Role of Agriculture in Economic Development," p. 321.

⁴⁵Gustav Ranis and J.C.H. Fei, "A Theory of Economic Development," American Economic Review 51 (Sept. 1961): 533-65; Development of the Labor Surplus Economy: Theory and Policy (Homewood, Ill.: Irwin, 1964); and "Agrarianism, Dualism, and Economic Development," Theory and Design of Economic Development, eds. Irma Adelman and Erik Thorbecke (Baltimore: The John Hopkins Press, 1966), p. 45-60.

⁴⁶Ranis and Fei, Development of the Labor Surplus Economy, pp. 15-16.

the commercial-industrial sector.⁴⁷

Positive marginal productivity in the traditional sector is a basis for Jorgenson to develop his dual economy theory in the neoclassical context. The first of two essential differences between the classical model and Jorgenson's neoclassical model is that the latter rejects the possibility of redundant agricultural labor. The second is that he assumes that it is the growth of an agricultural surplus that determines the rate of growth of nonfarm employment. As he suggests:

Disguised unemployment is neither necessary nor sufficient to generate a sustained rise in the share of saving. Ultimately a sustained increase in the saving share depends on a positive and growing agricultural surplus, and not on the presence or absence of disguised unemployment.⁴⁸

Fei and Ranis are also aware of the critical importance of agricultural productivity growth in the early economic development process. They insist any underdeveloped economy which attempts to force the pace of industrialization while disregarding the need for a priori, or at least simultaneous, revolution in its agricultural sector will find the going most difficult. They are aware of the fact that any criterion which concentrates only on the ability of the industrial sector to absorb labor is merely an index which implicitly summarizes the simultaneous capacity of the agricultural sector to release labor.⁴⁹

⁴⁷ Hayami, Agricultural Development, p. 21.

⁴⁸ Jorgenson, "The Role of Agriculture in Economic Development", p. 339.

⁴⁹ Fei and Ranis, Development at the Labor Surplus Economy, p. 121.

Both the Fei-Ranis and the Jorgenson dual economy models have the significance of confirming, in formal terms, the intuitive judgement that a shift in the domestic terms of trade toward agriculture signals a breakdown in the economic transformation leading to sustained growth and that this can only be offset by some combination of a more rapid rate of technological change in agriculture and/or dampening of the rate of population growth.

Microeconomic Perspective of Development

Dual economy models have contributed important insights into the development process. They have represented a significant advance over the completely aggregative post Keynesian one-sector, one-input models of the Harrod-Domar type.

Their generalization is grounded more analytically than the growth stages theories. In consequence, development theories are not confined any more to industrialization - first doctrines. But there is still a need for models with greater operational relevance for development policy. These models must provide formal interaction between the agricultural and nonagricultural sectors through agricultural products markets, the markets for the manufactured inputs used in agricultural production, labor markets, the land markets, capital markets, and consumer goods markets.⁵⁰ The new perspective of economic

⁵⁰Vernon W. Ruttan, Growth Stage Theories, Dual Economy Models and Agricultural Development Policy (Guelph; University of Guelph, Department of Agricultural Economics Publication, 1968), pp. 115, 19-20.

development processes goes beyond the dual economy and tries to find a solid basis for economic development with respect to microeconomic processes and behavior. The economic policies necessary to achieve economic development should be based on more effective resource allocation by households, firms, and public agencies among sectors and over time.

As Benjamin Higgins says:

...macroeconomic planning must be supplemented by intensive planning for individual sectors, regions, cities, industries, villages...with the closest attention to conditions actually prevailing in these microcosms of the economy and of the society... The challenge to the economist interested in development is to find ways of introducing into his analysis the knowledge we have regarding socio-cultural frameworks; and of individual behavior within those frameworks, gleaned by other kinds of social scientists in the course of their investigation.⁵¹

In the study of micro aspects of development the neoclassical model in the public domain might be regarded as a point to start. Although there are some objections to the elements of the neoclassical model, e.g., rationality and substitution, it might be used in the fashion that the simple Keynesian model was used for macroeconomics. More sophisticated models could then follow.

The Theory of Dependency

The failure of postwar development efforts in less developed countries have led to serious questions about the relevance of classical and neoclassical growth theories. In particular, the view of international trade, overseas investment, and transfer of technology as engine of growth is challenged by dependency theory which attempts to explain underdevelopment and poverty in developing countries in terms of their peripheral position in

⁵¹ Benjamin Higgins, "The Employment Problem in Development," Micro Aspects of Development, ed. Eleizer B. Ayal (New York: Praeger Publishers, 1973), p. 247.

relation to the dominant developed countries.⁵¹⁻¹ According to this theory the current economic relations between the less developed countries and industrial countries is a continuum from colonial days until the present. These countries have been exploited through mercantilist policies and unfavourable terms of trade which have tended to concentrate global wealth in developed countries. The political independence of former colonies is regarded as neo-colonialism reflecting continuation of their economic dependency. The analysis goes further and attributes the existing poverty of rural areas in developing countries to the internal dependency which reflects the transfers of rural surpluses and resources to the urban sectors. The urban sectors are, in turn, dominated by multinational corporations and foreign interests based in industrial countries. The extreme version of the dependency theory is a global exploitation model in which the industrialized countries collaborate with domestic elite in less developed countries to perpetuate under-development and poverty of the masses and peasants in the latter group. In Frank's words:

The contemporary underdeveloped institutions of the so-called backward or feudal domestic areas of an underdeveloped country are no less the product of the single historical process of capitalist development than are...the supposedly more progressive areas.⁵¹⁻²

⁵¹⁻¹ Among the writers of the approach are Andre Gunder Frank, Samir Amin, Osvaldo Sunkel, and Andres Bianche. Girvan, Norman ed., "Dependence and underdevelopment in the New World," Social and Economic Studies, Special issue 32 (March 1973); Cockcroft, James D., ed., Dependence and Underdevelopment: Latin America's Political Economy (New York: Anchor Books, 1972); and Frank Andre Gunder, Capitalism and underdevelopment in Latin America (New York: Monthly Review Press, 1969). For a review of dependency and other growth theories, see Towards a Unified Approach to Development Theory (Ottawa: University of Ottawa, 1977).

⁵¹⁻² Cockcroft, Dependence and Underdevelopment, p. 5.

The principle symptoms of a dependent economy can be summarised as: (i) a lagging agriculture causing increased reliance on food imports, (ii) a high concentration of export earnings in a few commodities making the economy highly vulnerable to external pressures, and (iii) a lopsided pattern of economic growth and polarisation of social classes. The dependence is contrasted with a policy for balanced national development that might avoid the alternative of violent revolution. Such a national development policy implies: (i) the integration of the economy through industrial diversification and greater domestic food production, (ii) agricultural development and income redistribution in favour of the rural population, (iii) more effective regulation of the activities of multinational corporations, and (iv) the development of national education and human resources.⁵¹⁻³

The Unified Approach and the Basic Needs Approach to Development

The dissatisfaction with the state of development theory and its inapplicability to the solution of actual development problems⁵² has given rise to two interrelated approaches to development as an alternative

⁵¹⁻³ Osvaldo Sunkel, "National Development Policy and External Dependence in Latin America," Journal of Development Studies 6 (October 1969): 31-33.

⁵² Manning Nash, ed., Essays on Economic Development and Cultural Change in Honour of Bert F. Hoselitz (Chicago: University of Chicago Press, 1977).

to revolution, namely the unified approach and the basic needs approach. The two approaches are the subject of a recent research project by the University of Ottawa.

In the research proposal the research group of the University of Ottawa present a review of development theories and their operational failure, obstacles to development, the economics of underdevelopment, international flows, and the present state of development theory.⁵³ The group suggest that:

it is time for social scientists interested in development to go back, not to the 'drawing-board,' which implies only the application of well established principles in a new design, but to the laboratory. For us, the 'laboratory' consists of communities in retarded regions of developing countries, and laboratory research requires the physical presence of the scientists.⁵⁴

The unified approach to development recognizes the development process as a feedback mechanism and insists on planning simultaneously for all interrelated aspects of development, nutrition, health, education, etc.⁵⁵ The approach requires a development policy which involves all sections of the population, all parts of the country, and all sectors of social activity in the course of development.

The basic needs approach is mainly concerned with the basic needs of the bottom 40%, 60%, or 80% of the population who are really poor. The approach rejects the reliance of the models mostly on capital

⁵³University of Ottawa, Towards a Unified Approach to Development Theory (Ottawa: University of Ottawa, 1977).

⁵⁴Ibid., p. 259.

⁵⁵Ibid., p. 230.

⁵⁶Ibid., p. 230.

accumulation and growth of national income, in the current definition, to solve the problems of the poor majority of people in developing countries. Instead of relying only on the growth of modern industrial and services sectors and the decline in the share of agriculture in total employment, the development efforts should raise productivity and levels of welfare, and improve the quality of life of poor people where they are and what they are doing now.

The two approaches emphasize the building of a human society rather than a policy towards an unlikely rich and fast-growing industrial society with many negative aspects even if it is achieved.

The course of economic development in Iran and particularly the need to reconsider the present economic policies towards the agricultural sector is best explained by the unified approach to development. In spite of a seemingly high rate of economic growth, the negative effects of past economic policies have already appeared and the attempts to solve the problems have failed in most cases. In a broad view there are now serious tensions over natural resources and the future of the economy, income distribution, traditional values, economic efficiency and basic human needs, bureaucracy, and institutionalizing the suppression of dissent.⁵⁷ It is interesting that many of these economic and social costs are being reflected in national income accounts and represent consequently a higher rate of growth without any contribution

⁵⁷ Jane W. Jacqz, Iran: Past, Present, and Future (New York: Aspen Institute for Humanistic Studies, 1976), pp. 4-5.

to economic welfare. These aspects are the subject of study in Chapter III and VI which deal with the course of economic development in Iran and the significance of the agricultural sector to the future of the economy.

On the ground of comparative advantage and many other simplified economic models which represent an imaginary economy created by economists, it might be argued that the agricultural development for a country which is not so rich in agricultural potential is not advisable for achieving a high rate of economic growth.⁵⁷⁻¹ Although, as will be considered, the objection is questionable, the national objective is not growth by itself, even if it is achieved; the objective is meeting the needs of people who have the right to benefit from the growth and many other qualitative aspects of the development which finally secure a sustained rate of economic growth in the long run. Surprisingly in the introductions of all these models we are reminded that they do not represent the real world and they do not take into account all relevant variables, but at the end the introductions are forgotten and the results are decisive and even universal. The imaginary economy becomes the real economy and the solutions for its problems become the solutions for the problems of a vast group of real economies at any time.

The difficulty of coping with variables of the real economy does not imply that these must be disregarded with consequent irrelevant advice on policies with high social and economic costs of implementation.

⁵⁷⁻¹ An example of this type of analysis is the postwar planning in the less developed countries. The planners used mostly a simple version of Harrod-Domar growth model based only on the availability of capital or the input-output tables with fixed coefficients. They disregarded the existing political and social institutions for implementation of the plans. Further, all social needs and reforms were postponed for the sake of industrialization and urban development. For it was assumed that the social needs would be automatically met when the gross domestic product increased sufficiently. The experience of the past shows the falsity of this assertion. O. Mehmet, "Economic Planning and Social Justice in Developing Countries," mimeograph, under printing, 1978 and Michael Lipton Why Poor People Stay Poor: Urban bias in World Development (Cambridge: Harvard University Press 1977).

And let us reiterate: we are not talking of a branch of human knowledge which has an interest only for an esoteric few. We are talking about the scientific basis for national and international policies that will shape the destinies of all mankind over the next generation or two.⁵⁸

In the present study, the endeavour has been that of building a macroeconomic model to justify quantitatively the recommended policies of agricultural development. It is by no means representative of Iran's total economy. In consequence, solutions of the model may be evaluated only in the light of other factors of a qualitative nature and not capable of quantification, but which at the same time may not be ignored.

Historical Perspective of the Role of Agriculture in Economic Development

Western Europe

In Western Europe perhaps too much attention has normally been given to the brief time spans of some 20-40 years during which many of these countries initiated a spectacular acceleration of their economic growth.⁵⁹ The revolutionary character of these take-off periods, which began at various dates during 1780-1850 makes it easy to overlook the

⁵⁸University of Ottawa, Towards a Unified Approach, p. 258.

⁵⁹Nicholls, "The Place of Agriculture," pp. 18-21.

long periods of evolutionary development which had preceded then. There were many contributing factors. First, capital accumulated from the slave trade⁶⁰ and colonial trade provided the financial requirements.⁶¹ Second, agricultural conditions at the outset of the Industrial Revolution were certainly favorable for the launching of economic development. Western Europe had by then enjoyed a long period of agricultural improvement and experimental farming had introduced high yielding new crops, e.g., the turnip and potato, which had substantially raised yields of traditional staple crops, e.g., wheat, and had greatly improved the efficiency of livestock production. Furthermore, this rising agricultural productivity was initially far from offset by population increase, since the population explosion in Western Europe came after.

New Countries

Considering the agricultural base, new countries such as the United States, Canada, and Australia were most favorably situated.⁶² First there were more than enough usable resources, so that labor was always at a premium and population pressure was unknown. Second, immigrants and capital went out to the new lands together. Third, the new lands had the potential for export prospects and that encouraged capital inflows. Fourth, they freed themselves of the colonial restraints earlier than presently developing countries. Combinations

⁶⁰Dunman, Agriculture: Capitalist and Socialist, p. 31.

⁶¹Ibid., p. 41.

⁶²Enke, Economics for Development, pp. 430-34.

of these factors made it possible for these countries to expand their agricultural sector characterized by high capital-labor ratios and optimum size for farming units. Under such favorable conditions the agriculture exports became the main basis for their development process and the economic development was established with a minimum of time and effort.

The course of development in these new countries is very different from that proceeding today in most developing countries. Economic development with cultural change and without abundant natural resources relative to population pressures is much more difficult and far less certain⁶³ than the case of new countries. The consequence was the growth of towns, market improvements in transportation, increasing displacement of feudal agriculture by farming for profits, and the creation of a free rural labor class the surplus of which was now available for alternative non-farm employment.

Soviet Union and Eastern Europe

The first real test of the viability of development under less favorable conditions of time and place was provided by Eastern Europe and primarily by Russia. Russia, unlike the new countries, did not have known extensive natural resources and cultivable unpopulated areas and unlike most of the Western European countries did not enjoy colonial trade.⁶⁴

⁶³ Nicholls, "The Place of Agriculture," p. 434.

⁶⁴ For a treatment of the Soviet Union development model, see Nicolas Spulber, Soviet Strategy for Economic Growth (Bloomington: Indiana University Press, n.d.); Jerzy F. Karcz, "From Stalin to Brezhnev: Soviet Agricultural Policy in Historical Perspective," The Soviet Rural Community, ed. James R. Miller (Urbana: University of Illinois Press, 1971), pp. 36-70; Angus Madison, Economic Growth in Japan and the USSR (New York: W.W. North & Company Inc., 1969), pp. 83-137.

The agrarian reforms of the 1860's marked a fundamental turning point in Russia. However the end of serfdom did not free most Russian peasants from the necessity of remaining in agriculture, because they were still bound to the land by their collective obligations for the land-redemption payments required by the agrarian farmers. On the other hand, this land-redemption requirement plus an increasingly heavy tax burden forced peasants to raise more crops for sale, thereby facilitating the growth of grain exports to Western Europe by which Russia maintained a favorable balance of trade and serviced its capital imports. At the same time, the land-redemption bonds issued by the government provided an important source of capital for the development of trade, industry, and transport.

Continuous exploitation of agriculture caused the discontent and resentment by Russian peasants who were the major factor in the overthrow of the Russian Czar regime.⁶⁵ The Soviet regime abolished land ownership by estate owners and chose the collectivization of agriculture to provide food for the nation. By 1936, the policy of collectivization had been implemented. The cost of this transformation was very high, but any judgement must distinguish carefully between the methods utilized in the collectivization process, and the utilization of a cooperative form of production organization.⁶⁶

The Soviet Union was the classic case of industrial and commercial development depending on agriculture for almost the whole of its required capital. The country had to be industrialised and it was

⁶⁵Nicholls, "The Place of Agriculture," p. 21.

⁶⁶Robert C. Stuart, The Collective Farm in Soviet Agriculture (London: Heath and Company, 1972), pp. 3-5; and Madison, Economic Growth, p. 101.

obvious that in that circumstance the important source of accumulation was agriculture. Collectivization did permit the Soviet government to extract compulsory food collections, to use farm machinery and modern techniques, to save millions of workers in agriculture for other activities, and to finance a high rate of capital formation.⁶⁷ The strain was unmitigated and severe.

With the end of the Stalin era, Soviet leadership was forced to admit some sad aspects of its agriculture. In 1953, Khrushchev noted that during 1940-52 agricultural output had increased only 10 percent while industrial production had more than doubled. In the same period the Russian population had increased much more rapidly than grain production.⁶⁸ As a result of changes in policies towards agriculture, farm output boomed from 1953 to 1958.⁶⁹ In recent years agricultural production is a major determinant of the Soviet's development plans. The significance of agriculture in the course of development in the USSR has been confirmed in several studies.⁷⁰

The situation of the European countries which took the socialist road after 1945, except for Czechoslovakia and the German Democratic Republic were dominated by small-scale peasant farming. The industrial base in these countries was relatively small. However, unlike Russia after 1917, they were not alone; they could count on the support of the Soviet Union whose socialist experience they used. Nevertheless

⁶⁷ Nicholls, "The Place of Agriculture," p. 23.

⁶⁸ Ibid., p. 24.

⁶⁹

Madison, Economic Growth, p. 114.

⁷⁰ Ibid., p. xvii.

these countries had to build on the whole with their own resources and the construct was based primarily on agriculture.⁷¹

Japan

Development of Japan was achieved under very similar conditions to those of present developing countries, overpopulated and with limited agricultural land and lacking many resources.⁷² Its course of development could be used, in many respects, for those countries which plan to develop their economies in the framework of the capitalist system.

Johnston⁴ has estimated that during the thirty years between 1881-90 and 1911-20, Japan increased its agricultural output by 77%, with the area under cultivation increasing by only 21%, as compared with increased yields per acre of 46%. During the same period, population increased much less, 44%, while the agricultural labor force fell by about 14%. These figures show that the output per farm worker during that period has increased by 106%.⁷³ Considering the fact that Japan launched its economic development with severe overpopulation, i.e., with the average farm unit consisting of only 2-3 acres of highly fragmented land, the significance of its achievements is outstanding.

Johnston attributes this doubling of labour productivity in Japanese agriculture primarily to the expanded use of commercial fertilizers and the selective breeding, propagation, and distribution

⁷¹Dunman, Agriculture, p. 127.

⁷²For a detailed study see K. Ohkwa and H. Rosovsky; "The Role of Agriculture in Modern Japanese Economic Development, Agriculture in Economic Development, eds. C.K. Eicher and L.W. Witt (New York: McGraw Hill, 1964): 45-69.

⁷³Bruce F. Johnston, "Agricultural Productivity and Economic Development in Japan," Journal of Political Economy, 59 (December 1951): 499-500; and Maddison, Economic Growth, pp. 77-79.

of rice strains which would respond most favorably to heavy applications of fertilizers. Other factors contributing to the sharp increase in crop yields were improved methods of irrigation and pest control and of cultivating, transplanting, and weeding the growing plants.⁷⁴

The increase in agricultural output was obtained with a minimum of social dislocation, since it was accomplished by largely land-saving methods which were applied effectively on existing small farms with a super-abundance of labor, with a minimum of mechanization, and with an appreciation of the vital importance of knowledge. Considerable government investment in the social overhead of agricultural research and extension services was the major factor in the use of Western knowledge adapted to the particular conditions of Japan.⁷⁵

Although the growth of agricultural production in terms of output and productivity was accompanied with a rise in the level of living and wages for farmers,⁷⁶ they were not the only beneficiary of the nation's economic development. Heavy land taxes and higher rents made possible capital formation for industrial expansion. This was directed mostly towards the small-scale industry in the rural areas. The additional contributions of agriculture to the development of Japan were the provision of labor, the decrease of agricultural imports, and the supply of food-stuffs to the growing population. The Japanese experience clearly offsets the commonly held view that not much can be

⁷⁴Johnston, "Agricultural Productivity," pp. 500-501.

⁷⁵Ibid., pp. 512-513.

⁷⁶K. Ohkawa and R. Minami, "The Phase of Unlimited Supplies of Labor," Hitotsubashi Journal of Economics 5 (June 1964): 1-15.

done to increase agricultural productivity without vast and fast institutional changes in the countryside. As Lewis says:

The experience of Japan shows that appropriate expenditure by government (on agricultural research, extension, credit, and roads) can have spectacular effects on the output of peasants, and that agriculture...can be turned into a leader, generating demand for other sectors, and also providing them with capital. But most other governments in this situation have neglected peasant agriculture, with the result that its failure to expand has kept down the rate of growth in other sectors.⁷⁷

China and India

Comparative studies of Chinese and Indian economic development indicate that under almost similar economic conditions for the two countries, China has better relative performance on all fronts.⁷⁸ Malenbaum estimates a higher rate of growth for agricultural output in China than in India during 1950-57. While the relative allocation of gross investment to industry has been substantially greater in China than in India and conversely to the tertiary industries such as transport, education, health, etc., China still allocated more to agriculture than did India. Observing that agriculture has frequently turned out to be a sector where relatively large returns follow from a unit of new capital, at least where yields per acre are very low

⁷⁷W. Arthur Lewis, Theory of Economic Growth (London: Geo. Allen and Unwin, 1955), p. 279.

⁷⁸Wilfred Malenbaum, "India and China: Contrasts in Development Performance" American Economic Review 49 (June 1959): 284-309; Kang Chao, Agricultural Production in Communist China: 1949-1965 (Madison: University Wisconsin Press, 1970); Colin Clark, "Economic Growth in Communist China," China Quarterly (January-March 1965); "A Comparative Appraisal", Economic Development and Cultural Change 21 (July 1973): 320-32; James Tobin, "The Economy of China - A Tourist's View," Current Scene (May 1974): 1-12; and Colin Clark, "Economic Development in Communist China," Journal of Political Economy 84 (April 1976): 239-264.

initially, Malenbaum adds that the scope for improvement in agriculture remains large.⁷⁹

It seems clear that India has not yet fulfilled the most fundamental precondition for its economic development,⁸⁰ i.e., the achievement and maintenance of an adequate and reliable food surplus or, at the very least, the reduction of its food deficit to a magnitude which expanding manufactures for export might realistically be expected to cover in the near term. Hence the emphasis on industrialization was premature and the results were the relative stagnation in agriculture and the failure of development plans.⁸¹

On the other hand, Malenbaum attributes China's superior performance to many factors. The government has achieved a far greater standardization of product because of the limited scope of private enterprise and an almost complete power of product allocation and rationing. Extensive use was been made, especially in construction, of a considerable volume of labor, on a largely involuntary basis. Greater control has been exercised over savings derived from heavier taxation of agriculture, which supplies at least 60 percent of total taxes as compared with only 20 percent in India. More projects have been carried out to mobilize underutilized resources in order to expand both agricultural and industrial production. China has found means of siphoning out of the

⁷⁹ Malenbaum, "India and China," pp. 293-95.

⁸⁰ Nicholls, "The Place of Agriculture," p. 39.

⁸¹ Malenbaum, "India and China," pp. 298-303; and Aloys Heuberger, Economic Growth and the Role of Agriculture in the Developing Countries, -With Special Reference to India (Frankfurt: Herbert Lang, 1974), pp. 168-74.

rural areas nonmonetized savings in kind which can be monetized or otherwise used to finance capital formation. Industrial expansion in China was based on modern small scale industries which discourage overurbanization.

The overall course of development in China has paid great attention to the potential of the agricultural sector.

Generalization of Historical Review

An historical review of the path of development of today's developed or developing countries shows that under general conditions agricultural progress is normally a prerequisite for industrial development either in capitalist or socialist regimes. This is clearly the case in a closed economy, where one of the most important pre-conditions of industrial expansion is the achievement of a rate of increase in agricultural productivity and output. Rising agricultural productivity supports and sustains industrial development by releasing part of its labor force for industrial employment; by meeting the increasing food needs of the non-agricultural sector; by raising agricultural incomes and thereby creating the rural markets for new industrial goods and rural savings for capital formation to expand the industrial sector; and finally by the supply of the major wage-good (food) of industrial workers at prices favorable to the profitability of new industries.⁸²

⁸²Lewis, Theory of Economic Growth, p. 334.

For an open economy, it seems the rising of agricultural productivity is not as crucial as in the case of the closed economy. For then the given nation may find it more economical to import some of its food needs and in exchange export non-food products for food. Even here, however, rising productivity in the food sector may save scarce foreign exchange needed for financing her development projects. The expansion of the agricultural sector contributes to the integration of the dualistic agricultural economy, the existence of which has so often restricted the rate and spread of economic progress. The integration is achieved through expansion of markets in industrial and agricultural sector. Finally, if agricultural productivity is or becomes sufficiently high, the nation may enjoy a food surplus of such magnitude as to permit its export.

Historical review, particularly the experience of socialist countries, reveals that the operation and the course of development in agriculture is far more complicated than industrial expansion. A rapid restructuring of a small-scale peasant agriculture into large-scale, mechanized farming units is likely to create a surplus labor force not easily absorbed into nonagricultural employment. The final effects may be an increase in unwanted leisure and an actual decrease of the national product.⁸³ The experience of capitalist countries shows that, as a precondition for agricultural development, there is a need for land reform defined in a broad sense as a means for solving integrated problems of landownership, financial needs, marketing institutions, technical aids, education, etc. Large-scale farms neither necessary nor sufficient for maximization of output. The performance of small farmers in Iran, as will be seen in Chapter IV, is an evidence for this assertion.

⁸³Nicholls, "The Place of Agriculture," p. 25.

World Food Situation

During the nineteenth century, agricultural products and raw materials were exported from new countries in America and Australia or from colonies in Asia and Africa to the developed countries. At the same time, manufactured products were exported from these developed economies to the less developed ones. In fact comparative advantage theory was the relevant theory in international trade.⁸⁴ After World War I, as a result of policies followed by developed and developing countries the previous system broke down gradually.⁸⁵ By the end of World War II, the result of these policies was a disequilibrium in international trade. The developing countries, the former food exporters, became net importers of agricultural products and they did not succeed in developing their industrial exports. At present, in spite of the existence of a continuous deficit in the balance of payments in developing countries, certain policies, by developed and developing countries, in form of price distortions in product and factor markets are followed.

In the United States, Western European countries, and Japan, on one hand, the governments protect domestic agriculture through price supports, deficiency payments, import duties, multiple exchange rates, and export subsidies. In developing countries, on the other hand,

⁸⁴ Hayami, Agricultural Development, pp. 241-43.

⁸⁵ Harry G. Johnson, Economics Policies Toward Less Developed Countries (Washington: The Brookings Institution, 1967), pp. 48-52 and Alex F. McCalla, "Protectionism in International Agriculture Trade, 1850-1968," Agricultural History 43 (July 1969): 329-43.

agriculture is used to finance the cost of industrialization through stabilization of agricultural prices at low levels and taxation of agricultural exports in order to keep food prices low for the population in urban areas and to protect less efficient domestic industries.⁸⁶ The final result is overvaluation of agricultural products in developed countries and their underevaluation in developing countries. Surplus food-stuffs from developed countries are dumped into the developing countries and the existing disequilibrium is being aggravated rather than adjusted along a dynamic equilibrium path. To illustrate, the projected shortfall in cereal grains in Asia, Latin America, and Africa is estimated to be 11% in 1985, compared with 8% in 1970. It would cost at least 15 billion dollars, assuming a price of 150 dollars per metric ton, for developing countries to buy that much grain.⁸⁷ This indicates the impact of the prospect of further imbalance in the world food situation.

Earlier Food Crises

The 1789 writings of Malthus were the earliest systematic attention to the food scarcity.⁸⁸ Reasoning from a basic demographic truism, Malthus determined that man's potential reproductive ability implied an exponential population growth curve over any significant length of time; he also suggested that food supplies for a region

⁸⁶Theodore W. Schultz, Economic Growth and Agriculture (New York: McGraw Hill, 1968), pp. 17-41.

⁸⁷Joseph W. Willett, ed., The World Food Situation: Problems and Prospects to 1985, 2 vols. (New York: Oceana Publications, 1976), 2:595.

⁸⁸T.R. Malthus, An Essay on the Principle of Population (London: Reeves and Turner, 1888).

would grow no more vigorously than by an arithmetic progression. This belief stemmed from observation of a bounded total quantity of cultivatable land and diminishing returns with a fixed land input. His conclusion that food supply potential is no match for population potential follows immediately.⁸⁹ Some facets of Malthus' thesis have withstood the test of human experience remarkably well; others have been found lacking.

The thesis seems consistent with circumstances presently existing in countries with low incomes and poor diets. On the contrary the experience of developed countries provides evidence for challenging certain of Malthus' conclusions. In developed countries the average diets have been increasing in the past and it is fully adequate by any nutritional standard. However, in some periods, the stagnancy of agricultural development aggravated by bad weather has indicated the likely realization of Malthus' thesis. The scarcity of wheat in England and other European countries at the end of the nineteenth century and the agricultural concerns in the early 1920's in the United States are two examples of the past food crises.⁹⁰ In very elaborate works some economists have even argued that the fluctuation of weather conditions and the consequent effects on agricultural production are the major factors of economic cycles.⁹¹

⁸⁹M.K. Bennett, "Population and Food Supply: The Current Scarce," Scientific Monthly 68 (Jan. 1949): 17-26.

⁹⁰Sir William Crookes, The Wheat Problem (New York: G.P. Putnam's Sons, 1900), p. 6; Joseph S. Davis, On Agricultural Policy, 1926-1938 (Stanford, California: Stanford University Press, 1939), pp. 4-5; and L.C. Gray et al., "The Utilization of Our Lands for Crops, Pasture, and Forests," Agriculture Yearbook, 1923 (Washington, D.C.: U.S. Government Printing Office, 1924), pp. 433-442.

⁹¹W. Stanley Jevons and Henry Ludwell Moore, in Higgins, Economic Development, pp. 545-550.

Post War Food Crisis

In the post World War II period the population-food imbalance again drew the attention.⁹² The main factors of this new interest were the devastation brought about by the war, the growing impact of the Food and Agriculture Organization of the United Nations, environmental concern over the conservation of natural resources, and the effects of lifesaving techniques on death rates in the underdeveloped countries.⁹³ The last factor has contributed largely the current concerns over world food supplies. Before World War II the probable world population was projected at about 3.3 billion in the year 2000. Data available at the present indicate that the world population passed 3.3 billion in the late 1960's and world population is estimated between 5.3 to 7 billion in 2000.

During the 1950's and early 1960's the performance of world agriculture became poor in relation to the growth in the aggregate demand and in terms of the growing imbalance in the rates of growth of production and among countries. Total production of food on a world wide basis increased at a rate of 3.1% per year in 1952-62. This compares to the rate of growth in the world population of 2% (Table 2-1). Thus during the period when concern with the world food problem was becoming more intense, per capita food consumption increased.⁹⁴

⁹²M.K. Bennett, "Population and Food Supply," p. 14.

⁹³Leroy L. Blakeslee et al., World Food Production, Demand, and Trade (Ames, Iowa: Iowa State University Press, 1973), pp. 8-9.

⁹⁴Hayami, Agricultural Development, p. 286 and John H. Sanders and Richard C. Hogt, "The World Food Problem: Four Recent Empirical Studies," American Journal of Agricultural Economics, 52 (February 1970): 132-35.

TABLE 2-1

Growth Rate of Food Production in Relation to Population in World and
Main Regions (FAO Data), 1952-62 and 1962-72
(Percent per Year)^a

Type of Economy	1952-62			1962-72		
	Population	Food Production Total	Food Production Per Capita	Population	Food Production Total	Food Production Per Capita
Developed Market Economies ^b	1.2	2.5	1.3	1.0	2.4	1.4
Western Europe	.8	2.9	2.1	.8	2.2	1.4
North America	1.8	1.9	.1	1.2	2.4	1.2
Oceania	2.2	3.1	.9	2.0	2.7	.7
Eastern Europe and USSR	1.5	4.5	3.0	1.0	3.5	2.5
Total Developed Countries	1.3	3.1	1.8	1.0	2.7	1.7
Developing Market Economies ^b	2.4	3.1	.7	2.5	2.7	.2
Africa	2.2	2.2	---	2.5	2.7	.2
Far East	2.3	3.1	.8	2.5	2.7	.2
Latin America	2.8	3.2	.4	2.9	3.1	.2
Near East	2.6	3.4	.8	2.8	3.0	.2
Asian Centrally Planned Economies	1.8	3.2	1.4	1.9	2.6	.7
Total Developing Countries	2.4	3.1	.7	2.4	2.7	.3
World	2.0	3.1	1.1	1.9	2.7	.8

Source: World Food Conference, United Nations, Assessment of the World Food Situation, Present and Future, E/CONF. 65/3, 1974, Table 4.

a Trend rate of growth of food production, compound interest.
b including countries in other regions not specified.

During the same period per capita food consumption in developing countries increased by 0.7% in comparison with the 1.8% in the developed countries (Table 2-1).

The mounting concern with the food situation was based primarily on two factors. In aggregate, the rate of growth of food production remained relatively constant while the rate of growth in demand, from population and income growth, was rising. Furthermore the growth in demand was expanding most rapidly in the less developed countries,⁹⁵ while the growth of production was expanding most rapidly in the developed countries.

At a more sophisticated level than the simple food-population balance there was concern that growth in the agricultural sector was occurring on a resource-based, not on a science-based agriculture. Therefore the growth was not sufficient to generate the larger income streams necessary to support advances in the housing, education, health, and the other dimensions of economic development. The efforts to modernize agriculture in the poor countries were frustrated. When farmers in these countries attempted to use new varieties of seeds, e.g., corn developed in Iowa, they often failed to produce any corn at all.

⁹⁵Lester R. Brown, "World Population, Food Needs, and Production Problems," paper presented at the annual convention of the American Society of Agronomy in Kansas City, No. 1 November 17, 1964, p. 4.

Green Revolution

By the late 1960's a new perspective emerged on the prospects for agricultural development in the poor countries. This perspective was the direct result of extending the impact of advances in biological technology from the temperate zone countries to the tropics and subtropics in Latin America, Asia, and Africa through adaptive research and development. This revolution had, by the late 1960's, extended to the major cereal crops, wheat, rice, and, to a lesser extent maize. Its measurable impact on national average yields and total output was limited to a few countries, primarily Mexico, the Philippines, India, Pakistans, and Turkey. Nevertheless, the impact was sufficiently great to largely reverse the former pessimism about the prospect of agricultural products and the potential contribution of the agricultural sector to national economic growth.⁹⁶ Grain crops in India and Pakistan were excellent in both 1967 and 1968, and world grain production in 1967 exceeded the 1965 level by 12 percent.⁹⁷ Large grain exporters had to decrease the land devoted to wheat production from 45.1 million hectares in 1968 to 29.4 million hectares in 1970.⁹⁸

Many of the analysts who had seen only the prospect of continued stagnation in world agriculture began to herald the green revolution. They swung from a fear of scarcity toward concern with abundance.

⁹⁶Lawrence Howes, Rural Development: World Frontiers (Ames, Iowa: The Iowa State University Press, 1974), pp. 22-32.

⁹⁷Economic Research Service, World Agricultural Situation, November 1971, p.8.

⁹⁸U.S. Department of Agriculture, Agricultural Statistics, 1972, p. 5-6.

In 1968, in the midst of this rapidly changing situation, Lester Brown made a remarkable statement which was totally different from his earlier pessimism in 1964 that suggested that the less developed world is no longer able to provide enough food for large numbers of people being added each year.⁹⁹

Too much is at stake, too much has been invested, the expectation of too many people have been aroused. The agricultural revolution in Asia should not, therefore be viewed as an event but as the beginning of a process... the eventual modernization of Asia.¹⁰⁰

Later studies and recent food crisis in 1973 and 1974 showed the earlier optimism was very exaggerated. There is little evidence that the momentum of productivity increases of the late sixties will be maintained.¹⁰¹

Food Crisis of 1973 and 1974

The food crisis of 1973 and 1974 proved that the opportunities for agricultural development which seemed apparent were not easily secured.¹⁰² By the early 1970's, the increasing worldwide demand for food and the shrinking food reserves were approaching the balance point. Only one poor crop season was needed to bring on worldwide food shortages, and that came in 1972.

⁹⁹ Lawrence Howes, Rural Development: World Frontiers (Ames, Iowa: The Iowa State University Press, 1974), p. 5.

¹⁰⁰ Lester R. Brown, "A New Era in World Agriculture," paper presented at the Symposium on World Population and Food Supply, Kansas State University, Manhattan, Kans., December 3, 1968, p. 14.

¹⁰¹ Ingrid Palmer, The New Rice in Asia: Conclusions from Four Country Studies (Geneva: United Nations Research Institute for Social Development, 1976), p. 132.

¹⁰² Willett, The World Food Situation, 2:634.

The drought experience of 1972 and 1973 and food shortages of 1973 and 1974 demonstrated one important point, i.e., worldwide economic interdependencies. Poor 1972 harvests in such diverse areas as India, Australia, Africa and the USSR were reflected immediately throughout the rest of the world. It showed that the seriousness or magnitude of the world food problem should not be underestimated.

In India, the Green Revolution in the form of the dwarf wheat and miracle rice arrived at the moment of her need in 1966. This made it possible for India to reach, and surpass the 100 million ton mark in a few year-to-year leaps. In 1971, the output hit a record of 108 million tons, giving her a modest surplus of 2 million tons. In 1972 and 1973 the output fell back. In 1973, it amounted to barely 100 million tons against the Forth Plan target of 115 million tons.¹⁰³

Close to a decade has now passed since the launching of the Green Revolution, but success stories in family planning programmes in the poor nations are few. The futility of relying on the new agricultural technologies is evident in Mexico. Fifteen years of dramatic advances in wheat production made Mexico a net exporter of cereals in the late sixties, but a population growth rate among the highest in the world has again converted Mexico into an importer of food.

¹⁰³Sudhir Sen, Reaping the Green Revolution: Food and Jobs for All (New York: Orbis Books and Maryknoll, 1964), pp. 5-6.

The ratio of world reserves to the annual grain consumption has declined to only 8% in 1974 which is the lowest level in 1961-74 period.¹⁰⁴

As Borlang suggests the Green Revolution offers at most the possibility of buying twenty to thirty years of time, representing only a few seconds on the clock of human occupancy of the earth, in which to bring population growth into balance with food production and the total resources for human life. After the year 2000 world population will approach its ceiling. A new doubling will likely represent the definite maximum of the number who can expect to have a human life on this planet.¹⁰⁵

The latest estimates by United Nations show a further disequilibrium between demand and supply on a regional basis, particularly between developed and less developed countries in 1985.¹⁰⁶

Development of Agricultural Sector

The place of agriculture in economic development, the historical role of agriculture in presently developed countries, and the world food situation demonstrate that agricultural growth is critical, if not

¹⁰⁴Lester Brown, "World Population and Food Supplies," Agricultural Initiative in the Third World (London: D.C. Heath and Company, 1975), p. 172.

¹⁰⁵Norman E. Borlang and Oddvar H. Aresvick, "The Green Revolution: An Approach to Agricultural Development and Some of Its Economic Implications," International Journal of Agrarian Affairs 5 (March 1973): 401.

¹⁰⁶Willett, The World Food Situation, 2:1049.

necessary, for industrialization and general economic growth. The process of agricultural growth is in itself of significance for development economics and associated policies. Although in most development theories both technical change and institutional evolution in agriculture, required for sustained rate of growth in the agricultural sector, have not been treated endogenously,¹⁰⁷ there are some recent attempts to analyse the set of interactions among resource endowments and economic entities, farmers and public institutions, leading to technical change and productivity growth in agriculture.¹⁰⁸

It has been accepted that even the traditional agriculture is not essentially static. The annual growth of agricultural output in the range of 1% was feasible in preindustrial societies. But the question of agricultural development is not only modernizing agriculture within the limit of this rate of growth. The main purpose is to design an agricultural development strategy for achieving a higher rate of growth for agricultural output and productivity consistent with other sectors.¹⁰⁹

Limited Potential Approach

The classical school of economic attributes a dominating role to the land.¹¹⁰ The concepts of diminishing returns of labor and capital applied to land represents the limited possibilities for any increase

¹⁰⁷All growth stage theories and dual economy models discussed in previous sections treat technological and institutional changes as exogenous to the theory.

¹⁰⁸Vernon W. Ruttan, Growth Stage Theories, Dual Economy Models; Ester Boserup, The Conditions of Agricultural Growth: The Economics of Agrarian Change Under Population Pressure (Chicago: Aldine, 1965); and Thomas C. Smith The Agrarian Origins of Modern Japan (Stanford: Stanford University Press, 1959).

¹⁰⁹Hayami, Agricultural Development, p. 27.

¹¹⁰William J. Baumal, Economic Dynamic (New York: MacMillan Company, 1951)
Chapter 2.

in agricultural output. The production increase is only possible within certain limits and by the use of a very intensive agricultural system. It is achieved by the spread of the best existing techniques rather than from the invention of new ones.¹¹¹

The investigation of the doctrine of soil exhaustion, by Albrecht Thaer and other German scientists, provided a scientific basis for the law of diminishing returns.¹¹² Darwin was another contributor to the conservation view of the limited natural potential. His concept of the struggle for food had a social impact even larger than Malthus' views. Present philosophical naturalism of the American conservation movement is a new version of the old doctrine.¹¹³

The scarcity model and limited natural resources did not go without challenge. In natural science according to Abbott Paysan Usher, "it is steadily becoming clearer that science affords no basis for the static concept of the fertility program."¹¹⁴ The production increases in traditional agriculture and the effects of mechanical, chemical and biological technology on the agricultural output in industrialized economies are an empirical basis to reject the view of limited potential in agriculture.

¹¹¹H.J. Habakkuk, "Economic Functions of English Landowners in the Seventeenth and Eighteenth Centuries, Essays in Agrarian History, ed. W.E. Minchinton (New York: Augustus M. Kelley, 1968), p. 190.

¹¹²Abbot Paysan Usher, "Soil Fertility, Soil Exhaustion, and Their Historical Significance," Quarterly Journal of Economics 37 (May 1923): 385-411.

¹¹³Harold J. Barnett and Chandler Morse, Scarcity and Growth, The Economics of Natural Resource Availability (Baltimore: John Hopkins Press, 1963), p. 83.

¹¹⁴Abbot Paysan Usher, "Soil Fertility," pp. 410-11.

The extreme challenge to the classical position has been suggested by Ester Boserup.¹¹⁵ Her thesis suggests that the supply of land, or rather supply of productive services from land is highly elastic in response to population pressure. It is achieved by going from forest fallow to bush fallow, and hence to short fallow, and then to annual cropping, and finally to multicropping. In her view the fertility of soil is a dependent variable rather than an exogenous and determinant factor of production. In a similar context Theodore W. Schultz shows that in the past supply price of natural resources services has not been rising relative to the supply price of other factors of production. This implies that the marginal contribution of natural resources over time has not been increasing.¹¹⁶

It is concluded that the conditions which must exist if there is to be a clear presumption of diminishing returns are far more restrictive than is commonly realized.¹¹⁷

Urbanization and Industrialization Approach

The impact of industrialization and urbanization on agricultural development originates from the early efforts of Johann Heinrich Von Thunen (1783-1850) who generalized the Ricardian theory of rent to show how urbanization determines the location of production of

¹¹⁵Ester Boserup, The Conditions of Agricultural Growth, pp. 15-16.

¹¹⁶Theodore W. Schultz, Economic Growth and Agriculture, pp. 52-55.

¹¹⁷Barnett, Scarcity and Growth, p. 147.

agricultural commodities and influences the techniques and intensity of cultivation.¹¹⁸ In 1953, T.W. Schultz showed the favorable effects of urban industrial development for agricultural development in the United States' economy. He concluded:

The existing economic organization works best at or near the center of a particular matrix of economic development and it also works best in those parts of agriculture which are situated favorably in relation to such a center.¹¹⁹

The policy implications of the urban industrial impact view appear to be more relevant for the less developed regions of the highly industrialized countries than for the less developed countries. In these areas, urbanization influences the agricultural development through higher demand for commodities such as milk and vegetable, provision of urban jobs for surplus labor of agriculture, increasing capital availability which in turn is conducive to farm expansion and modernization, and provision of opportunities for education, and contact with new things which widen the horizons of rural people.¹²⁰

The view of Harry Johnson, Boiroch, and Rosenberg suggest that the pattern of indigenous manufacturing activity will exert a powerful influence on the growth of output and employment. The strategy has indirect effects in agriculture, through absorption of the rapidly

¹¹⁸H.D. Dickinson, "Von Thunen's Economics," Economic Journal 79 (Dec. 1969): 894-902.

¹¹⁹Theodore W. Schultz, The Economic Organization of Agriculture (New York: McGraw Hill, 1953), p. 147.

¹²⁰Mellor, The Economics of Agricultural Development, pp. 72-73.

growing labor force into productive employment, as well as direct effects related to the choice of technique within agriculture.¹²¹

For the less developed countries the test of urban industrial impact has been carried out by Nicholls for the state of Sao Paulo in Brazil for 1940-50. The analysis shows only limited impact of the urban industrial center on the agricultural sector.¹²²

It seems that the urbanization and industrialization hypothesis has limited scope in the less developed countries where the growth of urban centers, resulting from population pressure in rural areas, frequently runs ahead of growth in the demand for nonfarm workers.

Diffusion Approach

Classical studies by Carl O. Sauer, as well as some recent studies indicate that the international diffusion of cultivated plants and of agricultural technology have been an important element in the increase of labor productivity and aggregate output.¹²³ In the past, before the institutionalization of agricultural research and extension, exotic plants, animals, equipment, and technology were gradually, sometimes lasting several decades, introduced and adapted to local conditions. The well-known example of agricultural diffusion during the recent decades has been that of new high-yielding varieties of rice,

¹²¹ Johnston, "Agriculture and Structural Transformation," p. 390.

¹²² William H. Nicholls, "The Transformation of Agriculture in a Semi-Industrialized Country: The Case of Brazil," The Role of Agriculture in Economic Development, ed. Erik Thorbecke (New York: Columbia University Press, 1969), p. 311-78.

¹²³ Carl O. Sauer, Agricultural Origins and Dispersals: The Domestication of Animals and Foodstuffs (Cambridge: Massachusetts Institute of Technology Press, 1969); David R. Harris, "New Light on Plant Domestication and the Origins of Agriculture: A Review," Geographical Review 57 (1967): 90-107; and Vernon W. Ruttan "Technology Transfer, Institutional Transfer, and Induced Technical and Institutional Change in Agricultural Development," Agriculture in Development Theory, ed. Lloyd G. Reynolds (New Haven: Yale University Press, 1975) pp. 165-191.

wheat, and maize in the tropics. It involved a transfer of the capacity to invest a new, location specific biological technology and the establishment of relatively advanced research centers.¹²⁴

The positive effects of the diffusion of more advanced farming and husbandry practices in the past were the basis for the recommendation of the diffusion policy for developing traditional agriculture and increasing the agricultural output.¹²⁵ According to this policy the route to agricultural development is through more effective dissemination of technical knowledge and the use of new high yielding varieties. During the 1950's when the operation of experiment stations based on the diffusion approach failed to contribute substantially to the agricultural productivity and modernization of traditional farms, the agricultural economists recognized that the problem of agricultural growth is not the choice of technology and different varieties. It is the problem of adapting the new technology and the new varieties to the existing agricultural structure and institutions.¹²⁶

High-Pay-Off Input Approach

The failure of development policies based on the diffusion approach led to the re-examination of its possibilities for promoting agricultural development in developing countries.¹²⁷

¹²⁴Ruttan, "Technology Transfer," p. 167.

¹²⁵Albert H. Moseman, Building Agricultural Research Systems in the Developing Nations (New York: Agricultural Development Council, 1970), pp. 66-67.

¹²⁶Hayami, Agricultural Development, p. 39.

¹²⁷Theodore W. Schultz, Transforming Traditional Agriculture; W. David Hopper, "Allocation Efficiency in a Traditional Indian Agriculture," Journal of Farm Economics 47 (August 1965): 611-24; Pan A. Yotopoulos, Allocative Efficiency in Economic Development; A Cross Section Analysis of Epirus Farming (Athens: Center of Planning and Economics Research, 1968); and Pan A. Yotopoulos, "On the Efficiency of Resource Utilization in Subsistence Agriculture," Food Research Institute Studies 8 (1968): 125-35.

The high-pay-off input approach is developed most vigorously by Schultz. He argues that farmers in poor countries are not inefficient in allocating the available agricultural factors of production and that they have in general exhausted all profitable opportunities to invest in the agricultural factors at their disposal. There is little or no incentive to save and invest.¹²⁸ Therefore economic growth from traditional agriculture is very expensive. The key to transforming the traditional agricultural sector into a productive source of economic growth is investment which will make modern high-pay-off inputs available to farmers in traditional agriculture.¹²⁹ As Schultz says:

Economic growth from the agricultural sector of a poor country depends predominantly upon the availability and price of modern (non-traditional) agricultural factors... They consist of particular material inputs and of skills and other capabilities required to use such inputs successfully... But these modern material inputs are seldom ready-made. They can rarely be taken over and introduced into farming in a typically poor community in their present form.¹³⁰

This implies three types of relatively high productivity investments for agricultural development: in the capacity of agricultural experiment stations to produce new technical knowledge, in the capacity of the industrial sector to develop, produce, and market new technical inputs; and in the capacity of farmers to use modern agricultural factors effectively. The policies based on the high-pay-off model

¹²⁸Theodore W. Schultz, "Economic Growth from Traditional Agriculture," Economics of Underdeveloped Agriculture, ed. Tara Shukla, (Bombay: K.K. Vora, 1969), p. 3.

¹²⁹Schultz, "Economic Growth from Traditional Agriculture," p. 15.

¹³⁰Schultz, Transforming Traditional Agriculture, p. 145.

appear capable of generating a sufficiently high rate of agricultural growth consistent with population and income growth requirements.

Hayami and Ruttan argue that the high-pay-off input approach is sufficiently inclusive to embrace the previous approaches, limited potential, urbanization and industrialization, and diffusion of agricultural development, but as a theory it does not explain the mechanism by which resources are allocated for education and research in agriculture. In addition, it does not explain how economic conditions induce the development and adaption of an efficient set of technologies for a particular society.¹³¹

Technology as an Endogenous Factor

Hayami and Ruttan have developed a model of agricultural development in which technical change is treated as endogenous to the development process, rather than as an exogenous factor that operates independently of other development processes. They explain that there are multiple paths of technical change in agriculture available to a society. The constraints imposed on agricultural development by an inelastic supply of land may be offset by advances in biological technology e.g., high-yielding varieties. The constraints imposed by an inelastic supply of labor may be offset by advances in mechanical technology, e.g., farm machinery. The ability of a country to achieve rapid growth in agricultural productivity and output seems to hinge on

¹³¹ Hayami, Agricultural Development, pp. 42-43.

its ability to make an efficient choice among the alternative paths.¹³²

The induced development model for the agricultural sector presented by Hayami and Ruttan gives an explanation of the mechanism by which a society chooses an optimum path of technological change in agriculture. The model hypothesises that technical change could be guided along an efficient path by price signals in the markets provided that the prices efficiently reflect changes in the demand and supply of products and factors and that there exists effective interaction among farmers, public research institutions, and private agricultural supply firms.¹³³ Therefore any relative price increase for a particular production factor will induce technical innovations that save that factor. Hayami and Ruttan further hypothesise that institutional change can also be guided by the markets interactions:

Institutional innovations occur because it appears profitable for individuals or groups in society to undertake the costs. It is unlikely that institutional change prove viable unless the benefits to society exceed the cost. Changes in market prices and technological opportunities introduce disequilibrium in existing institutional arrangements by creating profitable new opportunities for the institutional innovations.¹³⁴

According to Hayami and Ruttan in the dynamic process of development, the emergence of imbalance or disequilibrium is a critical element in inducing technical change and economic growth. Disequilibrium

¹³² Hayami, Agricultural Development, pp. 53-59.

¹³³ Ibid., p. 57.

¹³⁴ Ibid., p. 61.

among the several elements in the system creates the bottlenecks which focus the attention of scientists, investors, entrepreneurs, and public administrators on the solution of problems for attaining more efficient resource allocation.¹³⁵

The Hayami-Ruttan model explains the path of technological change in a manner very close to general equilibrium models under perfect competitive conditions. Therefore it suffers the general objection made to those models, namely the validity of primary assumptions for representing factor and product markets in the real economic world.

Generalization of Review of Literature

In traditional agriculture the family and business considerations are closely intermixed. Unlike firms farmers cannot liquidate themselves if they make poor calculations. Although their concepts of costs and returns are different from the familiar ones in economics, they behave rationally and they allocate efficiently available resources given the possibilities which they face. The development projects for traditional agriculture must consider the type of rationality of traditional farmers, if they are supposed to achieve certain economic and social objectives. The failure to recognize the fundamental differences between traditional economy and customary economy leads to poor results of policies proposed to solve the problems of underdeveloped agriculture.

¹³⁵Ibid., pp. 61-62.

In spite of the existence of divergent approaches to economic development, e.g., the theories of earlier economists, growth stages, dual economy, microeconomic aspects, dependencia school, basic needs, unified approach, etc., it could be asserted that there is a critical role for agriculture in economic development. Any attempt to industrialize an economy without regard to the need for a priori or simultaneous transformation of the traditional agriculture will prove most difficult, if not impossible, for sustaining a certain rate of growth and further economic development. With respect to the case of Iran, the economy shows some features described by the growth stages and dual economy theories, but its course of economic development could be best explained by the unified approach to development. The poverty of the majority and the need to decrease the dependence on oil exports, for a secure future economy, requires a simultaneous plan for all sections of the population and all sectors of the economy, including the agricultural sector which has been largely neglected in the past.

The historical review of economic development in present developed economies reveals that the agricultural sector has played a significant role in the course of economic development either under a capitalist or a socialist system. The experience of Western European countries, the United States, the USSR, Eastern European countries, Japan, and finally the recent achievements of China all are evidence for this conclusion. For a closed economy agricultural expansion is almost the only possible policy for economic development. In an open economy the possibility for importing the nation's food requirements,

does not imply the neglect of the potential of the agricultural sector and its likely high contribution to the course of development of this economy. The historical review also indicates that certain difficulties might arise as a result of rapid restructuring of the agricultural sector. This would be accompanied by a reduction in agricultural production and high rate of urban migration not easily absorbed in other sectors. The case of Iran as an economy intending to develop cannot ignore the experience of present developed countries in view of their attention to their agricultural sectors and the significant role played by agriculture in their course of development.

Studies of the world food situation show that the food shortage is not an image created by the pessimism of some economists. It has happened in the past and will happen in the future, if the seriousness of the world food problem is underestimated. The food crisis of 1973 and 1974 refutes the exaggerated optimism of the Green Revolution in the late 1960's. The projected shortfall in cereal grains in developing countries is estimated at 11% in 1985 compared with 8% in 1970. Should this indeed be a trend, then it is important for Iran to diminish its dependence on the outside world for food, a dependence which has increased in recent years.

The theories for development of agriculture, limited potentials, urbanization and industrialization, diffusion, high-pay-off input, technology as an endogenous factor, are all useful under corresponding conditions explained for each theory. In the real world agricultural sectors in developing countries cannot be precisely defined with only

one of these theories. Each theory represents certain aspects of agriculture in different time and space dimensions. Therefore, any policy to develop the agricultural sector cannot only rely on one of these theories. It has to consider all features of the agricultural sector with which it is concerned. There is no unique and universal way to solve the whole problem of agricultural development. Each theory only solves a part of the problem. As will be considered in the following chapters, the case of Iran for agricultural development also requires several policies which cannot be derived from a particular theory under very restricted assumptions.

CHAPTER III

ECONOMIC DEVELOPMENT OF IRAN

For the last decade or so Iran has experienced extremely rapid economic change. The revaluation of her oil resources has resulted in a considerable acceleration of the rate of growth by removing financial constraints. Gross domestic product in 1959 prices has increased by 4 times during 1963-1976.¹ Like other oil producing countries, she has experienced her major expansion in the oil and service sectors, a lesser expansion in the manufacturing sector, and only a small expansion in the agricultural sector. Unlike most of other oil producing countries, the possibilities of agricultural development of Iran are not limited. A decade ago she was a self-sufficient country in food-stuffs and her traditional exports consisted mostly of agricultural products.

As could be expected the rapid economic growth accompanied by profound economic, social, and demographic changes has created serious imbalances, tensions, and bottle-necks which have proved extremely difficult to master in the development projects. The cumulation of

¹See Table 3-2 for year 1963. For year 1976, "The Growth of Gross National Product," Rastakhiz, Iran, written in Persian, 16 June 1977, p. 4. The figures were adjusted according to the single method of estimation of gross domestic product in 1963.

these difficulties will endanger the current achievements if they cannot be overcome in the near future.

The objective of the present chapter is to analyze the overall course of the economic development of Iran and its associated difficulties in relation to the agricultural sector.

Economy

During 1963-1976 the relatively stagnant economy of Iran has been transformed into a dynamic economy with divergent activities. Oil price increases have given a strong push to the economy and have provided the financial resources to import goods and services for the several development projects and for the increasing consumers' demand resulting mainly from higher incomes.

The gross domestic product has risen from 350 billion rials in 1963 to over 1400 billion rials in 1976 in 1959 prices,² i.e., 4 times. In current prices the increase has been almost 11 times; in terms of per capita, the gross domestic product has risen from 15,500 rials or 220 dollars in 1963 to 130,000 rials or 1,950 dollars, in 1976. In constant prices the per capita income has increased by 8% per year.³

Sectoral distribution of growth shows that during 1963-1975 compound rates of growth of gross value added in manufacturing, services and oil have been 16%, 13%, 11% respectively; that for the agricultural sector has been only 1% per annum (Table 3-1).⁴

²One American dollar is almost equal to 70 rials.

³See footnote 1 on page 69 of the thesis.

⁴The average rate of growth is higher. For more discussion see Chapter IV.

Neglect of Traditional Sector

The modernisation of the economy and the increasing contribution of industry and services to gross domestic product as may be expected, have resulted in a decreasing contribution of the primary sector to gross domestic product from 40% in 1948 to 8% in 1975 in constant prices (Table 3-2).⁵

Such an evolution is a natural product of economic development. However, it has been occurring more rapidly in Iran not only as a result of the unprecedented economic boom in other sectors or the limitation of agricultural potential. The main reason is the relative neglect of the primary sector. Neglect has arisen from an underestimation of the development capacity of the sector. The share received by agriculture of the total government investment has been less than its contribution to the economy. In the Fifth Development Plan, 1973-78, the share of agriculture was only 7% in comparison with its 15% contribution to the economy in 1973 (Table 3-2).

Agriculture benefits only marginally from economic growth and from the overall effect of the advanced technology applied in the modern sector, from which it is often physically and institutionally separated. Yet this traditional sector in which labor/output ratio is more flexible in comparison with the manufacturing sector will continue, as in the past, to employ a considerable part of the working population. There are many

⁵ See Chapter IV for the evolution of agricultural share in gross domestic product.

reasons why it is vital that this sector should flourish, rather than disappear: human, social, cultural, demographic, regional, and also economic.⁶

Widening Gap Between Consumption and Production

The extremely fast development of domestic demand for consumer goods and particularly food-stuffs, in relation to domestic supply, is in direct opposition to the expressed aim of decreasing the nation's dependence on imports. The ratio of commodity imports to the gross domestic product has increased from 10% in 1963 to 23% in 1975, in current prices.⁷

Inflation and Speculative Tendencies

From 1963 to 1970 economic growth was accompanied by a low rate of price increases. The implicit price index of gross domestic product increased from 106 to 115, 1959=100. In the 1970's the rate of price increases changed drastically. It increased from 115 in 1970 to 327 in 1976. In 1976, the consumer price index increased by 16.6%.⁸

The inflation is proving very difficult to curb. It does not affect all social strata in equal measure and is leading to increased land and property speculation. As price control is applied only to certain commodities, the domestic pricing structure is being distorted. The pressure of price control on food staples, particularly on wheat, had negative effects on agricultural activities. Before 1973 the price

⁶See Chapter VI.

⁷Table 3-1 and Table 3-3.

⁸For years before 1976, see Table 3-1. For 1976, "The Growth of Gross National Product," Rastakhiz, p.4.

of wheat had remained constant for more than a decade. Since 1973 this policy has been relatively modified.

Widening Income Gaps

The ratio of average per capita urban to rural consumption, which was 2.1 in 1966, rose to 2.8 in 1972 and 4.1 in 1974. Per capita consumption by the rural population seems virtually to have stagnated, at constant prices, over the last ten yeears. In 1972 per capita gross value added of farming population on average was 11,000 rials per annum and it did not exceed 6,000-7,000 rials in some backward regions. The per capita gross domestic product was 39,000 rials.⁹

Regional disparities in average per capita income are also tending to increase in both rural and urban areas. In 1972, for example, the gap in per capita consumption between the rural areas of Sistan and Gilan was 1 to 3. Regarding the factor income distribution, wages tend to form a smaller proportion of value added, thereby increasing the present income inequalities.¹⁰

Imbalances in International Trade

Iran's rapid economic growth has been accompanied by great increase in external trade. Massive imports of capital goods, raw materials, semi-finished consumer goods, consumer durables and other consumer goods, mainly food-stuffs, are balanced by exports of crude

⁹Iran, Plan and Budget Organization, National Spatial Strategy Plan, First Stage Final Report, 4 Vol. (Tehran: May 1976) Synthesis, p. 8.

¹⁰Ibid., p. 3.

oil (Table 3-3). Food imports have increased by 26 times during 1963-1975. In 1976 non-oil exports were only equal to 4.2% of commodity imports, the corresponding figure in 1963 was 26%.¹¹

The nation's industry, however, is oriented mainly towards the booming domestic market, where it is protected by customs barriers. Its competitiveness on the world market is limited. Only a few products for which Iran is particularly well placed are exported on a large scale. So diversification of exports should be a prime objective. On this ground, the government considers giving maximum support to the export-oriented industrial sector. Industrialization would, in that case, have to depend largely on public corporations and multinationals offering a sure market. Necessities of management would lead to the establishment of large, integrated and particularly autonomous industrial complexes. These complexes would be constructed on the Persian Gulf with easy access to raw materials and foreign markets. The Southern part of the country would benefit most from public investment, although the coastal region's population weighting would not increase significantly. The more populous provinces of the north and north west would suffer, and would experience a high volume of out-migration, most of which would be towards central Ostan. This would be accompanied by a deepening of the rift between the modern, highly capitalized sector and the somewhat neglected traditional sector.

¹¹ For year 1963, Table 3-3 and for year 1976, "The Growth of Gross Product," Rustakhiz, p.4.

In Chapter VI a projection of balance of payments in 1992, the end of the oil exports period, will be presented which shows the necessity for a basic change in the current economic development policies.

Markets Concentration

The towns of the central province, including the capital, which contain only 16% of the population of Iran, account for more than a third of the country's total expenditures on domestic consumption which is almost as much as that of the whole rural population. These towns also account for 42% of the nation's non-food expenditure. This concentration is the result of income gaps and it may lead to a serious hampering of economic growth.¹²

Measures taken to restrict the establishment of new industrial activities in the Tehran, the capital city, have had only a limited effect, due mainly to the possibilities for extending plants on existing sites. The concentration of tertiary command functions is becoming more pronounced than ever.

Tendencies Towards Centralization

Between 1963 and 1975 the contribution of the private sector to gross fixed capital formation fell from 67% to 41%. During the same period the share of government expenditure, consumption and capital expenditures in gross domestic product rose from 14% to 40%.¹³ The

¹² Ibid., p. 4.

¹³ The figures for the years 1963-1967 estimated by Hossain-Ali Mansoor, "Transformation of the Iran's Economy in the Years 1962-1967," written in Persian (M.Sc. dissertation, University of Tehran, 1974), p. 35. For 1975, Iran, Central Bank of Iran, Yearly Report 1975, written in Persian (Tehran: 1976), pp. 150-51.

TABLE 3-1
Sectoral Gross Domestic Product
In 1959 Prices and Current Prices^a
(Billion Rials)

Sectors ^b	1963		1968		1973		1975		Compound Annual Rate of Growth	
	Current	Constant	Current	Constant	Current	Constant	Current	Constant		
Agriculture ^c	98	90	140	120	234	144	211	100	7	1
Manufacturing and Mining	59	58	130	120	332	223	690	334	23	16
Services	171	157	286	249	656	471	1231	668	18	13
Oil and Gas	35	38	71	74	381	158	1453	140	37	11
Gross Domestic Product	363	343	627	563	1603	996	3585	1242	21	11
Per Capita GDP (Thousand Rials)	15.5	14.5	23	21	52	32	110	38	18	8
Per Capita GDP (Dollars)	220	210	330	300	740	460	1570	540	18	8

Source: Iran, Central Bank of Iran, Yearly Report, from 1963-1975. The original figures were adjusted according to the single method of estimation in 1963.

a 1963, 1968, 1973 are the first years of third, fourth, and fifth development plan respectively.

b For sector breakdown see Table 6-1.

c The average rate of growth in agricultural sector has been higher. For a detailed study see Chapter V.

distribution of government capital expenditure between economic sectors is also biased towards manufacturing and services, particularly activities with a high centralization nature, e.g., key industries and central government expenditures. As mentioned earlier traditional activities with a decentralization nature do not receive a share equal to their contribution to the gross domestic product (Table 3-2).

The strengthening of the hold of the public sector is no doubt necessary temporarily, but if it is not carefully managed it may cause government departments to lose sight of their primary role as guides with a concern for the long term. It can aggravate the tendency towards centralization, create a new feudal system in the form of state enterprises and restrict private initiative.

The bottle-necks appearing at the implementation level is a reason for the government to begin the process of decentralization at the level of administrative units rather than at the level of regions, which lack identity. This decentralization remains very limited, affecting only certain departments with an involvement at the local level. Major decisions and arbitrations continue to be made centrally. The role of local authorities remains minimal, their place being taken by state or state dominated development organization.

Absence of Coordination Between Urban and Economic Growth

The current implicit policy towards the few large cities as growth poles, Esfahan, Tabriz, Mashhad, Shiraz and Ahwaz has been handicapped by the natural constraints affecting each of these cities, e.g., lack

TABLE 3-2

Agricultural Investment by the Government
In the Five Development Plans
In Current Prices
(Billion Rials)

Plan	Agricultural Investment	Percentage of Total Investment %	Contribution of Agriculture to Gross Domestic Product in 1959 Prices
1948-1955	5.5	26	40
1955-1963	24.8	30	35
1963-1968	49	21	26
1968-1973	101	18	21
1973-1978	534	7	15

Source: For 1948-1955, Abdōlah Mehrjoo, "Transformation of the Iran's Economy in the years 1948-1955," written in Persjaj (M. Sc. dissertation, University of Tehran, 1973), p. 142; for 1955-1963, Mahmood Khataie, "Transformation of the Iran's Economy in the years 1955-1962," written in Persjaj (M. Sc. dissertation, University of Tehran, 1973), p. 157; for 1963-1968, Hossain-Ali Mansoor, "Transformation of the Iran's Economy in the years 1962-1967," written in Persjaj (M. Sc. dissertation, University of Tehran, 1974), p. 158; for 1968-1973, Mostafa Pakdaman, "Transformation of the Iran's Economy in the years 1968-1972," written in Persjaj (M. Sc. dissertation, University of Tehran, 1974), p. 199; and for 1973-1978, Iran, Plan and Budget Organization, Iran's Fifth Development Plan, 1973-1978, A summary (Tehran, 1973), p. 9.

- a Almost half of the investment in agriculture for the harnessing water resources either for urban and industrial consumption or agricultural irrigation. Therefore the real share of agriculture in government investment is lower than the above figures.
- b The beginning year of each plan was used for calculating the contribution of agriculture to the gross domestic product.

TABLE 3-3
Commodity Exports and Imports in Current Prices
(Billion Rials)

Year	1963	1968	1973	1975	Compound Annual Rate of Growth
Non-Oil Exports	9	15	44	42	13
Oil Exports	33	67	361	1348	36
Imports	35	97	262	819	30
Food Imports	5	5	28	131	31
Imports/Non-Oil Exports	3.8	6.5	6	19.5	-

Source: Iran, Central Bank of Iran, Yearly Report, in 1963 to 1975. The original figures were adjusted according to the single method of estimation in 1963.

of space and problems of water supply, by lack of initiative at the local level, and by concentration of power in Tehran. This is an evident result of the absence of coordination between urban planning and economic projects.

Current town planning techniques take account neither of the largest secondary and tertiary sector programmes, which will be the driving force behind future urban expansion, nor of the natural possibilities of the cities. The economic and urban plans are designed and carried out independently as if they were autonomous.

The institutional, financial, and technical tools of urban development also seem largely inadequate; this is seen in the delays in developing urban land, in the provision of cheap housing, and in the inadequacy of utilities.

Insufficiency of Transport Facilities

Iran's road network is still fairly rudimentary; 43,000 km of roads, of which 12,000 are asphalted. The average rate of construction over the past five years has been about 1200 km a year, yet a satisfactory coverage of useful land would call for a network of about 300,000 km.¹⁴

The demand for transport is increasing and the existing network is becoming incapable of carrying the large volume of traffic using its truck axes. The demand for transport is greatest at entry and exit

¹⁴Iran, Plan and Budget Organization, National Spatial, Synthesis, p. 12.

points on the country's borders, chiefly the Persian Gulf ports which are completely saturated. Future demand for transport and domestic trade is likely to ensure a development of large infrastructure. This applies particularly to the development of ports where inadequate facilities are a considerable obstacle to economic development at present.

Population

High Rate of Population Growth

According to the results of last census in 1976, the population of Iran was 33.6 million of which 46.8% live in the urban areas, defined as centers with more than 5,000 people (Table 3-4).

The rate of natural growth which had remained in the vicinity of 3% per annum for more than 25 years is now starting to decrease. The latest estimate for the growth rate of population is 2.7% which is still far more than 1% in the developed countries and even 2.4% in other developing countries.¹⁵

It is expected that factors such as the rapid increases in income, social change induced by urbanization, and individual and collective awareness of the problems posed by limited availability of natural resources will lead to a reduction of the birth rate. It should be most rapid in Tehran, followed by the large towns, and slowest in small towns and rural areas where family planning will

¹⁵ World Food Conference, United Nations, Assessment of the World Food Situation, Present and Future, E/CONF. 65/3, 1974, Table 4.

remain barely effective. The estimate based on this assumption results in a population of 48 million by the 1992 horizon, i.e., an annual rate of growth 2.4% between 1976 and 1986 and 2% between 1986 and 1992 (Table 3-4).

TABLE 3-4
Distribution of Population in Urban and Rural Areas
(Million Persons)

Population	1963	1966	1968	1973	1976
Urban Areas	8.5	9.7	10.7	13.2	15.7
Rural Areas	15.1	16.0	16.4	17.8	17.9
Total Population	23.6	25.7	27.1	31.0	33.6
Rate of Growth	3.0	2.7	2.7	2.7	---
Percentage of Rural out of Total	63.9	62.4	61.8	57.4	53.2

Source: For year 1966 and the ratio of urbanization in all years, Iran, Statistical Centre of Iran, Statistical Yearbook of Iran 1973 (Tehran: June 1976), p. 25. Population in the other years was estimated by using 3% annual rate of growth for the period 1963-1966 and 2.7% for the period 1967-1976. For year 1976, "Population Growth far Above World Optimum," Kayhan Weekly International, Iran, January 8, 1977, p. 7.

Note: Years 1966 and 1976 are the census years.

Labor Force

The high growth rate of population of Iran implies an increasing supply of labor. Fortunately, the past rapid economic growth has prevented unemployment from becoming a problem of any magnitude. In 1975 the unemployment figure was only 1.1% of active population.¹⁶ Nevertheless, in the long run, the problem of unemployment could be a serious one.

The active population¹⁷ of Iran has increased parallel to the total population but at a slower pace. The difference is explained partly by a change in the age structure of the population and partly by a drastic increase in school enrollment rates for the younger population and in retirement rates for elderly people. Consequently, the ratio of active population to the total population has decreased from 34% in the early 1920's to 28% in 1975.¹⁸

The participation rate of females in the labor force is very low. Only 12% of women 10 years or older were active in 1975.¹⁹

The above considerations reveal the high potential for future labour supply which would require the creation of job opportunities in the near future.

¹⁶ Firouz Tofigh, "Development of Iran: A Statistical Note," Iran: Past, Present and Future, ed. Jane W. Jacqz (New York: Aspen Institute for Humanistic Studies, 1976), p. 58.

¹⁷ Defined as population of 10 years or older who are ready to work. The recent definition which is used in the present study is 12 years and older. According to the latter definition the rate of activity is 26% in 1975. Iran, Central Bank of Iran, Yearly Report 1975, p. 834.

¹⁸ Tofigh, "Development of Iran," p. 58.

¹⁹ Ibid., p. 58.

The distribution of labor force among the economic sectors during 1963-1972 shows relative stability of labor employed in the agricultural sector and increasing numbers in the secondary and tertiary sectors. The agricultural sector employed 51% of total employed labor in 1963. By 1972 its share decreased to 39.8% of total employed labor.²⁰

Rapid Rural Emigration

Despite the resulting imprecision of all demographic data, it is highly probable that rural emigration has sharply accelerated recently, particularly in the most underdeveloped regions of South-East, East and West. Rural population as a percentage of total population has decreased from 63.9% in 1963 to 53.2% in 1976 (Table 3-4). Many villages are being deserted notwithstanding the fact that the rate of natural population growth is still high in rural areas, 3% per annum.²¹

Present agricultural policy which concentrates too much on the best quality resources, large-scale farms, agricultural growth poles, and structures such as farm corporations may cause an upheaval in production. But it has a detrimental effect in the domain of emigration.

Concentration of Urban Population in Few Cities

The drift away from rural areas combined with natural growth has led to an overall urban growth rate of almost 5% per annum. However, there are large discrepancies between regions. These factors have also led to a concentration of population, wealth, and power in Tehran. The

²⁰ For year 1963, Iran, Plan and Budget Organization, Evaluation of Agricultural Sector in the Past Development Plans, written in Persian (Tehran: January 1976), p. 3. For year 1972, F. Aminzadeh, "Human Resources Development: Problem and Prospects," Iran: Past, Present, and Future, ed. Jane W. Jacqz (New York: Aspen Institute for Humanistic Studies, 1976), p. 190.

²¹ Mostafa Pakdaman, "Transformation of Iran's Economy in the Years 1968-72" (M. Sc. Dissertation, University of Tehran, 1974), pp. 49-52.

average annual rate of population growth in Tehran has been 6.1% over 1966-1972 (Table 3-5); 40% of large industrial firms, 70% of industrial value added, and 90% of public and private decision-making centres are concentrated there.²²

Whereas previously a region's agricultural potential tended to determine its population level, this level is increasingly determined by the size of towns and their situation in relation to the development axes.

The harmful effects of this concentration on the quality of urban life, on the environment, on the vitality of the regions, on the development costs, on the natural resources, and on the balance of society are already manifest in Tehran, and they are now starting to appear in Esfahan, the second big city as well.

Population Growth of the Persian Gulf Coast

Economic development and strategic considerations tend to dictate migratory patterns which are sometimes incompatible with the aspirations of the individual, i.e., break with traditional culture and settlement in regions with harsh climates or poor living conditions. On this ground, the policy of settling sparsely populated areas such as the Persian Gulf Coast entails vast transmigrations and considerable risks of failure.²³ It is consistent with the strategic consideration

²²Iran, Plan and Budget Organization, National Spatial Synthesis, p.7.

²³Ibid., p. 29.

TABLE 3-5

Cities With Over 50,000 Inhabitants
(Millions Persons)

Urban Centers	Population in 1972	Percentage of all Urban Center,	Annual Rate of Growth 1966-72
Tehran	4.3	33.3	6.1
3 Cities with Population 500,000 - 1 million	1.6	12.6	4.7
3 Cities with Population 250,000 - 500,000	1.1	8.1	4
28 Cities with Population 50,000 - 250,000	2.8	21.3	3.9
Total, for Cities with Over 50,000 Inhabitants	9.8	75.3	5.0

Source: Iran, Statistical Center of Iran, Statistical Yearbook of Iran 1973 (Tehran: June 1976), p. 26.

of settling the whole country and the south coast in particular and it is in keeping with an export-oriented industrialization policy. Giving policy in this way to the development of the southern half of the country would lead to neglect of the development of the more populous regions of the north west, and consequently to encouragement of emigration to the Central Province and Tehran. These traditional populous regions have rich potentials in agriculture. Execution of development projects in these regions would not only increase the agricultural output, it would also prevent the higher rate of emigration.

Environment and Natural Resources

Degeneration of Environment

Rapid social change, migration, and the concentration of population and modern activities in more and more limited areas are causing overexploitation of some resources, and increasing the risk of pollution and deterioration of the environment, while at the same time vast areas are becoming marginal and will subsequently be deserted. The amount of land destroyed each year by abandonment, by erosion due to dry-farming, and by salinity due to irrigation greatly exceeds the amount made available or brought under cultivation in the modern agricultural areas. In the same way forests are exploited faster than they can regenerate. Productive capital is thus suffering damage which, while not immediately apparent, will be irreparable in many cases.

Marginalization of Agricultural Resources

The difficulties involved in assisting the traditional agriculture have led to a policy favouring large farms and agro-businesses and to compulsory regrouping of lands, and farm corporations. The policy tends to encourage rural emigration by reducing the number of jobs available and severing the crucial link between the farmer and the land. It might lead to a high rate of growth of agricultural output in the short run, but is not compatible with optimum output over the long run. Outside these poles of agricultural development which benefit in this way, both rural emigration and marginalization of the natural resources accelerate. Some marginal resources fall victim to gradual abandonment and many small agricultural areas are put in jeopardy.

The geographical conditions, scattered and marginal resources, and the need to keep an adequate number of people on the land for the protection of the environment and socio-cultural equilibrium require limitations to the break-up of traditional structures and active promotion of family farms which accounted for more than 70% of land under cultivation in 1975.²⁴

Society and Cultural Heritage

The sudden oil wealth of Iran is rapidly creating a welfare state in which individual responsibilities are being replaced by dependence on public services. Education, health, housing, and all forms of public utilities are expected to be provided freely by the government. The emerging social values are threatening the nation's culture and heritage. Even in remote areas the traditional sense of collective responsibility

²⁴Ibid., p. 8.

and family ties are yielding to a growing trend of materialism and individualism. In the conflict between cultural heritage and rapid economic growth, the former is being compromised, generally without adequate care to preserve or adapt the positive elements of the rich national heritage. Rural and village tradition and their corresponding manifestations, e.g., architecture, town planning, arts, and handicrafts, are fading away. Iranian society is in the process of conforming the western values. Consequently, the entire national culture is in danger of falling into neglect.

It is true that some aspects of cultural heritage must adapt themselves to changing circumstances, but there are questions of which aspects and of the speed of the transformation to be considered. A too rapid cultural change is likely to place, at a larger stage, obstacles in the way of progress, e.g., desertation of inhabited areas, creating of slums, and uncontrolled expansion. Rather than creating a welfare state by increasing the proportion of the population dependent on public assistance, it is far more efficient in the long-run to utilize the oil revenues for large-scale investments in food production, rural developments, and building the nation's human resources. These forms of investments are the most productive ways of raising the living standards of the future generations, with the least degree of social and economic disruption to the country and cultural heritage.

In summary, the consideration of national culture and social values is an important aspect of any economic planning. While the proper use of national cultural can accelerate the development process, its neglect will decelerate the progress of development projects. In proposed development projects the impact of existing social values and their possible changes must be carefully considered.

CHAPTER IV

THE AGRICULTURAL SECTOR OF IRAN

In 1962, according to the conventional criteria, Iran was an agricultural country. The agricultural sector was a leading sector and its fluctuations could affect the whole economy. From the economic point of view a bad or a good year was defined by the level of agricultural production in that particular year. Since that time the agricultural sector has been subject to many changes.

As a result of agrarian reform in 1962 and the introduction of new techniques, medium and large-sized agricultural farms have developed. Such development has been encouraged by agricultural credit facilities. Therefore a modern sector has taken its place alongside the small-farming sector. The mobilisation of new water resources has allowed the use of new land (in Khuzestan and Moghan) for the location of agribusinesses. This has made it possible to speed up the settlement of those few regions where marked expansion has been still feasible.

In spite of some achievements, the agricultural sector has been lagging far behind the other sectors. According to the adjusted official data it has been growing by 2.2% per year in the period 1963-75 which is lower than the rate of population growth of 2.7% per annum.¹

¹For a detailed discussion of this matter see Chapter V below.

The unadjusted official data for agricultural products have been estimated to range between 3.5-5%.² The contribution of the agricultural sector to the gross domestic product has sharply decreased (Table 4-1). In 1963 agricultural outputs were estimated at 89.9 billion rials,³ in 1958 prices, which represented 26.2% of GDP; in 1976 the corresponding figures were 100.4 billion rials and 8.1% respectively. As it was explained in Chapter III, this has been resulted from rapid increase of oil revenue and neglect of the agricultural sector.

In discovering the reasons for the slow rate of growth in the agricultural sector and evaluating the threats, potentials and restrictions of this sector for future development of the economy, the present chapter deals firstly with the natural potentials of Iran in agriculture. Land and water resources are the main factors for discussion. Secondly, it is concerned with the current agricultural production pattern in an evaluation of the advantages and disadvantages of the present system. The present agricultural situation and the potential of the economy to produce foodstuffs are the key factors in deciding the future path of agricultural development, in determining its possible part in the future economy of Iran, and in proposing some policies for developing the agricultural sector.

²Iran, Plan and Budget Organisation, Evaluation of Agricultural Sector in the Past Plans (Tehran: January 1975), p. 1. 5% rate of growth has been estimated by the use of the data published by the Central Bank of Iran in its yearly report as a part of national income accounts.

³70 rials are equal to 1 American dollar.

TABLE 4-1

Estimated Gross Domestic Product of Iran in 1963 and 1975 at
Constant 1958 Prices and Current Prices

(Billion Rials)

	1963				1975			
	Constant Prices		Current Prices		Constant Prices		Current Prices	
	Rials	%	Rials	%	Rials	%	Rials	%
Agriculture	90	26.2	98	27.0	100	8.1	211	5.9
Manufacturing and Mining	58	17.0	59	16.3	334	26.9	690	19.2
Services	157	45.6	171	47.1	668	53.8	1231	34.4
Oil and Gas	38	11.2	35	9.6	140	11.2	1453	40.5
Gross Domestic Product	343	100.0	363	100.0	1242	100.0	3585	100.0

Source: Iran, Central Bank of Iran, Yearly Report, written in Persian, from 1963 to 1975.

Note: The original figures were adjusted according to the single method of estimation in 1963.

Natural Potential in Agriculture

Climatic Environment

Iran is subject to extreme variation of climate between summer and winter and among geographical regions. Summer temperatures are very high except where modified by altitude and along the balmy Caspian coast.

In the north and on high ground much of the precipitation is in the form of snow. Winters are cold and long in the north, less so in the south. Frost is a winter hazard everywhere except along the south coast. In general Iran is classified as an arid or semi-arid country. The precipitation is low and its geographic and seasonal distribution is very uneven. Most of the total precipitation occurs at the end of winter and early spring, while for the rest of the year, which represents the growing season, precipitation is minimal.

Three major agro-climatic types are distinguishable:

1. Humid with an annual rainfall exceeding 700 mm which is confined to the Caspian Coast, east Caspian Plain, and localised areas of West Central Zagros. The region accounts for 52% of total precipitation and for 25% of total land area.
2. Seasonally arid, with annual rainfall between 250mm and 700mm falling from October-April.
3. Arid with less than 250mm annual rainfall. The two latter types account for 48% of total precipitation and 75% of total land area.⁴

⁴Iran, Plan and Budget Organisation, Iran's 5th Development Plan 1973-1978, written in Persian, (Tehran: 1972), p. 39.

Land Resources

The surface area of Iran amounts to 165 million hectares. Twenty seven soil associations have been described, they occur in four main physiographic areas, covering a wide range of climatic and other factors. The distribution of the soil associations have been classified in three categories of potential (Table 4-2).

TABLE 4-2
Soil Classification
(Thousand Hectares)

Categories of Potential	Area
Good	32,228
Moderately Good	18,566
Poor to Very Poor or Nil	114,206
Total	165,000

Source: Iran, Ministry of Agriculture and Natural Resources, National Cropping Plan, Final Report, 5 Vol. (Tehran: August 1972), 1:44.

Regarding those parts of Iran having an annual rainfall above 100mm in combination with cultivable soil, land resources for agricultural use are only estimated at 17 million hectares which accounts for 10% of total land area of Iran, (Table 4-3). In other sources the figure estimated has been as large as 22 million hectares.

In 1974 total area exploited including unplowed land was estimated at 12,167,000 hectares of which 7,330,000 hectares were cultivated annually, i.e., less than 5% of the surface of Iran. The latter figure constituted 3,336,000 hectares of irrigated farming and 3,994,000 hectares of dry farming.⁵

TABLE 4-3

Iranian Land Resources for Cultivation with Annual Rainfall
Above 100mm
(Hectares)

Land Resources	Area
Land Offering no, or only Slight Constraints	4,722,000
Land Comprising Drainage Difficulties or Problems of Salinity, Topography or Depth of Soil	4,568,000
Irrigated Land in Mountain Valley	500,000
Land with High Salt Content	2,229,000
Land Mainly Suitable for Dry Farming for Topographic Reasons	4,950,000
Total	16,969,000

Source: Iran, Plan and Budget Organisation, National Spatial Strategy Plan, First Stage Final Report, 4 Vol. (Tehran: May 1976), 2:59.

⁵Iran, Plan and Budget Organization, National Spatial Strategy Plan, First Stage Final Report, 4 Vol. (Tehran: May 1976), 2: 59 and M.L. Dewan et al., Soil Fertility and Fertilizer Trails in Iran, FAO/SF 2/IRA-MR4998612 (Rome: FAO, 1966), pp. 35-44.

The characteristic features of the land resources used for farming are following:

1. Salinity of the land is increasing as a result of the more intensive cultivation of summer crops and the replacement of underground canals by tube-wells.
2. Creation of new land by spreading silt-laden flood water is declining; off-take of water from rivers is being replaced by dams.
3. The good land is not necessarily available wherever water resources are found. In Khuzestan, the area with largest water resources available for development, the land comprises a large proportion of saline-alluvial. This fact increases the cost of production by requiring the field drainage systems to control the salt balance, and it imposes restrictions on the choice of crop.
4. One million hectares are under satisfactory irrigation. Regardless of soil or topographical constraints, the gravity irrigation is predominant. The efforts to modernize irrigation are concentrated primarily on harnessing the water resources, frequently neglecting to study how they can be most efficiently used by the recipients in individual plots of land.⁶
5. Areas used for dry farming are being extended, generally on shallow soil or steep slopes, thus tending to accelerate the irreversible process of soil erosion.
6. Expansion of the large cities, most frequently located in fertile plains, often encroaches on land with a high farming potential. Such is the case of Shiraz or Tehran.

In spite of uneven distribution of water resources between different qualities of land and some severe constraints on cultivation, land is not a constraint. In addition to many possibilities for land development, the productivity of most of the land at present cultivated

⁶Robert E. Looney, Income Distribution Policies and Economic Growth in Semi-Industrialized Countries (New York: Praeger Publishers, 1975), p. 25.

could be substantially increased. In rainfed farming areas soil and water conservation measures and associated inputs are major factors for improvement. In irrigated areas increased cropping intensities, wherever water is available, and improved irrigation management are effective for increasing production.

Rangeland Resources

Rangeland consists of all land which is neither occupied nor under cultivation by man, thus covering approximately 80% of the country, 125 million hectares.⁷

The economic importance of rangeland is far from negligible. It provides an average of 8.5 billion fodder units per annum for livestock consumption.⁸ Even if one includes the cost of improvement, fodder resources from rangeland are extremely economical. Despite seasonal and year-to-year variations, rangeland represents a plentiful source of fodder which is virtually free of charge. Meat-producing herdsmen cannot afford to ignore this potential. Extensive stock farming upgrades the gross value added of rangeland to roughly 55 billion rials which represents one-fourth of the value added for the entire agricultural sector in 1974.⁹

⁷Iran, Ministry of Agriculture and National Resources, National Cropping Plan, Final Report, 5 Vol. (Tehran: August 1975), 1: 71-79.

⁸1 Fodder Unit is Equal to 1 Kilogramme of Barley.

⁹Iran, Plan and Budget Organization, National Spatial Strategy Plan, 2: 71.

Rangeland is currently utilized under the system of common grazing land, whereby the land belongs to the Government but private individuals may use it for their own purposes with the exception of certain areas set aside for reforestation, erosion control, catchment areas, and so forth.

Depending upon varying life styles, rangeland is used either in concentric circles farming out around the dwelling places of sedentary herdsman, or in a linear pattern strung out along the available watering places used by nomadic or seasonally shifting herdsman. The former method is the more widespread one in Iran and gives rise to rapid denudation as a result of the constant levelling down of vegetation.

Additional factors leading to degradation of the plant cover and to a decline of rangeland resources are as follows:¹⁰

1. Expansion of rain-fed grain farming,
2. Depletion of ligneous plants which are used for heating and cooking,
3. Overgrazing,
4. Natural erosion of an already degraded environment.

Water Resources

In the previous sections it was seen that by and large land is not the constraint to the development of Iran's agriculture. What matters, however, is the application of water to the land. An increase

¹⁰Ibid., p. 72.

in the application to the land of a controlled supply of good quality water, which would mean an expansion in the area of well irrigated land, is the key to raising the agricultural potential of Iran.¹¹

In the past, water has been the main factor determining land use. Except on the shores of the Caspian Sea which enjoy heavy rainfall, the evolution of the rural environment can be explained primarily in terms of the availability of water resources, e.g., the setting of the vast majority of villages, is dependent on the qanat (an underground canal for water transfer) system for harnessing groundwater and not on the proximity of the best land. In regions which are arid but rich in surface water, such as Khuzestan, the river banks are the only places where the population has concentrated.

Far-reaching changes in water harnessing technology are bringing about corresponding changes in the rural environment, such as the shifting of a large number of villages to the centre of the plains, due to the replacement of qanats by tube-wells or, again, the development of a certain number of small rural centres was made possible by controlling the water supply (dams, major primary canals). It has been possible to create major urban centres in the areas with scarce water resources as a result of current long-distance water transfer capacity, pipelines and pumping stations, or of developments in techniques for desalinating salty or brackish water.

¹¹ Iran, Ministry of Agriculture and Natural Resources, National Cropping Plan, 1: 55.

These changes are made at the expense of the quality and conservation of the environment. Hydraulic tradition gave the agricultural landscape the quality it has now; the conservation of this landscape must be sought as far as possible. It is not merely a question of aesthetics, it is a question of safeguarding the country's agricultural potential. Indeed, abandonment of water control in what may be termed the marginal areas would lead in the short term to a large part of the country becoming desert.¹² The investments which have been made in hydraulics over the centuries must be maintained, otherwise their gradual disintegration will on the one hand cause the departure of rural populations whose return will be practically impossible should economic conditions demand, and on the other hand make it virtually impossible to reconstruct quickly the hydraulic potential of these areas.

Tentative Estimate of Iran's Water Resources

The distribution of water and land resources in Iran is very uneven. It is characterized by a wide dispersal of water and land utilization systems.¹³ There are for the most part (with the exception of the Northern and Western regions) sorts of oases formed by the concentration of the water resources in basins on the plains.

¹²Iran, Plan and Budget Organization, National Spatial Strategy Plan, Synthesis, p. 71.

¹³Iran, Ministry of Agriculture and Natural Resources, Water and Irrigation in Iran (Tehran: February 1968), p.8.

According to the Ministry of Energy, productive drainage basins cover only 57% of the country's area. If one concedes that, on the average, the concentration of water resources required for agricultural use is ten times that of the natural water flow, one arrives at a figure of 6% for the proportion of the land area which could in theory be irrigated, that is to say, allowing for 70% efficiency, an area of approximately 6 million hectares.

Overall water resources are greatly inferior to land resources. This conclusion which is dictated by common sense, must however be modified from region to region. Locally one finds surpluses of water allowing transfers which are not easy to implement, e.g., from Lorestan to Kermanshahan.

Overall Estimate of Water Resources

It has been attempted to establish an overall hydrological estimate for Iran with reference to the various existing documents.

The estimate of the average annual total volume of precipitation for the whole country is 335 billion cubic meters. An estimate of Iran's total water resources can be obtained by adding to the total volume precipitated, the volume of water entering Iran over its borders (frontier rivers) taking into account existing, planned, and possible sharing agreements. These imports total about 6.7 billion cubic meters per annum. Thus in an average year the total volume arriving is about 340 to 345 billion cubic meters.¹⁴

¹⁴Iran, Plan and Budget Organization, National Spatial Strategy Plan, 2: 15.

The annual average of water resources actually available is about 100 billion cubic meters per year divided as follows:

1. Direct infiltration by precipitation, 14 billion cubic meters per annum.
2. Run-off, 85.7 billion cubic meters per annum.

Direct consumption by dry-farming, rangelands and forests, not forgetting evaporation off bare earth, thus is about 242 billion cubic meters per annum.

The total volume currently harnessed in an average year is 51.2 billion cubic meters per annum. Of this 42.3 billion cubic meters are actually consumed (Table 4-4).

The estimated annual average indicates a non-utilized volume of about 57.4 billion cubic meters per annum. For economic, technical and natural reasons, it is unfortunately impossible to control all the water lost at present. A natural reason is the great irregularity of flow volumes, both during the course of a year and from year to year.

By implementing a very deliberate policy of drainage basin management, recycling, transfers, water quality improvement, it should, in the long term, be possible to harness 50 to 60% of current losses. This means that in the long term, the additional volume could be 30 to 35 billion cubic meters per annum which is equal to 80% total volume actually consumed at present.¹⁵

¹⁵Iran, Plan and Budget Organisation, National Spatial Strategy Plan, Synthesis, pp. 71-73.

TABLE 4-4
National Water Estimate for an Average Year
(Billions of cu. m. per Year)

	Surface Water	Groundwater	Total
Potential	71.1	28.6	99.7
Volume Harnessed	33.5	17.7	51.2
Volume Actually Consumed	26.9	15.4	42.3
Volume not Utilised	44.2	13.2	57.4
Additional Harnessable Volume	27	8	35

Source: Iran, Plan and Budget Organization, National Spatial Strategy Plan, Synthesis (Tehran: May 1976), p. 72.

Limitation of Agricultural Potential

Considering the climatic environment, water resources, and land resources, the agricultural potentials of Iran are limited. The areas annually cultivated, excluding rangeland cover 7.3 million hectares, i.e., less than 5% of the area of the country; total land potential to cultivate accounts only for 10% of the country's area. In most of the regions the potential has been already exploited.

Irrigated land covers only 3.5 million hectares. Taking into account water resources, the maximum area under irrigation in the long term can be estimated at 5.5 million hectares. Compared to the need, however, this extension is not very significant. The extension will generally be achieved at the expense of areas of fallow land, and by expanding farms which are part of the agricultural fabric at present.

The area occupied by the dry cultivation of cereals covers 8.5 million hectares, while the potential available without any risk of irreversible erosion occurring is estimated at less than 5 million hectares.

The limited production potential must not undermine the vitality of agricultural development in the long run future of the economy and the vast possibilities of application of new techniques and high yield varieties which in most of regions have not been yet introduced. Therefore, in addition to some unexploited land and water resources, the productivity potential in terms of land and water can transform the agricultural sector to a dynamic sector and provide most

food-stuff requirements of the economy.¹⁶

Principal Factors of Agricultural Changes in the Past

Population Explosion

The population explosion, in addition to the settling of the nomads, tripled the rural sedentary population between 1900 and 1966.¹⁷ In the last decade because of the emigration the rate of population growth has started to decline in rural areas. The rate of rural population growth which was 2.1% between 1956 and 1966 has declined to 1.1% between 1966 and 1976.¹⁸ In 1976, 17.9 million or 53.2% of total population, 33.6 million, lived in the rural areas. The number of people in families making a living principally from agriculture is estimated at 14.8 million of which 710,000 are nomads. It seems that the peak of rural population has been or is about to be reached. Various indicators show that the drift to the towns which has begun throughout the country will reach a considerable level in the coming years. The rural emigration will cause absolutely and proportionally a decrease in the rural population.

Agrarian Reform

Before the agrarian reform in 1962, the traditional farming of Iran was performed almost exclusively throughout some 55,000 villages.¹⁹ The villages which were the dominant settlement pattern in Iran not

¹⁶For a detailed discussion of this matter see Chapter V and VII below.

¹⁷For a detailed discussion of this subject see J. Bharrier, Economic Development in Iran, 1900-1970 (London: Oxford University Press, 1973).

¹⁸"Population Growth far Above World Optimum", Kayhan, Weekly International, January 8, 1977, p.7.

¹⁹Ismail Ajami, "Agricultural and Rural Development in Iran", Iran: Past, Present, and Future, ed. Jane W. Jacqz (New York: Aspen Institute for Humanistic Studies, 1976), p. 138.

only provided the organizational framework for socioeconomic and political transactions and the labor force for production, but also supplied sufficient numbers to resist both natural and human predators.²⁰ For equality of cultivation right, each cultivator would have several strips of land of different qualities scattered throughout different parts of the village domain.

The large-scale absentee landlords held about 50% of the agricultural land of the country.²¹ The large holdings were let in small subunits to tenants who farmed the lands on the basis of sharecropping or fixed rental arrangements. A major characteristic of large-scale landlordism which is known in Iran as arbabi was that the landlords not only let the land to the tenants, but in almost all cases provided water and often seed. In some cases the landowners advanced credit to their tenants and facilitated the marketing of their products. Under the arbabi system, the sharecroppers would cultivate the land individually or collectively. In collective farming, the landowner gives cultivation right to the sharecropper, but the individual cultivation rights become effective only when the tenants assume the farming responsibility as a group. The tenants in each group would pool their landholdings and tools for joint

²⁰The land tenure in Iran before the land reform is best explained in A.K.S. Lambton, Landlord and Peasant in Persia (London: Clarendon Press, 1953).

²¹Ajami, "Agricultural and Rural," p. 141. For a detailed discussion of land tenure in Iran see I. Ajami, "Transformation of Agricultural Production Structures in Iran - Before and After Land Reform," a paper presented at the FAO Inter-Regional Seminar on New Forms and Organization of Agricultural Production, Berlin, May 1974.

cultivation while still retaining their individual rights to their landholding.²²

On January 9, 1962 Council Ministers approved a cabinet decree which was later recognized as the original land reform law. The land reform was implemented in three phases: first, dividing the large estates; second, long term lease or crop sharing option; third dividing the land rented to the tenant farmers. The completion of these three phases took more than a decade. Through the land reform 7 million hectares of land were divided among 2.3 million heads of farmer families. Consequently, the small farming became the main characteristic of Iran's agriculture. The land reform covered 40 to 50 percent of agricultural land and 70 percent of Iran's total rural population.²³ But it ignored the farm laborers who constituted some 25% of the rural population.

The objectives of the land reform were stated in general terms as abolition of the existing landlord-tenant relations, emancipation of the peasants, promotion of democracy, and development of agriculture. In general, the political objective of land reform loomed larger than any economic goal. It seemed that the land reform was necessary to lessen the power of the landowners before any economic and social changes could be made.

²² Ajami, "Agricultural and Rural," p. 140.

²³ J. Safi-Nejad, Boneh: The Group Farming Systems Before Land Reform, in Persian (Tehran: Toos Publishers, 1974).

The question which is naturally raised is to what extent the Iranian land reform has been successful. Its effects cannot be easily evaluated because of insufficient data, long run effects, and value judgements. In terms of sociopolitical objectives, the reform has been successful, resulting in the transfer of land to the tenants and in the breakup of the power base of the landlords. Considering the achievement of its economic objectives, no definitive statement can be made. Although the agrarian reform changed greatly the traditional balance of rural areas, it did not provide the small farmers' needs. Consequently, they found themselves unequipped and isolated in an otherwise highly dynamic economy. In terms of agricultural production, as will be seen in the next chapters, the results are not very promising. But it would be a wrong deduction, if it was attributed directly to the land reform. In fact, the high oil income revenue facilitated the creation of new activities in services and manufacturing sectors with very high rate of profits in monetary terms. Thus it diverted the investment from traditional sectors, including agriculture, to the new activities.

The agrarian reform also shifted the political power from agriculture to the other sectors of the economy. Government influential decision makers do not have personal interest, experience, or relation to agricultural affairs. They are raised in families who make a living from bureaucracy or industry. Consequently, the agricultural sector does not have concerned representatives in economic and political decisions-making process, even in the areas which are directly related

to agriculture. The result has been the unconscious neglect of the agricultural sector relative to the other sectors in development projects or any economic decision.

The deterioration of village organizational structure has been offset to some extent by the creation of rural cooperatives. There has been a rapid expansion of rural credit cooperative societies. These societies have created a potential mechanism for active participation by peasants in economic progress. Experiments such as farm corporations and production cooperatives constitute an attempt to organize agricultural development. Nevertheless, the fact remains that this sector which is difficult to deal with, given its diversity and geographical dispersion, has largely remained untouched by progress.

Agricultural Areas

According to the dominant characteristics of the agricultural areas which are very varied, six main kinds of areas can be distinguished, newly exploited, intensively cultivated, cereal-growing, North Zagros, scattered, and marginal areas. (Table 4-5, Table 4-6 and Maps 4-1 & 4-2).²⁴

In newly exploited areas the mobilization of new resources is about to induce complete restructuring. These areas represent approximately 15% of the agricultural potential, 13% in Khuzestan alone. In 1974 their contribution to agricultural value added was only 10%.

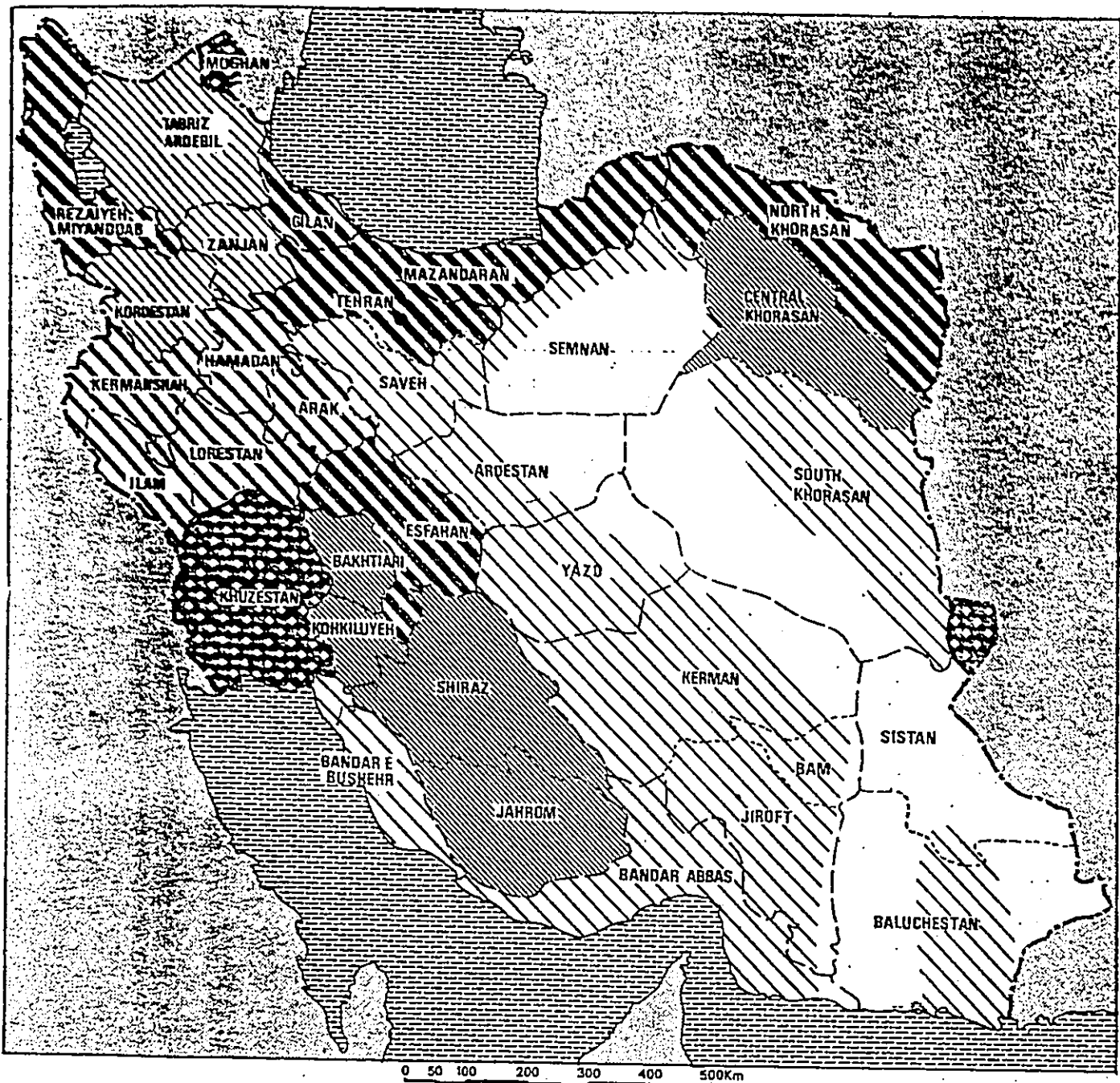
²⁴Iran, Plan and Budget Organization, National Spatial Strategy Plan, Synthesis, pp: 87-88.

TABLE 4-5

Estimates of Area and Agricultural Population in 1974

Agricultural Areas	Total Area Exploited Including Unplowed Land (Hectares)	%	Average Area Actually Cultivated Annually (Hectares)	%	Of Which			Population Living Principally From Agriculture (Persons)	%
					Irrigated Farming on Plains (Hectares)	Irrigated Mountain & Piedmont Farming Area (Hectares)	Dry Farming (Hectares)		
Newly Exploited Areas in KHUZESTAN, MOGHAN, and ZABOL	834 000	6.8	475 000	6.5	388 000	4 000	83 000	1 365 000	8.8
Intensively Cultivated Regions of TEHRAN, the CASPIAN, ES BAHAN, North KHORASAN and REZAIYEH	4 134 000	35.5	2 777 000	37.9	1 380 000	74 000	1 323 000	4 779 000	30.8
Cereal-Growing Areas of the North-West: TABRIZ, ZANJAN, KORDĒSTAN	2 342 000	19.2	1 252 000	17.1	54 000	105 000	1 093 000	2 520 000	16.3
Cultivated Areas of the North ZAGROS	2 295 000	18.9	1 299 000	17.7	303 000	72 000	924 000	2 470 000	15.9
Scattered Cultivated Areas of FARS, BAKHTIARI, KOHKI-LUTEH and Central KHORASAN	1 691 000	13.9	1 046 000	14.3	376 000	194 000	476 000	2 505 000	16.2
Marginal Cultivated Areas of the South and on the edge of the Desert	691 000	5.7	481 000	6.5	283 000	103 000	95 000	1 818 000	11.7
Total	12 167 000	100	7 330 000	100	2 784 000	552 000	3 994 000	15 457 000	100

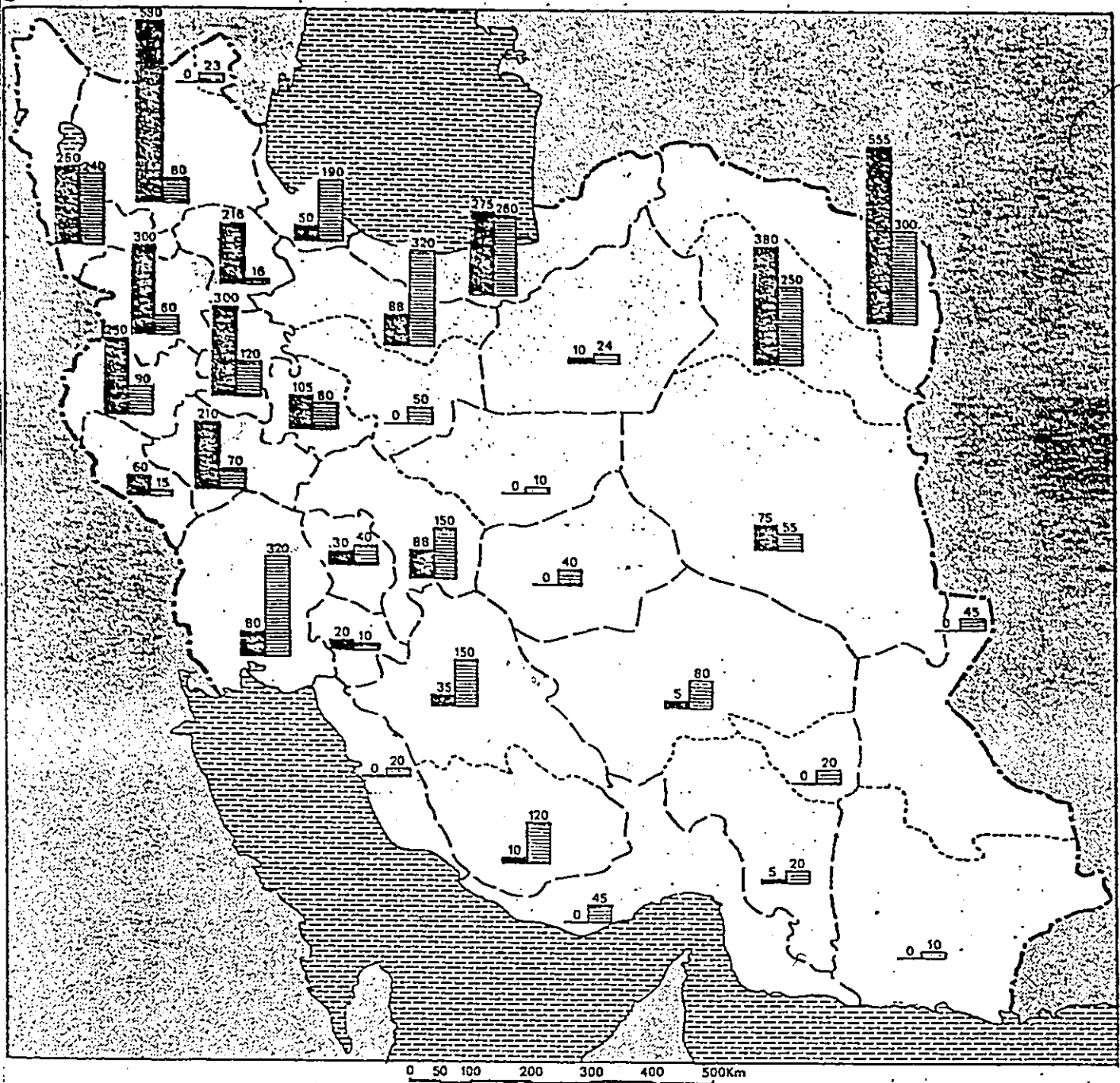
Source: Iran, Plan and Budget Organization, National Spatial Strategy Plan, First Stage Final Report, 4 Vol. (Tehran: May 1976), 2: 109.



- Legend**
- State boundaries
 - Agricultural region boundaries
 - Newly exploited areas
 - Intensive regions
 - Cultivated areas of the North Zagros
 - Regions of scattered cultivated areas in the Zagros and Central Khorasan
 - North western cereal growing zone
 - Regions of marginal cultivated areas around the desert and Southern Kavir.

Source: Iran, Plan and Budget Organization, National Spatial Strategy Plan, First Stage Final Report, Working Documents No. 1 (Tehran: May 1976), p. 21.

MAP 4-2 ----Agricultural Situation in 1974



Legend



- 1. AREA UNDER DRY CULTIVATION IN 10^3 Ha
- 2. AREA UNDER IRRIGATED CULTIVATION IN 10^3 Ha

Scale: 1 cm = 10^5 Ha x 2.

Source: Iran, Plan and Budget Organization, National Spatial Strategy Plan, First Stage Final Report, Working Documents No. 1 (Tehran: May 1976), p. 29.

TABLE 4-6

Distribution of Gross Value Added by Agricultural Regions in 1974

Major Types of Region	Value Added From:		Total Value Added		%	% of Range-land in Regional Value Added	% of Dry-Farming in Regional Value Added	% of Irrigated Farming in Regional Value Added
	Cultivated Areas	Rangeland	Million Riats	Million Riats				
Newly Exploited Areas	16,000	4,000	20,000	8.5	20	1	79	
Intensively Cultivated Regions	99,200	14,800	114,000	48.5	13	6	81	
Cereal-Growing Area of the North-West	16,800	6,900	23,700	10.1	29	39	33	
Cultivated Areas of the North Zagros,	16,500	9,300	25,800	11	36	30	34	
Scattered Cultivated Areas of the Zagros and Central Khorasan	16,200	10,300	26,500	11.3	39	10	51	
Marginal Cultivated Areas	13,800	10,800	24,600	10.5	44	3	53	
IRAN	178,500	56,100	234,600	100	24	12	64	

Source: Iran Plan and Budget Organization, National Spatial Strategy Plan, First Stage Final Report, Working Documents No. 1 (Tehran: May 1976), p. 25. Iran, Central Bank of Iran, Yearly Report from 1963 to 1975.

Note: The original figures have been adjusted. For detailed discussion of this subject see Chapter V below. According to the first source net value added was 164 billion riats and according to the second source gross value added was 303.3 billion riats.

In intensively cultivated areas large plains predominate and are heavily influenced by urbanization. They play a major role in the agricultural economy. In 1974 they accounted almost for 50% of value added; 44% of irrigated area, and 35% of dry-farming. The Caspian Sea regions, Gilan and Mazandran, alone provided 25% of national value added in 1975. Irrigated agriculture is overwhelmingly prevalent. Dry-farming plays only a negligible role.

In cereal-growing areas dry-farming and extensive animal husbandry dominate the region as a whole. Nevertheless some intensive plains are found here. In 1974 the cereal-growing areas of the North West provided 10% of the nation's agricultural value added.

In the North Zagros areas the productivity is very low, in spite of significant water resources which are badly managed. These areas are isolated in the midst of a mountain range where extensive animal husbandry and dry-farming are equally important. In 1974 their contribution to the agricultural value added was 11%.

Scattered cultivated areas are characterized by extensive animal husbandry, low-yield marginal dry-farming, and relatively isolated irrigated plains, sometimes intensive, and of medium-size, 2000 to 10,000 hectares. The scattered cultivated areas as a whole account for approximately 11% of the nation's agricultural value added in 1974.

The marginal cultivated areas are found in the regions on the edge of the central desert as well as in the southern coastal areas. In 1974 the category also accounted for 10% of the agricultural value

added. In some of these oases, Yazd, Bam and Kerman, the production is intensive, and there are serious problems of overuse of water resources and of salinity.

Prevailing Methods to Use Agricultural Resources

Irrigated Agriculture by Means of Small Hydraulic Systems

Small hydraulic systems consists of those pieces of hydro-agricultural equipment developed by the farmers during the course of time. Such systems which are major contributors to the present agricultural scene in Iran cover 70% of the area at present under irrigation (Table 4-7).

) Considering the different conditions of geomorphology, climate, rainfall, and water resources of agricultural areas, the various kinds of irrigation have been developed; mountain irrigation, irrigation on the plains, irrigation of oases.

• The mountains agriculture, and its irrigation systems, in spite of the intensive appearance in some areas, do not use efficient methods. Therefore, present agricultural techniques can be considerably improved. The irrigation system suffers from the low transport capacity and high level of unevenness of existing canals, their steep slopes, and too much loss of water by seepage. The major criticism that can be made is the wastefulness of the irrigation system both in the canal and off the individual plot, wherever water is available. This seepage water can, it is true, be recovered further downstream, but it is lost to the

TABLE 4-7
Distribution of Irrigated Agricultural Areas
by Production System in 1974
(1,000 Hectares)

Type of Irrigation	Area, Actually Cultivated	%
Small Hydraulic Systems	2293	68.7
- Mountain	(452)	(13.5)
- Plain	(1,740)	(52.2)
- Oases	(101)	(3.0)
Poles and Major Irrigated Areas	1,043	31.3
Total	3336	100

Source: Iran, Plan and Budget Organization, National Spatial Strategy Plan, First Stage Final Report, Working Documents No. 2 (Tehran: May 1976), p. 37.

farmers on the land where it operates.²⁵

The irrigation on the plains is the one that has developed most in recent years. It is here that the transformation of traditional agriculture began. It is on the great plains that for the first time surface water was collected using pumps. It is on the plains that at present the first impermeable canals are being built. Nevertheless, this type of land shows most strongly the lack of an overall policy which is necessary for optimum use of all water and soil resources. The distribution network is for the most part made of earth, with the same disadvantages as the mountain irrigation system. The major disadvantage is the low transport capacity which on the plains becomes critical as the slope of the land is often zero. Water losses in the canals are lower as the soil is less permeable. However, as the length of these canals are greater than those on the other types of land, the volume of water lost still remains above the acceptable level. These losses are often definitive, as downstream of these plains the water supply is degraded beyond worth by salt content or by losses to the desert.²⁶

Oases agriculture has developed in parts where the natural elements are the most hostile to human habitation. In 90% of oases ground water represents the only source of irrigation. The form of

²⁵Iran, Plan and Budget Organization, National Spatial Strategy Plan, First Stage Final Report, Working Documents, No. 2 (Tehran: May 1976) pp. 37-38.

²⁶Iran, Plan and Budget Organization, Water and Irrigation in Iran (Tehran: February 1968).

agriculture the oases have today is the result of a development linked to the various possibilities the farmers have found for harnessing and using the water. The isolation of cultivated fields behind walls, the inextricable networks of canals, and the garden-type of agriculture with multi-level crops paralyse this type of land to the point where it is virtually impossible to make it develop as a whole. The only possibility for development is in the frame of existing fields and irrigation networks.

Development Poles and Major Irrigated Areas

At the present these areas represent almost 30% of the total area effectively irrigated on average during the year (Table 4-5). The location of these areas shows that they concern mainly the development of intensive regions (more than 50%) and the newly exploited areas, Khuzestan, Moghan and Zabol.²⁷

The areas are enjoying the financial and technical aids of government and are using the new technology for farm irrigation. Nevertheless this system of irrigation has its own problems.

1. The intervention of the standard bureaucratic and centralized government organization.
2. The concentration on the ground water table and the neglect of the possibilities for improving the mobilization of surface water other than by constructing large dams.

²⁷ Iran, Plan and Budget Organization, Dam Construction in Iran, (Tehran: January 1969), pp. 16-18.

3. High importance for the production of hydraulic energy.
4. Insufficiency of networks.
5. Inflexibility in the face of technical innovations.
6. A timid tariff setting policy encourages wastage of water.

Dry-Farming

Dry-farming contributes nearly 10% of agricultural value added and 40% of total cereal output. It represents 4 million hectares or 54% of total actually cultivated area. Wheat and to a lesser extent barley occupy almost all of the dry farmed land.

The natural factors which affect yields are rainfall, temperature, numbers of days of frost, the fertility and salt content of soil, relief, and topography.

The yield ranges between 0.3 to 2 tons/hectare. It is 0.8-1 tons/hectare in 72% of dry-farming area, in comparison with 2.3 tons in the United States (Table 4-8).

The dry-farming methods are often rudimentary, even if they are becoming increasingly mechanized. A similar remark can be made as regards sowing. Fertilizers are rarely used.²⁸ It is true that they have little or no effect when rainfall is below 350mm.

In marginal areas where the yields obtained are low, 300-600 kg/hectare, and agricultural production takes on an element of risk, one might believe that with the increase in the standard of living and

²⁸ A. Mudra, Report on Wheat and Barley Breeding in Iran (Tehran: FAO, 1964), pp. 5-7.

the migration of rural population, marginal cereal-growing would be on the decrease. In fact this is not true, everything possible is farmed even beyond the bounds of the seemingly reasonable assumption.

Rangeland

Rangeland constitutes an important resource whose exploitation provides 20-25% of agricultural value added.²⁹ This is not counting the utilization of fallows, hay and stubble, and other various by-products used in conjunction with natural resources to feed the herd. Rangeland covers approximately 125 million hectares including forests and deserts. It provides 8.5 billion fodder units in an average year and makes up 60% of extensive animal husbandry consumption.

General aspects and the features of rangeland of Iran were discussed in the section of natural potential in agriculture. Here the problem of extensive husbandry which is closely related to the rangeland exploitation is explained.

At present, extensive animal husbandry production supplies 70% of red meat consumption and 65% of dairy product consumption for Iran. Its productivity is very low and is viewed as a crumb-eater grazing on stubble fallow which otherwise would not be used. Not well nourished during the whole year and badly nourished for a portion of it, animal husbandry cannot guarantee high production and so is not worth improving.³⁰ Improvement of feed should enable extensive animal husbandry to get out of this vicious circle of low production and under nutrition. But in fact it faces the strong competition or even

²⁹Iran, Plan and Budget Organization, National Spatial Strategy Plan, 2: 161.

³⁰C.K. Pearce, Working Plans of the Pasture and Fodder Crop Investigations. U.N. Special Fund Report (Tehran: FAO 1967), pp. 10-19.

elimination in the most favourable areas by apparently more profitable propositions, e.g., sugar beet and vegetable crops. To break the vicious circle, there is a need to increase the price of meat which is controlled by the government; this in turn raises the question of priority for husbandry or cultivated products which is a national decision, given the limited agricultural potential.

Including unfavourable conditions of market and prices for husbandry products there are some other problems such as small size of herds, the lack of suitable association between livestock farmers, land control, and erosion which require considerable attention to adopt the relevant policy in the framework of the national economy.³¹

Low Productivity

The result of the present production situation is low productivity of land. In the case of wheat, dry-farming yield is only 420 kg/hectare and irrigated farming yield is 1,300 kg/hectare. The figures are far below the yields of other countries. The average yields are 2,300 and 4,400 kg/hectare in the U.S. and England respectively (Table 4-8).

Important Role of Marginal Areas

The proportion of value added which comes from the exploitation of marginal resources including rangeland, is estimated at 1/3 of total agricultural value added. Marginal resources are those resources the exploitation of which is barely profitable and those which make up small and isolated cultivated areas. They cover approximately 30% of

³¹Iran, Statistical Center, Agricultural Census 1971 (Tehran: January 1973), pp. 55-60.

TABLE 4-8

Comparison of Yields for Wheat and Rice Between Iran and Other Countries 1971
(kg/hectares)

Country	Wheat	Rice
Iran	800	2550
England	4400	-
U.S.	2300	5200
Canada	1850	-
Egypt	3050	-
India	1300	1700
Pakistan	1100	1600
World	1050	2300

Source: Monthly Bulletin of Agricultural Economics and Statistics
(December 1974) p. 31, for all countries but Iran.

Iran, Statistical Center, Agricultural Census 1971, (Tehran:
January 1973), p. 44, for Iran.

the area under cultivation. They provide almost 20% of the added value of intensive regions and more than 60% of the cultivated areas of the North Zagros.³²

Marginal resources constitute a large amount of capital, particularly for the production of red meat and cereals. A means of conserving these resources is thus indispensable as a means of reducing the country's food deficit. It is clear that this impression of marginality due to the isolation and gap in incomes will be felt more and more strongly by the farmers. This is so because:

1. Almost 30% of the agricultural population normally live in very isolated villages of less than 250 inhabitants.
2. 45% of the agricultural population live in mountainous areas, dry-farming areas or on rangeland, i.e., in conditions which are more often not marginal.
3. The persistent gap between agricultural income and average national income is rising.

Structural Problems

Small Farms

In all areas the system of small farms is in the majority. It produced more than 70% of the agricultural value added in 1974. The small farming sector is to a large extent the result of agrarian reform.

³²Iran, Plan and Budget Organization, National Spatial Strategy Plan, 2: 14.

It is estimated that 2.3 million families benefited from agrarian reform with the distribution of 7 million hectares of land. These figures do not include the land which was already in the hands of small farmers. The average farm size in all areas, irrigated and rainfed, is 6.1 hectares. 38% of farming land is less than 10 hectares but this represents 84% of the number of holdings (Table 4-9).

TABLE 4-9
National Farm Size Distribution 1972

Size Group Hectares	% Total Area	% Total Irrigated	No. of Holdings	%	Average Farm Size Hectares
1	2.0	4.3	801,000	31.0	0.4
1-2	3.2	5.6	342,000	13.5	1.4
2-5	11.8	14.4	545,000	21.5	3.3
5-10	20.7	18.2	434,000	17.1	7.3
10-50	45.9	33.2	394,000	15.6	17.9
50-100	4.6	5.4	10,000	0.4	70.3
100	11.8	18.9	7,000	0.3	258.7
Total	100	100	2,533,000	100	6.1

Source: Iran, Statistical Center, Yearly Report 1973 (Tehran: 1976), p. 188.

Note: Total agricultural land is different from the figure adopted in this report.

The technical skill of the farmers is inadequate in most regions. However, the most frequent stumbling block is inadequate infrastructure. Traditional irrigation systems are built on small plots of land unsuited to mechanized soil preparation.

In spite of low and poor average yield, 1,500-1,800 kg/hectare for irrigated wheat and 20 tons/hectare for beets, it is noteworthy that the small holdings are capable of yielding excellent results provided there is a long standing agricultural tradition fostering dissemination of technological advances. This producers' achievement is admittedly with traditional, but nevertheless relatively well adapted methods. For example, in Esfahan small farms produce 50 tons of beets per hectare; or in Yazd, under hostile agricultural conditions, the smallholders produce 4 tons of irrigated wheat per hectare.³³

Farm Corporations

These were designed to facilitate the implementation of a policy of investment and technical assistance. The corporations are intended to overcome the problems of property fragmentation, land investment, mechanical equipment, and crop specialization.³⁴ In 1975 there were 85 farm corporations occupying a total area of 320,000 hectares of which 154,000 hectares were actually under cultivation.³⁵

³³Iran, Plan and Budget Organization, National Spatial Strategy Plan, Working Documents, No. 2, p. 108.

³⁴Iran, Ministry of Agrarian Reform and Rural Cooperatives, Ten Years After Agrarian Reform (Tehran: 1971), Without page numbers.

³⁵Iran, Central Bank of Iran. Yearly Report 1975, written in Persian (Tehran: 1976), p. 86.

One could expect remarkable performance if in a traditional village, without any fundamental restructuring or any collectivization, one has a service and technical assistance co-operative with 3 tractors at its disposal for every 450 hectares and managed by 3 technical officers and 3 other officers with multiple functions at the accountant level, but the results of farm corporations, as far as one can ascertain, are not remarkable. Irrigated cereal yields are usually in the order of 2 tons/hectare; beetroot yields are a miserable 10-15 tons/hectare. This can be explained by the disinterest of the farmers, overcollective management, excessive centralization, disappearance of individual initiative, and finally amalgamation of village communities into over large structures.

The main effect of increasing the size of plots is to economize on manpower which is not a desirable aim and to reduce the working time for mechanical equipment which is worthwhile but constitutes quite a minor objective. The farm corporations do not offset the tendency to leave the land; the tendency which grows stronger as soon as the direct link which joins the farmer to his land disappears. The farm corporations may solve specific problems but it obviously does not constitute a generally applicable solution.

Production Co-operatives

Production co-operatives, numbering 34 in 1975, were responsible for farming approximately 45,000 hectares, of which 25,000 were actually under cultivation.³⁶

³⁶ Ibid., pp. 85-86.

The system is a variation on the farm corporations and was designed to be more flexible and less centralized. In principle the individual's right to work the land is maintained, but organizing the land into groups should make it possible to carry out joint farming of areas of at least 20 hectares.

The system will reproduce a smaller version of farm corporation conditions. Individual initiative will indeed be less diluted and the interests of participants less antagonistic than in an association of too many farmers.

Agro-Businesses

Agro-businesses have developed primarily in Khuzestan, a newly exploited area. The heavily production oriented programmes of the ministry of agriculture propose the creation of units covering large surface areas.³⁷ Their functions are to encourage rapid and intensive exploitation. In 1975, in Khuzestan 100,000 hectares were assigned and 30,000 hectares actually cultivated.

Whereas the system should enable high yield, the rate of development has been slower and the production costs higher than expected. The level of intensity is usually satisfactory, 40,000 rials per hectare. These performances are not exceptional, they are of the same magnitude as those obtained by small farms in the Esfahan region which plant major crops by using labor intensive methods. Agro-businesses carry out

³⁷ Iran, Ministry of Water and Power, The Law for Establishment of Companies for Utilization of Lands Downstream (Tehran: n.d.), p. 1-3.

highly mechanised farming and they employ only one person per 25 to 30 hectares.³⁸

Density of Agricultural Population, Under-Employment, and Poverty

The density of agricultural population is very high, 3.3 inhabitants/hectare (1 irrigated hectare is taken equal to 3 dry-farmed hectares).

The extent of this agricultural population density is also characterized by under-employment. In family based agriculture where the family takes part in work during the peak periods, the work force can be estimated at 300 days/year per family which is a minimum, even taking into account the irregularity of agricultural work. The average employment rate in Iran is only 140 days/family (Table 4-10).

Income levels from agriculture are very low and differences are equally high. In 1974 the national average was only 15,200 rials which was 1/6 of per capita of gross domestic products, 9,500 rials or 1,350 dollars (Table 4-10).

Given the level of under-employment and the poverty of the agricultural milieu, the tendency to move from the land will become very strong as soon as a town becomes a center of attraction or a fundamental reorganization upsets the traditional balance of a village.

³⁸Iran, Plan and Budget Organization, National Spatial Strategy Plan, 2: 166-67.

TABLE 4-10

Agricultural Population Employed and Value Added Per Capita in 1974

	Estimated Agricultural Population in 1000's	Population per Irrigated Hectare or Equivalent	Average Employment per Family Days/Year	Value Added Million Rials	Average Per Capita Value Added Rials
Newly Exploited Areas	1,365	3.2	100	20,000	14,650
Intensively Cultivated Areas	4,779	2.5	184	114,000	23,850
Cereal-Growing Areas of the North West	2,520	4.8	112	23,700	9,400
Cultivated Areas of the North Zagres	2,470	3.6	133	25,800	10,400
Scattered Cultivation Areas	2,505	4.8	126	26,500	10,600
Marginal Cultivated Areas	1,818	3.4	120	24,600	13,550
Iran	15,457	3.3	140	234,600	15,200

Source: See Tables 4-6 and 4-7.

CHAPTER V

PATTERNS OF SUPPLY AND DEMAND FOR AGRICULTURAL PRODUCTS

Demand and supply of agricultural products, either in aggregate forms or in terms of different items of foodstuffs, reflect the final consequences of the decision-making process by all economic agents involved in the agricultural sector.

The present patterns of supply and demand for agricultural products and their possible future changes can illustrate to a high degree the significance of agriculture in the economy of Iran and consequently determine partially the guidelines of economic policies required to develop the sector. Chapter V is devoted to explain the present production and consumption of agricultural products, and to estimate their future patterns.

Supply of Agricultural Products

Present Production

According to the official figures the gross value added of the agricultural sector in current prices has increased from 98 billion rials in 1963 to 401 billion rials in 1976. In terms of 1959 prices the corresponding figures are estimated at 90 and 171 billion rials respectively.² These figures show that agricultural value added has

¹ 70 rials are equal to 1 American dollar.

² Iran, Central Bank of Iran, Yearly Report, from 1963 to 1976.

been growing annually at the rate of approximately 5% in the years of 1963-1976.

During 1962-72 the annual growth rate of food production in the world has been 2.7%. In Eastern Europe and USSR which enjoyed the highest rate among different groups of countries the rate has been only 3.5%.³ Considering these figures, it would be surprising to assert that the agricultural sector of Iran with such a high rate of growth, 5% is lagging far behind the other economic sectors and the country is importing large and increasing amounts of food-stuffs each year.

To determine the reasons for the above contradiction it is noted:

Firstly, during 1963-76 per capita income increased annually by 8% and population by 2.7%. Taking into account the level of per capita income of 1963, approximately 200 dollars, and consequently the high income elasticity of food-stuffs, estimated at 0.5,⁴ the food consumption could be increased by 6.7%. The difference between 5%, unadjusted annual growth rate of production, and 6.7% annual growth rate of consumption had to be imported.

Secondly, comparing annual consumption and supply of agricultural products reveals that the domestic food production has been overestimated in the last few years. Adjusted figures show only 2.2% annual average rate of growth in the years 1963-75 (Table 5-1). Some sources estimate

³ Joseph W. Willett, ed., The World Food Situation, Problems and Prospects to 1985 (New York: Oceana Publications, 1976), p. 635.

⁴ John W. Mellor, The Economics of Agricultural Development (Ithaca: Cornell University Press, 1966), p. 78. A tentative estimate for Iran is 0.45, in aggregate. Mojtaba Zamani Farahani, "Agricultural Value Added of Iran in 1963-1974" written in Persian (M.Sc. dissertation, University of Tehran, 1976), p. 248.

the rate of growth for agricultural products at 2.5-3.5% per annum.⁵

Table 5-1 shows the changes of main variables of the supply of agricultural products in three periods - the Third Development Plan, the Fourth Development Plan, and a part of the Fifth Development Plan. As could be seen, during the 1973-75 agricultural products have remained constant in comparison with the average year in period 1968-72, but during 1963-75 it increased by 2.2% per year. The ratio of agricultural imports to production has increased from 6.5% in the period 1963-67 to 36% in the period 1973-75. Agricultural value added in Iran consists of four subsectors. Crop farming products contribute nearly 2/3 of total value added. The share of husbandry products is 1/3. The two other subsectors, forestry and fishery, have negligible shares (Table 5-2). Production of different agricultural output has been presented in Table 5-3. The main agricultural products are grains, cotton, sugar cane, and sugar beet which according to unadjusted data have increased substantially in the past decade.

Supply Adjustments

In the past few years, 1970-75, in spite of constant increases in agricultural production, Iran has been importing large amounts of different agricultural products which may be explained partly by a sharp increase of food consumption (Table 5-4). But the increase, even when taking into account the growth of income and population and other

⁵Iran, Plan and Budget Organization, Evaluation of Agricultural Sector in the Past Development Plans (Tehran: January 1976), p. 1.

relevant factors, is not consistent with the long run trend of food consumption and consumers' behaviour. For the period 1973-75, it seems that the figures for agricultural products have been overestimated. Therefore, to use the available data for forecasting purpose, adjustments have to be made by applying some indices of the agricultural sector.

In order to study the long run trend of food consumption, aggregate food supply was estimated by adding domestic products to the agricultural imports and subtracting the agricultural exports. From 1956 to 1963, the period of the Second Development Plan, food supply was increasing at the rate of population growth, 3% per annum; the per capita income was constant and the economy was just able to maintain the prevailing standard of living.⁶ During this period food imports were about 5 billion rials per annum in current prices which was almost equal to the surplus of some agricultural products being exported. Therefore, it may be concluded that the agricultural production was increasing by 3% per year during 1956-63.

After 1963 the economy began to grow rapidly. The high growth rate caused an increasing demand for all goods and services including agricultural products. As a result of a shortage for some food items, the agricultural imports increased by 24% per annum to satisfy the needs of growing population, 2.7%, and the higher standard of living.

⁶M. Khataie, "Economic Transformation of Iran 1955-62," written in Persian (M. Sc. dissertation, University of Tehran, 1974), pp. 223-44.

TABLE 5-1
Agricultural Products, Imports, Exports, and Supply at 1959 Prices
1963-1975
(Billion Rials)

	(1) 1963-67	(2) 1968-72	(3) 1973-75	Growth Rate Between Period 1&3
1. Agricultural Production	99	126	120	2.2
2. Agricultural Imports	6.5	8	44.5	24
3. Agricultural Exports	7	10	11	5
4. Agricultural Supply (1+2-3)	98.5	124	159.5	5.5
5. Population (millions)	25	28.5	31.9	2.7
6. Per Capita Agricultural Supply in Rials	3940	4350	4940	2.5
7. Per Capita Gross Agricultural Supply in Dollars	56	62	71	2.5
8. Agricultural Imports as a Percentage of Agricultural Production	6.5	6.5	36	--

Source: Compiled from different government publications.

Note: The figures have been adjusted. To solve the problem of weather effects and storage, average year was calculated.

TABLE 5-2
Distribution of Agricultural Value Added in 1975

Sub-Sectors	Percentage
Crop Farming	62.6
Husbandry	34.5
Fishery	2.4
Forestry	0.5
Total	100

Source: Iran, Central Bank of Iran, Yearly Report, 1975, written in Persian (Tehran: 1976) p. 27.

TABLE 5-3
Unadjusted Agricultural Products
(Thousand Tons)

Products	1 1963-67	2 1968-72	3 1973-75	Changes Between Periods 1 & 3
Wheat	3,120	4,200	4,930	58
Barley	900	1,070	1,060	18
Rice (paddy)	840	1,060	1,360	62
Cotton (unginned)	380	500	600	58
Sugar-Beet	1,750	3,520	4,400	151
Sugar-Cane	350	570	1,080	184
Oil Seeds ^a	--	40	75	--
Tobacco	20	20	15	25
Tea (leaves)	55	80	90	64
Red-Meat	260	360	480	85
Poultry	25	50	100	300
Eggs	50	65	95	90
Dairy (milk or its equivalent)	1,620	1,920	2,300	42
Fish ^b	--	--	25	--

Source: Compiled from different government publications.

a: Cultivation of oil seeds began in 1967.

b: There is no figure for fishery before 1971.

TABLE 5-4

Agricultural Imports

1971-1975

(Thousand Tons)

Products	1971	1972	1973	1974	1975	Average 1971-1975
Wheat	990	770	780	1,430	1,440	1,070
Barley	190	20	110	180	200	140
Rice	60	90	12	190	280	125
Corn	60	70	130	220	150	125
Sugar (refined)	90	160	290	220	600	270
Oil, (vegetable)	105	145	110	225	220	160
Tea (dry)	7	9	9	13	14	11
Red-Meat	7	8	9	25	55	21

Source: Iran, Central Bank of Iran, Yearly Report 1975, written in Persian (Tehran: 1976), p. 197.

To adjust the 1973-75 figures for agricultural production, the period of 1963-75 was divided into two sub-periods, 1963-72 and 1973-75.

The income elasticity of food consumption was estimated at 0.35 for 1963-72. For the period of 1973-75, according to the unadjusted production figures there was a jump in food consumption and it grew at a rate approximately equal to the growth rate of per capita income implying that the income elasticity of food consumption was 1.

Considering the increase in per capita income, the increase of income elasticity of food consumption does not represent the expected rational consumer behaviour, but it represents the inconsistency of the available data which indicates that consumers with higher incomes spend a higher percentage of their incomes on food expenditures.

To overcome the difficulty and to adjust the 1973-75 data, it is assumed that consumers, in spite of higher levels of income, have raised their food expenditures in a manner which accords with the past trend, i.e., they have spent 35% of their income increases on food consumption. Moreover it is assumed that in the first period 1963-72 the consumers have not substantially raised their consumption because of the permanency of consumption habits and consequently the effects of the earlier income increases have appeared in the second period, 1973-75. Using the consumer budget survey, 0.45 has been taken as income elasticity for food consumption in the period 1973-75.⁷

⁷Mojtaba Zamani Farahani, "Agricultural Value Added of Iran in 1963-74," p. 246.

Food consumption was estimated by using per capita income increase and income elasticity of food consumption. Addition of agricultural exports, and the subtraction of agricultural imports from the food consumption determined the domestic agricultural production. The average estimated agricultural production for the period 1973-75 was 124 billion rials in constant 1959 prices which is 23% less than the unadjusted figures. This can be interpreted, in comparison with the 126 billion rials average production of 1968-72, as the constancy of agricultural production or even an increasing negative rate of growth in recent years.

The above adjustment method was checked by the use of the following econometric model:

1) $SIP = DIP + XIP - MIP$

2) $DIP = N * D1NP$

3) $D1NP = 0.8881 + \frac{1.1369}{11.9} \log(YD1NP)$
3.2

NDF=8 SEE=0.074 $R^2=0.934$ DW=2.38

SIP Agricultural Production

DIP Food Consumption

XIP Agricultural Exports

MIP Agricultural Imports

N Population

D1NP Per Capita Food Consumption

YD1NP Per Capita Gross Domestic Products excluding oil sector.

Per capita food consumption is assumed as a log function of per capita gross domestic nonoil product. The coefficients of equations 3 were estimated by the use of 1963-72. YD1NP is treated exogenously for

the period 1973-75 by which D1NP is estimated. Multiplying per capita food consumption by population, N, gives the aggregate food consumption. Addition of agricultural exports, and subtraction of agricultural imports from the aggregate food consumption determine the agricultural production in the years 1973-75. The estimated average figure for the years 1973-75 in this method is 120 billion rials. The latter figure has been used in the building of the econometric model explained in the Chapter VI.

Production Prediction

With respect to the dependency of agricultural production on the weather conditions, likely structural changes, implementation of several infrastructural projects, and different probable economic policies, any prediction of agricultural production would be very tentative.

Two methods have been used to predict the supply of agricultural production in 1992, the end of the Eighth Development Plan and the time of the sharp reduction in oil exports.

Method I

In this method the past trend, 2.2% annual rate of growth, is used to estimate the future supply. It is implicitly assumed that there will not be any major structural change and a combination of introducing new technology and development of the area under cultivation in a manner similar to the past will cause a higher level of production (Table 5-5). Regardless of the results, the method does not seem to

be justified in the dynamic economy of Iran. As it was shown there is a rapid transformation in all non-agricultural sectors at the same time that the agricultural sector is facing relative neglect. Therefore it will be far from reality to assume that the trend of the past 13 years will continue on a smooth path. As evidence, in the past years there has been a constancy or even a reduction in the agricultural production. Thus it can be concluded that the real trend represents a constancy of agricultural production or some reduction the extent of which is a matter of value judgement and the possibility for the economy to import its food requirements.

Method II

In this method production is estimated by considering the potential of Iran to develop her agricultural sector, provided certain economic policies may be implemented. Sooner or later the planners should make their decision to develop the agricultural sector on the basis of several economic, social and natural reasons. The timing of these decisions is of crucial importance for the whole future development of the economy. The necessity to develop the agricultural sector is discussed in every detail in Chapter VI.

Method II assumes first, that the actually cultivated area will increase by 1.5% per annum up to 1992, 3% for the period 1974-92.⁸ Regarding the soil and water resources of the country, it is not a very ambitious plan. The present irrigated farming amounts to 3.3 million

⁸The figures are in accordance with the two technical studies by Iranian government, i.e., Iran, Plan and Budget Organization, National Spatial Strategy Plan, 4 Vol. and 8 Working Documents (Tehran: May 1976) and Iran, Ministry of Agriculture and Natural Resources, National Cropping Plan, Final Report, 5 Vol. (Tehran: August 1975).

hectares and there are possibilities for this to be increased to 5.5 million hectares. This can be done through development of some new areas and decrease of the annual fallow in the present farming areas.

Second, the productivity of agricultural land will increase 3% per annum, or 70% for the period 1974-92. Considering the present low level of yields per hectare; the differences of yields between different areas in Iran, even in traditional agriculture, which in some cases is more than 150%; and the possibilities of the advanced agricultural technology and irrigation methods which have not been extensively used in Iran, the proposed rate for productivity increase is not again very ambitious. It is possible but it certainly needs economic and social policies which will be discussed partly in the final chapter.

The result of Method II shows an increase of 123% in agricultural production by 1992 or 4.55% per annum (Table 5-5).

Demand for Agricultural Products.

Present Consumption

Estimates of present aggregate food consumption were derived in the previous section (Table 5-1). Here consumption of different food items are estimated by the use of production and foreign trade figures and consumption surveys.

In the first estimate, present annual consumption is equated with national average annual production, less exports, plus imports, after making allowances for seed retention and wastage. Average

TABLE 5-5

Prediction of Agricultural Production
At 1975 Prices
(Billion Rials)

Year	(1) ^a Average 1963-67	(2) ^a Average 1968-72	(3) ^a Average 1973-75	(4) 1982	(5) 1987	(6) 1992	(7) Change Between Period 3 and 5%
Method I	208	264	252	300	334	373	48
Method II	208	264	252	360	450	561	123

a: The figures for the first 3 periods are actual figures. See Table 5-1.

statistics are used in order to eliminate the effect of year-to-year storage and fluctuations in domestic production. Account was taken of the adjustments of figures discussed in the supply section.

In the second estimate, the primary source of the data is the consumption survey undertaken by the Statistical Center in 1971.

Table 5-6 compares the estimates of consumption based on the statistics of national production and foreign trade with those based on the consumption surveys. There are wide discrepancies between the two estimates for vegetables and mutton and to a lesser extent for wheat and rice consumption.

Consumption Prediction by Food Items

In the light of the likely rate of growth of population and projected change of per capita income, an estimate is made of future demand for agricultural products.

Given the relevant variables - income, population, and rural migration - it could be possible to draw up a trend for each item of food consumption, but it was by no means certain, however, that the past trends would in fact continue. A continued increase in the relative price of meat, for example, could slow down the rate of increase in the demand for it. The pattern of demand for food can also be affected by the teachings of nutritionists as well as by the extent to which those teachings are taken into account by governments in the welfare and educational programmes, e.g., the substitution of vegetable protein for meat protein. Moreover the available time series data are not

TABLE 5-6

Estimates of Human Agricultural Products Consumption in 1975

Agricultural Products	National Consumption, 000 tons		Per Capita Consumption	
	Consumption Survey	Production & Import Statistics	Consumption Survey	Kg. Production & Import Statistics
Wheat	4,340	5,000	132.2	152.4
Rice (paddy)	1,320	1,500	40.2	45.8
Vegetable Oil	230	190	7.1	5.9
Fruit ^a	1,640	1,845	50	56.3
Vegetables ^b	1,370	1,860	41.8	56.7
Pulses	300	180	9.1	5.4
Sugar (refined)	960	980	29.3	29.8
Tea (dry)	54	35	1.7	1.1
Mutton	410	230	12.5	7
Beef	120	120	3.7	3.7
Poultry	80	65	2.4	2
Milk Products	2,940	2,470	89.6	75.2
Eggs	80	80	2.4	2.4
Barley	---	240	---	7.3
Cotton (unginned)	---	216	---	6.8
Tobacco	---	20	---	0.6
Potato	---	310	---	9.3

Source: Consumption survey figures have been estimated mainly by the use of Iran, Statistical Center, Statistical Year Book of Iran 1973 (Tehran: June 1976), pp. 451-53. The production and import statistics have been compiled from different government publications.

Note: Animal feed, seed, and wastage are not included.

a : Includes nuts

b : Excludes potatoes and includes cucurbits.

sufficient or reliable for use for prediction of demand for food items.

In these circumstances it seems desirable to consider alternative patterns of demand (Table 5-7). The alternatives are set out below; each are based on the assumption that a balanced diet is expected. However, the aggregate food consumption will be taken as a function of per capita income and population. Therefore the estimates of food items are only tentative and could be used to check the aggregate food consumption.

TABLE 5-7
Comparison of Nutritive Intakes of Different Diets
(Per Capita Per Day)

Cases	Calories	Total Protein
Case I Low	2500	70
Case II Medium	2800	85
Case III High	3300	94
United States 1972	3330	106
France 1972	3210	105
United Kingdom 1972	3190	92
Iran	2268	15.9
Mean Physiological Requirements	2322	60

Source: Iran, Plan and Budget Organization, National Cropping Plan, Final Report, 5 Vol. (Tehran: August 1975), I: 23-24.

Case I would be in excess of physiological requirements, but is postulated in order to allow for some increase from present levels of animal protein consumption in response to increased incomes. It could be regarded as a minimum objective for domestic production.

Case II assume a greater increase in the demand for animal protein in the diet, stemming from increased incomes but also affected by expected price trends and changing nutritional policies.

Case III is assuming a combination of likely income and population levels with a continuation of past trends in the pattern of demand. It assumes no change in the relative prices of individual products or relevant government policies. It represents a diet similar to the present diets of developed countries.

When these cases are compared with the present consumption, it will be seen that even the low case I represents substantial increases in consumption.

Clearly the total number of calories or amount of protein could in each case be met in different ways. For example, calories could come from wheat, rice or sugar. Animal protein could come either from red meat or white meat (Table 5-8).

In case I, the intake of wheat is decreased and that of animal products is increased in order not to exceed the total protein figure of about 70 grammes. To maintain the calorie consumption at 2,500 increases are made in the intakes of sugar and oil. In practice the public is more likely, at this level of diet, to maintain their wheat

TABLE 5-8

Nutritive Content of the Main Food

Food Items	Calories per 100 Grammes	Protein Per Cent
<u>Crop Products</u>		
Wheat	312	10.4
Rice (milled)	360	6.7
Vegetable oil	716	0.6
Fruit	35	0.6
Vegetables	22	1.4
Potatoes	70	1.7
Pulses	345	23.0
Sugar (refined)	387	--
<u>Animal Products</u>		
Lamb	241	11.9
Beef	225	14.7
Poultry	129	12.0
Milk products	82	3.2
Eggs	144	11.0
Fish	69	11.5

Source: Iran, Plan and Budget Organization, National Cropping Plan Final Report, 5 Vol. (Tehran: August 1975), 1:28.

or bread intake while raising their intake of animal protein.

In Case II the diet is richer in protein because of the assumption of higher incomes. The consumption of bread may well decrease slightly, while the consumption of fruit and vegetables is likely to be considerably increased.

For the purpose of prediction of demand for agricultural products the three cases have to be translated into the relevant requirements for agricultural products. This is done in two steps. First, the national consumption corresponding to cases I, II and III are derived by multiplying the per capita consumption by the projected population of 48 millions in 1992. Second, adjustments are made for wastage and seed retention to derive the national requirements of agricultural products (Table 5-9).

The choice of even the medium forecast postulates substantial increases in aggregate agricultural requirements in 1992, compared with present food consumption. Increases range from 33% in the case of wheat to 328% in the case of poultry and eggs combined (Table 5-10). However the presented forecast of the needs of agricultural products are affected substantially by the critical variables that influence the long term demand, namely population growth, increase in per capita income, and rural migration. These factors have been taken into account in the estimate of aggregate food consumption.

TABLE 5-9
Alternative Gross Requirement Projections
for Agricultural Products at 1992
(Thousand Tons)

	Case I Low	Case II Medium	Case III High
Wheat	6,410	6,630	7,580
Rice (paddy)	1,910	2,350	2,350
Oil Seeds ^a	1,430	1,760	1,810
Fruit	3,660	4,770	5,770
Vegetables	2,810	4,160	4,640
Pulses	390	390	515
Sugar (refined)	1,670	1,670	1,900
Potatoes	770	1,640	1,640
Cotton (unginned) ^b	820	820	820
Tobacco	40	40	40
Tea (dry)	60	60	60
Red-Meat	1,110	1,460	1,720
Poultry and Eggs	390	620	600
Milk	5,090	7,170	8,310

Source: With population adjustments derived from Iran Plan and Budget Organization, National Cropping Plan, Final Report, 5 Vol. (Tehran: August 1975); 1: 30.

a: Excluding cotton seed which would derive from 70% products of the cotton consumption requirement. The cotton seed oil is 23% of the seed weight.

b: Includes cotton seed.

TABLE 5-10

Comparison of Projected Agricultural Requirement in 1992
With Present Production and Consumption
(Thousand Tons)

	Average Production 1973-75 ^a	Human Consump- tion 1975	Projected Total Require- ments 1992 ^d	Change Over Average Production %	Change Over Consump- tion %
Wheat	4,930	5,000	6,630	34	33
Rice (paddy)	1,360	1,500	2,350	56	73
Oil Seeds ^b	75	542	1,760	234 7	225
Fruit	1,890	1,845	4,770	152	159
Vegetables	1,890	1,860	4,160	120	123
Pulses	210	180	390	86	116
Sugar (refined)	680	980	1,670	146	70
Tea (dry)	18	35	60	233	71
Potatoes	510	310	1,640	222	429
Cotton (unginned) ^c	600	216	820	37	280
Tobacco	15	20	40	167	100
Red-Meat	480	350	1,460	204	317
Poultry & Eggs	195	145	620	218	328
Milk	2,300	2,470	7,170	212	190

Source: Tables 5-1, 5-6, and 5-9.

a: The data are unadjusted. The real figures are probably lower for 1975. Production of red-meat, poultry, and eggs are particularly high and the real figures seem to be 30% lower than these figures. The main reason is the importation of large amounts of red-meat and poultry in 1975.

b: Excludes cotton seed.

c: Includes cotton seed.

d: It includes animal feed, seed, and wastage.

Aggregate Consumption Prediction

Market value of agricultural products is equal to the value added of different activities in all economic sectors including the value added of the agricultural sector, e.g., in the case of sugar, industry and transportation have a major share in the final value.

It would be ideal to forecast the aggregate demand for agricultural products in terms of value, through imputation of value added of the agricultural sector for each item of food-stuffs. The data for value added in the agricultural sector are only available in the form of groups of products, e.g., grains and industrial crops. This reduces the degree of precision for the forecast demand, particularly the forecast of the imputed value for a certain product.

From the particular view point of this study, the precision of the forecast figure for value added in the agricultural sector in the aggregate form is affected less by defects of the data. Moreover the aggregate demand for agricultural products is checked by the use of the past trend of food consumption and its response to the population increase, rural migration, and income increase.

According to the first method, using value added for each item, the aggregate demand for food consumption in terms of value will be 745 billion rials in 1992 (Table 5-11). Using the past trend of aggregate food consumption, 5% annual rate of growth of per capita income, 48 million forecast population, and other relevant variables⁹

⁹A major variable is the rate of urbanization. 20% of present food consumption does not pass through the market and is not reflected in the production figures. With the commercialization of traditional agriculture and a higher rate of urbanization, this amount has to be provided through the market. Therefore in the prediction of food consumption adjustments were made for this. The figure 20% is taken from Iran, Plan and Budget Organization, National Spatial Strategy Plan, 2: 123.

result in 700 billion rials aggregate demand for food consumption in 1992, 5.6% less than the former figure. To find the consumption in the interval years, it is assumed in both methods that the goal will be achieved by a constant rate of growth (Table 5-12): According to these estimates, production and consumption will increase, but in any case the economy will not be able to be self-sufficient in food consumption. Even in the case of method II, a higher rate of production increase, the economy will import 118 billion rials of food-stuffs by 1992 which represent 118% change over the average food deficit in 1973-75. However, the ratio between deficit and consumption will remain in the neighbourhood of 0.20. This is the result of 4.5% annual rate of growth of consumption and production, in constant prices, during the period 1976-1992. In the case of method I food consumption is higher and production is lower. Consequently, the ratio of the food deficit to consumption increases to 0.50 in 1992.

Having admitted the economy's dependency on food imports, the question will be the distribution of production increase among the different crop products and animal products. The detail of any agricultural policy requires an extensive field study, but even with this aggregate study it would be rational to advise a policy which provides self-sufficiency in crop products. This will provide the security in grain supplies which is a major item in an average Iranian's diet. Moreover the demand for animal products is highly related to the level of income which in any case cannot be precisely forecast, but the demand for grains is almost directly related to the population growth which

forecast has a higher degree of precision. For example, red-meat is desired as tastes change with rising incomes. It is not a physiological necessity and the diets consisting of a mixture of plant products can supply adequate quantities of protein and calories.

TABLE 5-11
Gross Value Added Required in Agricultural Sector in 1992
(Billion 1975 Rials)

Sub Sectors	Value	Percentage of Total
Crop Farming	395	53
Husbandry	330	44
Fishery	6	1
Forestry	14	2
Total	745	100

TABLE 5-12
Estimates of Food Consumption and Production
At 1975 Prices
(Billion Rials)

Year	(1) 1973-75	(2) 1982	(3) 1987	(4) 1992	Change Between Period 1 & 4 %
1. Food Consumption					
Method I	317	465	590	745	135
Method II	317	451	562	700	121
2. Food Production					
Method I	252	300	334	373	48
Method II	252	360	450	561	123
Difference Between 2 and 1 ^a	65	91	112	139	118

a: The figure is only calculated for the method II which is the basis of the study.

CHAPTER VI

SIGNIFICANCE OF AGRICULTURAL DEVELOPMENT FOR THE FUTURE ECONOMY OF IRAN

In the previous chapters the agricultural sector was discussed in different dimensions. Although each chapter has been implicitly concerned with the significance of the agricultural sector in the economic development of Iran, the importance of the subject to the thesis necessitates an exclusive approach to the problem. Therefore, the present chapter is devoted to dealing with the vitality of the agricultural development for the economy of Iran. First, the justification will be analysed on the basis of the discussions and the data presented earlier. The endeavour is to show how agricultural development can solve many imbalances of the current course of economic development. Second, a national macroeconomic model is used to quantify the effects of agricultural development as well as other economic policies. The objectives of the model are a certain sustained rate of growth, full-employment, and balance in foreign trade in the long run. Obviously, these objectives must be achieved within the boundary of possibilities of the economy.

Qualitative Approach

The development of the agricultural sector and the increase of its products are vital to the economy. It is a major economic goal necessary for satisfying food consumption. It is also a helpful means

for solving some of the present economic imbalances; income and regional disparities, potential international trade deficit, excessive rural emigrations, desertion of the country, economic cost of urban concentration, political and social unrest, quality of life, etc. Thus, regarding the current problems, it is suggested that a high growth rate of the agricultural sector, 4.5% in the period 1975-1992, is not only desirable but necessary. It must be spread over all the regions and it implies the utilization of all available resources. It will proceed from an improvement in the productivity of the production system and any feasible development of the production factors.

Theoretical and Empirical Studies

Review of Chapter II "Agriculture in Economic Development" shows that the contribution of agriculture to economic development is crucial. The earlier attention to industrialization as a necessary and sufficient condition for economic development has been substituted by the need for growth and development of the agricultural sector for overall economic development. In particular the dependencia school, the basic needs approach and the unified approach provide strong and favourable theoretical support for the argument.¹ Empirical studies of the course of development in different countries, developed or developing, confirm the theoretical argument.

¹ Samir Amin, Sous-développement et dépendance en Afrique noire contemporaine (Paris: Maspero, 1972); E. Wayne Nafziger, "A Critique of Development Economics in the U.S.," Journal of Development Studies 13 (October 1976): 18-34; and University of Ottawa, Towards a Unified Approach to Development Theory (Ottawa; University of Ottawa, 1977), pp. 207-258.

It seems that under present national and international conditions for developing countries, agricultural development is a major condition for their sustained rate of growth and economic development. In view of the results of past economic policies of Iran, there is no apparent reason to assume that the case of Iran is an exception to the rule. Moreover, it is the task of those who support the view that only a one-sided policy of industrialization can generate development to find the reasons justifying their idea and to present the feasible policies for achieving the goal of industrialization combined with its likely welfare effects. Their main argument might be the limitation of agricultural potential in Iran. But, this does not justify the nonutilization of the existing agricultural resources and or the total neglect of people who live and will live in the agricultural sector. However, there is no claim that the key to the solution of the manifold development problems of Iran is exclusively to be found in the agricultural sector. Development strategy for Iran is not the choice of priority between the different sectors. In fact, the question is not 'either or' but only 'as well as'.

Iran's agricultural problem also has to be seen against the world-wide background of the food shortage. The immediate cause of the shortage usually has been bad weather aggravating what could be a long term trend namely, a rising demand for food by industrializing countries which exceeds the capacity of industrialized countries to produce.²

²Joseph W. Willet, ed., The World Food Situation, Problems and Prospects to 1985, (New York: Oceana Publications, 1976), p. 701.

Should this indeed be a trend, then it is important for Iran to diminish its dependence on the outside world for food, a dependence which has grown in the course of her past development experience.

Food Consumption and Balance of Payments

The most important task of agriculture is the procurement of sufficient food-stuffs. The demand is largely biological and consequently it cannot be avoided. Procurement from abroad would be possible, but, it would require foreign currency and thus limit the imports of products which are needed for the industrialization. Based on this argument, the creation of a guaranteed nutritional foundation by local production is a task the solution of which must take a preferential position in the development plan.

The present forecasts of population and income growth indicate very large increases in Iran's consumption of all food commodities by 1992. These range from increases of around 35% in the consumption of wheat and 75% for the rice to increases of at least 160% in the consumption of fruit and 300% of animal products. The achievement of this level of consumption will mean that the average Iranian in 1992 will have a diet consisting of 2800 calories and 85 grammes of protein per day in comparison to 3200 calories and 92 grammes of protein in the United Kingdom in 1972.³ A much higher level of certainty can be attributed to the expected increases in wheat and rice than to the

³See Chapter V.

increases in the demand for fruit, vegetables, and animal products. Increases in the latter commodities are much more closely related to the increase in incomes than to the population growth.

In terms of value, in 1992, the economy has either to produce 700 billion rials, 10 billion dollars, required agricultural products at 1975 prices or to import the food deficit which will range between 20 to 50 percent of the total food requirements, according to the different agricultural policies. The high rate of dependency on food imports, in view of the cessation or decline of oil exports in 1992, requires firstly, huge amounts of industrial exports to finance food imports which is outside the foreseeable potential of the economy within the next 15 years. Secondly, it causes dependency on increasingly monopolistic international markets for agricultural products. In addition the world food situation is not very promising; and there is possibility for world food shortages. Thirdly, it jeopardises the security of the food supplies of Iran which is of particular importance from the political and economic view point for a country with a limited international influence.

Growth and Welfare

Growth measured in terms of changes in gross national product is not a true index of development achievements aimed at the welfare of people. Recent concern for the quality of life, high social costs of urbanization, and non-renewable resources has highlighted some of the shortcomings of the gross national product as a measure of economic

well being.⁴

Gross national product is at the utmost one variable of the multivariable welfare function. If the increase in gross national product is accompanied by the changes of other welfare variables, the final effect on welfare will not be necessarily positive.

Gross national product overestimates economic welfare insofar as it does not take into account the items of expenditure which should really be regarded as costs rather than income. The overall task indeed is difficult, for economic welfare in the last analysis is essentially a psychological magnitude of which any mere commodity total is a very imperfect measure, but this does not imply ignorance of the real meaning of gross national product and its proper consideration in estimating change and growth.

Gross national product is simply the aggregation of the market values of goods and services produced in a certain period. Under ideal conditions the market prices would reflect social values, but in a distorted market where the prices are manipulated, the market prices do not represent the social and real values. For many years the price of agricultural products in Iran had been artificially kept low to help the consumption budget of the urban families. The poor peasants had to subsidise the rich in the cities. During the long period of 1961-1974, in spite of 73% change of the whole sale price index, the price of wheat

⁴Kenneth E. Boulding, *Economics of Pollution* (New York: New York University Press, 1971), pp. 52-55 and Joseph J. Seneca, *Environmental Economics* (New Jersey: Prentice-Hall, 1974), pp. 331-33.

had remained constant.⁵ The government even imported expensive foreign agricultural products for sale at a cheaper price to stabilize the food prices. The difference paid by the government amounted to 14 billion rials in 1973.⁶ Considering the rate of dependency on food from abroad, 12%, it is concluded that Iranian farmers have subsidised the nation's food expenditure by 120 billion rials, equal to 1.7 billion dollars, in that particular year. The figure amounts to 50% of gross agricultural value added in 1973 at current prices.

Gross national product also does not take into account the value of home produced goods and services, quality of the life, and social activities. These items are significant in the rural life, although they do not have any market value.

Gross national product does not reflect the personal and regional income distribution which has a great weight in the welfare function. Iran's rapid growth in national income during 1960 has been accompanied by large and increasing income disparities. The ratio of average per capita urban consumption to average per capita rural consumption has increased from 2.1 in 1966 to 4.1 in 1974. In 1972 the lowest 20% of families in the income scale which include most of the rural families accounted for 5.5% of the total consumption. In the same year the highest 10% accounted for 34.2% of the total consumption. The Gini coefficient of expenditure for the whole country was .44.⁷

⁵ Mojtaba Z. Farahani, "Agricultural Value Added of Iran in 1963-1974," (M.Sc. Dissertation, University of Tehran, 1976), p. 75.

⁶ Iran, Central Bank of Iran, Yearly Report 1973 written in Persian (Tehran: 1974), p. 37.

⁷ M.H. Pesaran, "Income Distribution and Its Major Determinants in Iran, in Jane W. Jacqs, Iran: Past, Present and Future (New York: Aspen Institute for Humanistic Studies, 1976), pp. 268-69.

Between the rural areas themselves there were wide income gaps. The ratio of per capita consumption of rural families between Gilan and Sistan was 3. If the disparities widen, they will become a major potential cause of discontent and political and social unrest. The consequences will disturb the present political and economic stability which has been a main factor in the recent economic achievements. If change is postponed the transformation to a new order will not be an easy procedure, economically, socially, and politically. To avert this, a strenuous effort is justified for increasing incomes in the rural areas. While other rural activities can make a significant contribution to raising rural income, those from agricultural production remain the major source.

In 1976, 53% of total population lived in the rural areas. In view of execution of any feasible policy, the ratio will remain high in 1992.⁸ Therefore development policies in rural areas would be an investment in human capital. Moreover these policies will increase the satisfaction of the majority and thus the welfare of society. The final goal is the satisfaction of people, not only a certain rate of growth in terms of gross national product.

The above discussion shows that the role of the agricultural sector in the economy is far more than that indicated by gross national product. Therefore it deserves more development projects on different fields. A lower rate of economic growth with a higher contribution by the agricultural sector and by the people who live in the rural areas

⁸In Iran, Plan and Budget Organization, National Cropping Plan, Final Report, 5 Vol. (Tehran: August 1975), p. 6, it was estimated at 39%; in Iran, Plan and Budget Organization, National Spatial Strategy Plan, First Stage Final Report, 4 Vol., Synthesis (Tehran, May 1976), p. 27 it was estimated at 33%; the run of macro-model with the assumption of the most ambitious plan for the industrialization shows at least 30% of population has to remain in rural areas at 1992 which represents 14.4 million persons.

would increase the welfare of Iranian society more than a high rate of growth with many negative side effects and high social costs.

Spatial Distribution of Activities

Regarding the present course of development, the population will tend to be concentrated in increasingly smaller densely populated areas where numerous problems will arise of over-exploitation of natural resources, of alteration of the environment and the quality of life, and of competition for the use of land and water. At the same time vast areas with less favourable geographical characteristics are threatened by depopulation and marginalisation. Thus the present path will cause radical changes in the traditional structures which will be injurious to the individual and to the national objectives.

The gravity of the problems and the urgency with which a solution should be found to respect both the needs of economic growth and the aspirations of the individual and of the society requires harmonious long term development. Here the planning faces the way in which men and activities are distributed and organized over the country. This aspect of planning plays an essential role both as regards the well being of the individual in the society and also the efficiency of the economy itself. The distribution of men and activities cannot be seen as an inevitable consequence of economic mechanisms but as a subject for concern itself. The agricultural sector and the manner of its development play a crucial role in spatial dimension of economic development. The sector, including the rangeland activities, covers almost the entire country. The agricultural activities are the

backbone of the rural areas and their existence. In the short-run, the spatial aspect of the economic development is intractable of quantification and not reflected in growth indicators, but its qualitative effects are considerable. An example is the vitality of the preserved production potentials of agriculture. The lack of interest in agricultural development has encouraged the abandonment of the marginal resources and therefore their continued irreversible deterioration. These resources are a major factor of the agricultural production capacity in the long run. In fact, the agricultural potential as the wealth of the nation and the source of incomes for present and future generations cannot be easily disregarded. In 1974 the marginal resources provided one third of the agricultural products.⁹

Employment

A very high growth rate might absorb the expanding young population of Iran in productive employment, but such a high rate of growth is out of the possibilities of the economy and moreover is accompanied by the negative side effects which could offset the positive aspects of the growth rate. One aspect of growth is its sectoral analysis and the methods which ensure certain rate of growth and employment. In 1972 45% of population were 0-15 years old and employed population was only 26.7% of total population.¹⁰ The figures represent the high supply of labor in the near future. Taking into account the likely higher rate of participation of women in the labor

⁹For a detailed discussion see Chapter IV

¹⁰Iran, Plan and Budget Organization, National Cropping, p. 8.

force, the prospects of labor supply requires job creation policies in future development. In 1972 women constituted only 10% of the employed population.¹¹ The run of macro-model shows that even with a very ambitious and doubtful plan for industrialization, the labour force remaining in the agricultural sector is 2 million persons in 1992 in comparison with 3.8 million persons in 1973. The results of a more feasible policy will be 3.4 million workers in agriculture, unless a high rate of disguised unemployment in the urban areas, particularly in services is assumed.¹² Agricultural sector and its related activities through the labor intensive method offer many opportunities to absorb the labor force. The labor intensive methods do not mean necessarily lower yields or even lower profits in the agriculture of Iran.

The case studies suggest that small, labour-intensive farms can achieve high levels both of yields and profits provided they are well irrigated and have access to modern machinery through contractors providing machines on hire.¹³ Profits can be high because of the low level of fixed costs. However, such farms are an exception at present, particularly in terms of profits, since most of the farms are only partially irrigated, but it represents clearly the unexploited possibilities of agricultural production with labour intensive methods.

¹¹Iran, Statistical Center, Statistical Yearbook of Iran 1973 (Tehran: June 1976), p. 50.

¹²In F. Aminzadeh, "Human Resources Development: Problems and Prospects," Iran: Past, Present, and Future, ed. Jane W. Jacq (New York: Aspen Institute for Humanistic Studies, 1976), pp. 179-94, has estimated 7.2 million persons will work in services in 1992 in comparison with the 2.7 million in 1972. The run of macro-model shows only 5 million, under the second set of condition.

¹³I. Ajami, "Agrarian Reform, Modernization of Peasants and Agricultural Development in Iran," Iran: Past, Present, and Future, ed. Jane W. Jacq (New York: Aspen Institute for Humanistic Studies, 1976), pp. 148-54.

The demand of agro-industry and handicrafts activities for labor force is a potential to be exploited. There is no field of industry that is so suited to settlement in rural areas. Raw materials need not to be transported over long distances; the investment in housing and schools is not as high as in the urban areas; seasonal employment fluctuations can be balanced; production techniques are relatively simple and do not need skilled knowledge; and there are no social and cultural problems caused by emigration and concentration of population in the large cities.

Expansion of Markets

Development of agricultural sector and provision of higher incomes for the great majority of the population who live in the rural areas will help to open a wider market for the domestic industrial products. Indeed, there may be an extended slow down in the industrial outputs unless the incomes and the purchasing power of the rural population who constitute in 1976 53% of population are increased. Under present conditions the industries will gradually saturate their existing markets and then will grow only in accordance with the growth of population in urban areas.

Through increased purchasing power, domestic industries can operate at larger scale with reduced production costs and better export prospects.¹⁴ Moreover a wider market would make possible the manufacture of industrial parts and even of the equipment necessary for future expansion. The development of the agricultural sector can also

¹⁴ Alays Heuberger, Economic Growth and the Role of Agriculture in the Developing Countries, with special reference to India (Frankfurt: Peter Lang, 1974), p. 170.

provide a market for the industries of farm machinery and equipment for processing primary materials.

Quantitative Approach

The National Economy Model for Agriculture Sector Analysis

In this section a set of equilibrium, simultaneous equations with statistically estimated coefficients is used for analyzing the agricultural sector of Iran as a part of the economic system and evaluating the impact of the present economic policies on the behavior of the future of the economy. Since the simultaneous equation technique was used and this technique relies heavily on time series data, it led to several difficulties. First, this prevented the inclusion of certain variables of interest to the subject in the model simply because the time series data for the variables did not exist. In fact, information to solve a given development problem is scarce, and that which exists is in divergent forms of experimental data; the judgment of informed and experienced scientists, farmers, politicians, administrators, and casual and isolated observers. Yet the complex nature and the urgency of development problems require that available kinds and sources of data be used. Thus techniques developed with one or a limited range of kinds and sources of data are not very helpful. Second, though information about likely values of certain coefficients was available from knowledgeable experts in the field, the general procedure was so oriented to estimate all of the coefficients from the time series data

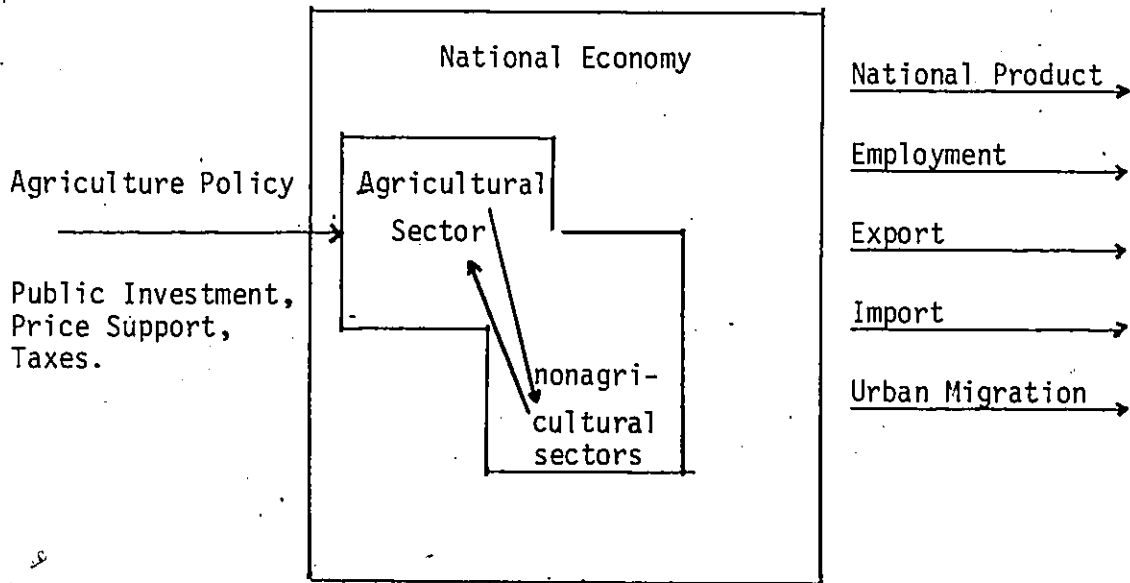
and such knowledge was ignored or rejected.

It could be possible to build a model of the agricultural sector and to consider only the parameters of this sector. However, such effort to model the agricultural sector as a separate entity required exogenous treatment of some parameters of the nonagricultural economy. In reality there are several key interactions between the agricultural and other sectors which are relevant to the analysis of the agricultural sector. In particular, the flows of goods and services between agriculture and nonagriculture are of significance. The interactions have been fully discussed in the previous chapters. In summary the agricultural and nonagricultural sectors interact first in the product markets through supply of food and raw materials by agricultural sector to nonagricultural sectors and through demand for nonagricultural products by agricultural sector, e.g., fertilizers, machinery, and nonfood commodities. Second, the agricultural and nonagricultural economies interact in the factor markets. Capital and foreign exchange must be allocated between agriculture and nonagriculture. Third, the distribution of the labor supply between agriculture and nonagriculture depends on the rate of rural-urban migration, which in turn is affected by the rural-urban income differential.

Recognition of the interactions between the agricultural and nonagricultural sectors is important to the agricultural sector analysis for two reasons. First, variables of the nonagricultural sectors which are inputs into the agricultural sector become endogenous to the system. In a macro-model, this enables the full implications of

agricultural policies for the agricultural sector to be considered after taking account of the various interactions and feedbacks from the nonagricultural sectors. Second, the policy maker usually wishes to study the effect of agricultural policies on the national economy. This requires knowledge of the impact of agricultural policies on the nonagricultural sectors (Figure 6-1).

FIGURE 6-1
Interactions of Agricultural and Nonagricultural
Sectors in a National Framework



Furthermore, from a national viewpoint, increases in output and employment in the nonagricultural sectors must be considered in evaluating the agricultural policies. So the need arises for a model of the national economy.

The model represented in this chapter is a macro-model which tries to describe the total economy. It is static in the sense that the variables are "introduced as single variables relating to one time period" and not "as multiple variables relating to a series of time periods."¹⁴⁻¹ Because of its simplicity, the model has little value in detailed national policy formulation. The essential point is that, although the model can show the implications of a given increase in agricultural output for the total economy, it does not show how an increase in agricultural output may be achieved.

In the model the economy has been divided into five sectors - agriculture, manufacturing and mining, private services, governmental services, and oil sector. The aggregation of these sectors gives us the national account figures. The detailed description of each component of the model are given in Table 6-1. In the original model more elaborated relations, particularly for production functions were contemplated, but the deficiency of data imposed the adoption of simpler functions, i.e., fixed coefficient production function. For example, it is evident that production in agriculture is a function of available land and water, capital, and labor among the other factors,

¹⁴⁻¹J. Tinbergen, On the Theory of Economic Policy (Amsterdam: North-Holland Publishing Company, 1970), p. 11. The approach of Tinbergen quoted above is a descriptive interpretation of the formal definition of dynamic model provided by Ragnar Flisch. According to him a model is considered dynamic where at least one of the structural relations is dynamic. "This means that it contains at least one of the variables as related to different points of time". "On the Notation of Equilibrium and Disequilibrium," Review of Economic Studies 3 (1935-36): 100.

TABLE 6-1

The Sector Breakdown in the Macro-Model

Sectors		Composition of Sector
1	Agriculture	Crops, Livestock, Fishery, and Forestry
2	Manufacturing and Mining	Industries, Nonoil Mining, Construction, Water, and Electricity
3	Private Services	Trading Companies, Banking, Insurance, Petty Trading and Services, Transport
4	Governmental Services	All utilities and services which are provided by government
5	Oil and Gas	Oil Production, Refinery, and all other related activities.

but the efforts to find the yearly cultivated land in some periods, even for major crops, were futile. Often where data existed the difference between the available figure was in some cases as great as 30%, though they might have been published by the same department. Under such circumstances a selective option was inevitable which would considerably affect the results and could lead to any desired projection. This, once again, confirms the earlier discussion about the advantage of simultaneous use of descriptive and quantitative approach to analyse the agricultural sector, particularly in the case of Iran.

Nevertheless, for the use of future research in the agricultural sector of Iran which is of prime importance, a reformulation of the initial model and some time series data gathered and used in the present model could be found in the Appendix of the thesis.

Notation

The five sectors of the economy of Iran - agriculture, manufacturing and mining, private services, governmental services, and oil - are numbered 1,2,3,4,5 respectively. Therefore any number after a variable represents that the particular variable belongs to the sector specified by that number, e.g., S2 represents gross value added of sector 2 which is the manufacturing and mining sector and S5 represents gross value added of sector 5 which is the oil sector.

The letter "p" at the end of each variable represents the value of variable in terms of 1959 prices e.g., S5P is the gross value added of sector 5, oil, in constant prices of 1959. Without the letter "p" the value of the variable is measured in current prices.

The letter "p" before a variable represents the price index for the variable in terms of 1959 prices=1, e.g., PS5 is the price of gross value added of the oil sector, sector 5, in terms of 1959 prices=1.

The letter "N" combined with other variables represents the value of variables in terms of per capita, e.g., YDN is the per capita gross domestic product in current prices and YDNP is the same variable in constant prices of 1959.

The value of Si, Di, Xi, Mi, YD, YD1, X, M, D, BP, G, TT, OR, BG, X51, X52, S34 in billion rials; Li, N, LD, LS, LU, L34, UN, RN, in million persons; OQP, OQX in million tons; and OP in thousand rials per ton.

Si	Gross value added of sector i	i=1...5
Di	Domestic demand for the output of sector i	i=1...5
Xi	Exports of sector i	i=1...5
Mi	Imports of sector i	i=1...5
Li	Demand for labor in sector i	
N	Population	
YD	Gross domestic product	
YD1	Gross domestic product excluding oil exports	
X	Aggregate exports	
M	Aggregate imports	
D	Aggregate domestic demand	
BP	Balance of payments (deficit or surplus)	
LD	Aggregate labor demand	
LS	Aggregate labor supply	
LU	Unemployed labor	
G	Government expenditure	
TT	Total taxes, direct and indirect	
OR	Oil revenue of government	
BG	Balance of budget	
SiL	Output/Labor ratio in sector i	i=1...5
OQP	Quantity of oil production	
OQD	Quantity of oil demanded for domestic consumption	
OQX	Quantity of oil exported	
OP	Price of oil, excluding gas	
X51	Value of oil exported, excluding gas	
X52	Value of gas exported	
X34	Gross value added of sector 3 & 4, services	
L34	Demand for labor in sector 3 & 4, services	
S34L	Output/Labor ratio in services	
T	Time trend 1963=1	
A3	Commercialization factor in food consumption	

UN Urban Population
RN Rural Population
UNN The ratio of urban population out of the total population.

Endogenous Variables¹⁴⁻²

Out of the 112 variables, including price indices and per capita value for variables, which are used in the model, the 77 following variables are endogenous. YD, YD1, DYN, YD1N, X, M, D, G, TT, OR, BG, YDP, YDNP, YD1NP, XP, MP, DP, BP, TTP, ÖRP, UNN, UN, RN, BGP, LD, S1, X1, M1, D1, X1P, M1P, D1P, D1NP, D1N, L1, YD1P, S2, X2, M2, D2, LU, X2P, M2P, D2P, L2, S2LP, S3, X3, M3, D3, S3P, M3P, D3P, S34, S34P, L34, S34LP, S4, X4, M4, D4, S4P, M4P, D4P, S5, X5, M5, D5, S5P, X5P, D5P, X51, X52, X51P, OQP, OQD, S5LP.

Exogenous Variables

35 variables are exogenous out which 21 variables are price indices for converting the projected values from constant 1959 prices to 1975 prices and three variables are instrument variables.

GP, S1LP, M5P, X3P, X4P, LS, S2P, T, S1P, A3, L5, N, X52P, OQX, PG, PTT, POR, PS1, PX1, PM1, PS2, PX2, PM2, PS3, PX3, PM3, PS4, PX4, PM4, PS5, PM5, OPP, OP, PX52, PX51.

Excluding the instrument variables GP, S1LP, S2P and the last 21 variables which are price indices, the value of other exogenous variables in 1992 are determined as follows:

¹⁴⁻² For the definitions of endogenous, target, and instrument variables see Karl A. Fox, Jatic, Sengupta, and Erik Thorbecke, The Theory of Quantitative Economic Policy (Amsterdam: North-Holland Publishing Company, 1973), pp. 20-23 and Camilo Dagum et Estela Bee Dagum, Construction de modèles et analyse économétrique, Economies et Sociétés 8 (1974): 1804-5.

M5P, oil imports in constant prices is equal to zero.

X3P, and X4P exports of services by private and government sector is exogenously determined by the use of past trends.

T, is time trend 1963=1 1992=30

S1P, gross value added of agricultural sector, as discussed in Chapter V, is estimated by the use of the past trend in the first alternative, 2.2% annual rate of growth, and by considering the agricultural potential of Iran in the second alternative, 4.5% annual rate of growth.

LS, labor supply, has been calculated through multiplying the likely ratio of activity¹⁵ by total population, 30%.

N, population is estimated by the use of the past trend and the likely decline in the birth rate. It will be equal to 48 million in 1992 discussed in Chapter III.

X52P, gas exports in constant prices is equal to the prediction of the Iranian government for 1992¹⁶. The possible favorable changes in terms of trade has been considered.

OQX, quantity of oil exports, will be 160 or 27 million tons in 1992, according to the optimistic or pessimistic view correspondingly. The possible favorable changes in terms of trade have been reflected in

¹⁵Activity ratio is equal to active population divided by total population.

¹⁶Firouz Vakil, Determining Iran's Financial Surplus 1973-1992: Some Management Concepts (Tehran: The Institute for International Political and Economic Studies, 1975), p. 24.

the quantity of oil exported. In fact, the volumes of oil exports, in both alternatives are less than the above figures but the effect is as if those volumes are exported in 1975 prices without any favourable change in terms of trade.¹⁷ The optimistic view will be used in scenario 1 and pessimistic view will be used in scenario 2.

A3 is the factor showing the effects of commercialization and urbanization on the food consumption which is equal to 20% of present consumption. This amount has to be provided through the markets in 1992.¹⁸

L5 labor force in the oil industry and related activities will be equal to 80,000 in 1992.¹⁹

Objective Variables

Regarding the long-run economic objectives of Iran which are a certain steady rate of growth, employment for urban migrants, and balance in foreign trade excluding oil exports; the three objective variables of the model are YDIP, nonoil domestic product in constant prices, BP, balance of payments, and LU, unemployed labor.

Following the semi-official policy of government,²⁰ it is projected that nonoil domestic product in constant prices, YDIP, will increase annually by 10% during 1976-92. It implies 7% growth rate of

¹⁷ Ibid., p. 24.

¹⁸ Iran, Plan and Budget Organization, National Spatial Strategy Plan, First Stage Final Report, 4 Vol. (Tehran: May 1976): 2423. Also see Chapter V of the thesis.

¹⁹ Iran, Plan and Budget Organization, Iran's Population: Past, Present and Future (Tehran: 1973) and Iran, Plan and Budget Organization, Perspective of Manpower and Employment Planning of Iran, 1972-1992 (Tehran: 1973).

²⁰ Iran, Plan and Budget Organization, "A Revision in the Twenty-year Macro-economic Perspective for Iran According to Revised Oil Scenarios." (Tehran: 1975), pp. 50-55.

gross domestic product, YDP, and less than 5% annual growth of per capita income, YDNP. In constant prices of 1959, YDIP as an objective will be 5625 billion rials in 1992 in comparison with 1,113 billion rials in 1975. In 1992, in terms of per capita, gross domestic product will be 3750 dollars in 1975 prices. Per capita gross domestic product was 1,570 dollars in 1975.

In view of growing domestic demand for oil and the likely substantial cut in oil exports by 1992, nonoil exports must provide foreign exchange for imports of goods and services, i.e., $X-M=BP=0$. Therefore, the equilibrium in foreign trade is the other objective variable. The likely expansion of gas exports and the possible oil exports in 1992 will be taken into account. The 1975 deficit in the current balance of payments for goods and services, excluding oil exports, is 813 billion rials or 11.6 billion dollars.

Employment of labor force is a prime goal in any economy through which a country uses the available human resources to achieve higher standard of living. Official figure for unemployment in Iran has never been more than 2.5% of total labor force, but disguised unemployment has not been considered in this figure. For the future unemployment objective of not more than 5% of total labor force is assumed, that is, the number of unemployed labor in 1992 will be $LU=720$ thousand persons out of 14.4 million persons in the labor force, $LS=14.4$, and $N=48$ million.

Instrument Variables

To achieve the above objectives different policy instruments could be implemented, but to evaluate the current economic policy and projecting

the likely future of Iran's economy, the instrument variables are those of present policies, i.e., government expenditure, GP, value added of manufacturing and mining sector, S2P, and output/labor ratio in the agricultural sector, S1LP.

Government expenditure is an instrument for fiscal policy used to smooth out the economic fluctuations at the time of inflationary and deflationary gaps. In view of the economy of Iran, its use has considerable constraints, in particular it cannot be implemented for removing physical and structural bottlenecks in the economy. On the contrary in the case of financial constraints it is very powerful.

The policy of export-oriented economy carried out through the expansion of manufacturing and mining sector for imports substitution and exports is supposed to secure a certain high rate of economic growth, balance in payments (excluding oil exports) and job opportunities for urban migrants. Although there is no question in the use of such a policy instrument, the past two export decades of Iran show little success, if at all.²¹ The causes of failure must be found in the highly unbalanced expansion of the economic sectors and in the limitation of the economy to absorb a very high rate of expansion in only one sector, especially over a short period of time.

²¹ M. Khataie, "Transformation of the Iran's Economy in the years 1955-1962," written in Persian (M. Sc. dissertation, University of Tehran, 1974); H.A. Mansoor, "Transformation of the Iran's Economy in the years 1962-1967, written in Persian (M. Sc. dissertation, University of Tehran, 1974); and M. Pakdaman, "Transformation of the Iran's Economy in the years 1968-1972," written in Persian (M. Sc. dissertation, University of Tehran, 1974).

The objective of full employment, the limitation of nonagricultural sectors to absorb all potential rural emigrants, and the possibility of the agricultural sector to use a flexible output/labor ratio implies that the output/labor ratio of the agricultural sector, SLP, can be used as an instrument variable.

Operating the Model

To use the model for the purpose of this study, i.e., to find out the shape of the economy resulting from the following current economic path and to draw up the economic policies for an alternative and feasible development path, the model is operated under two different sets of conditions - present and alternative paths of development.

Present Development Path - Scenario 1

Considering the objectives discussed earlier, if the government can provide the means to achieve those objectives, mainly 10% annual rate of growth of nonoil gross domestic products, the economy of Iran in 1992 will be a highly industrialized economy and structurally different from the present one. To be more optimistic there is an assumption of existence of 876 billion rials (12.5 billion dollars) of oil exports in 1992 which is equal to 65% of present oil exports.²²

²²See the section on exogenous variables in this chapter.

In 1992 demand for agricultural products will be 701 billion rials in 1975 prices, compared with 322 billion rials in 1975. Only half of this figure will be produced inside the country and the rest, 365 billion rials (5.2 billion dollars), will be imported (Table 6-1).

The shares of the economic sectors will change greatly. The agricultural sector will produce only 3.1% of gross domestic product, while the manufacturing and mining sector will increase its share from 19.2% in 1975 to 47.6% in 1992. This represents a yearly growth rate for the manufacturing and mining sector equal to 13% at constant prices during 1975-92. The share of services will remain almost constant, but the share of the oil and gas sector will decrease from 41% in 1975 to 14.2% in 1992 which will provide mostly domestic needs (Table 6-2).

The reduction of oil exports will require an export-oriented economy for manufactured goods. In 1992, to avoid the huge deficit of current balance of payments, the economy will export 1,360 billion rials (20 billion dollars) manufactured goods in 1975 prices. The total exports of manufactured goods was 22 billion rials in 1975 (Table 6-3 and 6-4). This implies an annual rate of growth for manufactured exports equal to 27.5% in the years 1975-1992. On the contrary the oil and gas exports will decrease by 20% during the same period. In 1992 the economy will have no deficit in her current balance of payments, including 875 billion rials oil exports and 210 billion rials gas exports (Table 6-5). Total imports of the economy will increase by 219.8% from 1975 to 1992.

In 1975 the government budget had a surplus, 134 billion rials, but in 1992 to achieve the planned objectives, the government will face a deficit of 3466 billion rials. The figure will amount to 57% of total government expenditure (Table 6-6).

With regard to the labor force, in 1992 only 13.9% will be engaged in agriculture compared with 40% in 1975. The manufacturing and services will have to absorb the natural population increase and the rural emigrants. This implies that in 1992 11.7 million persons must find work opportunities in the secondary and tertiary sectors in comparison with 4.9 million persons in 1975. This means the creation of job opportunities by a rate of 5% per annum during the period 1975-1992. The rate of urbanization will be 69.4% compared with 46.8% in 1976.

Alternative Development Path - Scenario 2

The annual expansion of manufactured exports by 27.5%; the yearly job creation opportunities in secondary and tertiary sectors by 5%; the huge government budget deficit, 57% of total government expenditure, the high rate of urbanization, a jump from 47% to 70%, and its consequent housing and utilities investment; and finally the required capital for expansion of the manufacturing and mining sector to increase its outputs by more than three times in the next 15 years are not merely arithmetic digits. They are economic figures and their achievements need at least very exceptional if not impossible economic conditions. If the pessimistic view of oil exports reduction had been

TABLE 6-1
Major Variables of Agricultural Sector
(Billion Riials of 1975)

Variables	1975		1992			
			Scenario 1		Scenario 2	
	Value	Value	Value	Increase %	Value	Increase %
Production	211	373		77.2	561	165.9
Exports	19	37		93.2	37	93.2
Imports	131	365		178.9	170	29.8
Domestic Demand	322	701		117.6	693	115.2
Labor Force in Agriculture (millions)	3.4	1.4		-44.1	3.4	0
Percentage of Total Labor Force	40	14		--	25	--

TABLE 6-2
Gross Domestic Product by Sectors
(Billion Rials of 1975)

Sectors	1975		1992					
	Value	Share %	Scenario 1			Scenario 2		
			Value	Share %	Increase	Value	Share %	Increase
Agriculture	211	5.9	373	3.1	77.2	561	6.4	165.9
Manufacturing & Mining	690	19.2	5,642	47.6	718.1	4,002	45.3	480
Private Services	872	24.3	3,432	28.9	293.4	2,417	27.4	177.2
Governmental Services	359	10	1,471	12.4	309.3	1,030	11.7	186.9
Oil and Gas	1,453	41	1,687	14.2	16.1	819	9.3	-43.6
Gross Domestic Product	3,585	100	11,858	100	230.8	8,829	100	146.3
Per Capita Income Thousand Rials	110	--	250	--	124.8	184	--	67.5
Per Capita Income in Dollars	1,570	--	3,530	--	124.8	2,630	--	67.5

TABLE 6-3
Exports by Sectors
(Billion Rials of 1975)

Sectors	1975		1992		
	Value	Scenario 1		Scenario 2	
		Value	Increase %	Value	Increase %
Agriculture	19	37	93.2	37	93.2
Manufacturing & Mining	22	1,362	6,035.4	989	4,495.5
Private Services	68	342	405.4	342	405
Governmental Service	91	460	405.5	460	405.5
Oil and Gas	1,348	1,084	-19.6	356	-73.6
Total Exports	1,548	3,284	112.2	2,184	41.1

TABLE 6-4
Imports by Sectors
(Billion Rials of 1975)

Sectors	1975		1992		
	Value	Scenario 1		Scenario 2	
		Value	Increase %	Value	Increase %
Agriculture	131	365	178.9	170	29.8
Manufacturing & Mining	688	2,156	213.5	1,501	118.2
Private Services	100	332	232.1	219	119.0
Governmental Services	108	431	297.6	295	173.1
Oil and Gas	0	0	0	0	0
Total Imports	1,027.0	3,284	219.7	2,184	112.7

TABLE 6-5
Current Balance of Payments
(Billion Riials of 1975)

Exports and Imports	1975	1992	
		Scenario 1	Scenario 2
Exports	1548	3284	2184
Imports	1027	3284	2184
Balance of Payments Excluding Oil and Gas	-827	-1084	-356
Total Balance of Payments	521	0	0

TABLE 6-6
Government Budget
(Billion Riials of 1975)

Revenue and Expenditure	1975	1992			
		Scenario 1		Scenario 2	
		Value	Increase %	Value	Increase %
Total Taxes	335	1563	366.1	1136	239.1
Oil Revenue	1247	995	-20.1	329	-73.6
Total Revenue	1582	2559	61.8	1465	-7.4
Expenditure	1448	6025	316.1	4138	185.8
Balance of Budget Excluding Oil Revenue	-1113	-4462	--	-3002	--
Balance of Budget	134	-3466	--	-2673	--

TABLE 6-7
Human Resources Perspective
(Million Persons)

	1975		1992			
	Number	Share %	Scenario 1		Scenario 2	
Number			Share %	Number	Share %	Number
1. Population						
Total Population	32.71	100	48	100	48	100
Active Population	8.50	26	14.4	30	14.4	30
Urban Population	14.42	44.1	33.3	69.4	29.1	60.6
Rural Population	18.29	55.9	14.7	30.6	18.9	39.4
2. Employment by Sectors						
Agriculture	3.30	40	1.9	13.9	3.4	24.9
Manufacturing & Mining	2.45	29.7	6.0	43.9	5.2	38.0
Services	2.43	29.5	5.7	41.7	5	36.5
Oil and Gas	.06	.8	.08	0.6	.08	0.6
Total Employment	8.24	100	13.68	100	13.68	100
Unemployed	.26	3 ^a	.72	5 ^a	.72	5 ^a

a: Out of active population.

accepted, that is, instead of only 35% decrease in oil revenue higher figures, up to 100%, had been introduced to the model, the results would have been more expansion of the manufacturing and services sectors, need for more manufactured exports, and a larger budget deficit. Moreover, even if quantitatively these objectives were achieved, as discussed earlier, qualitatively they would create some imbalances and negative side effects which could not be overcome or disregarded.

In view of the above discussion, there is a need to reconsider Iran's present course of economic development and to find an alternative development path. On qualitative grounds, different aspects of Iran's economy and present course of development have been explained in earlier sections. Here the quantitative objectives are presented.

The growth rate of the agricultural sector will be 4.5% per year to reduce the imports of food-stuffs and create jobs for the rural population. This is 2.3% higher than projected in scenario 1 (Table 6-1).

The annual growth of normal domestic product will decrease from 10% to 8%. This implies 2630 dollars per capita income in 1992 in comparison with 3530 dollars in scenario 1 and 1,570 dollars in 1975 (Table 6-2). This means the annual growth rate of per capita income will be 3% instead of 5% in scenario 1!

The pessimistic view for the oil exports is accepted to safeguard the economy in the case of likely oil reserves depletion and consequently higher rate of oil exports reduction. The oil exports revenue in 1992 is assumed equal to only 11% of present oil revenue. In scenario 1 it is equal to 65%. If the economy finds itself with higher

oil revenue, the goals could be easily adjusted upward. But the case of downward adjustment would not be simple and without social and economic costs.

In consequence, the agricultural production will be 561 billion rials and the ratio of imports to the demand for agricultural production will decrease from 52% in scenario 1 to 25% in scenario 2. The share of agricultural output in gross domestic product will increase from the present 5.9% to 6.4%. But the share of the manufacturing and mining sector which was 5642 billion rials in scenario 1 will decrease to 4002 billion rials in scenario 2. This implies an annual rate of growth for the sector equal to 11% instead of 13% in scenario 1 (Table 6-2).

The total exports will be 2184 billion rials and equal total imports. The manufactured exports must increase still with a high rate of growth, 25%, to reach 989 billion rials in 1992. This will be 27% less than the objective in scenario 1. Considering the small amount of present manufactured exports, 22 billion rials (315 million dollars), the rate of growth in the beginning will be very high and then will decline gradually to reach a reasonable level. The total imports in scenario 2 is 34% less than the corresponding figure in scenario 1 (Tables 6-3 and 6-4).

Although the government budget will still have a deficit, equal to 2673 billion rials, it is 23% less than the one in the first scenario. Moreover, by gradually losing the oil revenue, the people have to provide required savings for investment and public expenditures.

This implies a restructuring in the tax system. At present the nonoil revenue of government, mainly taxes, is equal to 10% of gross domestic product. Its gradual increase to over 35% would eliminate the potential deficit in the government budget.

The labor force in secondary and tertiary sector will be 10 million persons in 1992, in comparison with 12 million in scenario 1. The share of the agricultural sector in the labor force will decrease from 40% in 1975 to 24.9% in scenario 2 compared with 13.9% in scenario 1. In 1992 29.1 million people will live in urban areas, 60.6% of total population. Corresponding figures in scenario 1 are 33.3 million and 69.4%.

Although the objectives set in scenario 2, the proposed development path; do not seem as ambitious as those in scenario 1, their achievement will not be an easy process. They need a great overall effort in all sectors, if they are supposed to be fulfilled. Past decade growth figures made possible mainly by unexpected oil income increases should not cause any overestimation of the economy's potential growth. As evidence, in 1975 the constancy of oil revenue caused the gross domestic per capita income in 1974 prices to be limited to only 2.4% and national per capita income remained constant. The goal of 3% steady rate of growth in per capita gross domestic product for a long period 1975-1992 is a difficult as well as a critical objective. Its achievement would secure sustained development and progress, but its failure would be disastrous to the future of the economy and it would endanger even the past progress of Iran.

Summary of Equations

National Accounts

- 1) $YD=S1+S2+S3+S4+S5$
- 2) $YD1=YD-X5$
- 3) $YDN=YD/N$
- 4) $YD1N=YD1/N$
- 5) $X=M+BP$
- 6) $M=M1+M2+M3+M4+M5$
- 7) $D=D1+D2+D3+D4+D5$
- 8) $G=GP*PG$
- 9) $TT=TTP*PTT$
- 10) $OR=ORP*POR$
- 11) $BG=TT+OR-G$
- 12) $YDP=YD1P+X5P$
- 13) $YDNP=YDP/N$
- 14) $YD1NP=YD1P/N$
- 15) $XP=X1P+X2P+X3P+X4P+X5P$
- 16) $MP=M1P+M2P+M3P+M4P+M5P$
- 17) $DP=D1P+D2P+D3P+D4P+D5P$
- 18) $GP=-180.2368 + 1.2984 S34P$
-4.2
NDF=11 SEE=65.612 RBSQ=0.909 DW=0.80
- 19) $TTP=-17.3086 - 0.1538 YD1P$
-1.9 10.8 : 10.8
NDF=11 SEE=12.478 RBSQ=0.906 DW=1.85
- 20) $ORP=1.5763 + 0.9168 X5/POR$
0.7 123.1
NDF=11 SEE=6.522 RBSQ=0.999 DW=1.83

- 21) $BGP = TTP + ORP - GP$
- 22) $UNN = 0.3605 + 0.0014 YDIN$
52.8 6.7
NDF=11 SEE=0.012 RBSQ=0.783 DW=0.30
- 23) $UN = UNN * N$
- 24) $RN = N - UN$
- 25) $LD = LS - LU$

Agricultural Sector

- 26) $S1 = S1P * PST$
- 27) $X1 = X1P * PX1$
- 28) $M1 = M1P * PM1$
- 29) $D1 = S1 - X1 + M1$
- 30) $X1P = 6.1021 + 0.4225 T$
6.3 3.4
NDF=11 SEE=1.659 RBSQ=0.474 DW=1.88
- 31) $M1P = D1P + X1P - S1P$
- 32) $D1P = D1NP * N$
- 33) $D1NP = 0.7667 + 1.1802 \text{ LOG}(YD1NP) + 1.0410 A3$
4.0 18.4
NDF=11 SEE=.068 RBSQ=0.966 DW=2.28
- 34) $D1N = D1 / N$
- 35) $L1 = LD - L2 - L34 - L5$
- 36) $S1LP = S1P / L1$

Manufacturing and Mining Sector

- 37) $S2 = S2P * PS2$
- 38) $X2 = X - X1 - X3 - X4 - X5$
- 39) $M2 = -30.3146 + 0.1734 YD$
-1.6 13.8
NDF=11 SEE=44.855 RBSQ=0.940 DW=2.33

- 40) $D2 = S2 - X2 + M2$
- 41) $S2P = D2P + X2P - M2P$
- 42) $X2P = X2 / PX2$
- 43) $M2P = M2 / PM2$
- 44) $D2P = 5.8633 N + 0.6121 YDP$
- 45) $L2 = 0.1790 UN$
37.44
 $NDF = 8 \quad SEE = 0.1482 \quad RBSQ = 0.838 \quad DW = 0.17$
- 46) $S2LP = S2P / L2$

Private Services Sector

- 47) $S3 = S3P * PS3$
- 48) $X3 = X3P * PX3$
- 49) $M3 = M3P * PM3$
- 50) $D3 = S3 - X3 + M3$
- 51) $S3P = S34P + S4P$
- 52) $M3P = -3.4646 + 0.1030 MP$
-6.6 41.7
 $NDF = 11 \quad SEE = 1.252 \quad RBSQ = 0.993 \quad DW = 1.15$
- 53) $D3P = S3P - X3P + M3P$
- 54) $S34 = S34P * PS3$
- 55) $S34P = YDP - S1P - S2P - S5P$
- 56) $L34 = 0.1712 UN$
115.6
 $NDF = 8 \quad SEE = 0.0459 \quad RBSQ = 0.951 \quad DW = 0.93$
- 57) $S34LP = S34P / L34$

Government Services Sector

- 58) $S4 = S4P * PS4$
- 59) $X4 = X4P * PX4$
- 60) $M4 = M4P * PM4$

61) $D4 = S4 - X4 + M4$

62) $S4P = 29.1426 + 0.2022 GP$
4.0 8.8
NDF=11 SEE=17.207 RBSQ=0.865 DW=0.56

63) $M4P = -1.5284 + 0.0726 GP$
-1.6 24.2
NDF=11 SEE=2.255 RBSQ=0.980 DW=3.05

64) $D4P = S4P - X4P + M4P$

Oil and Gas Sector

65) $S5 = S5P * PS5$

66) $X5 = X51 + X52$

67) $M5 = M5P * PM5$

68) $D5 = S5 - X5 + M5$

69) $S5P = D5P - X5P + M5P$

70) $X5P = X51P + X52P$

71) $D5P = OQP * OQD$

72) $X51 = OQX * OP$

73) $X52 = X52P * PX5$

74) $X51P = X51 / PX51$

75) $OQP = OQD + OQX$

76) $OQD = -18.4494 + 0.0325 S2P + 0.8353 N$
-2.9 3.3 3.0
NDF=10 SEE=0.755 RBSQ=0.979 DW=1.75

77) $S5LP = S5LP / L5$

At 1% level of significance the coefficients of all explanatory variables and the coefficients of constants of equations 18, 22, 30, 33, 52 and 62 are $\neq 0$. The Durbin-Watson test shows the absence of autocorrelation for all equations except equations 22, 45, and 62. The test is inconclusive for equations 18 and 56.

CHAPTER VII

AGRICULTURAL DEVELOPMENT POLICIES

The past economic policies have resulted in the relative backwardness of the agricultural sector. Regarding the future of the economy and the vital role of agriculture in the economic development of Iran, some policies are proposed for the development of the agricultural sector. These policies are derived from the analysis set out in the earlier chapters and incorporate the results of the quantitative model tempered by the qualitative understanding. However, these policies could not be independent of the national objectives for social and economic development of the country.¹

Although, here the task is not to determine in detail what the national objectives are, any proposal to develop the agricultural sector without reference to them would not be meaningful. The past experience has shown that the one-sided policy for the achievement of the highest possible rate of growth results in a course of economic development with many problems, difficulties; and tendencies which are not desirable and easy to solve. There are serious reasons for considering that these powerful and undesirable trends must be curbed

¹ Bruce F. Johnston and Peter Kilby, Agriculture and Structural Transformation (New York: Oxford University Press, 1975); pp. 133-46; Bruce F. Johnston and Peter Kilby, "Interactions Between Agricultural and Industrial Growth," Agricultural Policy in Developing Countries, ed. N. Islam, (New York: John Wiley and Sons, 1974), pp. 41-57; Theodor Dams, "The Integration of Agriculture into an Overall Development Policy," Agricultural Policy in Developing Countries, ed. Islam, (New York: John Wiley and Sons, 1974); pp. 71-88; and Earl O. Heady and Larry R. Whiting, eds. Externalities in the Transformation of Agriculture: Distribution of Benefits and Costs from Development (Ames Iowa: Iowa State University Press, 1975).

and controlled by means of equally powerful and logical counter-weights. The reasons are not only technical in nature, but also of a philosophical order; They can be summarized in the simple concept that above and beyond the requirements of growth per sector there are men and women living in the country who should be the beneficiaries, not the victims, of change. With respect to this point, the underlying concepts of national economic objectives would be first that economic growth is not in itself an adequate response to the aspirations of the individual and of society; second that the efficiency of the economy does not depend on technical, quantitative, sectoral, short term factors alone, but also on broader, longer term and more qualitative considerations.

In Chapter VI "Significance of Agricultural Development for the Future Economy of Iran" qualitatively and quantitatively two different scenarios, present and alternative development paths, were considered. Based on the comparison of their likely economic and social effects, it was suggested that scenario 2 was the development course which could achieve the objective of economic development, i.e., welfare of the society in the long run, within the boundary of possibilities of the economy. That analysis provided the rationale for the selection of following options as the national objectives in order to draw the agricultural policies in the context of national economy.²

²Some objectives are in accordance with the proclaimed policies of government, but not with the present course of development. Iran, Plan and Budget Organization, Iran's Fifth Development Plan 1973-1978 (Tehran: 1973), pp. 1-6 and Iran, Plan and Budget Organization, National Spatial Strategy Plan, First Stage Final Report, 4 Vol. Synthesis (Tehran: May 1976), p. 21.

1. Desire for a feasible economic growth based on a modern production apparatus capable of taking over from natural resources in the long term. 8% growth is suggested for non-oil sectors during the period 1977-1992.
2. Control of socio-economic disparities as far as is compatible with the requirements of growth, and mitigation of their effects on the individual.
3. Assertion and consolidation of national unity and identity in the face of the drastic changes which will affect society.
4. Control of urban growth, implying measures to slow down and channel the growth of large cities. The urban population will increase to 60% of total population in 1992.
5. Control of migration, proper account being taken of the requirements of the modern economy, strategic necessities and the needs of the population.
6. Decentralisation of management tasks and better compliance of individuals with the choices made by society.
7. Protection of the environment, natural resources, and the national heritage.

The national goals set the following general objectives for agricultural development:

1. Maximisation of agricultural production in the long term. It is estimated at 4.5% per annum during the period 1976-1992.
2. Guarantee of satisfactory living conditions for the agricultural population.
3. Control of the drift from the land.
4. Administration of the economy's agricultural resources within a long term perspective and protection of marginal resources.

The analysis of past chapters in terms of above options are the underlying rationale for policies dealing with the agricultural sector. However, it is not the intent to map out an overall comprehensive agricultural policy, but rather to define guidelines consistent with the general objectives of agriculture determined in terms of national goals. The policies discussed in this chapter are concerned with the areas such as, insufficiency of infrastructure, structural problems, agricultural resources, population, and income. The effects of these policies were quantified as far as possible in scenario 2 of the macroeconomic model in chapter VI.

Infrastructural Policies

Development of agricultural infrastructure is the prime means of modernising the small farming sector and expanding the medium and large scale farm sector while preventing the latter from competing with the small farms which will remain in the majority.³

This policy must vary accordingly as it deals with large irrigated areas and poles of development, farming areas with small scale irrigation works (qanats, tube-wells, simple wells, etc.), and dry farming areas or rangeland.

³Yujiro Hayami and Vernon W. Ruttan, Agricultural Development: An International Perspective (London: Johns Hopkins Press, 1971), pp. 274-82.

Large Irrigated Areas and Agricultural Poles

The provision of infrastructure for the major irrigated areas is the key to the exploitation of new regions (agricultural poles) and the intensification of current irrigated areas.

In the newly exploited areas, the rate at which infrastructure is provided should become very rapid in order to satisfy the objectives of increased production especially for certain strategic products such as sugar and rice.⁴

The development programme for intensively farmed areas near cities can be the determining factor in curbing a high rate of emigration from the peri-urban agricultural areas. Farms are frequently quite intensively cultivated already. Expansion of agricultural areas can for the most part be achieved by extending area already under cultivation.

The renovation programme is more important than the expansion programme. As soon as a modern irrigation network and suitable land consolidation provide satisfactory water control, virtually all the prerequisites for growth (infrastructure, market, etc.) will be in place.⁵

Great care must be taken at the level of the individual plot. The parcel of land must be large enough to permit profitable use of power-driven machinery and good water management, and laid out in such

⁴M.H. Ghavamian, "New Approaches to Agricultural Development in Iran," in The Agribusiness Council, Agricultural Initiative in the Third World (London: D.C. Heath and Company, 1975), pp. 125-28.

⁵Iran, Plan and Budget Organization, Iran's 5th Development Plan, pp. 39-47.

a manner as to facilitate cooperative efforts on heavy farming tasks and the layout of the network of farm tracks. The farms could grow gradually by absorption of other land parcels abandoned in the course of inevitable emigration, which would no longer be caused by restructuring.

In this way gradually expanding irrigated agricultural areas, perfectly modern in their water management which is of prime importance, is foreseen. However, it is envisaged that these farms may be less advanced in terms of their use of farm machinery which is of secondary importance in the near future.

Agricultural Areas Irrigated by Small Hydraulic System

Approximately 70% of irrigated areas, representing even in the long term, 2,500,000 hectares of 55% of the total irrigated surface area, will not be serviced by a large scale hydraulic system.⁶ The land development programme for these areas is therefore of considerable significance. It should be tied in with the programmes for the rangeland, dry farming, animal husbandry, fodder cultivation, and fallow and stable fields.

Some small projects will be very effective for developing the farms irrigated by small hydraulic systems. The main purpose of these projects are water control and efficiency in the use of available water.

In the east (Khorasan, Semnan, Kerman, and Yazd) control of the inevitable replacement of qanats by the sinking of tube-wells and the assistance to villages will enable them to withstand competition for allocation of water.

⁶Iran, Plan and Budget Organization, National Spatial Strategy Plan, First Stage, Final Report, Rural Geography (Tehran: May 1976), p. 27.

In all agricultural areas the construction of small irrigation networks, levelling of parcels of land, and expansion of agricultural areas through sprinkler irrigation are projects for the efficient use of water resources.

The small hydraulic operations and civil engineering projects (tracks, bridges, buildings, etc.) will require the development of local construction companies which will be able to employ surplus manpower in the agricultural areas. This programme will therefore be an important channel for transfer of incomes.

Dry-Farming and Rangeland

The conservation of land resources implies land development and structuring which promote the cooperation necessary for the joint practice of dry-farming, rangeland, and irrigated farming.⁷

Dry-farming must be coordinated with the potential of land. In some areas it must be carefully controlled, because over-exploitation gives rise to irreversible erosion. The decline in rural population will facilitate the implementation of the proposed policy. It will then be the time to put into operation a system for water and soil conservation, e.g., construction of terraces and water diversion networks on steep slopes or reforestation trenches. Any decision to reduce dry-farming must be accompanied by appropriate provisions.

⁷ Ibid., p. 78.

Although dry-farming currently contributes only 10% of agricultural value added, it produces 40% of the cereal output. Uncontrolled cut backs on a large scale would create shortages of wheat which plays an important role in the Iranian food basket.

Exploitation of rangelands remains a major activity, accounting for nearly 25% of agricultural value added, but in some areas its use must be totally neglected or rationally exploited.⁸ This statement is based on the fact that grassland is for the most part used by nomadic highland populations whose number will decline and by the poorest sedentary strata - landless herdsmen and small land owners who will be the first to emigrate towards the city. The problems of the rangelands stem from the fact that they do not have any specific owners (although they legally belongs to the state) and therefore are subject to disorderly exploitation which leads only to their deterioration. In rangeland areas even more so than in other areas, technical improvement and resource management are inseparable since no lasting improvement is possible if the rangelands are not used rationally.

A cooperative or a basic group can receive the right to the use of a certain area of improved rangeland (or rangeland in the process of being improved) as well as the complementary facilities, and can agree in exchange to follow a plan for exploitation and to accept supervision of their livestock numbers.

⁸Ibid., pp 89-104.

Structural Policies

While the agricultural infrastructure policies allow for modernisation of the production system, the structural policies are proposed for the organization of this production system so that it may adapt itself to economic, social, and technical constraints.⁹

The economic constraints require general and rapid growth throughout the system, i.e., advancement of the small farming sector, more intensive cultivation by large and medium sized farms, high productivity by agro-business concentration on strategic commodities.

The social constraints call for a policy which will control agricultural emigration by protecting the family scale farms.

The technical constraints which require necessary agricultural modernisation do not necessarily call for gigantic operations. Through cooperation, costly farm machinery can be utilised to full advantage. The policy of deliberately increasing the size of farms utilized in some developed countries is primarily part of a policy for eliminating income disparity and cutting back on manpower. In Iran the implementation of this policy would be incompatible with the goal of controlling the emigration of rural population. Therefore, there is a need for searching for other policies for the problem of income disparity.

⁹William H. Nicholls, "Development in Agrarian Economies: The Role of Agricultural Surplus. Population Pressures, and Systems of Land Tenure," The Journal of Political Economy, 61 (February 1963): 27-28; Iran, The Ministry of Land Reform and Cooperatives Affairs, Ten Years After Land Reform (Tehran: 1971) pp. 10-15; and R. Doroudian, "Modernization of Rural Economy in Iran, Iran: Past, Present and Future, ed. Jane W. Jacqz (New York: Aspen Institute for Humanistic Studies, 1976), pp. 157-68.

Agro-Businesses

The agro-businesses are effective in achieving the goal of short term rapid increase in output, but they are in opposition to the proposed demographic objectives. Moreover in this system of production except for specialised industrial cultivation, the level of intensiveness in the long-run is inferior to that of the small and medium scale farms.¹⁰ Since agro-businesses cannot play a major role in future Iran's agriculture the location of agro-businesses must be limited only to newly exploited areas. Their role should be limited according to the production targets for those products for which they are truly efficient, namely sugar cane, beef, oil seed, etc.

In the areas where the agro-businesses play an important role, they must not be isolated. Planners should think in terms of developing a diversified system to renovate the traditional agricultural areas and to set up small and medium size farms. This will help to promote an atmosphere of cooperation, especially in the use of manpower. During the time of the seasonal peak in employment in agro-businesses, there would be an increase in wage earners who are normally integrated in a diversified rural environment, e.g., former agricultural labors working on their own farms.

The agro-businesses programme could equally well be used to establish a network of fodder production centers whose purpose would be the creation of fodder stocks to relieve the hazards of rangeland production, thus enabling the stock breeders to stabilize the livestock

¹⁰Iran, Plan and Budget Organization, National Spatial; 2: 166.

numbers at their optimum level.

The strict management and modern technology which characterize the agro-businesses could be properly directed towards the setting up of firms specializing in the development of marginal areas. They could deal with the exploitation of outward resources, e.g., the use of highly turbid downstream waters in Khuzestan and the ground waters downstream of hydro-electric plants before they are finally lost in the Kavisr.

Medium and Large Scale Farms

Agricultural policy for these farms should be more concerned with their progress within the limit of their present area and prevention of any increase of their water consumption.¹¹

It is therefore important to guide their development towards intensification. In order to accomplish this, it is advisable to establish specialised bodies. The dissemination of technical knowledge in this sector must stem from a very specific approach, regarding these farms as real business ventures.

In regions where corporate style farms play an important role, management centres could be established. A management centre would be composed of qualified, non-specialised agronomists who would be in close contact with the farmers enrolled at the center. Any government assistance, technical or financial, would be provided for the enrolled

¹¹ Ibid., p. 167.

farms at their regional management centre.

Small-Farming Sector

The main recommended policy for the agricultural sector is the modernisation of the small farming sector.¹² For this, success with the cooperatives is essential. The aim of controlling agricultural emigration rules out the widespread application of formulae of the farm corporation or even producers' cooperatives in as much as a cooperative would reproduce on 20 hectares the same conditions as a small farm corporation. It is well known that this kind of operation is disliked by the farmers, that it causes the departure of landless peasants who are very numerous, and that it increases the rate of emigration of small farmers, in particular the younger generation.

In any case, farm corporations or producers' cooperatives are not essential for technical change, and there is no strong evidence of inefficiency of technical assistance of small farms; what is obvious is the irresponsibility of farmers and engineers in producer's cooperatives. Such formulae must therefore be limited to very particular uses, e.g., the settling of the nomads.

Agricultural Resources Policies

Land

The achievement of a high rate of increase in agricultural products calls for an optimal management of all land and water resources.¹³

¹² Ismail Ajami, "Agricultural and Rural Development in Iran," Iran, Past Present, and Future, ed. Jane W. Jacqz (New York: Aspen Institute for Humanistic Studies, 1976), p. 153.

¹³ Iran, Plan and Budget Organization, National Spatial, 2: 63-69.

In order to fulfill this aim, given the location of water resources and the present utilisation of land with a high potential, it will be increasingly necessary to use land involving considerable natural constraints (due to considerations of topography and drainage). In the long term it may be anticipated that an increasing percentage of farming land will require heavy investment to render it suitable for use. It is of the utmost importance for the future to ensure the preservation of land with a high potential, particularly since increased production most frequently relies on this type of land for high yield varieties which, however, impose considerable pressures on the soil.

Most of the existing urban areas are situated near to, or in the centres of, areas with high agricultural potential. Even if only a part of this land is threatened by the urbanisation process, it will have a considerable effect on agricultural production.

-Regarding the above consideration the proposed policies for land resources are:

1. The land resources suitable for farming must be protected against the main factors causing their deterioration namely natural erosion (water and winds) assisted by negligent farming; salination of irrigated land; and urban encroachment on agricultural land.
2. New land resources suitable for farming must be developed by desalination and drainage, by land reclamation obtained by spreading flood water, and by the opening up of land previously unsuited for irrigated farming through introducing new techniques of irrigation, e.g., sprinkling.

Water

The policy of water resources, necessarily involves the study of the processes whereby these resources are renewed and, consequently, of the functioning of natural cycles.¹⁴ The consequences of a decision in this field cannot be determined by merely comparing the local advantages and disadvantages of a given project. On the contrary, the approach should aim at optimising the utilization of all resources seen in the contexts of the hydrological unit (the drainage basin) and, if possible, of a group of several hydrological units. The approach also is not confined in terms of the quantities available, but also in terms of the quality of the resources and any foreseeable changes caused therein by the uses contemplated, taking account of the predictable needs of the various users.¹⁵

Such an approach calls for:

1. Maximum possible recycling of water which includes the preferred use of irrigation water for areas furthest upstream with the advantage of consuming less water; recovering sewage water and processing it where it is necessary; and priority for those treatment and cooling processes in industry which consume the smallest quantity of waters and treating effluents so as to avoid irreversible pollution.
2. Optimum stock management and, in particular, of reserves contained in water tables.
3. Whenever physically possible and humanly desirable resources of marginal water should be managed in such a way that development does not lead to a reduction of the volume used and the subsequent transformation of large parts of the country into desert.

¹⁴Iran, Plan and Budget Organization, Water and Irrigation in Iran (Tehran: February 1968); Iran, Plan and Budget Organization, Iran's Fifth Development, pp. 39-48; and Iran, Plan and Budget Organization, Evaluation of Agricultural Sector in the Past Development Plans (Tehran: January 1976).

¹⁵Ibid., pp. 45-47.

Productivity of Land and Water

Considering the limited water and land resources, and the objective of a high agricultural production increase, there should be a nation wide increase in the productivity of per unit land and water used. This increase in productivity will be largely due to land improvements, mainly renovation of networks and an increase in the water resources available for areas where present-day irrigation is unsatisfactory. Except for newly exploited areas where the rate of productivity is already high, production increases will be gained by the expansion of land and water resources.

Population Policies

In a country where the growth of the population has been 2.6-3% in the past twenty years and there has been a change in the age structure towards a younger population, there will be a serious employment problem in the next fifteen years. The problem will be aggravated by the likely higher rate of participation of women in the labor force.¹⁶ Therefore, in spite of a decline in the number of people dependent mainly on agriculture, the rate of rural emigration cannot be very high. This will be achieved by the implementation of the proposed agricultural policies and the diversification of activities. The relative control of agricultural emigration policy stems from a concern for consistency, and has two very different facets: a

¹⁶Firouz Tofigh, "Development of Iran: A Statistical Note," Iran: Past, Present, and Future, ed. Jane W. Jacz (New York: Aspen Institute of Humanistic Studies, 1976), p. 58.

decrease in the agricultural population and at the same time some measure of emigration control. One has only to look at future income disparities to realise that all in all the agricultural population emigration is normal for a developing economy,¹⁷ nevertheless, nation-wide agricultural growth should make it possible to limit emigration in all regions. In particular, the policy of support for marginal areas and promotion of small farms should make it possible initially to obtain a below average rate of emigration in those regions which are less influenced by urbanisation. The average cultivated area per family in 1992 will not change drastically from the present level.

The policy of relative emigration control will cause the agricultural areas of the country to remain more populated in comparison with the policy of adoption of a nation-wide collective system and a radical restructuring. Farm corporations and producers' cooperatives of twenty hectares or so bring about a sharp decrease in employment and drastically reduce the resistance of the agricultural population to the temptation to leave the land.

Incomes Policies

The policy of relative control of agricultural emigration will be a negative factor for closing the gap between agricultural incomes and average incomes.

¹⁷Derek R. Byerlee and Carl K. Eicher, "Rural Employment, Migration and Economic Development: Theoretical Issues and Empirical Evidence from Africa," in Rural Islam, Agricultural Policy in Developing Countries (New York: John Wiley and Sons, 1974), pp. 296-99.

The Ratio: $\frac{\text{Gross Domestic Output/Total Population}}{\text{Gross Agricultural Output/Agricultural Population}}$ which was approximately 4 in 1974¹⁸ will remain high in 1992. The gap is so large that a large scale transfer policy will be imperative if the rural exodus is to be controlled.

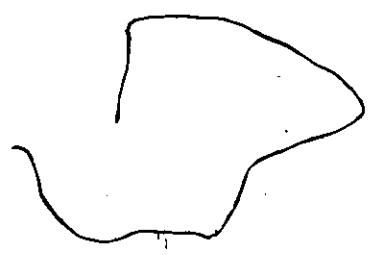
Since it is the small farmers who need bolstering, the incomes policy should focus more on assistance to farms than only on price supports, e.g., equipment subsidies, earmarking of wages for rural infrastructure construction workers recruited from the farms, contribution to the operating budget of cooperatives, etc.

Considering the non-existence of organized markets for agricultural products and their present inefficiency, any policy aimed at improving the marketing conditions could raise the producer's share of the price paid by the consumer for agricultural products and consequently improve the incomes of farmers. In this context the appropriate policy includes a system of local roads, a nation-wide network of information on the agricultural markets, a network of storage warehouses, and the role cooperatives or the state agencies as regulatory mechanisms for the markets. The aim of the marketing policy is to simplify commercial circuits and leave farmers less dependent on middle men, especially as regards loans. The financial capabilities of present middlemen could be channeled to

¹⁸Plan and Budget Organization, National Spatial, 2: 174 and M.H. Pesaran, "Income Distribution and Its Major Determinants in Iran," Iran: Past, Present and Future, ed. Jane W. Jacqz (New York: Aspen Institute for Humanistic Studies, 1976), p. 269.

other activities, e.g., services and small scale industry. The existing credit cooperatives would be the basis for the accomplishment of financial objectives.

To help the producers with regard to severe fluctuations in price and provide them with economic security, minimum prices for major agricultural products must be set and guaranteed. In the past the policy has been biased towards the consumers in urban areas. For the future the minimum prices must be set for various grades of each product in line with normal production costs in the region and with due consideration of other nations' support of their domestic products.



CHAPTER VIII

CONCLUSION

This thesis was designed to show, by means of theoretical considerations and empirical analyses, the place of the agricultural sector in the course of economic development of Iran. Although the work was consequently limited to the socio-economic conditions of Iran, there were implications and generalization of interest for the other developing countries. The study confirms that under general conditions agricultural development is a major factor, at least in the early stages of economic development, for overall development and a sustained rate of growth. However, the potentials and characteristics of each economy modify or intensify the vitality of agricultural development for its current economic development and the determination of its future path.

For a closed economy the increase in productivity of workers in agriculture is necessary, if there should be an increase in the production of other sectors through capital accumulation and the transfer of labor from the agricultural sector to other activities. For an open economy, it seems that the necessity for agricultural development is not as imperative as in the case of a closed economy, but in view of the severe national or international constraints imposed on developing countries, their economies operate under conditions very similar to closed economies.

However, it is not claimed that the exclusive and unique solution to the manifold problems of economic development is in agriculture, but it is asserted that a one-sided policy of industrialization will not achieve any welfare goal of society. Industrialization by itself is neither necessary nor sufficient for economic development. What is needed is an overall simultaneous short run and long run consideration of all sectors and their components, economically, socially, and politically. It appears difficult to implement, but it is the real economic world with which the economists and the planners have to deal.

In a global perspective, the thesis not only developed the above problem and provided the case of Iran for supporting the hypothesis of the significance of the role of agriculture in economic development, it also explained the neglect of the contribution capacity of agriculture to the welfare of the economy and the resulting inadequate attention in the development plans of developing countries. The main reason is the customary measurement of contributions of economic sectors in terms of gross national product. The latter concept by no means represents the welfare of the society and the level of satisfaction of the people. The contribution of agriculture to the economy is so crucial that even for a country like Iran with present high levels of oil exports it cannot be disregarded.

On empirical grounds the course of development in present developed countries and the situation of the world food market support the need for vitality of agricultural development in developing countries.

The study of the course of development in Western European countries, the United States, Japan, Russia, and the relative achievements of China show that all these countries prior to their industrialization or simultaneously have increased substantially their productivity in agriculture. However, the favourable natural conditions in the case of the United States and the colonial trade in the case of Western Europe have been other significant elements for their rapid and high levels of development.

The study of the world food situation indicates that the future world food supply is not very bright and in addition, the world food market is gradually becoming more monopolistic. The world food crisis of 1973 and 1974 confirmed that the earlier exaggerated optimism about the green revolution was a hasty deduction. If the real trend of world food supply is not in favour of developing countries, they should reconsider their plans for agricultural development.

The agricultural sector, particularly in developing countries, is characterized by features which are in many respects different from the familiar assumptions in economics. The farmers in traditional agriculture behave rationally within the boundary of their socio-economic possibilities, but the unfamiliarity of the customary economists with the conditions of traditional farming results in the imputation of irrationality to the farmers and the proposal of inapplicable policies for agricultural development. In fact, the development of traditional agriculture is far more complicated than that explained by models such as the conservative view, the

urbanization and industrialization approach, the diffusion view, the high pay-off input analysis, etc. Any proposal for agricultural development requires a very extensive field study in each case. The proposed policies are usually combined results of the above models as well as the incorporation of many other considerations - economic, social and environmental.

In the case of Iran, the period 1963-76 have shown some remarkable economic achievements in all but the agricultural sector. In constant prices the gross national product has increased annually by 11% during 1963-1976. There have been improvements in industries, communications, electric power capacity, education, and health conditions. The economy's progress has been achieved up to 1970 in the absence of appreciable rates of inflation.

Unfortunately, the progress of Iran has been accompanied with some negative aspects. The priority given to achieving the highest possible rate of economic growth has resulted in the development of a highly capitalistic modern sector which takes every opportunity the market offers to entrench itself and increase its prosperity. Continuation of this one-sided policy has led to the gradual collapse of the traditional activities including the agricultural sector. The economy still displays the features of economic backwardness. There is lack of integration between sectors; the deficit of nonoil balance of payments increases; disparities in incomes by region and class grow due to the large profits made by capital in the cities; bottlenecks proliferate because of the concentration of activities in

a few wealthy, densely populated areas; the risk of social unrest increases; and the recent high rate of inflation offsets considerably the effects of economic progress. In summary, the economic growth of Iran has not been accompanied by the projected increase in welfare.

The agricultural sector has suffered most from the past economic policy. As a consequence, the country has ceased to be a self-sufficient economy in agricultural products. In 1975 she imported 131 billion rials, 1.9 billion dollars, food-stuffs which was equal to 20% of the nation's total food consumption. The dependency is still increasing.

The present agricultural policies try to develop the sector in the same manner as in industrial development. The aim is to increase production through use of only foreign technology and operation of large farms. The policy tends to centre efforts on favourable areas. There is considerable interest in promotion of rapid restructuring of these areas, namely, the policy of agro-businesses, animal husbandry complexes, farm corporations, and development poles. While some small farms cultivated by Iranian farmers who use domestic inputs have very high yields, it seems that the small-farming sector with 70% contribution to the agricultural value added in 1975 has been neglected and the institutions seem somewhat badly organized for its promotion.

The agrarian reform in 1962 changed greatly the traditional balance of rural areas and small-farming became the main characteristic of Iran's agriculture. Although the agrarian reform was successful in the transfer of land to the tenants and in the breakup of the economic

and political power base of the landlords, it did not provide the small farmers' economic and technical needs. In consequence, the farmers found themselves unequipped and isolated in an otherwise highly dynamic economy.

Regarding the present agricultural policies certain questions are raised. First, one can question the capacity of the large farm units to encourage decisive progress in comparison with other means of restructuring entailing less upheaval for the traditional environment. Second, such a policy, if applied generally, would speed up the move from the land which as a result of limited job opportunity in other activities could not be of interest in the near future. Third, the lack of interest in marginal areas would lead to the abandonment and deterioration of some agricultural potential.

According to the adjusted data, the rate of growth in the agricultural sector has been limited to 2.2% per annum during 1963-75. The adjusted figures for the recent years imply more stagnancy and even reduction for some products. The rate has not kept pace with population growth and the higher annual demand of 5.5% for food-stuffs.

The development of the agricultural sector of Iran can solve partially her economic imbalances. In addition to the earlier global theoretical and empirical reasons, there were some qualitative aspects more relevant to the case of Iran which were explained in Chapter VI. In order to show the effects of changes in quantifiable variables of each economic sector on the whole economy and to depict an image of Iran's economy in 1992 a macroeconomic model was built. The year 1992 is the end of the Eighth Development Plan and the time of

oil reserve depletion. At present, oil constitutes more than 90% of the total exports. Particular attention was made to the possibility of agricultural production and its demand.

Technical studies show that despite the relatively limited agricultural potential of Iran, the country would be able to expand her agricultural production by 4.5% per annum during the period 1976-92. The increase would become possible through a 1.5% annual increase in the actually cultivated land and a 3% annual increase in the productivity of per unit land. The projected demand for food consumption during the same period would increase by 4.5% per annum. The figure was determined through the projection of the critical variables that influence the long term demand, namely population growth, increase in per capita income, and rural migration.

Equal increases in agricultural production and consumption indicate that although the country will provide the bulk of her food consumption in 1992, she will not be able to become self-sufficient in food requirements unless a drastic decrease in the projected per capita income takes place. The rate of food imports to food consumption will remain at the present level of 20% in 1992.

If the economy fails to achieve the proposed rate of increase in agricultural production, it will need huge amounts of industrial exports to finance the food imports. This will be outside the foreseeable potential of the economy within the next fifteen years. The run of the model showed that 5% annual rate of growth of per capita

income during 1976-92 will require 28% annual rate of growth in the exports of ~~manufactured~~ goods in the years 1976-92.

Viewing the welfare of the society as the final objective of the economic development showed that the contribution of the agricultural sector to the economy has been underestimated. This was either because of the distorted price structure in the market or the difficulty of imputation of monetary value to some aspects of the agricultural activity such as low social cost, low cost of utilities, and environmental problems. By the change of attitude towards present evaluation of activities agriculture will find its proper place in the economy. The agricultural sector can also play a major role in spatial distribution of activities, provision of employment for the young population of Iran with a high supply of labor in the near future, and expansion of markets for manufactured goods.

The runs of the macroeconomic model under a variety of assumed economic policies determined the likely picture of the economy of Iran in 1992. Scenario 1 as a representative of the present path of economic development showed that in the very near future the official economic objectives and the associated policies would have to be revised, unless the economy would strike a substitute for her depleted oil reserves. Even in 1975 the constancy of oil revenue caused the national per capita income to remain constant. Scenario 2 was representative of the proposed alternative development path for Iran. It took into account the foreseeable possibilities of the economy during 1976-92. In Scenario 2 a lower rate of economic growth with a higher contribution

of the agricultural sector, in comparison with Scenario 1, was proposed. The objective annual rate of growth of per capita income was equal to 3%. It could be easily adjusted upward, if the financial potential of the economy were expanded.

The concluding task of the thesis was the provision of policy measures. The policies are not less important than the proposed objectives themselves. They were determined in the frame of national goals and emphasise the use of modern technology adapted to the long agricultural tradition of Iran. Some experience of this method has proved its efficiency in the geographical conditions of Iran and has produced high yields for many products. The policies as proposed should consider the protection and expansion of agricultural resources, infrastructural projects particularly for the maximum efficiency in use of available agricultural resources, structural aspects, population, income disparities, prices, and marketing.

The case of Iran as an example of developing economies shows that the role of agriculture in economic development and on the welfare of society is so crucial that even with the availability of financial resources from the other sectors it cannot be disregarded. Further, the development process is not confined to one sector, since the question of development is not 'either or' but 'as well as'. Finally, the development of the agricultural sector involves many social, cultural and environmental aspects which must be carefully assessed for averting any possible failure of development attempts.

APPENDIX A

Complete National Economy Model for the Agricultural Sector¹

Notation

The five sectors, agriculture, manufacturing, private services, governmental services, and oil sectors, are numbered 1-5 respectively, e.g., S3 represents gross value added of sector 3 or private services sector and S5 represents gross value added of sector 5 which is oil and gas sector. The monetary values are in constant prices. In a more detailed model there will be a need to use current prices for some behavioural equations.

S _i	Gross Value added of sector i	i=1....5
D _i	Domestic demand for the output of sector i	i=1....5
X _i	Exports of sector i	i=1....5
M _i	Imports of sector i	i=1....5
L _i	Labor demand in sector i	i=1....5
K _i	Accumulated capital in sector i	i=1....5
I _i	Investment in sector i	i=1....5
Y	Gross domestic product	
X	Aggregate exports	
M	Aggregate imports	
LD	Aggregate labor demand	
LS	Aggregate labor supply	
D	Aggregate domestic demand	
K	Aggregate accumulated capital	
I	Aggregate investment	
N	Population	
Y/N	Per capita gross domestic product	
G	Government expenditure	
BG	Balance of budget	
OR	Oil revenue of government	
TT	Nonoil taxes	
D/TN	Per capita demand for agricultural products	
OQP	Quantity of oil produced	
OQD	Quantity of oil domestically demanded	
OQX	Quantity of oil exported	
OP	Price of oil, excluding gas	
S _i L	Output/Labor ratio in sector i	i=1....5

¹The model presented in this appendix, is different from the model which was used in the text, in terms of structural relations, endogenous, and exogenous variables.

RM2	Raw material used in sector 2	
RM22	Raw material imported for sector 2	
S _i K	Output/Capital ratio in sector i	i=1....5
y	Rate of growth of gross domestic product	
BP	Balance of payments	
t	Time period	
T	Time trend 1963=1	
n	Rate of growth of population	
g	Rate of growth of labour force	
RM21	Projected production of raw material for sector 2	
LU	Unemployed labor	
LA	Land in sector 1	
W	Available water in sector 1	

Endogenous Variables

Out of 79 variables used in the model, the 57 following variables are endogenous:

Sector 1 S1, K1, L1, S1K, I1, D1N, D1, X1, M1
Sector 2 K2, L2, S2K, S2L, I2, D2, X2, M2, RM2, RM22.
Sector 3 S3, K3, L3, I3, X3, M3, D3.
Sector 4 S4, K4, L4, I4, X4, M4, D4.
Sector 5 S4, K5, L5, I5, X5, D5, OQD, OQP.
National Accounts Y, YN, N, X, M, D, I, K, y, BG, OR, TT, LD, LS, BP, LU.

Exogenous Variables

The 22 exogenous variables are following:

LA, W, T, t, X1, S3K, S3L, S4K, S4L, I4, S5K, S5L, I5, M5,
OQX, OP, G, n, g, S2, S1L, RM21.

Objective Variables

Regarding the present long run economic objectives of Iran which are a certain steady rate of growth, employment for urban migrants, and balance of payments excluding oil exports, the objective variables of the model are:

1. $y = \bar{y}$ certain rate of economic growth
2. $BP=0$ or $M=X1+X2+X3+X4$, no deficit in the balance of payments
3. $LU=0$ or $LD=LS$, full employment

Instrument Variables

To achieve the above objectives different policy instruments could be chosen. For evaluation of present economic policy and projecting the likely future of Iran's economy, the instrument variables used in the model are chosen with respect to the present official policy, i.e., government expenditure, expanding the industrial sector for imports substitution and exports, and urban migration control.

1. G Government expenditure
2. S2 Value added of manufacturing and mining sector
3. S1L Output/Labor ratio in agricultural sector.

Agricultural Sector

1. $S1 = F(K1, L1, LA, W)$
2. $K1 = F(S1/L1, T)$
3. $S1K = S1/K1$
4. $S1L = S1/L1$
5. $I1 = F(K1, S1)$
6. $D1N = F(YN)$
7. $D1 = D1N * N$
8. $X1 = \bar{X1}$
9. $D1 = S1 + M1 - X1$

Manufacturing and Mining Sector

10. $S2 = F(K2, L2, RM2)$
11. $K2 = F(S2, T)$
12. $S2K = S2/K2$
13. $S2L = S2/L2$
14. $RM2 = RM21 + RM22$
15. $RM22 = F(S2)$
16. $I2 = F(K2, S2)$
17. $D2 = F(Y, S2)$
18. $M2 = F(I2, Y)$
19. $D2 = S2 + M2 - X2$

Private Services Sector

20. $S3 = F(Y, S4)$
21. $S3K = S3/K3$
22. $S3L = S3/L3$
23. $I3 = (S3, G)$
24. $X3 = F(T)$
25. $M3 = F(YN)$
26. $D3 = S3 + M3 - X3$

Governmental Services Sector

27. $S4 = F(G)$
28. $S4K = S4/K4$
29. $S4L = S4/L4$
30. $I4 = \bar{I}4$
31. $X4 = F(T)$
32. $M4 = F(S4)$
33. $D4 = S4 + M4 - X4$

Oil and Gas Sector

- 34. $S5K=S5/K5$
- 35. $S5L=S5/L5$
- 36. $I5=\bar{I}5$
- 37. $X5=OQX*OP$
- 38. $OQP=OQD+OQX$
- 39. $OQD=F(S2, N)$
- 40. $D5=OAD*OP$
- 41. $D5=S5+M5-X5$

National Accounts

- 42. $Y=\bar{Y}(1+y)^t$
- 43. $Y=S1+S2+S3+S4+S5$
- 44. $YN=Y/N$
- 45. $N=\bar{N}(1+n)^t$
- 46. $D=D1+D2+D3+D4+D5$
- 47. $X=X1+X2+X3+X4+X5$
- 48. $M=M1+M2+M3+M4+M5$
- 49. $X=M+BP$
- 50. $I=I1+I2+I3+I4+I5$
- 51. $G=OR+TT+BG$
- 52. $OR=F(X5)$
- 53. $TT=F(Y-S5)$
- 54. $LD=L1+L2+L3+L4+L5$
- 55. $LS=\bar{L}S(1+g)^t$
- 56. $LI=L8=LD$
- 57. $K=K1+K2+K3+K4+K5$

Operating the Model

To use the model for the purpose of this study, i.e., to find out the shape of economy provided following the current economic path and to draw up the economic policies for possibly more secure development path, the model might be operated under two different sets of conditions:

First, according to the current path, by the end 1992 the oil production will be enough for domestic consumption and nonoil exports should finance the imports of goods and services, i.e., $X_5=0$ and $BP=0$. At the same time the economy develops with a relatively high rate of growth, 10% per year $y=10\%$, and full employment, $LU=0$ through developing the industrial sector.

Second, if the current economic development is not feasible and the policy to develop export-oriented industries cannot help the economy, other policies, e.g., lower steady rate of economic growth in long run, increases in agricultural production, development of independent industries, are introduced to the model and the results in different cases are compared.

APPENDIX B

Time Series Data

The data compiled in Appendix B are mostly from the Yearly Report of Central Bank of Iran. The original data have been adjusted according to the estimation method of 1963. The notation used in the tables is the one used in Chapter VI. The figures for 1992 are forecast figures. 1992 (1) and 1992 (2) represent the effects of two different sets of policies on the economy which were explained in Chapter VI as Scenario 1 and Scenario 2. Current prices for 1992 is 1975 prices. The five sectors of the economy of Iran - agriculture, manufacturing and mining, private services, governmental services, and oil - are numbered 1,2,3,4,5, respectively. Therefore any number after a variable represents that the particular variable belongs to the sector specified by that number, e.g., S2 represents gross value added of sector 2 which is the manufacturing and mining sector and S5 represents gross value added of sector 5 which is the oil sector.

The letter "p" at the end of each variable represents the value of variable in terms of 1959 prices e.g., S5P is the gross value added of sector 5, oil, in constant prices of 1959. Without the letter "p" the value of the variable is measured in current prices.

The letter "p" before a variable represents the price index for the variable in terms of 1959 prices=1, e.g., PS5 is the price of gross value added of the oil sector, sector 5, in terms of 1959 prices=1.

The letter "N" combined with other variables represents the value of variables in terms of per capita, e.g., YDN is the per capita gross domestic product in current prices and YDNP is the same variable in constant prices of 1959.

The value of Si, Di, Xi, Mi, YD, YD1, X, M, D, BP, G, TT, OR, BG, X51, X52, S34 in billion rials; Li, N, LD, LS, LU, L34, UN, RN, in million persons; OQP, OQD, OQX in million tons; and OP in thousand rials per ton.

Si	Gross value added of sector i	i=1...5
Di	Domestic demand for the output of sector i	i=1...5
Xi	Exports of sector i	i=1...5
Mi	Imports of sector i	i=1...5
Li	Demand for labor in sector i	
N	Population	
YD	Gross domestic product	
YD1	Gross domestic product excluding oil exports	
X	Aggregate exports	
M	Aggregate imports	
D	Aggregate domestic demand	
BP	Balance of payments (deficit or surplus)	
LD	Aggregate labor demand	
LS	Aggregate labor supply	
LU	Unemployed labor	
G	Government expenditure	
TT	Total taxes, direct and indirect	
OR	Oil revenue of government	
BG	Balance of budget	
SiL	Output/Labor ratio in sector i	i=1...5
OQP	Quantity of oil production	
OQD	Quantity of oil demanded for domestic consumption	
OQX	Quantity of oil exported	
OP	Price of oil, excluding gas	
X51	Value of oil exported, excluding gas	
X52	Value of gas exported	
X34	Gross value added of sector 3 & 4, services	
L34	Demand for labor in sector 3 & 4, services	
S34L	Output/Labor ratio in services	
T	Times trend 1963=1	
A3	Commercialization factor in food consumption	
UN	Urban Population	
RN	Rural Population	
UNN	The ratio of urban population out of the total population.	

TABLE B-1
Gross Domestic Product by Sectors in Current Prices
(Billion Rials)

Year	S1	S2	S3	S4	S5	YD
1963	98.1	59.3	139.4	31.3	34.7	362.8
1964	110.3	68.7	152.4	37.1	41.0	409.5
1965	119.7	80.7	164.5	47.4	44.9	457.1
1966	121.5	92.2	175.6	52.9	53.0	495.2
1967	128.4	111.8	191.4	56.1	63.0	550.7
1968	139.6	130.3	218.4	67.7	70.9	626.9
1969	147.8	150.3	244.8	74.3	81.8	698.0
1970	160.6	168.1	279.6	87.3	94.3	790.0
1971	172.3	205.0	323.4	111.9	158.0	970.6
1972	199.6	253.3	392.8	139.2	190.5	1,175.4
1973	234.4	332.4	488.4	167.1	381.4	1,603.7
1974	234.6	474.8	644.6	279.6	1,398.9	3,026.5
1975	210.5	689.7	872.4	359.4	1,452.0	3,585.0
1992(1) ^a	373.0	5,642.5	3,432.0	1,470.9	1,687.3	12,605.7
1992(2) ^a	560.9	4,001.7	2,417.2	1,029.7	818.5	8,827.5

^a In 1975 prices.

TABLE B-2
 Gross Domestic Product by Sectors in 1959 Prices
 (Billion Rials)

Year	S1P	S2P	S3P	S4P	S5P	YDP
1963	89.9	58.5	130.8	25.9	38.4	343.5
1964	92.2	67.2	140.2	30.7	44.2	374.5
1965	99.0	78.3	149.4	39.2	49.2	415.1
1966	102.8	88.7	158.3	43.8	55.5	449.1
1967	111.1	106.3	173.6	46.3	67.8	505.1
1968	119.7	119.8	194.2	54.4	73.9	562.0
1969	123.4	130.9	214.6	61.3	88.5	618.7
1970	129.1	144.4	242.0	72.1	101.1	688.7
1971	124.4	170.6	267.7	92.4	123.4	778.5
1972	134.4	195.9	307.6	112.9	141.4	892.2
1973	143.5	222.5	347.3	123.8	158.2	995.3
1974	117.3	272.6	405.5	150.0	156.7	1,102.1
1975	100.4	334.2	499.7	168.5	139.7	1,242.5
1992(1)	177.9	2,733.9	1,965.6	689.6	78.7	5,729.0
1992(2)	267.5	1,938.7	1,384.5	482.8	16.1	4,152.3

TABLE B-3
Exports by Sectors in Current Prices
(Billion Rials)

Year	X1	X2	X3	X4	X5	X
1963	6.5	2.5	2.5	1.0	32.9	45.4
1964	6.8	3.9	2.8	1.2	38.9	53.6
1965	7.8	4.8	3.8	1.6	42.6	60.6
1966	6.7	4.4	3.9	1.8	50.1	66.9
1967	7.5	5.2	6.2	2.2	60.0	81.1
1968	9.1	6.0	8.0	3.1	67.1	93.3
1969	10.3	6.9	9.2	4.0	77.0	107.4
1970	10.9	8.5	8.4	3.0	89.2	120.0
1971	11.9	11.5	13.0	4.8	150.5	191.7
1972	15.0	15.8	15.2	8.4	181.8	236.2
1973	26.6	17.8	22.8	13.9	361.2	442.3
1974	16.6	24.1	41.9	67.1	1,316.2	1,465.9
1975	19.3	22.2	67.6	91.0	1,347.9	1,548.0
1992(1) ^a	37.3	1,362.1	341.7	459.9	1,083.5	3,284.3
1992(2) ^a	37.3	989.2	341.7	459.9	355.8	2,183.9

^a In 1975 prices.

TABLE B-4
Exports by Sectors in 1959 Prices
(Billion Rials)

Year	X1P	X2P	X3P	X4P	X5P	XP
1963	6.5	2.5	2.4	1.0	36.4	48.8
1964	6.7	3.8	2.5	1.1	41.9	56.0
1965	7.7	4.7	3.3	1.4	46.7	63.9
1966	6.5	4.2	3.5	1.6	52.4	68.4
1967	7.3	5.1	5.6	2.0	64.6	84.5
1968	8.8	5.8	7.1	2.8	70.0	94.4
1969	9.8	6.6	7.9	3.5	83.3	111.1
1970	10.1	7.9	7.0	2.5	95.6	123.0
1971	10.4	10.0	10.0	3.7	117.6	151.7
1972	11.3	11.9	11.2	6.2	134.9	175.5
1973	14.5	9.7	15.1	9.2	149.8	198.5
1974	8.4	12.2	23.7	37.9	147.4	229.6
1975	9.7	11.2	36.7	49.3	129.6	236.5
1992(1)	18.8	685.9	185.3	249.4	104.2	1,243.6
1992(2)	18.8	498.1	185.3	249.4	34.2	985.7

TABLE B-5
Imports by Sectors in Current Prices
(Billion Rials)

Year	M1	M2	M3	M4	M	BP
1963	4.9	30.1	2.7	4.6	42.3	3.1
1964	11.9	40.0	3.1	5.0	60.0	-6.4
1965	7.7	53.1	3.4	6.5	70.7	-10.1
1966	6.8	60.6	3.5	6.1	77.0	-10.1
1967	4.9	78.4	4.9	7.8	96.0	-14.9
1968	4.9	92.3	8.0	11.3	116.5	-23.2
1969	5.4	102.6	10.2	13.8	132.0	-24.6
1970	7.7	109.7	12.4	14.2	144.0	-24.0
1971	15.3	128.9	12.4	18.7	175.3	16.4
1972	18.8	161.1	14.2	21.4	215.5	20.7
1973	27.5	234.1	26.0	37.7	325.3	117.0
1974	77.4	385.6	56.2	66.2	585.4	880.5
1975	131.0	687.7	100.0	108.5	1027.2	520.8
1992(1) ^a	365.3	2155.6	332.1	431.4	3284.2	0
1992(2) ^a	169.1	1500.6	218.6	295.4	2183.7	0

^a In 1975 prices.

TABLE B-6
Imports by Sectors in 1959 Prices
(Billion Rials)

Year	M1P	M2P	M3P	M4P	MP
1963	4.5	27.4	2.5	4.2	38.5
1964	10.8	36.2	2.8	4.5	54.3
1965	6.9	47.8	3.1	5.9	63.6
1966	6.1	54.1	3.1	5.4	68.7
1967	4.3	69.1	4.3	6.9	84.7
1968	4.3	81.9	7.1	10.0	103.4
1969	4.5	85.4	8.5	11.5	109.8
1970	6.3	90.2	10.2	11.7	118.4
1971	12.1	101.8	9.8	14.8	138.5
1972	13.5	115.8	10.2	15.4	154.9
1973	17.4	148.3	16.5	23.9	206.0
1974	43.8	218.2	31.8	37.5	331.3
1975	71.5	375.6	54.6	59.3	561.0
1992(1)	199.5	1,177.2	181.4	235.6	1,793.8
1992(2)	92.3	819.6	119.4	161.4	1,192.6

TABLE B-7
Government Budget in Current Prices
(Billion Riials)

Year	TI	TT	OR	G	BG
1963	22.3	33.0	27.7	66.9	-6.2
1964	23.1	32.7	36.4	80.2	-11.1
1965	29.2	52.7	39.5	101.8	-9.6
1966	33.7	49.5	47.4	113.3	-16.4
1967	39.1	53.7	54.0	138.8	-31.1
1968	45.6	75.6	61.8	178.8	-41.4
1969	51.2	84.2	76.4	208.6	-48.0
1970	57.4	87.6	84.7	231.8	-59.5
1971	65.4	103.0	155.3	284.4	-26.1
1972	74.2	123.9	178.2	359.1	-57.0
1973	77.3	153.5	311.3	478.0	-13.2
1974	48.3	189.2	1,205.2	1,076.5	317.9
1975	59.1	335.3	1,246.8	1,447.7	134.4
1992(1) ^a	ā	1,563.0	996.2	6,024.6	-3,465.3
1992(2) ^a	ā	1,135.8	329.1	4,137.8	-2,672.7

^a In 1975 prices.

TABLE B-8
Oil and Gas Sector

Year	QQP ^a	QQX ^a	QQD ^a	X51 ^b	X52 ^b	OP ^c
1963	73.0	69.2	3.8	32.9	0.0	0.475
1964	84.0	79.7	4.3	38.9	0.0	0.488
1965	93.5	88.8	4.7	42.6	0.0	0.480
1966	105.4	99.6	5.8	50.1	0.0	0.503
1967	128.8	122.7	6.1	60.0	0.0	0.489
1968	140.5	133.0	7.5	67.1	0.0	0.505
1969	168.1	158.3	9.8	77.0	0.0	0.486
1970	191.3	180.8	10.5	88.8	0.4	0.491
1971	230.8	219.7	11.1	148.0	2.5	0.674
1972	262.6	250.3	12.3	177.5	4.3	0.709
1973	295.7	279.8	15.9	355.1	6.1	1.269
1974	295.7	278.1	17.6	1,307.0	9.2	4.700
1975	262.9	243.7	19.2	1,333.8	14.1	5.473
1992(1)	270.4	160.0	110.4	875.6	208.0	5.473
1992(2)	111.6	27.0	84.6	147.8	208.0	5.473

^a In million tons

^b In million rials

^c In thousand rials per ton.

TABLE B-9
Population and Labor Force
(In Million Persons)

Year	N	UN	RN	LD	LS	LU
1963	23.55	8.51	15.04	5.92	6.29	0.37
1964	24.25	8.93	15.32	6.07	6.40	0.33
1965	24.98	9.37	15.61	6.23	6.52	0.29
1966	25.73	9.77	15.96	6.39	6.64	0.25
1967	26.43	10.21	16.22	6.70	6.86	0.16
1968	27.14	10.68	16.46	6.82	6.98	0.16
1969	27.88	11.15	16.73	7.02	7.19	0.17
1970	28.63	11.64	16.99	7.23	7.41	0.18
1971	29.40	12.14	17.26	7.44	7.61	0.17
1972	30.19	12.67	17.52	7.74	7.82	0.08
1973	31.01	13.23	17.78	7.92	7.97	0.05
1974	31.85	13.79	18.06	8.10	8.18	0.08
1975	32.71	14.42	18.29	8.41	8.50	0.09
1992(1)	48.00	33.32	14.68	13.68	14.40	0.72
1992(2)	48.00	29.08	18.92	13.68	14.40	0.72

TABLE B-10
Labor Force by Sectors
(In Million Persons)

Year	L1	L2	L34	L5
1963	3.02	1.30	1.56	0.04
1964	3.07	1.43	1.53	0.04
1965	3.08	1.52	1.59	0.04
1966	3.04	1.69	1.62	0.04
1967	3.09	1.83	1.73	0.05
1968	3.04	1.93	1.80	0.05
1969	2.97	2.12	1.88	0.05
1970	2.95	2.22	2.01	0.05
1971	2.92	2.36	2.11	0.05
1992(1)	1.93	5.96	5.70	0.08
1992(2)	3.42	5.21	4.98	0.08

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