SOME IMPORTANT CONCEPTS OF THE PROCESS OF EXPANDING AGRICULTURAL PRODUCTION CONSIDERED IN LIGHT OF RECENT PAKISTAN EXPERIENCE

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ABSTRACT

SOME IMPORTANT CONCEPTS OF THE PROCESS
OF EXPANDING AGRICULTURAL PRODUCTION
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by John R. Wilson

Agriculture is often the lagging sector in the economic development of a country, and increasing attention is being given to methods for effectively increasing production of this vital sector in developing nations. A study of the literature reveals wide disagreement as to what action these countries need to take in order to increase agricultural production. There was agreement, however, that agricultural improvement is necessary; will contribute to the development of other sectors; and is needed to assist in maintaining foreign exchange balances.

It was noted that there were many similarities in the relative importance given to various programs of agricultural development by countries which have achieved a certain amount of improvement. In order to determine if there is a pattern that can be usefully followed by developing nations, five countries were studied: Japan, Mexico, Taiwan, Greece, and the United States. It was found that these five countries followed very similar paths during the years of development. The pattern has been compared with the agricultural improvement programs of Pakistan to see if the experience of the five countries offered any suggestion as to what further steps needed to be taken to advance Pakistan's agriculture.

First, this study revealed that there were four general conditions or situations in each of the five countries which may have contributed to their agricultural development although they do not relate specifically to the field of agriculture. These four conditions were: (1) the traditional society had been changed by a political, economic, or social revolution, (2) the revolution was followed by a period of stable government, (3) there was a fair supply of manufactured consumer items on the market, and (4) a staff of competent administrators was available to carry on projects.

Second, it was found that there were twelve categories of activities that the leaders of the five countries had apparently considered important to agricultural development and each country had carried on programs to strengthen the farmers' position in respect to each of them. These activities affecting agricultural policy and production focused on: (1) land and tenure reform, (2) technical improvement, (3) farmer involvement in his own development, (4) general education (especially at the adult level), (5) transportation and communication, (6) agricultural research, (7) farmer training in agriculture, (8) agricultural education, (9) investment in agriculture, (10) supplies for agricultural production, (11) improvement of markets and prices, and (12) agricultural credit.

Each of the twelve development categories was then weighted based on the effort involved and the extent of the programs carried on to increase agricultural production in the five countries. Pakistan was then studied in terms of these factors

and given a similar "development score" based on the extent and effectiveness of its agricultural programs. Pakistan's score was considerably below that of the five developed countries for the period 1952-1962. Further, on dividing the 1952-1962 period into two parts, 1952-56 and 1952-62, it was found that Pakistan's development score was higher for the latter part of the period than for the first part. When a score was calculated for the 1962-67 period it was found to be still higher, indicating that, based on the five country experience, its agricultural program was improving.

Production records indicate that Pakistan's agriculture improved at a slower rate during the ten-year period than did that of the five countries, one percent versus four percent or more, and production increased at a slower rate in the first five years of the period than in the latter part, zero versus almost two percent. The estimate of Pakistan's development score as of 1962 for the years ahead, based on the weights assigned to the programs in the five more developed countries, indicates that its agriculture should improve at a rate somewhat higher than heretofore, perhaps approaching the rates achieved by some of the developed countries.

Recommendations were also made as to the categories of development programs that should be given special attention in Pakistan to raise its development score (i.e. its agricultural production increase rate) to a level comparable to or above that of the five countries.

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By

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During almost ten years of service in Pakistan as an employee of the U.S. Agency for International Development and its predecessor agencies, I had an excellent opportunity to observe and to take part in the agricultural development of the country. It was brought forcefully to my attention on several occasions that many projects had been tried on a large scale and had then been abandoned which had been successful and full of promise when conducted on a pilot basis a year or so earlier.

Further observation brought out the fact that conditions were "different" in the pilot project areas. They were carefully selected, the farmers owned their farms, the people were cooperative, the planning and execution of the projects were carried on jointly between farmers and officials, the project leaders were enthusiastic about the possibilities of success, the necessary production inputs were readily available, and the farmers and officials studied, worked, and learned together. However, as the projects spread to new areas, one of more of these conditions no longer existed and they failed.

This study is a continuation of the above observations started in Pakistan. By studying five agriculturally developed countries in relation to Pakistan, it was hoped that a procedure would emerge which could be followed by developing countries. The concept of the "development score" is the result of this work. Unfortunately, there is not time for me to further test the

concepts presented here, but if the ideas put forth have merit, they should be given further testing by others more capable of doing the necessary research.

I wish to gratefully acknowledge the assistance given me by the Agency for International Development. Without its support, this work would not have been possible. I especially appreciate the advice and assistance of Dr. Frank W. Parker, Dr. Ervin Long, and Dr. Monroe McCown, all of whom assisted in planning my program.

I am also very grateful to Dr. Lawrence Witt, my faculty advisor, for the long hours that he spent in checking the concepts and ideas presented in this paper and for the many suggestions that he made, to my faculty committee, Dr. James B. Hendry, Dr. Robert Stevens, and Dr. David Boyne for their assistance, criticisms, and suggestions. I would also like to thank all of those who have been so helpful during my tours in Pakistan for the contribution they have made to my understanding of the problems of agricultural development.

Finally, there are four ladies to whom I am deeply indebted and to whom special thanks are due; to Mrs. Pat Fuehring and Mrs. Joseph Fuleihan for the typing of the last two drafts of the paper, and to Betty and Christine, my wife and daughter for their forebearance and understanding during the past year and for the tremendous amount of encouragement and assistance they

have given me. Without their help, I am afraid that I would not have been able to carry on as I have.

In spite of all of the assistance received, however, any mistakes appearing herein are mine and I hereby take the full responsibility for them.

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CHAPTER I

INTRODUCTION

The Problem

Since the early eighteen hundreds, there has been an interest in economic growth and a few writers developed economic theories as to of how countries progress. Among these are Ricardo, Marx, J.S. Mill , and others whose economic theories explaining why some countries developed faster than others have been of interest for years.

However, economic development as a separate area of economics did not receive much attention until after World War II. That over half of the world's population suffered from extreme poverty was brought forcefully to the world's attention by statements such as that of Mr. B.R. Sen, director general of the Food and Agriculture Organization of the United Nations,

> "The first half of the twentieth century has witnessed three major revolutions. The political revolution has given self-government to nearly a third of the world's population and has brought their aspirations for a better life to the forefront of world attention. The revolution in communications has broken down the barriers of distance and language, and the dynamism of ideas can no longer be contained within the limits dictated by social privilege or political considerations. The demographic revolution has imparted to the challenge of poverty and want a new dimension."[1]

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[1] U.N., FAO, Aspects of Economic Development, (Freedom from Hunger Campaign, Basic Study No. 8, Rome, 1962), p. vii.

For such reasons as indicated above economic development is receiving much more attention than formerly.

Starting with the Marshall Plan in Europe and similar efforts in Japan, a great deal of success was achieved in early development efforts. However, as improvement programs were spread around the world to the less advanced countries, success did not come easily and progress was slow.

Since 1945 many economists, anthropologists, sociologists, natural scientists, and politicians have considered the problem of economic development of the underdeveloped nations and a body of theory has been evolving to explain development or, rather, the lack of development in these areas. The amount of literature has grown tremendously and ranges from fictional accounts of economic improvement work such as The Ugly American and Burma Days through the well recognized and authoritative works of Hagen, Heady, Schultz, Leibenstein, Hirschman, Kuznets, and others. Professional journals are full of articles giving arguments and counter arguments for suggested procedures to improve the condition of the agricultural people of the world.

In the course of these arguments, two main themes have emerged. The first is the idea of the "leading sector" in which one industry or group of industries is developed with the hope that it will either push or drag all of the other sectors along with it on the road to development. The second argument has come to be called the theory of the "big push" or "balanced growth" with all sectors traveling the path to

prosperity together. The idea being that there is enough complementarity between industries and between sectors that any neglected sector will become a drag on the rest of the economy and delay development. Both of these schools of thought argue for a rather massive capital investment program, although some consideration is being given to the possibility of development through a more gradual change in the economy. Unfortunately, agriculture is usually neglected in these theories. Only recently, say during the last four or five years, has come the realization that in all economies, agriculture has a big part to play through furnishing labor, food, raw materials, and capital for industry, and, in providing a market for industrial products.

Other aspects of agriculture are also important to the developing countries. It may be the principle earner of foreign exchange; it may save foreign exchange by supplying food; it may employ up to seventy or eighty percent of the people; and it is the center of the traditional way of life which has a profound effect on the way all people in the nation react to the development process.

Agriculture in many countries has become a drag on the economy because of neglect. It does not fulfill its normal function. Its people are poverty stricken, uneducated, half starved, underemployed at times, and, as such, may be a source of unrest and national instability.

Regardless of whether a country follows the ideas of those who favor the leading sector theory or of those who favor

the big push, agriculture dare not be neglected. It is important, then, to study the procedures that have been used in successful agricultural development programs to see if they can serve as a guide to the lagging countries and if they will provide ideas that will help these nations progress more rapidly.

There have been many studies of certain phases of rural development, such as the Community Development program of India, or the Agricultural Extension programs of the United States and Japan, or the Land Reforms of Mexico with marvelous results reported as having been achieved. Each is proposed as the answer to all development problems everywhere by each program's proponents. Others suggest that community development is not enough; land reform is not enough; and that agricultural extension by itself is a sterile discipline that can contribute little unless united with a program that involves the farmers, the administrators, industrialists, researchers, and consumers in a combined effort to improve the rural community.

In spite of the suggestions that have been made and the development programs that have been tried, the fact remains that development has been slow and expensive in terms of capital and people. The author of this paper spent over nine years in Pakistan working on development programs, and, in conjunction with many others, attempted to help Pakistan grow into a prosperous country. As will be shown later, some progress has been made, but not enough to maintain Pakistan's relative position in comparison with more developed nations, to say

nothing of forging ahead.

The mere fact that some countries, once similarly situated, have advanced shows that it is not absolutely necessary for a country to remain underdeveloped. The question then is, what did the successful countries do that was not done in Pakistan? What happened in Taiwan, Greece, Mexico, Japan, and the United States that made their agriculture increasingly more productive? What can be done now to help Pakistan, and other underdeveloped countries, achieve a position as prosperous members of the family of nations?

In this study we will be interested primarily in the agricultural phases of development with some reference to other sectors of the economy as they become relevant. Five countries that have increased agricultural production since World War II will be studied in some detail to establish, if possible, the methods and procedures used which led to progress in agricultural development and to determine if there is a pattern that can be used as a guide to developing countries. The United States and Japan are to be studied as being representative of countries that have been long periods of development; Mexico and Taiwan will be considered as examples of countries achieving rapid advancement of agriculture during the last fifty years; while Greece will be examined as a country that has developed since World War II.

The processes and experiences of these countries will then be compared with the programs that have been undertaken in Pakistan in its efforts to develop the agricultural sector.

It is hoped that the ideas and concepts that emerge will prove useful as a means of identifying important elements in the agricultural development process, and, at the same time, may serve as a rough guide in indicating the areas of ongoing programs which need strengthening in the developing countries.

CHAPTER II

A REVIEW OF THE LITERATURE

During the last twenty years, with the emergence of dozens of new nations from the colonial empires of the past, differences in living standards have become wider between the underdeveloped and the more fully developed nations; independence has not been an automatically opened door to affluence for the great masses of people in the newer nations, no more than it had been for the people of nations achieving independence many years ago. It became apparent to national leaders all over the world that if the gaps were not to become intolerably wide between the rich and the poor countries, steps would have to be taken to help the poor countries develop into economically advanced members of the world community.

Economic development has been defined in many ways but the most popular definitions seem to emphasize growth in a country's economy and an increasing gross national product, accompanied by an improvement in the economic welfare of the individuals in the country, plus an expansion in production capacity. It seems clear that economic development has come to be regarded as a dynamic process which is influenced by the resources available, the people, their attitudes, values and beliefs, and the country's position in time. Development then is likely to be an individual process for each country. Some can move fast, others slowly, some will be able to jump

barriers of time while others will not. Each country will follow a different path while developing, yet the body of theory that has accrued does not always reflect these differences. Let us now briefly look at some of the ideas that have grown up in regard to economic advancement.

The early mercantilists considered the industrial and trading sectors to be the most important aspects of the economy and that the main functions of agriculture were to serve as a source of raw materials and as a market for industrial products.

The mercantilists were followed by the physiocrats who found the agricultural sector to be most strategic to development. They believed that the non-agricultural sectors of an agrarian economy "would grow at an optimal rate and in sympathy with, and in response to, the growth of the agricultural sector, so long as there was an absence of governmental intervention, of special privilege and monopoly, and of other interferences with the competitive processes."[1]

Later, Adam Smith, developed ideas on division of labor, improvement in technology, and specialization as means of satisfying the increasing wants and desires of the entire population. He believed that the creation of an agricultural surplus would produce a demand for other goods and services

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[1] Joseph J. Spengler, "Mercantilist and Physiocratic Growth Theory," printed in Theories of Economic Growth, (edited by B.P. Hoselitz, The Free Press, New York, 1960), p. 55.

which could be paid for with the excess supply of agricultural products. He also believed that manufacturing industries would automatically develop to supply this demand so that agriculture would make demands on and supply industry, and industry would make demands on and supply agriculture.

Ricardo, on the other hand, believed that production increases from both land and industry would eventually be eaten up by an increasing population and that inevitably a point would be reached where the population would have increased "to the point where total wages equal total product minus rent, there will be no more profits, even with wages at the 'subsistence level.' Accumulation will cease, and the stationary state will have been reached."[2]

In the intervening years to 1945, there was relatively little interest in, or attention paid to development, though some of the writings of Marx, Marshall, Schumpeter and others can be read as applying to development.[3]

In fairly recent times, new theories of development have been established, each with its cohort of supporters. The first that should be mentioned is the theory of "Stages of Economic Growth" developed, or redeveloped, by Rostow. He

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[2] J.M. Letiche, "Adam Smith and David Ricardo on Economic Growth," B. Hoselitz, editor, Theories of Economic Growth (The Free Press, New York, 1960), p. 75.

[3] For further discussion of the evolution of Economic Development Theory, see Theories of Economic Growth, (edited by Bert F. Hoselitz, The Free Press, New York, 1960).

envisages all countries passing through five stages of development which he classifies as (1) the traditional society, (2) the pre-conditions for take off stage when the economy begins to expand and a transition begins to take place, (3) the take off stage when investment and savings rates increase to ten percent or more of the national income and some manufacturing sectors expand rapidly, (4) the drive to maturity, when ten to twenty percent of the national income is invested, permitting output to outstrip the increase in population, and lastly (5) the age of high mass-consumption.[4]

This much quoted theory is often criticized as a doctrine of development because of the difficulty in identifying the stage in which a country finds itself. Professor Kuznets also questions the validity of Rostow's interpretation and asks, "... why manufacturing--rather than agriculture, transport, or any other rapidly growing industry--should be the leading sector."[5]

Gerschenkron also argues against Rostow's thesis saying that there is no reason why a late developing nation should follow the same path as the advanced nations and that it should be expected that the latecomers will skip some of the "stages

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[4]W.W. Rostow, The Stages of Economic Development (Cambridge University Press, Cambridge, 1961), pp. 4-17.

[5]Simon Kuznets, "Notes on the Take off," paper prepared for September 1960 meeting of International Economic Association reprinted in Morgan, et al. Readings in Economic Development (Wadsworth Publishing Co., Belmont, Calif. 1963), p. 206.

of development."[6]

As opposed to Rostow's ideas, others have advanced theories to explain how economic development can take place. For example, Nurkse points out that development can be accelerated by mobilizing surplus agricultural labor to build social overhead capital at a very low cost.[7] Arthur Lewis argues that there are unlimited supplies of agricultural labor in most underdeveloped countries that can be used at a wage just slightly higher than the subsistence level in agriculture to develop industry, thereby forcing agriculture to contribute to industrial development.[8]

However, other authors, notably Schultz, Eicher, Anschel, Kao and others, argues that while there may be times when agricultural labor is not fully employed, it is very doubtful if there are many, if any, countries where sizeable numbers of laborers can be withdrawn from the agricultural working force without decreasing agricultural production.[9,10]

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[6]Alexander Gershenkron, Economic Backwardness in Historical Perspective, (Harvard University Press, Cambridge, 1962).

[7]Ragnar Nurkse, Problems of Capital Formation in Underdeveloped Nations, (Oxford University Press, New York, 1953).

[8]W. Arthur Lewis, "Economic Development with Unlimited Supplies of Labour," The Manchester School (May 1954) Reprinted in Agarwala and Singh, The Economics of Underdevelopment, (Oxford University Press, New York 1963), pp. 400-449.

[9]T.W. Schultz, Transforming Traditional Agriculture, (Yale University Press, New Haven, 1964), pp. 63-70.

[10]H.C. Kao, K.R. Anschel, Carl Eicher, "Disguised Unemployment in Agriculture: A Survey," printed in Eicher and Witt, Agriculture in Economic Development (McGraw-Hill Book Co. N.Y. 1964), pp. 129.

Other authors, such as Hirschman argue that development efforts cannot be successful unless they are such as to induce decisions on the part of other entrepreneurs which will lead them, in turn, to increase production. He demonstrates that, if properly chosen, new industries have forward and backward linkage affects which induce the formation of other companies, both to supply the requisites for, and to consume the products of the new industry, thus contributing to economic development.[11]

The idea outlined above is countered by other writers such as Nurkse who believe that massive amounts of capital must be expended in an across the board advance of all parts of the economy in order for development efforts to be successful. These proponents of the big push discount the linkage effects expounded by Hirschman and believe that direct action is required to achieve development in any sector.[12]

The position of agriculture in the modern theories of development has varied from one of being regarded as of primary importance to being looked upon as having a value of zero or below as a contributing factor to development. However, it has recently come to be realized that a stagnant agriculture has a depressing effect on the economy as a whole,

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[11] A.O. Hirschman, The Strategy of Economic Development, (Yale University Press, New Haven, 1961).

[12] Bert F. Hoselitz and others, Theories of Economic Growth pp. 155-298.

and that a live, vital, improving agriculture can help stimulate and contribute to the development process.

Dr. Nicholls writes that in a closed economy,

> "Rising agricultural productivity supports and sustains industrial development in several important ways. First, it permits agriculture to release part of its labor force for industrial employment while meeting the increasing food needs of the non-agricultural sector. Second, it raises agricultural incomes, thereby creating the rural purchasing power needed to buy the new industrial goods and rural savings which may then be mobilized, by direct or indirect means, to finance industrial development. Finally, it enables agriculture to supply the major wage-good (food) of industrial workers at prices favorable to the profitability of new industry."

He continues that in an open economy some of these aspects may not be so important but that,

> "Even here, however, rising productivity in the food sector is desirable, both because it may save scarce foreign exchange needed for financing imports of industrial capital and because it contributes to the integration of the dualistic (plantation-peasant) agricultural economy..... Finally if agricultural productivity in the food sector is or becomes sufficiently high, the nation may enjoy a food surplus of such magnitude as to permit the export on favorable terms of food itself..."[13]

Even Rostow made a bow in the direction of agriculture in a speech given at the 17th annual conference of the Middle East Institute in 1963 at Georgetown University when he said,

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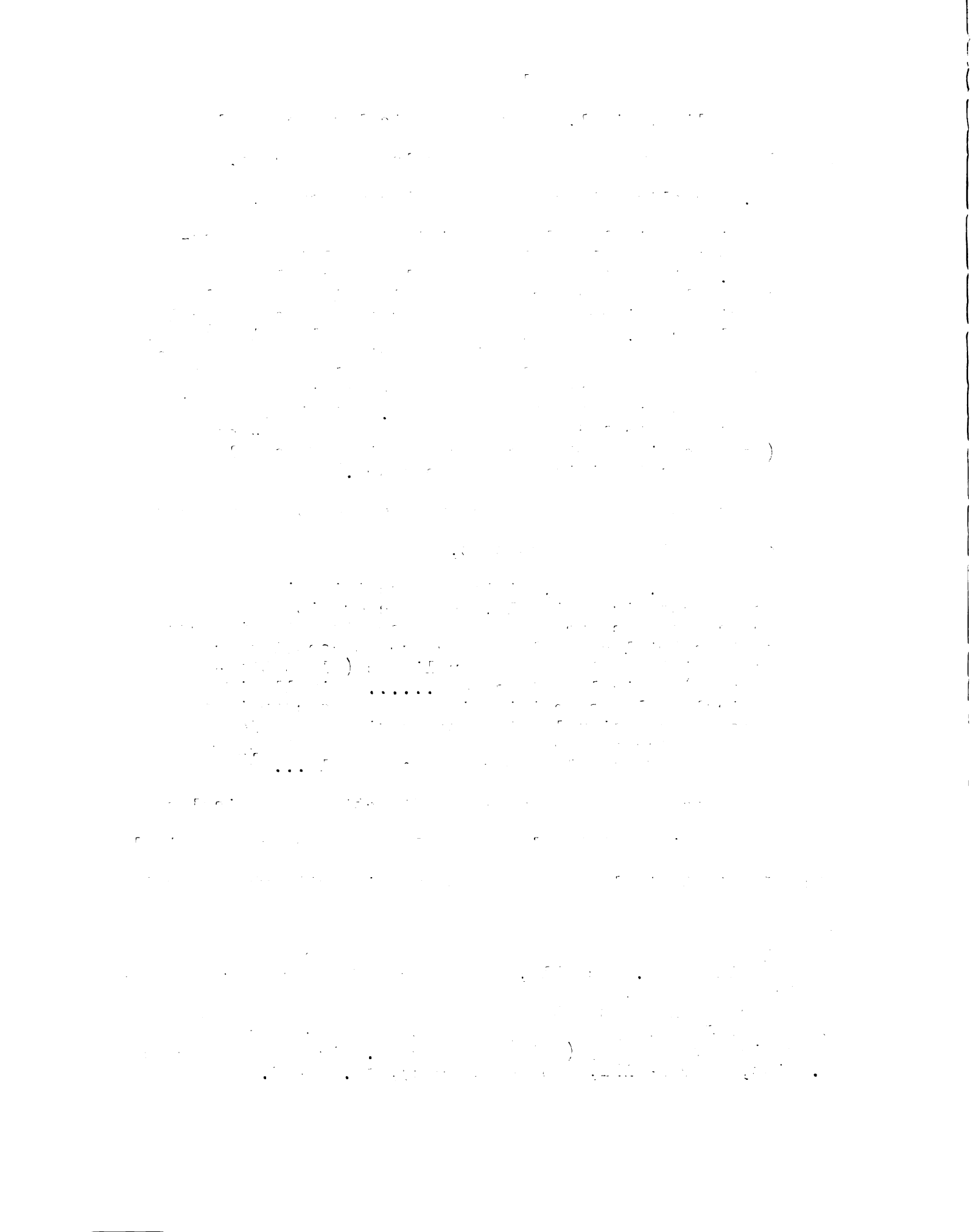
[13] William H. Nicholls, "The Place of Agriculture in Economic Development," a paper presented at a Round Table on Economic Development with Particular Reference to East Asia, Camagori, Japan, April 1960, reprinted in Agriculture in Economic Development, (edited by Carl K. Eicher and Lawrence W. Witt, McGraw-Hill, New York, 1964), pp. 12-13.



> "Rural development is proving, however, not merely a social duty to the less advantaged portions of the population, but a fundamental condition for the maintenance of a high rate of development for the society as a whole including especially its industrial development."[14]

He goes on to say that "...the lesson of experience... is that sustained industrialization requires the modernization of the countryside."[15]

Other writers have stated these same ideas and expanded on them since 1960, so that now the consensus seems to be that agriculture, by one means or another, must develop either ahead of or concurrently with industrialization. However, there does not seem to be the same general consensus as to what needs to be done to cause agriculture to modernize and improve. Dorreen Warriner, for example, said in a lecture in 1955 that "Land Reform is the most important social change now taking place in the world. ... No contemporary social change in the industrial countries is comparable in scope. The great new advances in social life are now happening in agricultural countries, above all in Asia, and they affect the people on the land."[16]

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[14] W.W. Rostow, "The Nationalization of the Takeoff," reprinted in State Department Bulletin (No. 48, May 27, 1963), p. 825.

[15] Ibid. p. 825.

[16] Doreen Warriner, "Land Reform and Economic Development," National Bank of Egypt Fiftieth Anniversary Commemoration Lectures, Cairo, 1955, reprinted in Eicher and Witt, editors Agriculture in Economic Development, (McGraw-Hill Book Company, New York, 1964, p. 272.

Other writers point out that distribution of land in itself is not particularly important nor will it have much effect unless accompanied by broad reforms or changes in the institutions serving agriculture. Pei-Kang Chung, for example, says that,

> "...it may be concluded that industrial development is a necessary, but not necessarily a sufficient condition for agricultural reform and improvement. ... Other conditions have to be provided simultaneously or even in advance if agricultural reform and improvement are to be effectively carried out. Among the other conditions the most important are improvements in transport, consolidation of farms and legal regulations relating to redistribution of land."[17]

Some writers have emphasized that incentives must be provided to increase production and cite high-fixed prices, subsidies on agricultural inputs and credit, and improved markets as means of accomplishing this goal. Others are just as vehement in their denials, or rather in their statements that price does not serve as a sufficient incentive. Hirschman, in his book Strategy for Economic Development, writes,

> "Rising agricultural prices will not often be very effective by themselves in calling forth additional output, because incentives to increased cultivation are weakened by existing land tenure systems, and other institutional rigidities, and because knowledge of improved methods or the extension of such knowledge is inadequate."[18]

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[17] Pei-Kang Chang, Agriculture and Industrialization, Harvard University Press, Cambridge, 1949, p. 231.

[18] A.O. Hirschman, The Strategy of Economic Development, p. 160.

Raul Prebisch, on the other hand, advocates a system of maintaining high prices for farmers as an incentive and even suggests that tariffs should be placed on imports, the income from which would be distributed to farmers to compensate them for losses incurred when producing low-priced exports. As an alternative, he suggests international retransfer of income from exports which would divide the income from the farmers' produce between the processor in the importing country and the producer in the exporting country.[19]

Prebisch also is an advocate of the idea that development must be preceded by radical social changes and reforms to,

> "...bring about structural changes such as would enable the savings potential to be used to the full and promote social mobility, ...to satisfy the demand of a rapidly increasing population that needs to improve its diet, and...to raise the level of living of the rural population."[20]

Other writers, such as Scrimshaw and Shumpeter, indicate that new technology is the best source of increased agricultural production. Scrimshaw believes that,

> "The problem of the underdeveloped countries, then, is to increase the productivity of their farms and farmers. This would allow them to industrialize and to feed their people more adequately... The entire population needs to be indoctrinated in the possibilities of scientific agriculture, including public

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[19] Raul Prebisch, Towards a Dynamic Development Policy for Latin America, (United Nations, New York, 1963), pp. 83-85.

[20] Ibid. p. 39.

officials who must provide the necessary funds, planning, training, and research programs."[21]

Security on the land, however, is the aspect of rural development that seems most important to Robert Hudgins.

> "True agrarian reform lies not in the revolutionary redistribution of land, but in the evolutionary process by which people find security on the land. It involves not merely the cravings of land hungry people, but the whole complex problem of rural insecurity. We are concerned, therefore, with agrarian reform as a process of advancing rural security."[22]

T.W. Schultz is a firm believer in the value of training and education and thinks that much of the improvement achieved in American agriculture is derived from investment in human capital.[23]

Schultz's ideas are confirmed by a United Nations study which says,

> "It has been recognized in recent years that the process of economic growth requires both formal training in new skills and the development of new values. The training in new skills is required to allow the country to operate in the modern technological world; the development of new values is necessary to provide acceptance of, and efficient operation within a changed society."[24]

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[21] Nevin S. Scrimshaw, "Food," in Technology and Economic Development, (published by "Scientific American," Random House, New York, 1963), p. 40.

[22] Robert W. Hudgins, "Essentials of Land Reform" International Development Review, Oct. 1961 reprinted in Dynamics of Development, (edited by Gove Hambridge, Frederick A. Praeger, Ner York, 1964), p. 277.

[23] T.W. Schultz, Transforming Traditional Agriculture. Yale University Press. 1964, pp. 175-206.

[24] United Nations, National Development Efforts (Basic study No. 13, Freedom from Hunger Campaign, 1963), p. 17.

The above comments indicate that there is little agreement on the proper methods to be used to achieve increased agricultural production, although no one doubts that production can be increased. As mentioned in a recent U.N., FAO, publication,

> "To sum up, it is clear that the earth's physical resources and man's present technical knowledge are sufficient to multiply the world's production of food many times. ... To be effective, knowledge must be applied in developing resources and increasing productivity. The magnitude of the obstacles that must be overcome in bringing present knowledge into full play throughout the world cannot be over emphasized."[25]

Very little research has been done in the field of agricultural development to provide empirical evidence of the efficacy of any of the suggestions offered. The U.S. Agency for International Development, with the cooperation of many developing countries, the U.S. Department of Agriculture, and several land grant colleges, is now conducting research on the problem to determine the most efficient ways for increasing the output of agriculture. As a preliminary to this study, the Economic Research Service of the U.S. Department of Agriculture prepared several papers, among the most important of which, for our purposes, have been "How the United States Improved its Agriculture" and "Agriculture and Economic

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[25] United Nations, Population and Food Supply (Basic study No. 7, Freedom from Hunger Campaign, 1962, p. 41.

Growth."[26]

Dr. Frank Parker and Dr. William Hendrix, of the U.S. Agency for International Development and the Economic Research Service respectively, prepared a paper, Foundations for Agrarian Development,[27] which analyzed and compared the development of five countries achieving a good rate of agricultural growth during the years 1952-62 with six countries that did not achieve satisfactory growth rates during the same period. They used four conditioning factors: (1) Land tenure, (2) Farm Prices, (3) Markets, and (4) Consumer Goods; and four production factors: (1) Knowledge, (2) Requisites, (3) Credit, and (4) Investment in developing land resources, in making comparisons based on a three-stage rating system.

The three papers mentioned above have been drawn on very heavily in preparing this discussion. In addition, an excellent review has been prepared, under the auspices of the Japan FAO Association, (edited by Takekazu Ogura) on the agricultural development of Japan.[28]

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[26] U.S. Department of Agriculture, Economic Research Service, How the United States Improved its Agriculture, (ERS-Foreign 76, Washington, March, 1964).
U.S. Department of Agriculture, Economic Research Service, Agriculture and Economic Growth (Agricultural Economic Report No. 28, Washington, March, 1963).

[27] Frank W. Parker and William Hendrix, "Foundations for Agrarian Development" presented at the CENTO Symposium on Rural Development, September, 1963 and included in the report of the symposium by CENTO, Ankara, Turkey.

[28] Takekazu Ogura, (editor) Agricultural Development in Modern Japan, Japan FAO Association, Tokyo, 1963). An interesting feature of this report is the section dealing with the implications of the Japanese experience for other developing countries.

The United Nations and the Food and Agricultural Organization of the U.N. have prepared numerous articles and reports which, except for two, will not be mentioned here but reference will be found to them in the text. The two that have been most instructive and useful are Economic Survey of Asia and the Far East, 1963 and a series of reports. The State of Food and Agriculture, issued annually.

Other sources of information on the development of agriculture are listed in the "Literature Cited" for those desiring to inquire further in to this inspiring and useful field of development.

CHAPTER III

AGRICULTURAL DEVELOPMENT IN SELECTED COUNTRIES

Since the beginning of history, the nations of the world have been affected by periods of famine and periods of glut of agricultural products. The first reported effort to establish an agricultural policy was that of Joseph in Egypt when he correctly interpreted the king's dreams and encouraged excess production during the fat years to be stored for use during the lean.

However, during only the last hundred years or so, has there been a systematic effort to develop agriculture in any part of the world; and only during the last twenty-five years has agricultural improvement become a factor of great importance to nearly all nations because of their desire to industrialize, because of the press of population, and because of increasing shortages of food.

A few nations stand out in the progress that they have made in improving agricultural production. For some, such as Japan, the United States, and a few European countries, it has been a long process, starting a hundred or more years ago. For others, such as Mexico and Taiwan, the process has been shorter, covering only the last fifty years; and in some, such as Greece, the development of agriculture is a very recent phenomena, dating from World War II.

The techniques used by these five countries at different stages in their agricultural growth have varied depending upon special local conditions, but as will be seen, there has been a remarkable uniformity in the priorities given in the Agrarian sector.

We will now examine these countries briefly to see what happened--what measures were taken to increase the supply of agricultural commodities available for use by the people in industry and to improve the level of living of farm families. We will attempt to make an evaluation of the success of these measures and determine their relevance for those countries seeking to increase agricultural production.

CHAPTER IV

JAPAN'S AGRICULTURAL DEVELOPMENT

Japan's experience is of interest to many developing countries, particularly those with a traditional type of agriculture, too little land, and a rapidly expanding population. As noted in Agricultural Development in Modern Japan,

> "The level of productivity of Japanese agriculture prior to the Meiji Restoration--as measured by yields per acre or per man--was probably not very different from, or at best only moderately higher than, levels of productivity which persist to this day in many parts of the region."
>
> "...What is of interest to other countries is not so much the fact of this transformation in agricultural productivity. It is rather that it took place within a traditional framework of small scale farming."[1]

Other factors making the Japanese agricultural experience worthy of study by developing nations are that: (1) production was increased without cutting down on the agricultural work force in the early stages of development, giving industries a chance to develop without mass unemployment; (2) early production increases were achieved without large capital outlays or the use of capital intensive production methods, thus permitting surplus capital to be used for building up an industrial base; and (3) agriculture was able to assume the

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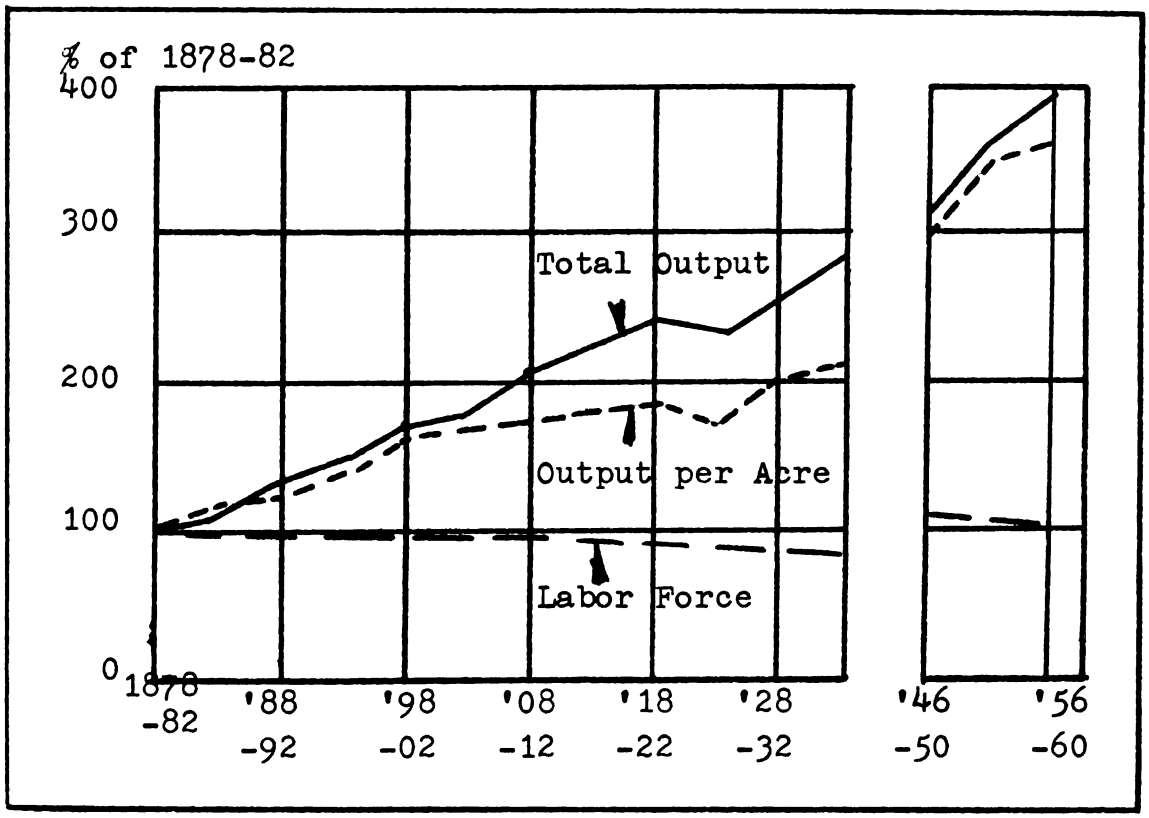
[1] Takekazu Ogura, editor, Agricultural Development in Modern Japan, (Japan FAO Association, Tokyo, Japan, 1963), p. 617-18.

Figure 1: Agricultural Output and Labor Force, Japan*



Note: It will be noted in the chart above that Total Agricultural Production has increased rather steadily over the whole period; was even higher in 1946-50 than before the war, about 1936. Output per Acre kept pace with total production until 1900 when it began to lag. In the early 1920's, it began to rise again so that by 1945-50, it had again reached the same level as the Total Agricultural Production Index. It will also be noted that the agricultural labor force has remained almost constant for the full 80 year period.

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* Parker and Hendrix, Foundations for Agrarian Development, p. 31, Figure 2.

triple roles of a foreign exchange earner during the course of the transformation, a provider of capital for industry, and a supplier of food to the industrial population.

The agricultural development of Japan can be conveniently divided into three periods for study:

> "1. A period of rapid growth lasting from approximately the Meiji Restoration to World War I.
>
> "2. A period of slower growth lasting from the end of World War I through World War II.
>
> "3. And finally, a renewal period of rapid growth, starting almost immediately after the end of World War II and continuing to the present time."[2]

1. The Meiji Restoration to World War I : 1860-1914.

This was a period of rapid growth in agricultural production as well as a time of rapid social and political change and much industrial development. The annual growth rate of agricultural net output averaged almost 2.3 percent per year, well above the growth rate of the population. (see figure 1) At the same time, the absolute number of people employed in agriculture remained fairly constant and the non-agricultural sectors of the economy developed rapidly in close harmony with agriculture.[3]

Soon after the restoration, effective action was taken to break up the large feudal estates, to permit peasants to

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[2] Ibid. p. 622.

[3] Kazushi Ohkawa and Henry Rosovsky, "The Role of Agriculture in Modern Japanese Economic Development," reprinted in Eicher and Witt (ed) Agriculture in Economic Development, (McGraw-Hill, New York, 1964), pp. 45-48.

buy land and to become property owners, and to give farmers freedom to conduct their own business.

Taxes on land were increased and, along with the new taxes on Sake and tobacco, were payable in cash so that the farmers were forced to enter the monetized markets for the first time in the history of Japan. Industries were built up and the government later established a monopoly on sake and tobacco so that money was required for new consumer goods as well as for the luxury goods the farmer used. More and more of the farmer's business was in a market which necessitated the use of money.

The reduction of rents, the creation of a new class of farm owner-operators, and increases in production meant that the farmers had more products to dispose of in the market. A large part of these returns were siphoned off as taxes and were used for industrial and national development. Silk and tea exports during this period supplied much of the foreign exchange used to purchase equipment and supplies for industry which in turn created the equipment and supplies needed in agriculture.

Most farms in Japan were very small (one hectare or less) and a high proportion of the farmers were tenants. Agricultural production increased 121 percent on a gross basis or 108 percent net between 1878 and 1913. The productivity of land increased 76 percent and the productivity of labor 117

percent during the same period.[4]

The unification of the country and the removal of restrictions on movement of produce, along with the growth of cities, increased the demand for farm products and widened the markets. All in all, it was a time of generally rising prices for farm products and in several ways, farmers were motivated to produce more.

In 1877, three new varieties of rice were discovered by farmers and, with government help, spread rapidly in the three main rice-growing areas of the country. As late as 1926, they were still the main varieties grown. These varieties were responsive to fertilizers which stimulated the use of organic manures and composts and later the use of chemical fertilizers.

Several organic fertilizer factories were started in the 1880's, yet in 1912, the country was forced to import about 518,000 tons of soybean cake for fertilizer. A sulphate of ammonia factory was opened in 1910.

Between 1877 and 1900, the government established two agricultural schools, a federal agricultural experiment station, made provision for one experiment station in each prefecture, and built a seed breeding station.

The discovery of methods for sorting rice seeds by the use of salt water and the invention of pedal threshers made

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[4]Ogura, Agricultural Development, p. 8-9.

production more sure and allowed double cropping.

Western technology such as planting materials, livestock, implements, cultural methods, tools, and agricultural literature were imported in fairly large quantities. Only a few of the ideas were found to be practical as imported, except in Hokkaido, and most had to be adapted to Japanese conditions.

In 1881, a national meeting was held with 110 leading farmers invited to discuss agricultural improvement. Some of these farm leaders were hired to teach at the agricultural schools and others were employed to tour the country advising groups of farmers on methods for increasing production. The prefectural governments were ordered to hold agricultural meetings to discuss agricultural advancement and better farmers were urged to teach their neighbors how to produce more. About the same time, books on agriculture began to appear on the market.

In the 1890's, voluntary associations of farmers came into existence to exchange ideas for improving farming techniques. In 1899, the Agriculture Association Law was enacted to provide a legal basis for these associations. Thereafter, every village was required to set up such an association and provision was made for a federated organization with associations at the county and prefectural levels. In 1903, the associations assisted the ministry of agriculture and commerce in informing the farmers of fourteen improved practices to be followed, and in enforcing compliance. In 1910, the

national association was reorganized as the Imperial Agricultural Association and began to receive a government subsidy.

Institutional developments were equally as rapid as those in economics and technology. While agricultural workers had been given greater freedom of movement at the abolishment of feudalism, the number of agricultural tenants increased and the number of owner-operators decreased after 1900. The land became concentrated in the hands of landlords and wages increased so that it was more profitable to lease land to tenants than to attempt to farm it with hired labor.

As the result of the shift to landlordism, the landlords became the important sellers of rice. Several rice exchanges were set up and in 1893, a Rice Exchange Law was enacted to regulate their activities. Concurrently, an inspection system covering quality, grading, packing, and amount sold was inaugurated which was at first supported by the rice merchants and later by the Department of Agriculture and the agricultural associations.

Agricultural credit was not overlooked during this period. In 1897, the Hypothec Bank of Japan was organized to provide loans for up to fifty years for land improvement with real property as collateral. The bank could also make five year loans against property and unsecured loans to local bodies. By 1900, forty-six prefectural and industrial banks had been established which were subsidized by the prefectural governments and supported by the Hypothec Bank.

In 1900, a law establishing five types of cooperatives; credit, marketing, purchasing, manufacturing, and utilization, was enacted. By 1914, there were over eleven thousand cooperatives serving about 90 percent of the villages.

While these developments were taking place in agriculture, the increase in productivity was repaying the government investment in the form of taxes. Collections from farmers more than doubled between 1888 and 1914. At the same time, the land tax became less important in terms of total government revenue, falling from 85 percent to 43 percent of the total intake during the period.[5] As Ogura says: "...it must be noted that the heavy land tax which constituted the main (or major) source of government revenues during these early years...helped the Government in the furtherance of its policies of economic development.[6]

2. World War I to the close of World War II : 1914-1945.

This period was characterized by a decline in the rate of growth. A boom in prices between 1915 and 1919 was followed by a sharp slump, a slight recovery, then the world-wide depression of 1929-36, and World War II. Even with this unfavorable price picture, total agricultural production increased about 40 percent between 1908-12 and 1933-37 but fell rapidly during World War II.

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[5]Ibid pp. 8-22.

[6]Ibid p. 23.

During World War I, the requirements of the belligerents increased the demand for Japanese products, particularly industrial items. Despite a fall in prices following the war, production did not decline appreciably. With the subsequent recovery of prices, production again increased rapidly with fruits, silk cocoons, and livestock products recording the largest gains. Imports of food were increased from Korea and Formosa.

The use of chemical fertilizers increased to over twice what it had been in 1908-1912. The increased sales were probably stimulated by the relative drop in the price of fertilizer compared with the price of farm products; and, public credit was readily available for fertilizer purchases. Even though there was an increase in the use of fertilizer; in the use of cold-resistant, high-yielding varieties of rice; and the effective area planted had been increased by reclamation works and double cropping; production did not increase correspondingly. This was probably due to a less intensive use of family labor caused by a drop in rice prices and large rice imports from Korea and Formosa, and other government agricultural policies unfavorable to farmer.

From 1939 to 1945, production declined because of the increasing shortage of manpower, supplies and equipment. The amount of rice and other "major" crops produced did not fall appreciably until after 1942 when the decline in production became very rapid. By the end of the war, the yield per acre

of rice was only about 70 percent of pre-war, and other crop yields had fallen even more.

Among the favorable measures for agricultural improvement taken during the war years were those dealing with arbitration of disputes concerning rental rates and payments; farmland adjustment which helped delineate boundaries and consolidate holdings; price controls, purchase and storage of rice, and subsidies for agricultural improvements. One of the most interesting measures adopted was a two-price system for rice delivered to the government. Lower prices were paid for rice owned by non-farming landowners than were paid to actual producers. Since rents were largely paid in rice, this had the effect of lowering rents and of reducing the importance of the landlord class as a whole.

During the last 5 years of the period, other laws were passed strengthening the cooperative structure, changing the structure of the agricultural associations, establishing cottage industries, establishing fertilizer distribution channels, and an agricultural insurance system for crops and livestock.

The planned effects of these measures were largely negated by the last year or two of the depression, by the Manchurian War and World War II, by government policies on food imports, price controls, and food purchase systems, by shortages of labor, and by shortages of equipment and supplies.[7]

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[7]Ibid. pp. 27-62.

3. Modern Development : 1945 to date.

Since World War II, Japan has again increased agricultural production very rapidly, about 5.3 percent per year. Again, this has been done without heavy, long term, lumpy investment and without dislocating a large part of the population. It is true that short term agricultural capital investment has been heavy but it has largely been in operating capital with relatively small amounts invested in long-term capital projects. It is also true that since the war, there has been some reduction in the labor force employed in agriculture, but this out-migration has been slow and has not disrupted the economy.

As far as the government was concerned, Ogura notes that,

> "The basic theme of agricultural policy has changed from pre-war and war time authoritarianism to a more liberal approach as the economy was freed from the various controls dominant during and immediately after the war.
>
> "One important task of agricultural administration in the immediate post war years was, besides securing the nations' food supply, to democratize farming communities."[8]

As the first step in attaining the two objectives mentioned above, a series of land reform bills were passed which drastically changed the structure of land holding in Japan and completely broke the power of the large land owners in the rural communities. However, it did not change the pattern of small scale farming nor the labor intensive methods

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[8]Ibid. pp. 115-116.

used.

In the early years of this period, several production regulations were passed requiring delivery of crops to the government, establishing quotas, and setting up a system whereby the state took the initiative in providing technical guidance. These measures were continued until 1955 when the food situation eased and food production equaled or exceeded pre-war levels.

Changes were made in almost every facet of agricultural life as evidenced by the fact that, by 1959, almost every important law affecting agriculture, adopted before or during the war, was either repealed or changed.

Due to these changes, the farmers became landowners and by 1950, only 10 percent of the land was tenant operated, and by 1960, only 500,000 hectares remained under tenancy. Most of this land was actually owned by farm households but rented because of fragmentation, family illness, or distance from the farmstead.

Farm technology changed rapidly and fertilizer use per unit of land was an estimated 10 percent higher in 1952-54 than in the pre-war years. Between 1952 and 1960, the use of nitrogen increased 1.7 times, phosphorous two times, potash four times, and other farm chemicals about three times.

The use of farm implements also grew very rapidly and in 1960, over 500,000 power cultivators were in use, and over one million electric motors, 1,600,000 petroleum engines,

260,000 power sprayers, 2,476,000 power threshers, 840,000 power huskers, and 280,000 power pumps were being used by farmers.[9]

The introduction of these new implements has affected the cultural practices used by farmers. Early planting, economizing on plowing and labor, more intensive application of fertilizer, control of insects and diseases, more land reclamation by the farmer himself, and more multiple cropping have helped increase production.

The structure of agriculture itself has changed during the post war years. First, there has been a further trend toward commercialization of the industry. The level of agricultural production in 1960 was 39 percent higher than in 1950-52, and 75 percent of the product moved into commercial channels compared to 62 percent in the earlier period. At the same time, the commodities produced by the farmer have changed as the contents of the city housewife's market basket have changed. Rice still is the main commodity produced but there has been a shift toward producing more meat and other livestock products, more wheat and wheat products, and more fruits and vegetables than before the war. This, in turn, has had an effect on the relative prices of farm products and on processing and farm service industries.

While farm production has increased, the share of gross

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[9]Ibid. p. 418.

national product from agriculture has decreased and the share of the secondary and tertiary sectors has increased. Increased use of mechanical equipment on farms, coupled with small farm size and large families has resulted in many farmers seeking outside employment so that in 1960, non-agricultural income of agricultural households increased to 46.7 percent of the total family income. For these families, farming activities have tended to remain more or less traditional and they have not been an important factor in the commercial sector. Other farmers, about 41 percent of the total, have become even more commercial than before the war. Livestock production is notable for its commercialization, particularly milk, dairy products, poultry, and pig production where, to quote Ogura, the "expansion of the scale of production has been phenomenal in recent years."[10] In order to increase their incomes, farmers have organized 2500 (1961) "joint management" farms where the whole production process for a group of farmers is conducted jointly; more and larger equipment can then be used to make production more efficient. Many "joint organization" farms have also been formed where only a part of the production processes are carried on jointly.

Incentive for the farmer has been provided by maintaining a high price for rice, even though production was high

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[10] Ibid. p. 99.

enough to assure plenty for all. Before the war, the government food purchase plan had been conducted so as to protect the consumer and to provide cheap food to industrial workers, but after 1955-56, a system was adopted which provided a floor for farm prices of rice, wheat, and barley.

Fertilizer production was encouraged through the allocation of scarce raw materials immediately following the war and prices to the farmer were subsidized at about the world price level. During the years of shortage, the government allocated fertilizer to farmers on a crop priority basis. In 1950, fertilizer controls were lifted but prices to farmers have continued to be subsidized as the fertilizer industry has not been able to compete, pricewise, with the world market.

Japan's agriculture developed early in a traditional fashion characterized by small irregular fields, fragmented fields and wasteful methods of using and distributing water. A law was passed after the war to correct this situation. It was designed to "effect the improvement, development, security, and consolidation of farmland and to contribute to the maintenance and increase of the production of foods and other farm produce..."[11] Land improvement districts were set up and projects were initiated by the people concerned, or by the government, and a cost sharing procedure was established

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[11] Ibid. p. 244.

whereby the government shared in the expenses and in the allocation of newly formed land. After this law was passed, great emphasis was placed on the development of rice land which contributed to the abundant harvests of 1955 and afterwards.

At the end of the war, the National Agricultural Association and its branch units represented the government in practically all its dealings with farmers. In the field of agricultural extension, for example, the association had a staff of 38,000 technicians employed to assist the farmers with problems of agriculture, stock raising, and sericulture. It was decided that this organization was not democratic enough so an Agricultural Cooperatives Law was passed in 1947 to replace the associations with cooperatives.

General purpose cooperatives (marketing, purchasing, credit and utilization activities) were organized at the village or town level, economic and credit federations at the prefectural level and marketing and purchasing federations at the national level. By 1950, about 17,000 cooperatives had been formed, Later legislation helped reorganize many of the nearly bankrupt organizations and a program for amalgamation of small units was started in 1961 to take advantage of improved transportation, the joining of towns and villages, and because of the necessity to raise wages of employees. The business of the cooperatives has increased to the point that they handle about 90 percent of the rice marketed and

about 80 percent of the fertilizer sales.

The cooperatives took over the credit responsibilities of the agricultural associations at the prefectural and local levels at the end of the war, loaning their own funds as well as those of the Central Cooperative Bank for Agriculture and Forestry.

They had difficulty in securing additional money for credit and in 1948 a system of Agricultural Bills was established. These bills were granted to farmers for necessary purchases and discounted by the Central Cooperative Bank and the Bank of Japan. In 1958, the Bank of Japan stopped its preferential treatment of these bills so that they are no longer used except for dealings between cooperatives. In 1951 and 1953, changes were made in the agricultural credit laws and the Agriculture, Forestry and Fisheries Finance Corporation was set up. It is financed by the government and loans money for land improvements and "common" facilities on long term, low interest rates. In 1962 it loaned 71,000 million yen.

In 1955, another law was enacted making provision for intermediate loans in case of natural disaster of other mishaps, to prevent the degredation of farmers through the fragmentation of holdings or because of small farm size, and to increase the scale of farm operations through the Finance Corporation. Loans for the same purpose are made by cooperatives and are subsidized by the government.

Finally, a law for subsidizing the Agricultural Modernization Fund was passed in 1961, paralleling the Agriculture Basic Law. This law provided 30,000 million yen in 1961 and 50,000 million yen in 1962 for loans to private facilities at 6.5 percent interest and at 7.5 percent to other facilities. This legislation is significant in that it enables the cooperatives, through the use of rural funds, to perform the function of financing agriculture.

Some functions of the old agricultural associations, such as technical guidance of the farmers, were taken over by the prefectural and national governments. Other duties (regulation, enforcement, etc.) were taken over by agricultural commissions established at each level of government for the purpose.

An agricultural insurance program, (very informal in the early years) has been a part of the Japanese agricultural development program for many years. A livestock insurance program was started in 1927 and one for crops in 1938, both subsidized by the government. Since World War II, the insurance program has been revised and in 1949, insurance of cattle, horses, goats, sheep, cocoons, and breeding pigs became compulsory while crop insurance for rice, barley and other crops was made compulsory later. An insurance federation has been established in each prefecture with an association in each village or town. Property insured by these federations and associations is reinsured by the state through a mutual

relief fund. The insurance system is subsidized to the extent of about one-fourth the cost of the program.

In the pre World War II period, the agricultural extension service had been a combination service sponsored jointly by the agricultural associations and the government. It was responsible for inspection, supervision, control, and incentive subsidies besides activities. The Agricultural Improvement Law of 1948 changed this system completely. The extension service is now supported only by the state and prefectural governments and has become purely an educational and technical guidance service. By 1961, there were 13,495 full-time technicians (596 agricultural subject matter specialists working through 10,911 extension specialists, and 138 home economics subject matter specialists working through 1850 home advisors) working with the farmers through voluntary local groups.

The research and extension efforts of Japan have always been closely allied and in the early years, the research stations were responsible for training the "veteran farmers" who were serving as itinarant teachers. Later, the experiment station personnel were expected to spend part of their time working with farmers. In 1948, these functions were separated and a consolidated research organization was set up under the Ministry of Agriculture. Later, two other research organizations were set up to study land improvement and the social and economic aspects of agriculture. In 1956, a Science and Techniques Agency was set up in the Prime Minister's office

to coordinate all research in agriculture and industry.

The Agriculture Basic Law, passed in 1961, again decentralized research. Besides the National Institute of Agricultural Sciences and the District Experiment Stations, new national experiment stations for agriculture, horticulture, livestock, tea, and agricultural engineering have been established.

Along with the emphasis on farmer training and research, great importance has been attached to agricultural education. Agricultural colleges and universities had been established before World War II and over a million students were enrolled in agricultural continuation schools (night schools, 967,000 enrolled in 1933), agricultural schools (66,000) and agricultural colleges and universities (6,000).

After the war, the educational system was revised. The 6-3-3-4 system (six years primary--three years Junior High School--three years High School--four years College) was adopted and the first nine years were made compulsory, co-educational, and democratic, with local village school boards in charge. The night agriculture schools for adults were reborn; and by 1960, 830 agricultural high schools had been established and had graduated over 59,000 students.

Agricultural education at the college level received increased emphasis and there are now thirty universities having departments of agriculture, graduating over 5,900 students in 1960.

In addition, the Department of Agriculture has started agricultural retraining schools for its technicians. These schools work closely with the agricultural research stations so that the workers are kept in close touch with the latest developments. The department has also a number of Management Instruction Farms where short courses are held to train young people and adults in farm management to further increase farm production.

To quote Parker and Hendrix,

> "The Japanese Government maintained conditioning and production factors rather favorable for agricultural production except during the interwar period. It supported general education, agricultural research, and extension, credit and marketing facilities and industry provided production requisites and consumer goods. ... In the post war period there has been an effective land reform program and other conditioning and production factors have been favorable."[12]

As a result, agriculture and industry have advanced together for the improvement of the country.[13]

Agricultural production has increased, farmers incomes have improved, the diets of the people have been bettered, and the economy has flourished. Agriculture contributed greatly in the early years through taxes and by supplying food and labor to industry, and exports, which generated the necessary foreign exchange for capital imports. Even today, the agricultural industry still contributes its share to the

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[12] Parker and Hendrix, Foundations for Agrarian Development. p. 30.

[13] It will be noted that Agricultural Development in Modern Japan edited by Takekazo Ogura has been drawn on extensively in preparing this section.

economy of the country.

While writing of the agricultural development of Japan, B.F. Johnston summarizes the last one hundred years as follows:

> "These gains were predominantly the result of increased use of fertilizers and advances in farm technology introduced into the existing structure of Japanese agriculture. Moreover, the requirements for capital funds were small and consisted mainly of increased requirements for working capital for the purchase of fertilizers.
>
> "Considerable reliance was placed on the initiative of the individual farmer and on price incentives. In addition government experiment stations performed a key role in developing improved seed in experimentation, on the efficient use of fertilizers, and in spreading knowledge of improved methods.
>
> "Japan ... was able to borrow heavily from the hard-won progress of Britain and other countries. The government stimulated the introduction of "Western learning" by hiring foreign experts in agriculture ... and by sending Japanese students to foreign universities."[14]

Table 1, below, presents an assessment of the relative contribution to agricultural improvement of the various development programs and other actions taken (in both the public and private sector) in Japan during the period of its development. These actions and programs have been grouped into twelve categories which are listed in order of the first effective action taken in each category. The scale used is based on a ten point rating system and takes into account both the length of time that a category has been a part of the agricultural program and its apparent effectiveness in promoting

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[14]Bruce F. Johnston, "Agricultural Productivity and Economic Development in Japan," Journal of Political Economy, LIX (Dec. 1951), p. 512.

increased agricultural production. (For a listing of items included in each of the twelve categories, see Appendix I.)

Table 1. An Evaluation of the Relative Contribution of the Agricultural Improvement Programs Carried on in Japan, 1860-1962, to Increased Agricultural Production.

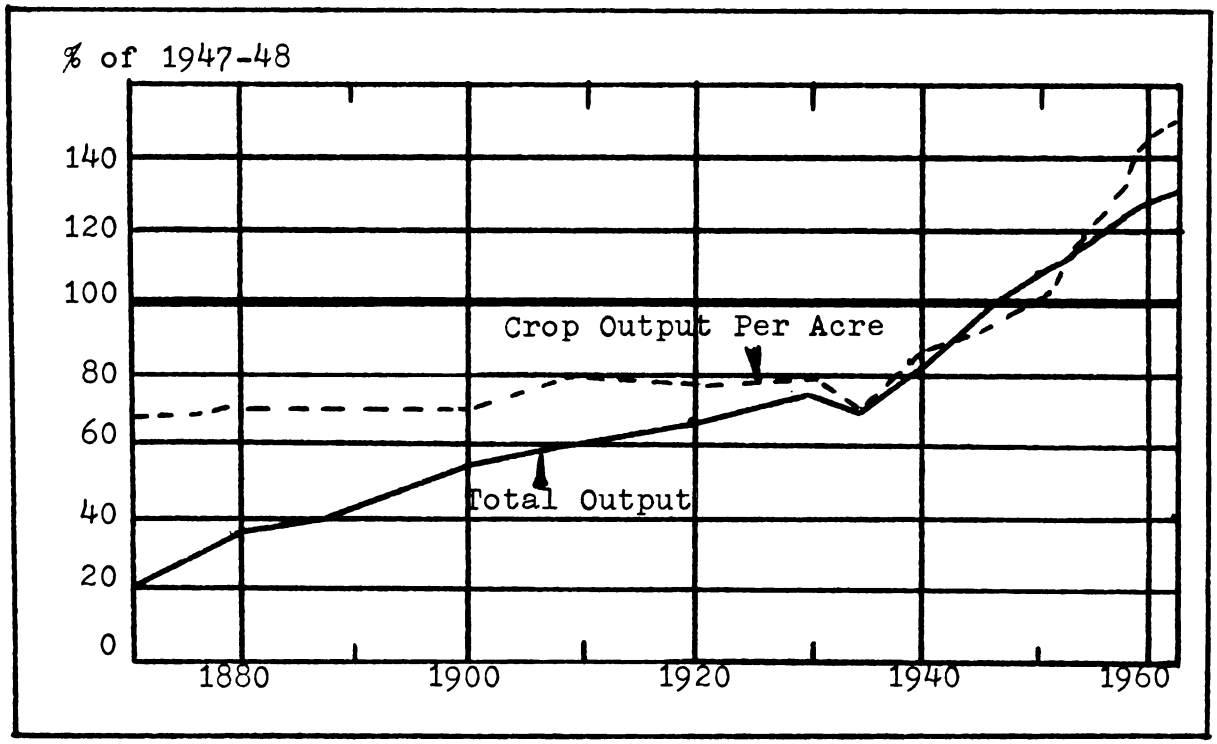
Relative Date	Category	Relative Contribution
1.	Technological Improvement	10
2.	Land and Tenure Reform	10
3.	Farmer Involvement	10
4.	Agricultural Research	10
5.	Agricultural Education	8
6.	Farmer Training	8
7.	General Education	6
8.	Transportation-Communications	6
9.	Agricultural Investment	6
10.	Markets and Prices	4
11.	Agricultural Supplies	4
12.	Agricultural Credit	2

CHAPTER V

AGRICULTURAL GROWTH OF THE UNITED STATES

The agricultural growth of the United States has been one of the wonders of the modern world and is pointed to in the developing countries as a model for emulation. In the view of the leaders of these countries, the present food and fiber surpluses in the face of a rising population in the United States is much to be desired and the question is often asked as to how is was accomplished. Some people argue that an abundant supply of fertile land is responsible, but most realize that more than a bountiful nature was required.

Figure 2: Farm Output, The United States[1]



First, let us look at what was done. Figure 2 shows the

[1]Frank Parker and W.E. Hendrix, Foundations for Agrarian Development, Figure 1, p. 29.

increase in output that has been achieved from 1870 to 1963. There was little change in crop output per acre during the period 1870-1930, while there was an almost continuous increase in total production, indicating that the increase was achieved through the addition of land. After 1935, there has been a decided increase in rate of production per acre, outstripping total production and indicating that land has become less important to increase production. In fact, the total amount of land in crops has decreased materially during the last thirty years.

As noted by the United States Department of Agriculture:

> "Improvements in Agricultural output and productivity have contributed greatly to national economic growth of the United States. Total farm output has increased more than fivefold in the last one hundred years. One farm worker now supplies food and other farm products for twenty-nine people at home and abroad as compared with less than five a century ago. This is about the same as in many of the less developed countries today. Although consumption levels have gone up greatly, American consumers now spend less than a fourth of their incomes for food as compared with over half by people in the less developed countries."[2]

The history of United States agriculture can conveniently be divided into four periods: (1) Independence to 1850, (2) 1850 to 1920, (3) 1920 to 1935, and (4) 1935 to the present.

1. Independence to 1850

Agricultural production increased steadily from Independence to 1850 with the value of agricultural products rising

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[2]Economic Research Service, How the United States Improved its Agriculture, p. 2.

from $333,000,000 to $1,442,000,000 (in 1910-14 dollars). This amounted to a fourfold increase, keeping up with population growth, which was increased at about the same rate (5.3 million to 23.2 million). In addition, agricultural exports supplied the needs of other countries for cotton and tobacco.

In 1785 and 1787, ordinances were passed which started the process of opening up the West, and making it easier for farmers to acquire land. The availability of new land and the rapid expansion of the industrial Northeast forced a rapid expansion of the communications network. In 1825, traffic started on the Erie Canal, opening up the whole of the former Northwest territory with cheap transportation. The Cumberland Trail and other East-West roads were opened up or improved. By 1850, railroads were making themselves felt as a factor in communications. All of these contributed to the development of East-West flows of traffic carrying agricultural products to the East and manufactured products to the West.[3]

The increase in agricultural production during the period was largely due to the expansion of land area under cultivation, although events were occuring which later were to affect productivity.

As early as 1796, President George Washington urged the creation of a National Board of Agriculture. In 1836-37, the

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[3]Economic Research Service, Agriculture and Economic Growth, p. 11.

patent office was established and began importing foreign seeds and distributing them to farmers (at the expense of the commissioner). Privately sponsored fairs and agricultural contests were begun very early in the period and the first agricultural periodicals were published in 1810 and 1819.

In 1839, funds ($1,000) were granted to the patent office for the collection of statistics on agriculture and representatives of the United States in foreign countries had been collecting "seeds, plants, and agricultural inventions" since 1819.[4]

America, during the period, contained very few elements of "traditional agriculture" as defined today except in Florida and the Indian villages. The early settlers--migrants from Europe--were rebels against the traditional society of Europe and the mere fact that they left their homelands for a new world demonstrated their willingness to break with the past. This attitude facilitated the movement westward and the adoption of new ideas from Europe and from the Indians.

The early settlers brought with them an interest in education which was maintained during their western migration so that almost every new settlement had a school and the Ordinance of 1787 made provision for compulsory primary education in the Northwest Territory. Private colleges were started at many places in the East and by 1850, there were several in

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[4]The U.S. Department of Agriculture, Century of Service, (Washington, 1963) pp. 1-10, 520.

the new states west of the Alleghany Mountains.

Several labor-saving innovations were made but, because of a lack of demand for grain, they were not generally adopted until later. An exception was the iron plow with interchangeable parts (invented in 1819). Other inventions, available but not widely adopted by 1890, were the steel plow for prairie soils, the reaper, harrows and seed drills, corn planters, corn cultivators, the threshing machine, and other horse-drawn machinery.

Considering the whole situation, the period was one of unstable prices, slowly developing markets, increasing interest in education, some new technology, improved transportation and increasing industrialization. At the same time, it was a period of low investment in agriculture and of low, almost constant productivity of agricultural labor. Most of the gain in agricultural production was derived from the opening of new lands to the west and the cultivation of more acres by the owner-farmers.

2. The 1850 to 1920 period

During this period, total farm output grew at a rate of about 2.2 percent a year. Most of the expansion resulted from the use of more production inputs; land, labor, and capital. Only a fourth came from increased overall productivity or increased output per unit of input.[5] (Figure 3)

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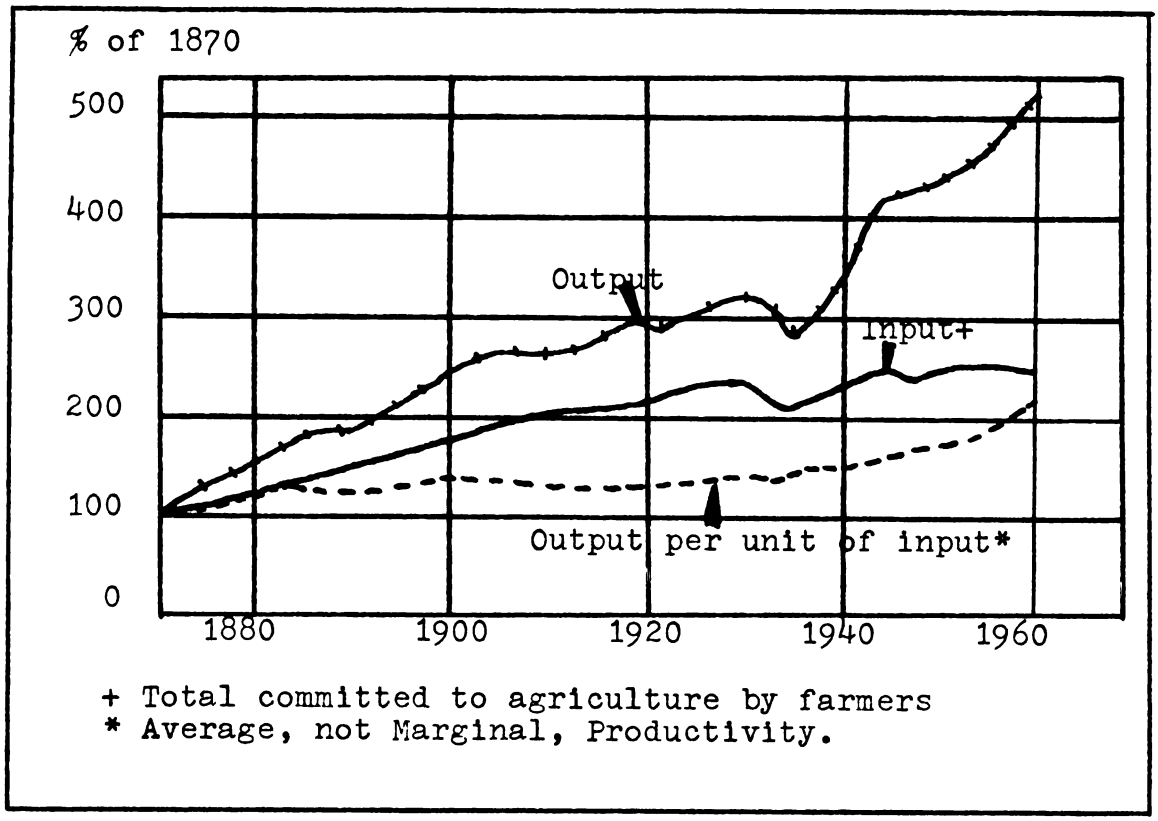
[5]ERS, How the United States Improved its Agriculture, pp. 2-3.

Inputs of land, labor, and capital increased steadily during the 1850-1920 period and although the percentage increases in capital were large, most of the increase in agricultural output resulted from the use of more land and labor.

Figure 3: Agricultural Productivity, United States[6]



In 1862, four laws were passed that were to have considerable effect on agriculture in the decades to follow. The Homestead Act encouraged settlement of the West on the basis of 160-acre farms; the Morrill Act established the pattern for land grant colleges, encouraging agricultural education;

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[6]Ibid., Figure 2, p. 3.

the act establishing the Department of Agriculture recognized the importance of assisting farmers to adopt better methods; and the act chartering the first cross-country railroad (the Union Pacific) assisted in opening the western land.

Chemical fertilizers entered the farm investment picture significantly for the first time in 1850, when about $2 million worth of fertilizer and lime were used. By 1900, this figure had increased to 90 million and to more than $150 million by 1920.

Machinery and tools were purchased in large quantities during the period, rising from eleven million dollars worth in 1850 to over 200 million in 1900, and to over 300 million in 1920. The interest in education continued and in 1855, Michigan provided for a State Agricultural College (now Michigan State University) to be followed later the same year by Pennsylvania legislation establishing the Pennsylvania Farmer's High School (now Pennsylvania State University). After the passage of the Morrill Act, other states established colleges of Agriculture in rapid succession and many private colleges included agricultural sections as part of the regular curriculum.

In 1887, the Hatch Experiment Station Act was passed providing federal grants to the states for agricultural experimentation. However, a great deal of experimental work had already been done by private parties and the first agricultural experiment station had been established at Wesleyan

University at Middletown, Connecticut in 1877. Interest was concentrated on the import of new varieties of crops and animals, foreign markets, crop and animal science, and such other activities as are associated with production and marketing.

In 1889, because of its increasing importance, the Department of Agriculture was raised to Cabinet status. Laws rapidly followed, regulating and promoting certain aspects of crop marketing, livestock marketing, conservation, the use of insecticides, plant and animal quarantine, research, medicines and vaccines for livestock, road building, futures markets, a rural free mail and parcel post system, and extension and vocational education.

In 1914, the Smith-Lever Act was passed providing for cooperative administration of extension work by the U.S. Department of Agriculture and the state agricultural colleges. As originally conceived, extension was to:

> "...Consist of the giving of instruction and practical demonstrations in agriculture and home economics to persons not attending or resident in said colleges in the several communities, and imparting to such persons information on said subjects through field demonstrations, publications, and otherwise..."[7]

This law provided that the agricultural colleges should set up divisions of extension and the agents were joint employees of the U.S. Department of Agriculture and the College concerned.

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[7]U.S.D.A., A Century of Service, p. 81.

In the early years, the extension workers assisted in the development of cooperatives, and in 1920 assisted with the formation of the Farm Bureau and fostered other farm organizations at the state and local levels. In many states, the extension service was partially supported by the Farm Bureau financially. In 1922, this relationship was brought to an end in some states by the U.S. Department of Agriculture and by 1958 the extension service had reverted to state and national control and financing in all states.

The Smith-Hughes Vocational Education Act was approved in 1917 authorizing vocational education in the high schools of the nation. Under this act, vocational agriculture departments were set up in high schools throughout rural America for training farm boys in scientific agriculture. As a part of the program, most states have also conducted courses for "out of school" youth and adult farmers to train them in the latest developments of agricultural science and management.

Agricultural credit did not receive much official attention until after 1910, when research was conducted on interest rates and use of rural credit. As a result of this activity, the Federal Farm Loan Act was passed setting up the Federal Farm Loan Board and twelve district Federal Land Banks in 1916.

Many other activities were carried on during the 1914-1918 period to support the war effort, most of which were discontinued in 1919 and 1920.

This period saw a rapid rise in the industrialization of the nation so that agriculture became relatively less important in the economy than it had been previously. For example, agricultural exports fell from over eighty percent of total exports in 1865 to a little over forty-one percent in 1921, but the absolute value of agricultural exports increased from 279 million dollars to 2,606 million dollars.[8] The farm share of total gross national product fell from about 39 percent (1870) to about 12 percent in 1920, but output per farm worker increased more than 50 percent during the period.

The gross investment in agriculture (not including land) reached 631 million dollars annually by 1900 and was expanding rapidly. Most of this investment was in the form of improvements to land and buildings, and purchase of machinery and equipment. In addition, the amount of intermediate products annually consumed on farms (repairs, fertilizers, etc.) had increased from about 47 million in 1850 to over 360 million dollars (1910-14 dollars) by 1900. While the relative importance of agriculture as an industry declined between 1850 and 1920, it was growing in an absolute sense and contributed substantially to development by supplying food, labor, markets, and investment funds for the rapidly rising industrial sector.

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[8] ERS, Agriculture and Economic Development, p. 25.

3. A period of Stress: 1920-1935

As shown in Figure 3, agricultural production continued to rise for part of the period and then decreased with a compound rate of increase of about 0.2 percent for the period compared with 2.2 percent for the preceding periods. It was marked by severe depressions, unstable prices, declining export markets, and unfavorable weather, all contributing to a poorer climate, both economic and meteorological, for increased agricultural production.

During this period, labor input began to decline and the input in land leveled off as most of the suitable land was brought into use before 1920.

Changing technology began to make itself felt with wider use being made of tractors and machinery and less dependence placed on horses and manpower. More emphasis was placed on education, training, and research and on the regulation of markets by the government.

During the fifteen years, legislation was passed making provision for or regulating almost every sector of the agricultural economy--markets, cooperatives, research, market stabilization, unemployment relief, soil conservation, mortgage relief, production and marketing controls and agreements, farm credit, surplus commodity disposal, crop production loans, rural rehabilitation, crop controls, school lunch programs, and rural electrification.

The principle problems of the period were the surpluses

of agricultural commodities on hand and the poor economic condition of the farmers. In efforts to allay these conditions, cooperatives were fostered, export corporations were formed to promote export of farm products, improvements in marketing were started and land was withdrawn from use in soil conservation programs and acreage and production controls. Emergency work programs were instituted and loans made to farmers for seed, feed, and relief in flood or drought-affected areas.

Acreage controls were imposed on the major crops in 1933 and 1934 and controls were placed on the production of most types of livestock products. Loan programs were stepped up and emergency purchases of crops were made in attempts to bolster the farm markets. Marketing agreements were used for many commodities in an effort to reduce production, and surplus disposal and relief programs were used to dispose of some of the surpluses in areas of low production and in areas where city people, as well as farmers, were in distress because of natural causes or unemployment.

One of the factors that has intrigued foreign economists for years has been the ability of American agriculture to respond to emergencies of all types and this was borne out during the great depression. Even though agricultural incomes were very low and many farmers were in distressed circumstances, agricultural production remained at a level sufficiently high to feed the population of the country so that even during the

depths of the depression, there was food enough for everyone.

4. After 1935

The period was marked by a continued increase in production, as noted before, caused by increased yields per unit of input. New land was limited, labor was high priced and scarce during most of the period. As a result, beginning in the late 1930's, the farmers of America stepped up their rate of investment in production and labor saving capital. Based on 1935-39 prices, the composition of farm inputs in 1935 were distributed so that 65 percent of the expense went to labor, 18 percent to land, and 17 percent to capital. By 1940, these percentages had changed to 41 percent for labor, 18 percent for land and 41 percent for capital. Using 1947-49 prices, the figures of the same inputs for 1940 are 56, 14, and 30 percent respectively and by 1960, the figures were 27 percent for labor, 15 percent for real estate, and 58 percent for capital. (See Table 2)

Crop yields averaged nearly twice as large in 1960-62 as in 1930-32 and the annual compound rate of increase of crop production was 1.7 percent in spite of a reduction of over fifty million acres in crops, forty million of which have been taken out of production since 1950.

In order to achieve this record of increasing productivity, the farmers have changed their way of farming radically during the last twenty-five to thirty years.

The shift to tractors from horses has accounted for a

Table 2. Changes in Farm Inputs, United States[9]

Year	Distribution of Inputs Based on 1935-39 Prices			
	Labor	Real Estate	Capital	Total
	Percent	Percent	Percent	Percent
1870	65	18	17	100
1920	50	18	32	100
1930	46	18	36	100
1940	41	18	41	100
	Distribution of Inputs Based on 1947-49 Prices			
1940	56	14	30	100
1957	31	15	54	100
1960	27	15	58	100

large part of the increase, particularly that occurring before 1940-45. Increased yields from crop acres and livestock units have accounted for most of the increase since that time.

Fertilizers are probably the most important single factor in this increase, the amount used being more than nine times as much in 1960 as in 1910. Table 3 shows that in addition to fertilizer, the farmers of America spent over seven times as much in 1960 as in 1910 for production items and eight times as much on capital expenditures.

The value of production assets increased during the period 1940-1960 by 82 percent per farm and by 100 percent

[9]ERS, How the U.S. Improved its Agriculture, Table 2, p. 6.

Table 3. U.S. Agriculture's Production Expenses and Gross Capital Expenditures.[10]

Item	Year (Million Dollars) 1910	1960
Total Production Expenses	3,115	22,039
Current Farm Operating Expense		
Fertilizers & Lime	152	1,462
Repairs & Operation of Farm Capital Items		
Buildings	199	578
Motor Vehicles & Machinery	52	3,283
Miscellaneous	558	2,839
Gross Capital Expenditures		
Buildings	236	1,497
Motor Vehicles	36	1,315
Other Machinery & Equipment	259	1,269
Total	531	4,081

per farm worker, and in 1960, stood at over 108 billion dollars for the United States, an average of almost $24,000 per farm and $14,700 per farm worker.[11]

Another source of high yields has been the use of improved seeds. For example, it has been estimated that between

[10] ERS, Agriculture and Economic Growth, Table 7, p. 23.

[11] Ibid. p. 24.

1940-41 and 1955, 12 percent of the increase in crop production per acre was due to hybrid corn and that 19 percent of the increase between 1919-21 and 1938-40 was due to this same input.

Other inputs entered into the production picture such as the use of chemicals for weed control, improved pest control chemicals, new crops and varieties, improved breeding and "hybridization" of livestock, improved feeding practices, disease and insect control and many others, too numerous to mention here.

Improved practices - made possible by the new equipment available, new seeds, new machinery, new knowledge, new management practices, and new technology all combined to make higher yields possible and production more efficient.

On the economic side, other factors combined to encourage the farmer in his production progress. Minimum price programs started in the 1930's were continued in a modified form. War time demands and post-war requirements for food created conditions that caused farmers to make the investments and to take the steps required to increase production.

In order to supply the information needed by the farmers, public and private research expenditures increased several times. For example, research expenditures of the United States Department of Agriculture increased from $29 million to $331 million between 1940 and 1960. Private research also represents a considerable sum. Some of the industries allied to agriculture

and their expenditures for research in 1960 are listed in Table 4, below.

Table 4. Industrial Research Investment Related to Agriculture[12]

Industry	Research Expenditure in Millions, 1960
Processed Foods & Concentrated Products	$ 97
Paper & Allied Products	65
Stone, Clay, & Glass	78
Primary Metal	146
Industrial Chemicals & Machinery	1,000

In addition, millions of dollars were spent by the land grant colleges, State experiment stations, feed companies, and others on agricultural research, but the total expenditure is still only about one percent of total agricultural production.

While early research concentrated on production, later work has dealt increasingly with marketing and utilization, as well as with finding ways for increasing efficiency.

Emphasis has also been placed on extension and education with increased effort being placed on training young people in the high schools and colleges through such groups as 4-H Clubs and the Future Farmers of America. Training programs are offered by the extension services, the universities,

[12] ERS, Agricultural and Economic Growth, p. 19.

experiment stations, vocational agriculture departments, manufacturers, and cooperatives to teach the farmer how to increase his efficiency in production and marketing.

As the price of labor rose and the need for machinery and other inputs necessary to increase the efficiency of labor became more apparent, a greater amount of credit was required. The activities of the Farm Credit Administration were greatly expanded to provide production credit and credit for capital increases. A large number of the farm credit associations set up under this program have become wholly farmer owned.

In order to relieve the uncertainties of production in some high risk areas, crop insurance programs are conducted which assure the farmer a fair return.

As a result of programs which have assured him of at least minimum prices, stable institutional credit, and a market for his products, the farmer has made good use of the other inputs available. Because of the large supply and low prices of inputs needed for production, an adequate supply of power, good transportation and communications, a constant stream of new technology to be used, and a continual flow of information, the farmers of America have continued to lead the world in producing the things people everywhere need for a better life.

In summary, to quote the Economic Research Service, U.S. Department of Agriculture,

"Expansion of land under cultivation was a Major

means of increasing production until about 1920. Over all productivity of agriculture went up gradually...and resulted from increased use of capital inputs and labor as well as land. Foundations of later increases...were built up with establishment of family operated farms, free public schools, agricultural research and extension services, credit facilities, farmer cooperatives, and improved roads and other transportation and communication facilities.

"Agricultural output increased slowly in the 1920-35 period. Strong incentives...were lacking, as prices of farm products declined relative to those of the production inputs.

"Total labor force began to decline...

"Agricultural production went up rapidly beginning in the late 1930's and continuing to the present. In fact, total agricultural output has increased as much or more in the last 25 years as it did in the preceding 75 years. Higher prices and larger markets for farm products made it profitable for farmers to apply improved agricultural technology, developed through years of research. Additional capital inputs were used to improve production methods, but the labor force in agriculture declined with corresponding industrial growth. Increasing productivity was the source of seventy five percent of the agricultural output expansion.

"Numerous interrelated factors have contributed to the large output and high productivity of American agriculture. They include: (1) a large supply of land and water resources; (2) large investments for education that improve human skills and managerial abilities; (3) development and diffusion of new knowledge about agricultural technology; (4) complementary industrial development that supplies capital inputs for agriculture and non-farm employment opportunities for people not needed in agriculture; (5) a structural organization of farmers and marketing firms to increase output and productivity; and (6) public and private institutional services that (a) help conserve and improve natural resources, (b) increase the fund of knowledge about improved agricultural technology, (c) encourage capital formation and investments in agriculture and (d) assure farm people that they will share in the economic benefits of increased production."[13]

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[13]ERS, How the United States Improved its Agriculture, p. 1-2.

Table 5, below presents an evaluation of the results of the various categories of development programs carried on in the United States during the period 1860-1962.

Table 5. An Evaluation of the Relative Contribution of Agricultural Improvement Programs Carried on in the United States to Increased Agricultural Production, 1862-1962.

Relative Date	Category*	Relative Contribution
1.	Land and Tenure Reform	10
2.	General Education	10
3.	Technological Improvement	10
4.	Transportation-Communication	8
5.	Farmer Involvement	8
6.	Agricultural Investment	4
7.	Agricultural Education	6
8.	Agricultural Research	8
9.	Agricultural Supplies	4
10.	Markets and Prices	4
11.	Farmer Training	8
12.	Agricultural Credit	2

* See Appendix I for items included in each category.

CHAPTER VI

TAIWAN'S AGRICULTURE

The experience of Taiwan is perhaps of more interest to the developing countries than that of Japan or of the United States because of its sub-tropical monsoon climate (which more nearly parallels that of most developing countries). Taiwan started the development process more recently, still has an agrarian economy, and was under colonial rule until the end of World War II. Agriculture accounts for about half of its national income, provides 70 percent of its exports, employs more than half its people.[1]

Figure 4 below shows the increase that has been made in agricultural production, mostly since 1920. The war years, of course, had an adverse affect on the province but, as seen, recovery was rapid and almost continuous since 1945.

Except for the war years, the island has increased production at an annual compound rate of about five percent per annum since 1910.

Taiwan was ceded to Japan in 1895 and from 1920 to the end of World War II, it contributed agricultural products, particularly food, to Japan's economy. At the end of the war it was returned to China, and with the takeover of the mainland

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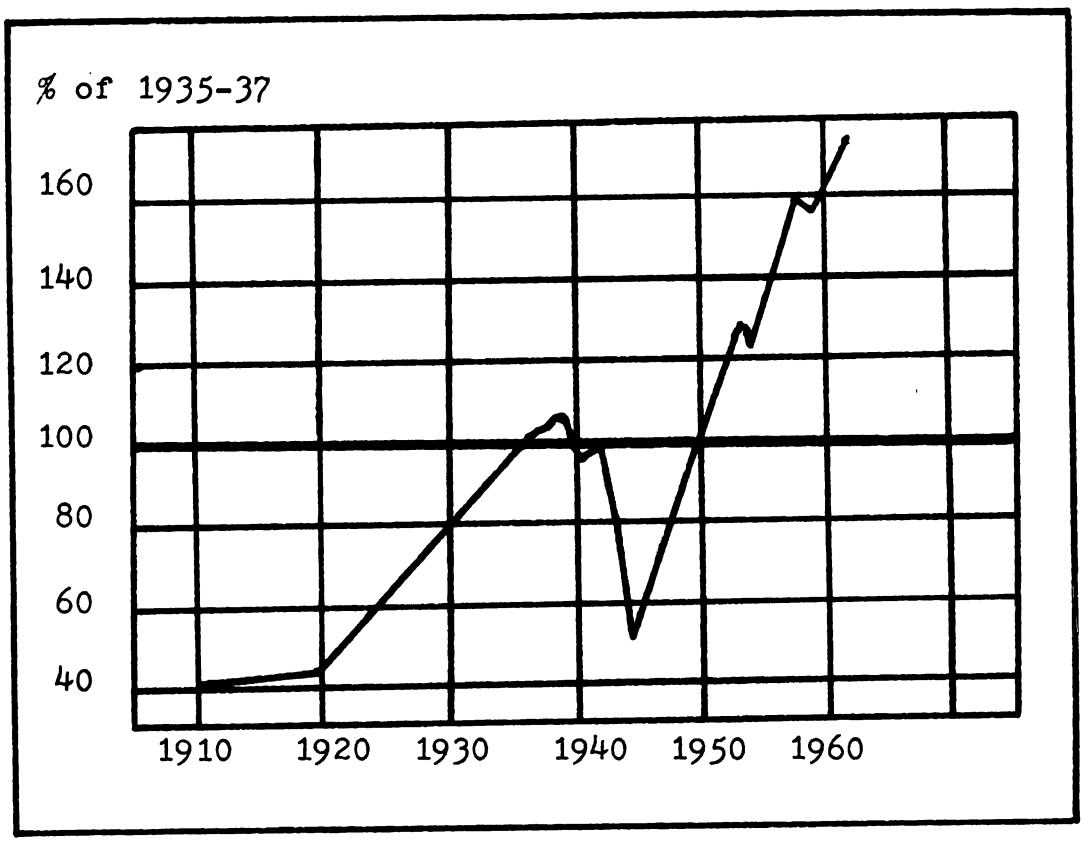
[1] Tsui Young-Chi "Land Use Improvement: A Key to the Economic Development of Taiwan," Journal of Farm Economics, Vol. 44, (May 1962).

by the communists in 1948-49, the Chinese government moved to Taiwan accompanied by an army and over a million civilians.

Figure 4: Farm Output, Taiwan[2]



From 1900-09 to 1960, the number of farm families increased from 359,000 to 786,000, the amount of cultivated land increased from 554,000 hectares to 869,000 hectares, and the average size of farm decreased from 1.5 hectares to 1.11 hectares.

The agricultural development of Taiwan can be conveniently divided into two periods: 1895-1945, the period of Japanese occupation; and 1945 to the present.

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[2]F.W. Parker and W.E. Hendrix, "Foundations for Agrarian Development," Figure 3, p. 23.

1. The Japanese Period: 1895-1945

While details of many aspects of the early progress of Taiwan's agriculture are not available to the author, evidence available indicates that the advancement made during the Japanese occupation closely paralleled Japan's own development, but with a fifteen to twenty year time lag which was reduced somewhat in the latter part of the period.

The first achievement of the Japanese was a complete cadastral survey of the island which has been useful in establishing land rights, settling disputes, levying taxes, and in implementing land reforms after World War II.

The "Farmers' Associations," familiar in Japanese development, were started in the province in 1900 and by 1945 there were over two hundred functioning associations. They were, as in Japan, largely government controlled and acted as agents of the government in its contacts with farmers. Early in the 1900's, the Japanese government began to encourage Japanese migration to Taiwan. The new settlers took over most of the government posts and the farmers' associations and used them as a means of control and instruction.

Two research stations, four seed farms, and a small experiment-cum-demonstration-cum-extension project was begun in 1916 to encourage the Chinese farmers in rice production. Japanese seeds and techniques were introduced and, although some adaptation was required (just as in Japan), they were generally found to be successful.

The extension program was strengthened in the 1930's, because of the requirements for rice in Japan, by strengthening the Farmers' Associations in every part of the province. In most cases, the extension work was carried on by locally-trained men or better farmers under the supervision of Japanese agricultural graduates working through the farmers' associations.

Hence, an efficient and quick-acting organization for introducing new technology was available which did not depend on local research exclusively for its ideas, but freely adopted ideas from other sources (mainly Japan).

Agricultural education got a later start and was limited in its scope. In 1919, a Senior School of Agriculture and Forestry was started for primary school graduates and a few Japanese graduates of this school were sent to Japan for further training since, as a general rule, Chinese could not attend college except to study medicine.

In 1928, a faculty of Science and Agriculture was established in Taisoku Imperial University (now National Taiwan University) and trained primarily Japanese students.

Fertilizers were first introduced about 1900 and by 1931-40 their use had increased to the point that 14.9 percent of the total imports of the province were chemical fertilizers. After 1930, fertilizer factories were inaugurated on the island along with petroleum, aluminum, steel, machinery, and electrical generating industries.

As noted earlier, seed and technical and managerial know-how were imported from Japan which helped in the development of the country during this period. Prices were relatively favorable during the period and a large export market existed for sugar and rice. Warehouses were constructed to improve marketing.

A fairly good transportation system, electrical generating system, and banking system were started which were later to serve as the foundation of Taiwan's industrial and agricultural structure.

Some agricultural credit was supplied by the farmers' associations, based on the savings of their members. However, this supply was unreliable before the war and never accounted for a very large part of the total amount of credit used by farmers. Most agricultural credit was supplied by relatives and merchants or money lenders and was provided at high rates of interest.

Another development during this period was the expansion of the irrigated areas. About 28 percent of the cultivated area was irrigated in 1903 and by 1940, 61 percent was irrigated. Counting the increase in cultivated area, the irrigated area increased 252 percent during the period 1903 to 1940. The government financed all irrigation projects; the large projects being undertaken by the state while the small ones were administered by local farmer operated irrigation associations.

This period, 1895-1945, is notable for the rapid increases in agricultural productivity that were made, essentially following the Japanese pattern of development. The traditional structure of agriculture was not materially disturbed, and the agricultural working force continued to increase, though relatively it became a smaller proportion of the total population. Except for the investment in irrigation and agricultural supporting industries, the capital investment was small and involved only operating expenses for good seed, fertilizers and small tools. The last factor that seems to have had an effect, but not the least important, was the adoption of new technology, transplanted, with some modification, directly from Japan and extended throughout the province quickly and expertly by the farmers' associations and their employees.

2. <u>After 1945 - The Joint Commission for Rural Reconstruction</u>.

Taiwan also presents a remarkable example of agricultural development since 1945. As noted in Figure 4, agricultural production decreased to about 50 percent of the 1935-37 level in 1945 but recovery was rapid and by 1950, agriculture had regained its prewar level.

Brown rice production increased from 639,000 metric tons in 1954 to 2,100,000 tons in 1962, yield per acre doubled and agricultural exports increased to $80,600,000,[3] (in 1962)

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[3]JCRR - General Report XIII, (Taipei, 1962).

from practically nothing in 1945 so that agriculture has contributed materially to the country's progress.

As the first approach of the Chinese government in promoting agricultural development, a program of land reform was initiated that was to have far reaching consequences. As Mr. Chen Cheng, a former governor of Taiwan says,

> "...the implementation of land reform is not only basic to the betterment of the people's livelihood and the promotion of political and social stability, but also a motive force for furtherance of economic development and industrialization. The progress we have made in economic reconstruction is largely due to changes in agriculture."[4]

To start the land reform program, the government leased land taken over from the Japanese to farmers. This program was started in 1947 and largely completed by 1949.

The second stage was the Rent Limitation program of 1949 whereby the rent of land was limited to 37.5 percent of the annual main crop yield. This encouraged double cropping, forced down land prices, and increased farmers' incomes. Leases were extended to six years, renewable at the will of the tenants, so that they could afford to make improvements on the land. This program eventually covered about 260,000 hectares and benefited about 300,000 tenants.

In 1951, the Land-to-the-Tiller program was initiated, first on government land and then on privately held land. The government sold 80,000 hectares of its land to the occupying

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[4] Chen Cheng, Land Reform in Taiwan, (China Publishing Company, Taiwan, 1961), preface, p. xii.

tenants at 2.5 times the value of the annual main crop yield. Payments were made in rice for paddy land and in sweet potatoes for high land and extended over a ten-year period. The size of holding was limited to three hectares of paddy land and six hectares of upland.

In 1951, a survey was carried on to determine the extent of tenancy on the island and in 1955 a bill was passed providing for the purchase of landlords' holdings (above what they actually farmed themselves) for resale to farmers on the same terms as mentioned above. This program transferred the ownership of 140,000 hectares of land to 200,000 former tenant operators. An interesting feature of this program was the manner of payment to the landlords. They were paid 70 percent of the sale value in land bonds and 30 percent in stocks of four publicly owned corporations allied to agriculture. As a result, thousands of former landlords became interested in, and supporters of, the industrial sector through compulsory investment in these companies.

The actual administration and supervision of the transfer of land was put in the hands of 341 local land commissions made up of eleven members: five tenants, two landlords, two owner-farmers, and two members appointed by the local government.[5]

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[5] T.H. Shen, Agricultural Development on Taiwan Since World War II, (Comstock Publishing Associates, Ithaca, N.Y. 1964), p. 44.

In 1957, the government initiated a long term "land loan" program to assist farm operators in completing the job of buying excess land from landlords, for enlarging their farms, and increasing the size of their farm business.

Equally as important as the land reform program in the development of rural Taiwan has been the constructive work conducted by the Joint Commission on Rural Reconstruction. This organization was started on mainland China, moved to Taiwan in 1949 and continued its work there.

Its objectives are as follows:

1. To increase crop and livestock production.
2. To improve rural living conditions.
3. To develop the potentiality of rural people for rehabilitation of their own communities.
4. To cooperate with government agencies in rendering services to agriculture.
5. To encourage and develop rural leadership.

The Joint Commission on Rural Reconstruction (hereinafter referred to as JCRR) has chosen to work through existing agencies or by setting up agencies for special jobs and has operated through a very small staff. It has functioned primarily as a planning, supervising, and supporting agency. It has taken the lead in promoting rural development since World War II, but only a few of its major efforts will be reported here.

The first major step was to reorganize the Farmers' Associations. With the end of the World War II and the departure of the Japanese, these organizations fell into disuse and were largely disorganized. After reorganization, they became a viable and forward thrusting part of the rural economy.

Dr. T. H. Shen describes them thusly:

> "The Farmers' Association system in Taiwan...makes it possible to increase agricultural production and promote the well-being of rural families. It is a federated system of multiservice cooperative organizations operating on three levels: an association on the provincial level, 22 associations on the county (hsein) and municipal level, and 317 associations on the township level. One member represents a family. The members of each village in the township area organize themselves into a small agricultural unit (SAU). There are 4,803 such units and the members total 702,254. These units are the basic structure for the organization of the farmers' associations."[6]

Membership is divided into two categories, active and associate, on the basis of proportion of income derived from agriculture. Active members (with voting privileges) must make 50 percent or more of their income from agriculture or be an agricultural graduate working in a field allied to agriculture. All others in the rural villages are associate members.

The management is vested in an unpaid board of directors with policy making duties, and a hired manager. An elected board of supervisors oversees the many activities of the organization.

The JCRR has provided much of the guidance for the farmers' associations and subsidized many of their activities, especially in the early stages of their operation. The provincial department of agriculture and forestry also has a special section to assist the associations in their regulatory

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[6] T.H. Shen, Agricultural Development on Taiwan, p. 48.

and legal activities and sponsors some of their activities.

Dr. Shen describes the activities of the associations as follows:

> "The farmer's associations in Taiwan perform such services and offer such facilities as rural credit and savings deposits, extension services, sale and marketing of agricultural products, provision for rural health and transportation, promotion of rural industry, settlement of disputes relative to farming problems, and sale of farm tools, food, cloth and clothing, rubbers, boots, bicycle tires, soft drinks, and canned fruits. In addition, they also render services for the government, provide facilities for rice milling and for warehousing of rice and fertilizers, and aid in crop and livestock improvement. They collect and process 700,000 metric tons of rice and distribute 600,000 metric tons of fertilizer and 100,000 metric tons of feed per year.
>
> "The services rendered by the associations and the nature of agriculture on Taiwan have necessitated the development of physical facilities, including large office space, warehouses, processing machines, trucks, seed and animal breeding farms, fishponds, jute-retting ponds, and jute packing machines. The assets of farmers' associations in Taiwan are estimated to be NT$900,000,000, and include 276 hectares of farm land, 103 livestock breeding stations, 330 hectares in nursery fields, 1,118 rice warehouses, 579 fertilizer warehouses, 3 tea processing plants, and 409 rice mills. There are 295 farmers' associations with credit departments, having deposits of NT$900,000,000. Nearly all these facilities are established in the township farmers' association, and most of the services are rendered by the latter.
>
> "...Every one of its members can reach it (the farmers' association) and come back in a day's time... The associations are sensitive and responsible to the needs of farmers and they constantly seek to increase their effectiveness and services. In addition, they are grass-roots agencies for promoting government policy, agricultural development, and the improvement of rural communities."[7]

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[7]T.H. Shen. Ibid. p. 51-52.

In 1955, the farm extension program was revised and many of the activities of the extension advisors were split off and given to specific interested organizations. For example, the Sugar Manufacturers' Association undertook the responsibility for conducting the necessary training and supervision of the cane producers, and other commercial organizations took over the responsibility for promoting their own industry among farmers. The provincial agriculture extension system now includes farm extension, 4-H Clubs, and home demonstration.

Farm extension work is carried on by 1500 township advisors under the guidance of 100 hsein supervisors. All work through township and village advisory committees. Over 3,000 farm discussion groups have been organized, averaging 30 members each, and during 1962 they distributed over 500,000 copies of educational materials and conducted over 6,400 result demonstrations. About 150,000 farmers participated in 2,390 farm tours.

The 4-H Clubs have expanded to more than 60,000 members in almost 5,000 clubs with 4,800 volunteer leaders. They have been active in production projects and community building (planting trees, flower beds, etc.) programs and international activities (IFYE, Young Farmers to Liberia, and others.)

Home economics work has been started in over half the townships with about 13,000 women taking part.

To support the extension effort, JCRR started a rural information program in 1949. The activities included agricultural bulletins, magazines, posters, movies, mobile publicity vans, and a radio program. All of these activities except for one magazine and the movie making activities have been taken over by the Provincial Department of Agriculture or private industry and expanded. Over 2,000 radio programs were prepared in 1961, over 2,000,000 pieces of literature distributed, and 500 mobile van programs presented.

The JCRR has instituted most of the rural studies that have been carried out in the province and at the present time is conducting or supporting studies on land use, mechanization, food consumption, dairy farming, food processing, farm record keeping, and agricultural census. In addition, JCRR publishes two rural economics periodicals for guidance of farmers and industry and for reporting the results of its research activities.

The farm tenancy committees set up to expedite land reforms have been continued to handle local tenancy and other land disputes and JCRR has appropriated money to improve the land registration system based on the cadastral survey mentioned earlier.

It has also supported agronomic research programs on the island, concentrating on rice, tea, jute seeds, and other phases of crops' work. As a result, Taiwan produced over 2,000,000 tons of brown rice in 1961 with an average yield

of 2,577 kg. per hectare.

Taiwan has eagerly accepted new varieties from all over the world for trial, searching for varieties that can increase yield or quality of the presently grown crops. JCRR brought in 209 new rice varieties in 1961-62 and provided other breeding materials and crops to the plant breeding stations of the province for test and experiment.

Under JCRR's leadership, and through the use of imported techniques and materials, Taiwan has been able to change from the traditional varieties to hybrids or F_1 generation seed of many crops in only five or ten years whereas the originating countries had to spend twenty to forty years in the same process.

Similar activities and accomplishments could be recounted in pest control, reclamation of land, irrigation, implements and machinery, livestock production (particularly in regard to artificial insemination of hogs and cattle with semen from the United States and Europe), poultry, fisheries, forestry, soil conservation, mountain resource development, planning, and administration.[8]

The farm credit program was retarded for several years because of the traditional Chinese attitude towards borrowing of any kind. Through an intensive educational program, the

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[8] JCRR, A Decade of Rural Progress, 1948-1958, Taipei, Taiwan, 1958.

JCRR, Annual Report XIII, 1962, Taipei. Both sources were drawn on in completing this section.

farmers were gradually taught that borrowing for productive purposes was not "shameful" and a larger number of farmers began to borrow and use the credit sections of their farmers' associations. By 1959, the total deposits of all township farmers associations had reached NT$927,000,000, more than seven times the deposits in 1953. The loans issued had reached NT$664,000,000, more than six times the loans made in 1953.[9]

It is estimated that in 1961, of the NT$2,900,000,000 in agricultural loans made by institutional or government agencies, about NT$1,800,000,000 were made by the Land Bank, Cooperative Bank, and the Farmers' Associations. It is further estimated that these official or institutional agencies supply about 60 percent of the production credit and land mortgage credit used by farmers.[10]

All loans are supervised, the lending institutions are frequently audited (every two weeks), and the record of loan use and repayment are exceptionally good; delinquencies amount to only 1.5 percent of the value and 3 percent of the number of loans.[11]

An agricultural education program has been carried on since 1945 and the general educational level has been raised. Enrollment in the primary schools has increased to include

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[9] T.H. Shen Agricultural Development on Taiwan, p. 372.

[10] JCRR, General Report XIII, p. 138.

[11] T.H. Shen - Agricultural Development on Taiwan, p. 319.

almost 95 percent of the eligible children. Forty-three vocational agriculture schools are in operation and the two agriculture colleges have increased their enrollment and faculties. The student body of the Agriculture College of National Taiwan University increased from five in 1945 to 879 in 1958 and the faculty increased from 47 to 248. At the Provincial Agriculture College, enrollment increased from 207 in 1945 to 1230 in 1958 and the faculty increased from 77 to 311. At the same time, all institutions of higher learning increased from 4 to 21 with 27,900 students--about eight times as many as in 1946.[12]

Agricultural investment has been heavy in Taiwan, but with the organizing and pump priming role of the JCRR, a great part of the cost has been recovered from the farmers. They, the farmers, have been involved in the planning and execution of the projects so that they have been in favor of those carried on and willing to pay for the benefits received. As a result of their new-found prosperity, farmers have invested heavily in their own enterprises and farms. Mr. Tsui Young Chi reports that by 1960, farm owners had built 100,000 new houses, and had bought 90,000 bicycles and 140,000 water buffaloes. He further reports that 13 percent of the farmers had made permanent improvements to the land's productive ability, 40 percent had bought equipment such as threshers, cleaners, and improved

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[12] Ibid., pp. 90-91.

plows, and 58 percent had constructed drying grounds and compost houses, bought excarts, etc., and in 1960, over 600,000 tons of fertilizer were sold.

During this same period, production has tended to shift to export crops and crops other than rice, although production of rice has continued to increase. There is now available more fruit, vegetables, and animal products as well as rice than in 1945 so that the general dietary level has been raised and net family income has increased from $285 in 1953 to $848 in 1960,[13] (in terms of 1960 dollars).

Table 6. An Evaluation of the Relative Contribution of the Agricultural Programs Carried on in Taiwan to Increase Production Since 1895.

Relative Date	Category*	Relative Contribution
1.	Land and Tenure Reform	10
2.	Farmer Involvement	10
3.	Agricultural Research	8
4.	Farmer Training	8
5.	Agricultural Education	6
6.	Technological Improvement	6
7.	Transportation-Communication	6
8.	Agricultural Investment	4
9.	Agricultural Supplies	6
10.	Markets and Prices	4
11.	General Education	2
12.	Agricultural Credit	2

* See Appendix I for items included in each category.

Table 6, above, gives an evaluation of the effectiveness

[13] Tsui Young Chi, Land Use Improvement, p. 366-67.

of the various development programs conducted in Taiwan by both the Japanese and Chinese governments, based on the length of time they have been operating and their apparent effect on the farmers in inducing increased production.

CHAPTER VII

THE EXPERIENCE OF MEXICO

Mexico is one of the few Latin American countries to achieve a satisfactory rate of increase in agricultural production, having achieved a rate close to five percent per year as compared to a population growth of 2.8 percent during the last twenty-five years. This means that Mexico has been able to increase per capita consumption of agricultural products and is increasingly able to export to earn foreign exchange.

The increases in production have not been spread evenly over the whole agricultural sector, nor have they necessarily increased the per capita supply of the staple foods, wheat and corn, but there has been an increase in livestock products, fruits, and vegetables. The increases in production have taken place, for the most part, in the northern states where the agriculture is quite similar to that practiced in the irrigated portions of the southwestern United States.[1]

The agricultural history of modern Mexico begins about 1910 with the start of the Revolution. What might be called a preconditioning period followed, lasting until 1930-35, when agriculture seemed to begin the "take-off."

This makes it convenient to divide Mexico's agricultural development into two sections, the preconditioning period from

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[1]Parker and Hendrix, Foundations of Agrarian Development, pp. 33-34.

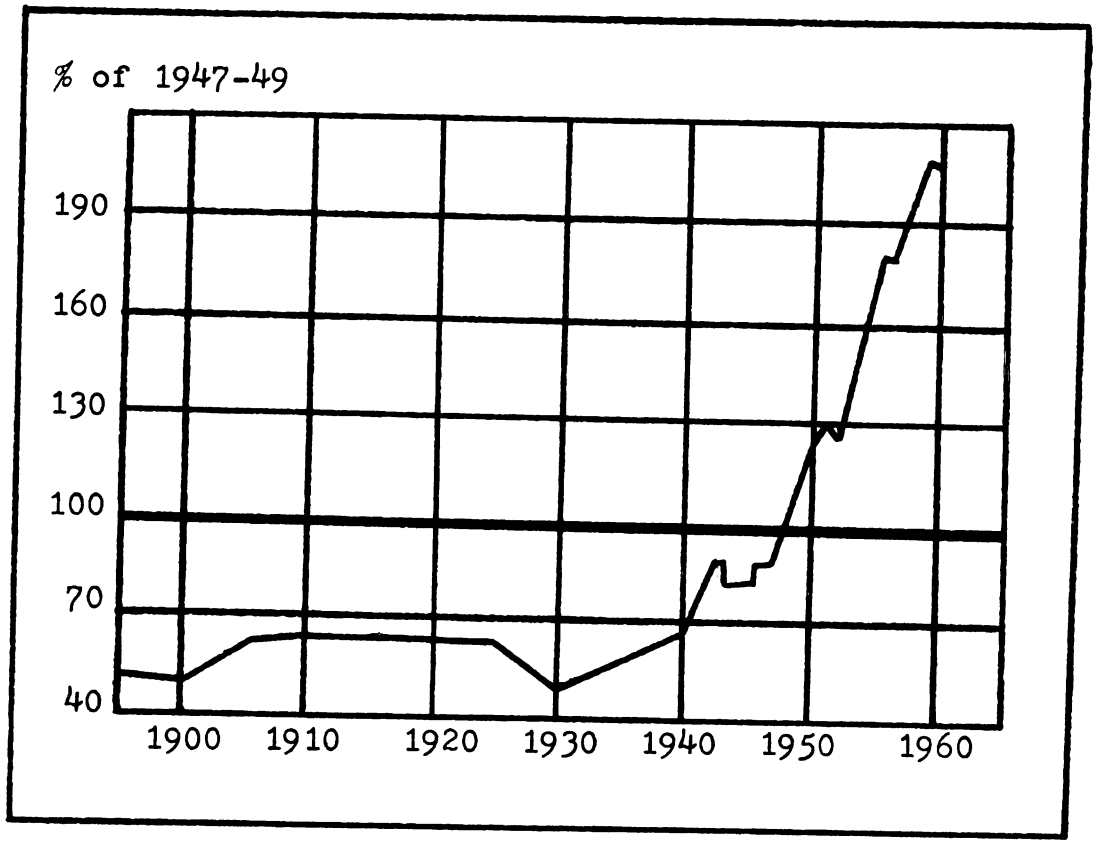
1910 to 1935 and the take-off from 1935 to the present.

Mexican Agriculture: 1920-1935

The period was marked by almost continuous fighting and unrest, and very little development took place. Agricultural production fluctuated around a level of about 60 to 70 percent of the average 1947-49 production as shown in Figure 5.

Even though there was no evidence of increased agricultural

Figure 5: Farm Output, Mexico[2]



production during this period, a groundwork was laid that later was to help Mexico on the road to modernization.

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[2]Ibid., Figure 4, p. 34.

The Revolution was principally a peasant revolution with interest centering on the ownership of land which had traditionally been held in latifundia owned by the Church and large landlords. In the course of the revolution, the army, the Church, and the landlords lost their former power to the revolutionary leaders, supported by the laborers and peasants.

The old constitution was replaced by the constitution of 1917 which provided that:

1. Land would be redistributed, mainly to foster the ejido; to provide the peasant with land which he could farm and/or own depending on his own desires.
2. Ownership of the subsoil and mineral rights of the land were vested in the government.
3. Laborers were singled out as a special class of citizens with new rights and benefits.
4. The government was given the responsibility for primary education on a free, secular and compulsory basis.[3]

However, not much was done to implement these reforms until 1920 when a program was started to improve roads and the irrigation system, and to provide agricultural credit.

When the road building program began, there were less than 700 Km. of paved roads in the country. Paved roads

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[3]James G. Maddox, "Economic Growth and Revolution in Mexico," Land Economics Vol. 36, (No. 3, August 1960), p. 268.

amounted to less than 10,000 Km. in 1939 and by the end of 1960, over 39,000 Kms. of paved roads had been constructed, connecting the main cities.[4]

Considering all kinds of roads, Flores reports that during the period 1930-59, over 46,000 miles of roads of all kinds were added to the already existing 27,000 miles and that over nine billion pesos had been spent on the program which contributed toward connecting farmers to their markets.[5]

In 1926, the government began rebuilding and adding to the irrigation system so that by 1935, about 1,800,000 acres of land were supplied water by government irrigation systems, and by 1959, there was an additional increase of 4.2 million acres at a cost of over seven billion pesos.[6] Actual irrigation of land generally lags behind the construction of large systems but this lag has been taken up by small projects constructed by local communities and farmers so that as Cline reports, in 1926-47, 816,000 hectares were irrigated, between 1947 and 1952, 665,000 hectares were added and another 1,128,000 were added between 1952 and 1958. A total of 2,609,000 hectares (about 6,390 thousand acres) were under irrigation[7] by 1959 at

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[4]Howard F. Cline, Mexico: Revolution to Evolution 1940-1960. Oxford University Press, New York, 1962, p. 65.

[5]Edmundo Flores, "The Significance of Land Use Changes in the Economic Development of Mexico." Land Economics, Vol. 35, (No. 2 May 1959), pp. 118-120.

[6]Flores. Ibid., p. 119.

[7]Cline, Mexico: 1940-1960, p. 69.

a total cost of 10.4 billion pesos.[8]

A third major action taken during 1925-26 was the starting of an agricultural credit system. The Banco Nacional de Credito Agricola y Ganadera, S.A. (Agrarian Credit Bank) was established in 1926 to supply credit to agriculture.

In 1935, it was realized that some kind of credit system was needed to support the ejidatarios in his efforts to improve himself. The Banco Nacional de Credito Bjidal, S.A. (Ejido Bank) was established to carry on this work.

In the same year, the Almacenes Nacionales de Deposito (National Food Warehouses) was established to provide support to agricultural commodity prices and to provide middleman services. The warehouse receipts issued on stored commodities by this concern are negotiable and are used by the trades, engaged in food supply, to finance their businesses.

The Banco Nacional de Pomento Cooperative, S.A. (Bank of Cooperative Development) was established to support the cooperative credit programs in 1941.

The enlargement of agricultural credit has been relatively slow during the whole period of Mexico's development program, largely because of a lack of funds.[9]

In 1939, the total amount of public credit extended to agriculturists amounted to about fifty-eight million pesos.

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[8] ERS, Agricultural Policies, p. 18.

[9] William P. Glade, C.W. Anderson, The Political Economy of Mexico, (University of Wisconsin Press, Madison, 1963), Appendix

This grew to 338 million pesos in 1950--about 5 percent of product value.[10] In 1960, the amount loaned amounted to 2,163 million pesos and fell to 1,887 million pesos in 1961.[11]

The agricultural credit act of 1955 relaxed some of the terms for credit in regard to collateral required. These loans are frequently contingent upon the use of improved agricultural techniques and supervision of the farm management practices of the borrower.

It has been mentioned that land reform was one of the major goals of all the governments since the revolution. The land reform program started slowly but increased rapidly from 1935-1940 and then dropped back in 1956 to resurge once again in the 1960's. The table below shows land distribution to 1956 and it is reported that the distribution during the year 1961-62 amounted to 3,400,000 hectares, slightly less than in 1960-61. Altogether over 100 million acres of land have been distributed.[13]

The Constitution of 1917 limits the amount of land that can be held by a farmer, limits the amount of land that can

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[10]The combined working party, the International Bank for Reconstruction and Development (The World Bank), The Economic Development of Mexico, (Johns Hopkins Press, Baltimore, 1953), p. 20.

[11]ERS, Agricultural Policies, p. 19.

[12]Glade and Anderson, Political Economy, p. 73.

[13]ERS, U.S. Department of Agriculture, Agricultural Policies of Foreign Governments, (Agr. Handbook, No. 132, Washington, 1964), p. 19.

Table 7. Land Distribution and Persons Receiving Land[14]

Period	Hectares Distributed Total	Average Per Year	Number of Persons Receiving Land Total (000)	Average Per Year, (000)
	(000) Ha.	(000) Ha.		
1916-34	7,777	409	783	41
1935-40	17,981	2,982	815	136
1941-56	11,146	743	267	18

be held by a corporation, prohibits a Church from holding land and in article 123, establishes minimum wages and other rights for agricultural labor.

Between 1922 and 1926, several laws were passed providing more secure tenure. A Homestead Law provided that unsettled land could be homesteaded, contingent on two years of occupancy and tillage. A Colonization Law provided land for ejidos in new areas and a Credit Act provided loans to pay for the amenities needed for community life. An Idle Lands Law provided that idle land revert to the government, and between 1922 and 1926, most of the states passed laws regulating the amount of rent that could be charged and providing relief from usurious debts.[15]

Another factor of development provided for in the constitution is the requirement that free education be provided

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[14] James G. Maddox, Mexican Land Reform (American Universities Field Staff, Mexico D.F. July 3, 1957), p. 15-17.

[15] Frank Tannenbaum, The Mexican Agrarian Revolution, (MacMillan Co., New York, 1929), pp. 260-287.

in each ejido. This program has been slow in getting started. As mentioned by the Working Party of the World Bank, "construction of schools has taken a minor share of total public investment, accounting for a little less than 1 percent of the total between 1930 and 1950."[16]

Additional effort was put into education following 1950 so that by 1963, Edwin M. Martin could write that in thirty years, the "literacy rate has been doubled."[17]

Mexican Agriculture After 1935

It will be noted that many of the activities started in the 20's and 30's have been expanded and carried over to the present. Irrigation, roads, land distribution, land tenure, education and agricultural credit are of continuing interest.

Besides the provisions mentioned earlier, there are other developments worthy of mention. In 1949 a Land Law was passed providing that a minimum ejido grant should be ten hectares of irrigated land or twenty hectares of seasonal land.[18]

Investment in agriculture increased considerably during these years with private investment tending to increase faster than public investment. Agricultural investment made up about 12 percent of the total national investment in 1939-47 and 20

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[16]World Bank, Economic Development, pp. 99-100.

[17]Edwin M. Martin, "The Economic Revolution in Mexico" Department of State Bulletin, Vol. 49, (No. 1278 Dec. 23) 1963, pp. 959-60.

[18]Cline, Mexico: 1940-1960, p. 72.

percent in 1948-50. The share of private investors during the period increased from 45 to 56 percent.[19]

The actual amounts invested have increased from thirty-nine million pesos in 1939 to 595 million pesos in 1950,[20] to a planned investment of over four billion pesos each year for 1962-64.[21]

To further agricultural development, Regional Development Commissions started functioning in 1947 as planning and supervisory agencies. In 1946, the National Colonization Commission was formed, followed by the National Maize Commission in 1947, and the National Coffee Commission in 1949. These commissions are to stimulate production, improve quality, increase exports, and help stabilize prices.

Price stabilization or guaranteed prices have been a part of the government agricultural program since 1938. This objective has been accomplished through a system of warehouses and retail outlets so that a floor is effectively maintained under agricultural prices by buying and storing or exporting farm commodities. Through the 400 retail outlets and 54 "motorized stores" serving the lower income areas of the major cities, the government maintains a ceiling price on major food items at the retail level.

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[19]World Bank, Economic Development of Mexico, pp. 10-18.

[20]World Bank, Ibid. Table 19, p. 194.

[21]ERS, Agricultural Policies, p. 19.

An agricultural extension service was started about 1950 but its growth has been slow. It is cooperating in a demonstration program with the National Institute for Agricultural Research set up by the Ministry of Agriculture in cooperation with the Rockefeller Foundation in 1943. Starting about ten years ago, demonstrations, conducted on individual farms and at the experiment stations located in the several states, have been used as centers of training for farmers.

As far as agricultural education is concerned, the main emphasis has been placed on the agricultural schools in each agricultural region. In addition, the rural high schools teach agriculture as a major subject. Tannenbaum describes the schools in these terms:

> "...looked at from the point of view of the changes that are taking place in the rural community, the type of school being established is perhaps of even greater importance than the number of schools. It is essentially an "action school." The rural school is socialized and as far as possible made the center of life of the community. The school almost always has a piece of land and there is instruction in agriculture, in the raising and care of animals, in the keeping of bees, and in raising vegetables."[22]

The development of cooperatives in Mexico has not progressed satisfactorily, even though one of the principal aims of land reform was to support the ejido (a form of cooperative, owning and farming land). Reports indicate that since the disruption of the rural economy by land reform, the Ejido Bank working through local credit societies, and in

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[22]Tannenbaum, The Mexican Agrarian Revolution, p. 424.

close cooperation with the elected Ejido leaders, has taken over some of the functions of the former landlords.[23] However, the bank has not been entirely successful in this respect because of its reluctance to loan money when land is not offered as collateral.

Most of the Ejidos were set up in the older agricultural areas of the country where the latifundia and haciendas were located and there has been a tendency for these farmers to continue their traditional type of agriculture. In the newly developed lands to the north, most of the land was purchased by individual farmers. The World Bank report indicates that these farmers have made greater investments, have used better technology, have been more efficient on larger farms, and have achieved greater development.[24]

Glade considers that the Ejidos, by remaining in the subsistence economy, have been an effective means of absorbing excess labor while private farms supply the market and use the surplus capital available. He goes on to say that the breaking up of the large holdings increased the efficiency of the remnants left to the latifundia and added to the amount of capital used on private holdings, resulting in a change from ascription to achievement in the assignment of economic

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[23] Maddox: Mexican Land Reform, pp. 11-12.

[24] World Bank, Economic Development, p. 20.

rewards, and the development of commercial agriculture.[25]

Fertilizers have played a part in the development of the northern areas but have not been an effective development tool in the older parts of the country. Fertilizer was introduced early in the history of Mexico and several factories for bone meal, oil cake, and mixed chemical fertilizers were producing in the 1930's. In 1944, Guano y Fertilizante was set up. In 1945, 13,000 metric tons of fertilizer were being used and by 1958, this had increased to 265,000 metric tons annually.[26] According to the FAO, the use of N, P_2O_5, and K_2O combined amounted to only .43 of a metric ton per 1000 hectares in 1949-50 compared to a Latin American average, at that time, of 2.74 metric tons per 1,000 hectares. By 1960-61, fertilizer use had increased, on the same basis, to 9.36 metric tons per 1,000 hectares compared to a Latin American average of 9.03 metric tons. While this is a fair increase, it is still only about a fourth of that used in the United States or Greece, 5 percent of that used in Taiwan, and 3 percent of the fertilizer used per 1,000 hectares in Japan.[27]

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[25] Glade and Anderson: Political Economy of Mexico, pp. 57-59.

[26] Glade and Anderson: Political Economy of Mexico, p. 66.

[27] FAO, The State of Food and Agriculture, 1963, (Rome 1963), Tables 18, 19, 20, and 22, pp. 218-227.

To summarize, agricultural production has increased rapidly during the last twenty-five years in Mexico. The land has been distributed, many essential services have been supplied, though in small quantities to date, and gradually increasing amounts of money are being spent on irrigation, roads, marketing, education, research, electricity, equipment, and industrial products used in agriculture. The increase in production, which seems to originate largely in the new farm lands of the north, is about 25 percent accounted for by the addition of new land and 75 percent accounted for by improvements in yield.

Flores sums up the situation in Mexico quite well by saying that Land Reform and development was paid for in the early stage by the landed gentry through land expropriation and inflation. Later, the labor force and agriculture paid for it through low wages and prices; and still later, agriculture has paid a large part of the bill through low food prices and heavy export taxes. He goes on to say:

> "The agricultural sector was able to withstand this drain without sinking into subsistence levels... because on the one hand, total agricultural income increased due to expanded and more intensive land utilization (the direct and induced effects of public works, agricultural credit, and urban expansion) and to high prices for agricultural exports, and on the other, the percentage of working population engaged in primary production dropped from 90 percent before land reform to around 52 percent today."[28]

Martin also says:

"The statistics on Mexico suggest that Mexico began

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[28]Flores, The Significance of Land Use, p. 123.

> its economic development in earnest in 1930...in the thirty years since that time the statistics show what a country can do that really sets its mind to raising the standards of living of its people. Gross national product has increased almost five times, per capita income has more than doubled, over 100 million acres of land have been distributed, agricultural production has increased over four times, the literacy rate has been doubled and the mortality rate has been cut in half."[29]

Below, table 8, is an evaluation of the part the various development programs carried on by the people and government of Mexico have had in contributing to the increased production of its agriculture.

Table 8. An Evaluation of the Relative Effectiveness of the Agricultural Programs of Mexico in Increasing Agricultural Production, 1910-1062.

Relative Date	Category*	Relative Contribution
1.	Agricultural Supplies	6
2.	Land and Tenure Reform	10
3.	Farmer Involvement	8
4.	General Education	6
5.	Agricultural Education	6
6.	Agricultural Investment	10
7.	Transportation-Communications	8
8.	Markets and Prices	6
9.	Agricultural Credit	8
10.	Agricultural Research	4
11.	Technological Improvement	6
12.	Farmer Training	6

* For identification of items included in each category, see Appendix I.

[29] Martin, The Economic Revolution, pp. 59-60.

CHAPTER VIII

THE GREEK EXPERIENCE

For over 4,000 years, Greece has been famous for its leadership in the arts, philosophy, government, and other disciplines affecting the lives of people. The experience of Greece during the last fifteen years may exhibit different aspects of leadership by showing that agricultural development can be a reality in the face of high population pressures, traditional outlook among the farmers, and a lack of resources.

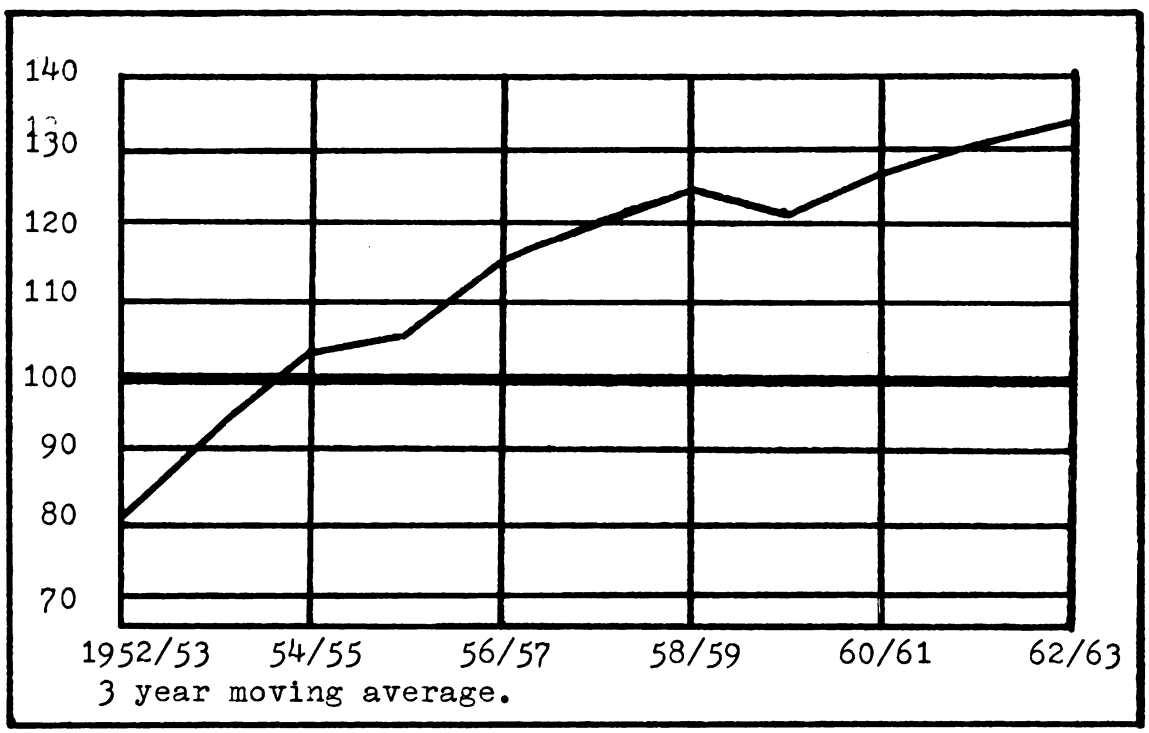
For hundreds of years, Greece was a captive state under foreign domination. After achieving independence, many years were spent in wars with neighbors in an effort to establish territorial rights. During World War II, it was again overrun and, after the war, was plagued by internal strife and rebellion until 1950. With subsequent peace and relative stability, it was found that many resources had been destroyed. Livestock had been slaughtered, the irrigation works, the drainage systems, and the transport systems were either destroyed or had become useless through neglect and lack of maintenance. The forests had been stripped and many thousands of farmers had migrated in front of intruding military forces or because of starvation.

In the face of these difficulties, Greece not only has made a remarkable recovery, but during the last twelve years, has increased agricultural production at an average compound

rate of four percent per year. With population growing at a rate of only 0.9 percent per year, this represents a gain on a per capita basis of nearly 3.1 percent per year.[1] (See Figure 6)

Figure 6: Agricultural Output, Greece[2]

(1952/53-1953/54 = 100)



To facilitate the discussion of Greek agriculture, it is convenient to divide the development period into two sections: 1920 to 1945 when many of the actions originated that have begun to pay off in the second period, 1945 to the present.

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[1]Parker and Hendrix, Foundations for Agrarian Development, pp. 35-36.

[2]Prepared from data in The State of Food and Agriculture, (U.N., FAO Rome, 1964), Annex Tables 1A and 1B, pp. 195-198.

The 1920 to 1945 Period

Land reform in Greece was started in 1923 by breaking up the large holdings and distributing the land, mainly to the mountain people.[3] In 1952, expropriation of farm land in excess of 25 arable hectares per farm owner was authorized and the job was practically finished by 1955. About 350,000 hectares were appropriated and distributed to over 136,500 families with the average family receiving 2 hectares of arable land or 22.5 hectares of grazing land each. This reform increased the number of small holdings (less than 5 hectares) by 5 percent and decreased the holdings of over 25 hectares (including non-arable land) by 20 percent. Considering the low yields generally received, (the Food and Agriculture Organization estimates that at least 6 hectares of non-irrigated or 2.5 hectares of irrigated land are necessary to support a family at a subsistence level) the farm size in Greece was too small even before reform to support a really prosperous agricultural population.[4]

Another factor contributing to the farmer's difficulties is the extreme fragmentation of the land. Land Consolidation was introduced in 1953 and, by 1961, 55,000 hectares had been consolidated with the holdings averaging 10 plots of about 0.25 hectares each before reform.

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[3] OEEC, Fodder Development in Mediterranean Countries, (Paris 1951).

[4] FAO, Progress in Land Reform, Third report, United Nations, (New York 1962), p. 17.

The farms in the grazing areas tend to be communal and only a few private landowners are found in these areas.[5] The government has not yet done anything about establishing ownership of this land so that the farmers are reluctant either to make land improvement investments or to take care of improvements made by the government.

In the field of agricultural education, some efforts have been made to educate the farmers and youth for over sixty years. In 1902, the American Farm School was started to give four years of agricultural training to rural boys destined to go back to their home villages to farm and to train their neighbors.[6]

Other schools were started between 1920 and 1935 but there was not much interest on the part of rural young people. In 1952, these schools were converted to the training and reorientation of the farm extension staff.

An extension program was started before World War II, with various government organizations doing their own farmer contact and training. Among the organizations engaged in this activity were the Mechanical Cultivation Section, the Agriculture Credit Bank, and the various irrigation organizations. Because of the lack of coordination between these activities, not much was accomplished before the war. During the subsequent periods of unrest in the country, the extension system

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[5] Ibid., p. 17.

[6] Munkman, American Aid to Greece, p. 88.

completely disintegrated.[7]

Two colleges were in operation before the war giving degrees in agriculture, and a considerable number of people had been trained in these institutions. However, opportunities for employment were scarce and interest in advanced agricultural education had dropped to the point that very few new students were seeking admission.

The Agricultural Bank was started before the war and made some medium and short term loans for production purposes. When the farmer cooperative program began, the bank was given the responsibility for overseeing the operations of the cooperatives and, until after the war, the majority of the cooperatives were credit operations. During the period, the volume of loans handled was very small because of a lack of financing and government support.

Greek farmers have practiced irrigation for years, using small diversion dams. In 1929 the government started building large irrigation and drainage projects but very few were finished. Financing was inadequate and too many projects were started to be serviced by the available staff. During the war years, most of these projects were destroyed or deteriorated from lack of maintenance.[8]

A Mechanical Cultivation Service commenced operations

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[7] Ibid., p. 90.

[8] Munkman, American Aid to Greece, pp. 112-116.

about 1925, doing reclamation and irrigation work and introducing mechanical cultivation to the farmers. The service was well organized and, until a large part of the equipment was destroyed by guerilla action in the early 1940's, continued to render assistance to the farmers.

A number of research stations were set up during the period, dealing mainly with the major export crops--tobacco, cotton, and wine. A Plant Improvement Station at Thessaloniki began testing varieties of grain brought in from outside in 1925.

Postwar to the Present

During World War II, agricultural production decreased about 30 percent. Shown below for comparison are a few production figures for 1938 and 1947.

Table 9. Deterioration in Agricultural Production During World War II[9]

Product	1938 1000 Tons	1947 1000 Tons
Wheat Production	768	578
Currant Production	158	76
Meat Production	111	88
Milk Production	705	441
Industrial Production Index (1939 = 100)	100	67

As noted before, considering the condition of Greek

[9] C.A. Munkman, American Aid to Greece, (Frederick A. Praeger, New York, 1958), p. 46.

agriculture at the end of hostilities, remarkable progress has been made in the twenty-year period.

Several developments in the country help account for this improvement. Mention has already been made of the land reform program and the changes it has made since 1952.

In 1948, a program for the improvement of agriculture was authorized with emphasis placed on two phases: (1) technical development, and (2) land improvement.

The technical improvement and development program included not only agriculture itself, but the whole rural infrastructure--transportation, health, administration, education, vocational education, forestry and fisheries. As a first step, the agricultural extension service was reorganized in 1951, using the remnants of the extension programs carried on before the war. An active recruitment program was conducted and about 400 Agricultural College graduates were formed into a staff and given intensive training and reorientation. The new extension service had two goals besides the normal goal of improving agricultural production: (1) to inculcate in the farmers a "let's try it" philosophy, and (2) to remove the element of distrust between the government workers and the farmers.[10]

The new extension organization embraces agricultural

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[10]Paul P. Vouras, The Changing Economy of Modern Greece, Since World War II, (Institute for Balkan Studies, 1962), p. 78.

extension, home economics, education of farm youth, information and advisory aids, and small land improvement projects. In the ministry of agriculture, there are fifteen subject matter extension specialists besides the directorate officials. In the rural areas, there are ten inspectorates or regions with an extension supervisor, a home economics inspector, and two subject matter specialists in each. There are fifty-two nomos (county) offices with an agent in charge. At the local level, there are 420 agricultural advisory officers plus about 110 home demonstration agents.

The advisory officers work through local groups in conducting demonstrations and training farmers. In addition, each advisor is responsible for conducting short course training and traveling schools for the about 2,500 farm families with whom he works.[11]

The agricultural cooperative program was reorganized in 1952 with cooperatives at the village level federated at the nomos and national levels. They are under the general supervision of the agricultural bank on behalf of the government. The bank makes reclamation (medium term), production, and crop (short term) loans directly to the local cooperatives, who, in turn, allocate the money and make collections.[12] The

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[11] OEEC, EPA, Agricultural Advisory Services in OBBC Countries in the Mediterranean Area. (No. 8 of a series entitled Documentation in Food and Agriculture. Paris, 1959), pp. 17-20.

[12] Munkman - American Aid to Greece, pp. 263-265.

lending program seems to be well organized but suffers from a lack of loanable funds, encompassing (1962) only about one-fourth of the agricultural loans outstanding, the rest coming from private, high-cost sources.[13] Most government loans for production are given in kind; the cooperatives supervising them to insure proper use and repayment.

The cooperatives are also set up to handle crop purchases and sales of agricultural supplies on behalf of the government. The government makes bulk purchases of grain (from the farmers) and of supplies from overseas or local sources. It is the responsibility of the cooperatives and the Agricultural Bank to warehouse, distribute, sell and buy, and collect payments on all commodities. A few specialized cooperatives handle olives and dairy products or engage in processing and canning food.

The second part of the development program of 1948 emphasized land improvement. The Mechanical Cultivation Service changed its orientation in 1948 and for a few years, most of its work consisted of plowing and minor reclamation of land that had been farmed before the war. Later it was given responsibility for "small" irrigation and reclamation works. Its work grew in size and scope so that eventually it became a major factor in earth work. As private contractors (often supported and trained by the Mechanical Cultivation Service)

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[13] ERS - Agricultural Policies, p. 75.

became familiar with and able to do the work, the Service withdrew and allowed the private parties to continue with mechanical development.[14] As a result of encouraging these entrepreneurs, in 1961 over 85 percent of the wheat grown in the plains was threshed or combined by privately owned power units, and in 1959, over 10,000 hectares of rice were grown in the riverine mudflats where none had been grown in 1948.[15]

The land reclamation, irrigation, and resettlement projects have been pushed by the government through special semi-autonomous organizations. A Border Area Resettlement program began in 1953 and was supplemented by the Mechanical Cultivation Section which built the necessary hillside terraces and small irrigation projects.

Irrigation has been fostered by two corporations besides the Mechanical Cultivation Section. About 100,000 acres of land came under irrigation in 1962 making a total of 1.1 million acres irrigated. Loans are available for farmers and communities for small scale reclamation projects; however, the supply of money is limited.[16] Since 1950, soil conservation programs have also been a part of the mountain development program.

The higher educational facilities of the country have

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[14] Munkman, American Aid in Greece, pp. 112-116.

[15] Vouras, The Changing Economy, pp. 40-46.

[16] ERS, Agricultural Policies, p. 75.

been improved and expanded, although there is still not enough capacity to accomodate all students desiring to attend. In 1959, the colleges of Greece accepted about 16,000 new students but over 5,000 went to other countries for training. Of the entire 21,000, only about 150 students were registered in five-year agricultural colleges.[17]

A new veterinary college was started at the University of Thessaloniki and the first class graduated in 1956. Since then, animal health clinics have been set up in provincial centers, and vaccination campaigns have been carried on with a fair degree of success. A cattle breeding project was initiated in 1948 and stations were stocked with good native and imported animals. As a part of the livestock improvement program, feed demonstrations have been carried on at several places in the provinces since 1955.[18]

The information programs have been vastly expanded since 1952 with the extension service, the colleges, and various government and private organizations contributing to the fund of information being given to the farmers.

Research seems to have improved more slowly than some sectors because of a lack of organization and trained personnel. However, some progress has been made in improving wheat

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[17] OEEC, Higher Education in Agriculture, (1960 series Paris 1960), p. 59.

[18] Munkman, American Aid in Greece, pp. 92-95.

varieties. In conjunction with the research organization, a seed production and certification program was set up in 1957 that now oversees the production of breeders, basic, and certified seeds of all commercially grown crops. All seeds are grown under the control of this organization and only approved varieties are permitted.[19]

The government has had a price support program for many years, and in 1950, price supports were extended to cover most farm crops. Since that time, the amount and nature of the support given has varied from year to year.[20] The bulk of the price support purchasing has been done through the cooperatives. Subsidies have been granted on products in short supply, and on commodities such as improved seed and fertilizer to stimulate use.

The use of farm chemicals has expanded, although the supply has been limited by shortages of foreign exchange. Weed and insect control chemicals have been sold through the cooperatives or private business outlets.

Fertilizer use has been subsidized since 1958. The consumption of nitrogen (N) increased from an estimated 25,000 metric tons in 1949-50 to 83,000 tons in 1961-62. During the same time, the consumption of phosphate (P_2O_5) increased an estimated 25,000 tons to 65,000 tons and potash (K_2O) from

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[19]OEEC, EPA, National Systems of Seed Certification, (1959 Series Paris, 1959), p. 22.

[20]ERS, Agricultural Policies, p. 74.

5,000 tons to 9,800 tons. The application of elemental fertilizers per 1,000 hectares jumped from about seventeen tons per year to over thirty-eight tons between 1949-50 and 1960-61.[21]

In the marketing sector, several developments have taken place to induce increased production of fruits and vegetables, to reduce production of tobacco and wheat (there is a surplus in the world economy and Greece does not have a specialization advantage in either), and to expand the production of rice. The expansion of the irrigation system has helped increase the production of fruits and vegetables, which are marketed in Europe since the acceptance of Greece as an associate member of the European Economic Community. The success of the marketing program has depended, to a great extent on the construction of about 6,000 miles of roads during the 1949-58 period, which have helped expedite market shipments. An arboriculture experiment station was established in 1956 to test imported fruit varieties under Greek conditions. In the same year, the government started inspecting marketed fruit, set up marketing standards for exported fruits and vegetables, and built the first of a series of cold storage warehouses, all of which contributed to better marketing. Trade associations (cotton, tobacco, fruit) have been established to promote quality, improve production practices, and increase

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[21] FAO, The State of Food and Agriculture - 1963, (Rome, 1963, Table 22), pp. 226-27.

exports, primarily to other members of the European Economic Community.

The system of price supports, subsidies, marketing controls, inspections, and research have been used extensively to manipulate production patterns, to balance production for internal consumption, and to promote exports.

In summary, Greece has increased production quite rapidly during the years since World War II to the point that their food supply averages about 2,600 calories (including about 140 calories imported) per day and the agricultural production index (1952-53 to 1954-55 = 100) stands at 151 for 1963-64 and is estimated to be 160 for 1964-65. Per capita production has also gone up to an index of 140 (1952-53 to 1954-55 = 100) in 1963-64 and 147 in 1964-65.[22] In both categories, this is a much larger increase than achieved in any other country in Europe.

The increase has been achieved through improvements in markets, security of land and tenure, increased use of inputs, irrigation, organization, training, reclamation, and a different attitude on the part of the farmers.

The effectiveness of the projects carried on in Greece's agricultural program are difficult to evaluate since most of the activities in each of the several categories are new,

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[22]Economic Research Service. U.S. Department of Agriculture, Foreign Agriculture Service, The 1965 World Agricultural Situation, (Foreign Agriculture Economic Report No. 22, Washington, January 1965), p. 29.

having started since 1946. However, the rapidity with which Greece has taken up the agricultural development of the country, some of the time effect noticed is missing here so that the evaluations made probably reflect more accurately the effectiveness of the projects themselves. Following is an evaluation of the Greek development efforts. (Table 10)

Table 10. An Evaluation of the Relative Contribution of the Agriculture Programs carried on since World War II in Greece to Increased Production.

Relative Date	Category*	Relative Contribution
1.	Land and Tenure Reform	10
2.	General Education	8
3.	Agricultural Research	8
4.	Farmer Training	6
5.	Transportation-Communication	4
6.	Agricultural Education	4
7.	Technological Improvement	6
8.	Agricultural Investment	6
9.	Markets and Prices	4
10.	Agricultural Supplies	4
11.	Agricultural Credit	2
12.	Farmer Involvement	6

* For items included in each category, see Appendix I.

CHAPTER IX

FACTORS INFLUENCING AGRICULTURAL DEVELOPMENT IN THE FIVE COUNTRIES

When reviewing the agrarian development of these five countries, one soon becomes aware that, in spite of the differences in culture, in background and resources, and in place and time, there are, nevertheless, many similarities in the methods used and in the order of implementation as well as in the fact that impressive results have been achieved.

Before attempting to analyze the agricultural history of the individual countries, there are four historical factors that should be noted as being consistent in each of the five countries. These are not, in themselves, a part of agriculture, but seem to have had a significant influence on country development.

The first point to be noted is that agricultural development in all five countries followed periods of political unrest and more or less violent social upheavals.

Japan's development was preceded by the restoration of the Meiji, the breaking up of the peasant's traditional communal agriculture, and the opening up of Japan to Western ideas and technology. Again, between 1937 and 1945, Japan was almost continually at war and the character of the government changed. A great deal of social and economic readjustment was required of the population at large as well as political adjustment.

The United States development started after the Civil War and continuing migrations to the West. As in Japan, each of the World Wars was followed by a mass movement of the population in search of work and better living conditions, and then by a rapid upsurge in agricultural production.

In Mexico, development was preceded by several years of bloody revolution and sweeping changes in the political, economic, and social structure.

In Taiwan, development followed a period of dislocation for many people on the island by the new Japanese immigrants and rulers. The second World War, independence, and mass migrations of armies, rulers, and people to and from the island in 1945 and 1948 were followed by increased agricultural production.

Greece is another case where intense warfare and guerilla activity accompanied by rather large migrations, realignment of social structures, and political and economic turmoil preceded a period of increased agricultural activity and economic progress.

While it is not advocated in this paper that war, accompanied by radical shifts in social, political, and economic structure is a necessary condition for development, the combination may contribute more than is commonly supposed. In each of these countries, millions of people were affected and were at least partially jolted out of their traditional "rut." A social revolution, the acquisition of new knowledge,

the development of a new invention or technique, or a chance for unusually high profits may serve to stimulate new activity among those affected. As pointed out by Rostow when writing about the preconditions for economic development,

> "The more general case in modern history, however, saw the stage of preconditions arise not endogenously but from some external intrusion by more advanced societies. These invasions--literal or figurative--shocked the traditional society and began or hastened its undoing; but they also set in motion ideas and sentiments which initiated the process by which a modern alternative to the traditional society was constructed out of the old culture."[1]

The second similarity in all five countries is that the revolutions mentioned above were followed by periods of relatively stable government. In Japan and the United States, this has certainly been true. In Taiwan, each of the two periods of turmoil were followed by a new set of rulers but, in each case, there was a stable government. In Mexico, while there were several changes in government during the early years of the revolution, all have been more or less stable and were revolutionary in character. The development program has been continuous in that all governments had land reform as a goal, though differing in degree of implementation, and all supported peasant and laborer improvement. The difference in government was largely a matter of degree. In Greece, for the first few years after the return of the monarchy, there were changes in governments, but all of them, as in Mexico, had practically

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[1] W.W. Rostow, The Stages of Economic Growth, (Cambridge University Press, Cambridge, 1961), p. 6.

the same goals as the preceding governments. In each of these cases, essentially one agricultural program was carried on for the entire period, from the start of development to the present.

The third factor that should be noted is that all of the countries experienced varying degrees of industrial development along with their agricultural development. There were both good markets for agricultural products and a fair amount of consumer goods and agricultural supplies for farmers to purchase during most of the development period. True, Japan and the United States had a far better supply situation than the other countries covered in this report, but industrial production in all five countries has increased, and there is a much greater supply of consumer and agricultural production goods available than is found in most underdeveloped countries.

A fourth factor common to the five countries' development has been the presence of a staff of able and trained administrators. The importance of this factor in a country's development may be more fully appreciated by studying examples of failure or lack of progress in a country's development program. In many, many cases, failure to progress as expected can be traced to too few administrators or their lack of ability, inadequate training, limited knowledge, lack of energy, lack of interest, or lack of experience. This then, becomes an area of supreme importance in the considerations of a developing country. It must take measures to select, train, and adequately

supervise its beauracracy before projects are implemented in order to insure their success.

FACTORS COMMON TO THE DEVELOPMENT OF FIVE COUNTRIES

The first step in attempting to determine the reasons for success of the agricultural sector in these five countries is to determine what measures were used in common, either accidentally or on purpose, that have contributed to agricultural development.

A close perusal discloses that there are many similarities in the programs which have been conducted in these countries, both in the public and in the private sectors. Some countries have made agricultural development a public responsibility, while in others, it has been primarily left to private interests except for a few areas such as education and agricultural research. This was especially true in the United States and in Japan where the governments did not take a leading role except in times of emergency until fairly late in the development period.

In the five countries, many different things were tried that had a definite effect on the development effort. However, for ease of handling, these many activities have been grouped into twelve factor categories. The listing of activities included in each category are included as Appendix I.

Other authors might quarrel with this division into categories but in light of the developments that have taken

place in these countries, this seems to be the most logical arrangement of agricultural development factors for our present purpose.

The twelve categories of agricultural improvement activities considered in this paper are listed below.

1. Land and Tenure Reform.
2. Technological Improvement.
3. Farmer Involvement in His Own Development.
4. General Education.
5. Transportation and Communications.
6. Agricultural Research.
7. Farmer Training (Extension).
8. Agricultural Education.
9. Investment in Agriculture.
10. Agricultural Supplies.
11. Markets and Prices.
12. Agricultural Credit.

While not every country has engaged in all of the sub-topics listed in the appendix, each of the five did carry on some activity involving all of the major categories and most of the sub-topics. Each country exhibited some individuality, depending on the needs of the country and the ability of the people, as to what it supported and to what extent support was given. It is important to note that each of the factors listed contributes to increased production or income from existing farm land except in the case of irrigation projects

which bring new lands into production. As a general rule, none of the countries except Mexico have added much new land, relative to that already cultivated, to their available supply since the early 1920's. In the case of the United States, the cultivated acreage has been considerably reduced.

Using the limited amount of information available, an attempt was made to determine the relative effect of each of the twelve agricultural production factors in increasing output. As the first step in this process, it was necessary to determine when each activity became important to the improvement of agriculture in each country. Table 11 below shows the relative rank of each category of activity based upon the time it became an effective part of the agricultural program and began to contribute to production increases. In case two or more major actions were adopted at about the same time, they were given the same rank.

An assumption that can be made is that the programs adopted first in the five countries were regarded as most important to encourage increased agricultural production by the administrators and politicians who were responsible for planning the country development effort under the conditions existing at that time.

It becomes apparent, when examining table 11, that land and land tenure reform was the first agricultural development activity undertaken in most of the countries and ranked near the first in all the countries, indicating the importance

Table 11. Agriculture Development, Five Countries, Factors of Agricultural Development in Five Countries with Date of Adoption or Date of First Major Effect and Order of Adoption with Average Order of Adoption in the Five Countries.

Factor	Japan Date	Japan Rank	United States Date	United States Rank	Taiwan Date	Taiwan Rank	Mexico Date	Mexico Rank	Greece Date	Greece Rank	Average Rank
Land and Tenure Reform	1871	2	1787	1	1895	2	1925	2	1923	1	1
Farmer Involvement	1890	3	1850	5	1900	2	1925	2	1952	10	2
General Education	1910	7	1800	2	1945	11	1925	2	1930	2	3
Agricultural Research	1890	3	1887	8	1916	3	1943	10	1930	2	4
Agricultural Education	1896	5	1862	6	1928	5	1926	5	1940	6	5
Technological Improvement	1870	1	1820	3	1930	6	1944	11	1948	7	6
Transportation-Communications	1920	8	1825	4	1930	6	1930	7	1930	5	7
Agricultural Investment	1920	8	1862	6	1930	6	1926	5	1948	8	8
Farmer Training	1903	6	1914	11	1916	3	1950	12	1930	2	9
Agricultural Supplies	1930	11	1900	9	1930	6	1920	1	1952	10	10
Markets and Prices	1920	8	1913	10	1936	10	1935	8	1950	9	11
Agricultural Credit	1930	11	1920	12	1957	12	1941	9	1952	10	12
Increase in Agricultural Production per Annum* 1952-1962	5.3%		1.7%[a]		4.0%		5.0%		4.0%		

* Parker & Hendrix: Foundations for Agrarian Development, Table 2, p. 28.
a. Production has been limited because of a lack of markets.

national leaders gave to this activity as a means of increasing agricultural production.

The involvement of farmers in their own development and a rising level of general education seem to be second in order of adoption by these countries, while the inputs that improve the technology a farmer uses ranked third. Transportation and communications, investment in agriculture, extension programs, and the supply of agricultural inputs shared the fourth priority, while programs to support prices, to regulate markets, and to supply institutional credit were generally adopted last or near the last.

Many development specialists have pointed out that perhaps a poor country could study the past performance of a developed country and benefit by following the same path to increased production. Others, such as Gershenkron and Kuznets, have pointed out that there is no reason why the developing countries should follow the same pattern. Actually, they say, the mere fact that the new countries are starting development late means that they can avoid mistakes made by the developed countries and they may be able to telescope some of the activities in time, accomplishing in five or ten years what it took the United States, Japan, or Mexico twenty-five to fifty years to achieve. By the same token, the new countries may be able to skip altogether some kinds of activity that are too costly, too time consuming, give too low a return for the inputs committed, or those kinds for which good substitutes have been

found. For example, a great deal of basic research that has been conducted in the developed countries does not need to be repeated in each of the new nations. They can take advantage of the work that has been done in other countries.

However, the patterns of development of these five countries are historically important in that they have been successful and they present an opportunity for farm leaders to study different techniques so that they can adapt and adopt those that seem to best fit their own circumstances. The actual sequence of some of the activities may or may not be particularly important and, in any event, a country development sequence will be influenced by its own political, social, and economic circumstances.

In this paper, we have, after determining the sequence of development activities in the agriculturally developed countries, made an attempt to evaluate the contribution of each activity category to agricultural progress. The evaluations for each country have been presented previously and are summarized in table 12, below.

These evaluations of the contribution to development of the various factors are based on personal observations, the observations of others, who also have worked in the various countries, articles, books, reports, surveys, official documents and other available sources. They represent the author's best judgement as to the importance of each category to the success of the agricultural development effort of each country.

Table 12. Relative Contribution to the Development of Agriculture by Each Category of Development Program in the Five Countries and the Establishment of Weights for Each.

No.	Category	Japan	U.S.	Taiwan	Mexico	Greece	Total	Weight
1.	Land and Tenure Reform	10	10	10	10	10	50	5
2.	Farmer Involvement	10	8	10	8	6	42	5
3.	Agricultural Research	10	8	8	4	8	38	4
4.	Technological Improvement	10	10	6	6	6	38	4
5.	Farmer Training	8	8	8	6	6	36	4
6.	General Education	6	10	2	6	8	32	3
7.	Transportation-Communications	6	8	6	8	4	32	3
8.	Agricultural Education	8	6	6	6	4	30	3
9.	Agricultural Investment	6	4	4	10	6	30	3
10.	Agricultural Supplies	4	4	6	4	4	24	2
11.	Markets and Prices	4	4	4	6	4	22	2
12.	Agricultural Credit	2	2	2	8	2	16	1
	Total	84	82	72	84	68		
	Average - Five Countries						78	

On the basis of this evaluation, the categories that apparently had the greatest effect in all of the studied countries were given a weight of five, the second most important group were given a weight of four and so on, with the least important receiving a weight of one. These weights were then multiplied by the contribution of the category to agricultural improvement for each country to derive a development score. For example, referring to Table 12, item number three, "Agricultural Research" received an evaluation of ten for Japan, eight for the United States, eight for Taiwan, four for Mexico, and eight for Greece, thus making a total of thirty-eight for the five countries. This category was then given a weight of four which, in turn, was multiplied by the "contribution to development" number of each country to secure a development score for the category. (Table 13) This process was repeated for each activity for all five countries.

The scores were then totaled on a country basis and compared with actual production performance (Table 13). Japan achieved an annual compound rate of increase in agricultural production of 5.3 percent and received a development score of 308. The United States achieved a 1.7 percent rate of increase, in spite of having had over fifty million acres taken out of production since 1930, and received a score of 296. Taiwan increased production four percent per year and received a score of 264. Mexico's score was 276 with a 5.0 percent rate of increase, and Greece's rate of increase came to 4.0

Table 13. Development Score for the Period 1952-62 for the Five Countries.

No.	Category	Japan	U.S.	Taiwan	Mexico	Greece	Ave.	Weight
1.	Land and Tenure Reform	50	50	50	50	50	50.0	5
2.	Farmer Involvement	50	40	50	40	30	42.0	5
3.	Agricultural Research	40	32	32	16	32	30.4	4
4.	Technological Improvement	40	40	24	24	24	30.4	4
5.	Farmer Training	32	32	32	24	24	28.8	4
6.	General Education	18	30	6	18	24	19.2	3
7.	Transportation-Communications	18	24	18	24	12	19.2	3
8.	Agricultural Education	24	18	18	18	12	18.0	3
9.	Agricultural Investment	18	12	12	30	18	18.0	3
10.	Agricultural Supplies	8	8	12	12	8	9.6	2
11.	Markets and Prices	8	8	8	12	8	8.8	2
12.	Agricultural Credit	2	2	2	8	2	3.2	1
	Total	308	296	264	276	244		
	Average Score						277.6	
*	Annual Increase in Agricultural Production	5.3%	1.7%[a]	4.0%	5.0%	4.0%		

* Parker and Hendrix: Foundations for Agrarian Development, Table 2, p. 28.

a. Production has been limited and/or controlled because of a lack of markets.

percent compared with a development score of 244. The average development score for the five countries is 277.6.

It is interesting to note the differences in relative rank of the various categories determined by the two methods of arrangement. As compared to the sequential arrangement (table 11), the "Contribution to Agricultural Development" arrangement (table 13) moved Agricultural Research up one position, Technological Improvement two positions, and Farmer Training as much as four positions in the table, while General Education, Agricultural Education and Agricultural Investment moved down, indicating that a lesser degree of importance is attached to these factors in the latter arrangement.

It is also interesting to note that the two highest ranking categories (those receiving a weight of five) are the two involving the farmer and his relationship to the land. The next group of factors (those with a weight of four) relate to the improvement of the farmer and the techniques he uses to farm his land. The third group (those receiving a "three" weight) are generally long range activities to improve the farmer, his land and his farming conditions. The fourth and fifth groups include items relating to marketing, supply, and credit which are generally more important to a fairly well developed economy than they are to a subsistence type of agriculture.

The pattern of development which seems to emerge from this study may have several ramifications for the consideration of developing countries. First, it indicates that there are

some activities that should have a high priority in a country development program for agriculture. The suggestions which follow should be considered in light of the political, social, and economic conditions of a country contemplating an agricultural development program, and adjustments made accordingly.

In general, this survey shows that a program is probably necessary which will insure that the farmers have rights to the land, either by ownership or by some other arrangement whereby the farmers' tenure on the land is secure at a fair rental rate.

Next in importance seems to be the involvement of the farmer in his own development. He should be encouraged and trained, and then made responsible for planning, executing, and maintaining projects and demonstrations for his own benefit. At the same time, research and technological improvement seem to have a place in helping the farmer improve the techniques and inputs he uses in production so as to increase the output from the agricultural sector.

As agricultural conditions improve, and the farmer begins to move out of the traditional subsistence form of agriculture, the technology needed to further increase production becomes more complex and general education standards need to be raised. Transportation and communications systems need to be improved to facilitate the movement of agricultural inputs and surpluses and to help in the farmer information program.

Agricultural education should be provided to train farm

leaders, trainers, researchers, teachers, administrators, technicians, and, eventually, farmers, to keep the development program moving. By the time the country has started to progress, additional investment is required to improve the land, to supply water, fertilizers, drainage, machinery, equipment, to build factories to supply the necessary inputs, processing plants, warehouses, cold storage plants, and other installations necessary to fill the farmers' requirements and to insure orderly and efficient marketing.

As the use of inputs besides land and labor increases, and as farmers enter the commercial, monetized sector of the economy, credit, at reasonable rates and well administered, will be essential to their support. This, in turn, requires, a greatly expanded administrative structure, security of tenure, and farmer involvement if it is to be successful.

This brief summary demonstrates that none of the development activities outlined can be successful by themselves. Each activity has a high degree of complementarity with the other activities so that, except in the very early stages of development, when agriculture is just emerging from its traditional rut, it is likely that all activities will have to be supported at increasingly higher costs in men, money, and material as production levels creep higher and higher. This has been the experience of the five countries.

Now let us compare the concepts presented here with the agricultural development efforts of a new nation, Pakistan.

Do these ideas shed any light on the reasons for the successes and failures Pakistan has experienced? On the basis of this study, can constructive conclusions be drawn as to the kind of program needed to strengthen Pakistan's agricultural sector? To speed her on the path to prosperity?

CHAPTER X

THE AGRICULTURAL DEVELOPMENT OF PAKISTAN

Pakistan's agriculture is apparently fairly typical of the underdeveloped world. The farmers are, for the most part, tradition directed and poverty stricken; they have very small farms; their standards of education are generally low and there is a very high rate of illiteracy.

Data of the Food and Agriculture Organization of the United Nations indicates that, between 1952-53 and 1962-63, the production index of total agricultural production in Pakistan increased from 100 to 111 (1952-53 to 1956-57 = 100). At the same time population increased from less than 76 million in 1951 to about 100 million in 1961, and per caput agricultural production fell from 105 to 94. During the same period, per caput food production fell from 102 to 94.[1] The population of Pakistan (100 million in 1961) is about 86 percent rural and increasing at a rate of about 2.6 percent per annum.

Pakistan achieved its independence, after years of agitation, in 1947 and nationhood was followed by about a year of turmoil and mass migrations to and from India.

The period 1947 to 1958 was marked by frequent changes

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[1] FAO, The State of Food and Agriculture, 1964. Annex Tables 1A and 1B, 2A and 2B, pp. 195-202.

U.S. Agency For International Development, Long Range Assistance Strategy, (Supporting Documentation, Karachi), p. SD/11/2.

in government and constantly changing government policies. Due to the lack of progress, a planning organization was set up and the first five-year plan (1955-56 to 1960-61) was drafted but was not accepted until 1958. Very few of its provisions were implemented before 1959.

In 1958, a revolution, led by the Chief of the Armed Services (now President-Field Marshal) Mohamed Ayub Khan, was successful, and has been followed by seven years of stable government and increasing democratization of the country through the "Basic Democracies."

Pakistan's industrial development has been relatively greater since 1947 than has the development of the agricultural sector. However, most consumer items except cloth are scarce in the market and/or very high priced. Practically all agricultural production inputs, except nitrogen fertilizer, are wholly or at least partially imported, because of the scarcity of agriculture supporting industries in the country.

At independence, Pakistan had an excellent administrative set up for "ruling, revenue collecting, and regulating" but it was not well adapted for development. The top administrators were capable and well trained but the junior officials were untried, inexperienced, and reluctant to assume responsibility. Over the intervening years, a corps of young men has risen in government ranks who now seem to be taking more responsibility for development (and with considerable success in some sectors).

Because of the differences in climate, terrain, agriculture

and institutions of the two provinces, it will be more informative to consider them separately in terms of the development factors listed earlier.

East Pakistan

East Pakistan is a low-lying, deltaic region subject to the monsoons which bring from 80 to over 200 inches of rain per year. About half of the province is subject to flooding and the principle crops are rice and jute. It covers about 54,000 square miles of which about 23,000,000 acres are cultivable. About half of the land is double cropped and the yields of all crops are low, less than a fourth of those of some of the developed countries. There are over six million farm families in the province with the average farm being about 3.5 acres in size and consisting of 6.6 fragments.

Land Reform and Land Tenure Reform

The institution of zamindari was broken up in 1950 and the land was sold or otherwise assigned to the farmers working it. The government holds title to all land but the farmers' rights amount to ownership in the ordinary sense. Rents (taxes) are paid to the government but the existing low rate was set in 1935 and has not been changed since that time. About 61 percent of the farms are owner operated, 37 percent are owner-cum-tenant operated and only 2 percent tenant operated.[2]

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[2]Agricultural Census Organization, Ministry of Agriculture Government of Pakistan, 1960 Census of Agriculture, Vol. III All Pakistan (Report 1, Karachi, 1964), Table 2, p. 32.

Under the land reform law, the maximum size of holding was 33 acres until 1958 when the maximum was raised to about 110 acres. Holdings under three acres cannot be further subdivided.[3]

A cadastral survey has not been completed but work was begun on a "certification of holdings" program in 1951 which was reportedly about 30 percent completed in 1962.

Farmer Involvement in Agricultural Development

While some cooperatives have been set up in the province since the early 1900's, they have not been effective and, during the period 1947-1954, most of them collapsed from lack of farmer interest and because of unpaid debts. The farmers were left to their own devices until the early 1960's when the Comilla Project began to use farmer members of cooperatives as agents of change in the rural community and when the officers of the Agriculture Department in the Mymensingh area developed a joint committee approach to solving farmer problems and inducing the adoption of new techniques in 1962.

Both of these efforts have come too late to have more than a very minor effect on the total production of the province during the period under review, but they offer a great deal of hope for the future. Since 1962-63, rural leaders have been used successfully in the rural works program as directors of projects to benefit the farmers, using both paid

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[3]State Bank of Pakistan, Agricultural Credit in Pakistan, (Karachi 1962), p. 3.

and volunteer rural labor.

General Education Level

While the education level in East Pakistan is higher than in many developing countries, the percentage of literacy is higher in the 25-45 age bracket than in the lower age groups. Historically, primary education had been a function carried on by private philanthropists and industrialists prior to 1947. It was not taken over as a public function throughout the province until the late 1950's. The government has undertaken a large school building program since 1959 but the teacher supply is not sufficient to fill the classrooms.

At partition there were two colleges and one university in the province. Since then the number of colleges has been increased to eleven and an Agricultural University has been opened.

Agricultural Research

One research station and several small substations had been established before 1947, but with the coming of independence, much of the research under way was wrecked and the new research programs tended to be designed to impress foreigners rather than to solve the problems of farmers. As one officer commented, "More status and more promotions are attached to having an article published in the American 'Agronomy Journal' than in helping the farmer."[4]

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[4] A comment made to the author by a plant breeder at the Tejgaon Station in 1961, during an inspection of the research work being done at the station.

In 1959, the Pakistan Academy of Rural Development was formed at Comilla to conduct research on rural development and to teach rural administration. The results of its work are evident in the rural works program and the Thana development programs now under way.

Agricultural Education

No work had been done in a formal way to give an agricultural education to farmers or prospective farmers until 1961-62 when a program was started for training agriculture teachers for high schools. An agricultural college was attached to the University of Dacca prior to independence but because of the lack of employment opportunities, only three to ten people graduated per year until the early 1960's. In 1961-62 the facilities were expanded to accomodate an additional forty admissions per year. At the same time an Agricultural University was opened at Mymnsingh which will graduate its first class in 1966. The whole agricultural program up to 1961 was being carried on by a staff of less than 230 agricultural college graduates.[5]

Technological Improvement

The farmers of East Pakistan have been very slow to adopt new developments in agriculture. In fact, the government and other agencies have been slow to introduce new developments.

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[5]Letter from Paul Booz, Harvard Advisory Group, East Pakistan to the author stressing need for additional Agricultural Education facilities.

Fertilizer was not introduced until 1954 for any crops except tea and sugar cane and, as late as 1963, less than five pounds of chemical fertilizer per cultivated acre were being used. No new seed varieties have been introduced since the "shail" varieties were first introduced in 1945. Plant protection, on a province-wide basis, was not introduced until 1960 and in 1963, only five percent of the province was covered. The Japanese method of rice culture was introduced about 1955 and has had mixed success. The main reason being that the principle feature borrowed, planting in rows, has not been accompanied by other necessary features such as heavy fertilization, use of good seed, adequate plowing, and control of weeds.

Transportation and Communications

The transport system is based on the railroad and waterways. The railroad is fairly efficient, though overloaded, but waterway freight traffic is dependent for the most part on wind and man power. Farm to market roads were practically non-existent until 1962-63 when a few roads were built under the "Rural Public Works Program." The main method used to move agricultural commodities to market is still the head basket, at least for the first part of the journey.

Communications are inferior. There is one province-wide agricultural publication with a circulation of about 15,000 but no newspapers carry articles dealing with agricultural improvement consistently. About one hour per week of agricultural programming is broadcast by local radio stations, but

only about a third of the 65,000 villages have radios.

Agricultural Investment

Agricultural investment was practically nil in the province until 1955, when the first of a series of irrigation projects was begun. However, by 1962-63, these projects were not yet functioning properly and only about 7,000 acres were benefited. In 1960, the government started a program of low lift pump installation for small irrigation projects and by 1964, 150,000 acres were irrigated.[6]

In 1961, the first fertilizer factory (117,000 tons of urea per annum) started production and in 1962, a pump factory began assembly operations. In 1958, a project for flood control in the lower delta area was started to eventually protect 2.4 million acres of which it is estimated that about 200,000 acres had benefited in 1962.[7]

Farmer Training

An extension service was established about 1940 but was not staffed at the local level until 1959 when 2,500 untrained lower employees of the Jute Regulation staff were transferred to the agriculture department. Since then, these employees have been given about three months training in agriculture and assigned areas of work. In 1961, a program to organize the

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[6] Falcon & Gosch, An Analysis of East Pakistan Agriculture, (Harvard Advisory Group to the Planning Commission, Karachi, 1965), p. 14.

[7] U.S. AID, Agricultural Growth in Pakistan, pp. 3-8.

farmers into working and planning committees was started in one district with great success and the technique is rapidly spreading.[8] A major part of this program has been the mutual training program whereby farmers are taught by leading farmers of the village, assisted by local agricultural workers. An agricultural information service was started in 1960 and by 1963 was turning out an average of two bulletins and three posters per month.

Agricultural Supplies

As noted earlier, fertilizers were not introduced to the general agriculture of East Pakistan until 1954 and the first fertilizer factory started production in 1961. Good quality seed did not become available in quantities large enough to plant more than one percent of the area until 1961. Pumps for irrigation, spray equipment, and chemicals are not freely available on the market being under government control and virtual government monopoly. Other modern implements such as Japanese weeders, pedal threshers, and hoes are not available except in a few areas near three or four large towns. In 1961 an Agricultural Development Corporation was formed to handle agricultural supplies, irrigation pumps, and seeds, and to promote agricultural development. A program for construction of storage and sales buildings (4,000) for fertilizers and seeds in every union was completed in 1964 so that these supplies

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[8] Ben R. Ferguson, Rural Life in Mymensingh (U.S. Agency for International Development, Pakistan, Dacca, 1962).

are now available within one day's travel by bullock cart, by boat, or on foot to every farmer in the province.

Markets and Price Stabilization

A department of Agricultural Marketing was established in 1956 and by 1964 had a staff of forty field reporters and market supervisors whose job was to report supplies and prices in the forty principle markets. The government buys rice in the border areas every year and from all over the province in years of surplus, both to prevent smuggling out of the country, and to support prices. However, the purchase price for government procured rice is usually lower than the market price at the time of purchase. On the other hand, ceilings have been established at which the government releases stocks of wheat and rice during times of rising prices. Rationing is instituted in times of actual shortage and prices are closely controlled.

The marketing system in the rural areas is of the traditional type with daily or weekly sales or "fairs" held in the rural areas from whence the surpluses move to the forty main markets. Free movement of commodities is limited by a system of "octroi" taxes and regulations against movement. No effort has been made to establish grades or standards for any agricultural commodity except tea and jute, both of which enter foreign markets.

Agricultural Credit

Agricultural credit has been a matter of concern to the

government of East Pakistan since before independence but institutional rural credit has not had a successful history in the province. Credit cooperatives, the Department of Agriculture, and Agricultural banks have all made loans to the farmers but by 1960, a survey made by the Central Statistical Office, Government of Pakistan, revealed that these sources accounted for only about three percent of the loans made. In 1962, the government of East Pakistan moved deeper into the field of agricultural credit with forty million rupees to be issued in kind (seeds, fertilizers, rent on pumps, etc.).[9]

East Pakistan's situation can be summarized by saying that the farmers' land and tenure situation has improved but that the necessary inputs have been slow in coming onto the market. There is a shortage of trained people and effective institutions to serve the agrarian sector. The situation in the fields of transportation, education, markets, and prices has been such as to reduce any incentive the farmer might have had to farm better and produce more.

West Pakistan

Contrasted to East Pakistan, West Pakistan is a dry, desert type country, except in the mountains of the north, and most agriculture is dependent on irrigation. Rainfall averages ten to twenty inches per year with some of the mountainous areas

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[9]U.S. Agency for International Development, Long Range Assistance Strategy, SD/11/Dp. 27-30.

receiving 60 to 100 inches annually. The climate is severe with temperatures ranging from over 125' F. in the deserts in the summer to considerably below freezing in the north during the winter.

In the rainfed areas, farms are generally large while in the irrigated areas, they are small and fragmented, similar to East Pakistan. According to the census of agriculture, there are 5.7 million farms of all types in West Pakistan with the average farm consisting of 10.1 acres of which 7.7 acres is cultivated. Forty-nine percent of the farms are less than five acres in size (10 percent of the total farm area) and eight percent are over twenty-five acres in size (42 percent of the area).[10] Forty-one percent of the farms are owner operated, seventeen percent are owner-cum-tenant operations, and forty-two percent are tenant farms.[11]

West Pakistan has 56 million acres of arable land of which 22 million are irrigated and the balance is arid or semi-arid.[12]

The principle crops are wheat, sugar cane, and cotton, the yields of which are much lower than in the more highly developed areas of the world.

West Pakistan's industry has developed more rapidly than

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[10]Agricultural Census Organization, 1960 Census of Agriculture, p. 64.

[11]Ibid., p. 64.

[12]U.S. AID, Agricultural Development, p. SD/11/Di-2.

that of East Pakistan and its agricultural expansion efforts have been expedited by a higher state of development at the time of partition from India. West Pakistan also has a completely different social and economic structure than East Pakistan as will be shown by the following discussion.

Land Reform and Land Tenure Reform

As noted earlier, a high percentage of the farms in West Pakistan are tenant operated and, in most areas, the bulk of the land was held by large landlords who in turn let out their land to petty farmers at rents exceeding fifty percent of the value of the crops. In 1959, a regulation was passed confiscating holdings in excess of five hundred acres of irrigated or 1,000 acres of rainfed or barani land. Land holdings cannot be subdivided if less than twelve acres in the northern part of the province or sixteen acres in the southern part. Nothing has yet been done to improve the security of tenure for tenants.

Farmer Involvement in Development

Farmers in West Pakistan have been involved less in their own development than those in East Pakistan. While the number of credit cooperatives has increased from 9,000 in 1948 to 11,800 in 1959-60, the officers of the cooperatives have been government officials, who directed the operations. The rural works program was started in the province in 1963-64 but here again, the planning and most of the supervision came from official sources rather than from the farmers themselves, although the labor was supplied by local communities. Very

little responsibility has been given to the farmers for furthering their own development except in the new development areas in the Salinity Control and Reclamation Project (SCARP's) areas started in 1963.

General Education Level

The rate of literacy is slightly lower in West Pakistan than in East Pakistan although the province is catching up with the East wing very rapidly. Schools have been publicly supported since before independence and there is a larger supply of trained teachers available to fill the new school houses. At the college level, general colleges are located in all of the principle towns with Universities in each of the principle cities.

Agricultural Research

Excellent research facilities at Lyallpur, Lahore, and Peshawar were started in the early 1900's and were well staffed at partition. At that time, many projects were destroyed, but by 1954 all research institutions were staffed and in operation again. The staffs have increased in size during the years and the amount of work done has increased; but because of inadequate supervision and management, not much was accomplished until after 1955. The Food and Agriculture Council, Pakistan, was formed in 1953 to coordinate, supervise, and finance the more important aspects of agricultural research. In 1952, the Social Science Research Center at Lahore was opened to conduct research into village life and a center similar to the one at

Comilla was opened at Peshawar in 1959. The new agricultural universities are conducting a limited amount of research, but most of the research conducted in the province suffers from inadequate reporting of results to the farmers and subsequent lack of farmer support.

Agricultural Education

The remarks about farmer education in East Pakistan will generally hold true for West Pakistan. However, five schools were set up to train Village Agricultural and Industrial Development Workers (V.AID) which have been taken over for training extension workers and a few farm boys.

Three Agricultural Universities have been set up in the province which have absorbed the Agricultural College at Lyallpur (established about 1900) and the agricultural section of Islamia College at Peshawar (established in 1940). Two of these institutions came into being in 1953 and the third in 1959. Each had graduated two or more classes by 1964 and seemed to be progressing satisfactorily.

Technological Improvement

The spread of technological innovations has been spotty throughout the province. In some areas, farming is carried on much as it was a thousand years ago while in other areas, it has modernized to the place that tractors and equipment are used quite widely by the larger farmers and the government has no difficulty in renting its equipment for land leveling and plowing.

However, there is a great deal of difficulty in introducing new practices and techniques to farmers. Fertilizer has been slow to catch on until a sudden spurt in use occurred in 1964. New irrigation projects are eagerly accepted by the farmers but production practices have not been changed with the addition of the new water supply so that often very little more is produced on newly irrigated lands than was produced before in good years. However, the variability of yields has been reduced.

The author was involved in a hybrid corn production project in the province for over six years and found that the farmers were willing to adopt the new seed but that they did not receive the full benefit of the innovation because of their reluctance to properly space plants, use fertilizer, remove weeds, or to water properly.[13]

New crops such as Virginia tobacco and sugar beets have been introduced during the last few years with excellent success. The same is true of some other innovations which have been tried. A hand corn sheller succeeded, but a steel plow that reduced the labor required in preparing land did not. Power threshing machines for wheat have not been accepted, but power winnowing machines and fodder choppers have been. These examples could be supplemented by other comparisons tending

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[13]See also Russell Olson, Economics of Hybrid Maize Production in Punjab, (U.S. Technical Cooperation Mission to India, 1958).

to show that the introduction of new technology has met with mixed success.

Transportation and Communications

The transport system was fairly good in West Pakistan on independence with a good railroad and road system in most of the province except in parts of the desert and in the mountains. The government has improved the trunk roads, local authorities have built a network of village to town market roads and during the last two years, additional local roads have been built under the rural works program. However, most farm products still move to the local markets cross country on bullock carts or in head baskets. Radio stations have been set up so that radio programs can be heard in all parts of the province and in 1962, about four hours of agricultural programming was carried per week.

Agricultural Investment

Large agricultural investments in irrigation schemes were made in West Pakistan long before independence, and several irrigation barrages and one major dam added about 800,000 acres to an already extensive system between 1950 and 1965. Tube wells for drainage were installed by the government beginning in 1955. These have since become useful for augmenting the water supply for irrigation. As a consequence of the success of this demonstration, thousands of wells have been installed by farmers in the private sector (32,000 are expected to be installed by midsummer, 1965).[14]

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[14] U.S. AID, Agricultural Growth, p. 23.

Three fertilizer factories have been built, the first coming into production in 1956, and several private factories are turning out agricultural equipment, particularly pumps and well equipment.

Farmer Training

An agricultural extension service was set up about 1940 with agricultural graduates at the district level. In 1954, graduates were stationed at the Tehsil (county) level and two matriculates with a year of agricultural training were placed in each tehsil to work with farmers in 1956. Until 1962, these men were salesmen of agricultural supplies and equipment as well as being extension men.

The extension service, until 1958, was not oriented to going out to work with farmers on their own land but to serve those who came into their offices. In 1958, the emphasis was placed on service and training and increased effort was put into preparing literature and training materials.

Agricultural Supplies

Fertilizer and a limited amount of seed has been available at subsidized prices from the agriculture department since about 1948. Plant protection service has also been provided free of charge, except to sugar cane producers, and a subsidized mechanical cultivation service has been operational since 1954. Other agricultural supplies are generally available in tehsil headquarters' towns and mechanical equipment is available in the major cities. In 1961, an agricultural

development corporation was formed to handle supplies and agrarian development. The corporation is concentrating on colonization of the new canal-fed areas and has turned the supply functions over to the private sector and to cooperatives with excellent results to date.

Markets and Price Stabilization

The comments regarding marketing and price stabilization made concerning East Pakistan apply to West Pakistan except that a larger staff is employed in the West. At one time, grades and standards were established for fruit in the province, but they were abandoned about 1945 under pressure of competing fruit from parts of what are now India. Other than this one experience, no effort has been made to establish grades and standards in the province.

Agricultural Credit

The agricultural credit experience of West Pakistan is very similar to that of East Pakistan except that the cooperatives have been slightly more successful in their credit operations. The number of societies has grown from 9,000 in 1948 to over 11,800 in 1959-60 and the membership rose from 246,000 to 434 thousand in the same period.

However, the proportion of agricultural credit from institutional sources in 1960 was less than two percent of the total credit used by farmers.

To summarize, in West Pakistan, land reform has not been as effective as in East Pakistan but, at the same time, many

of the other factors listed as being important to agrarian development have been much more favorable and agricultural development started from a more advanced position than in the eastern wing.

CHAPTER XI

ANALYSIS OF THE AGRICULTURAL DEVELOPMENT OF PAKISTAN

Reports indicate that Pakistan's progress in the agricultural sector was slow during the first ten to twelve years of independence but that the last five or six years have seen some improvement. As noted in the preceding section of this paper, many activities have been undertaken by the government and the people to increase production. Let us now examine these programs in relation to the results achieved to see if there is any correlation between them that can be explained by the concepts presented herein.

First let us look at Pakistan from the standpoint of the four historical factors listed earlier.

1) Pakistan has undergone a severe political and social upheaval. At the time of partition from India and independence, millions of people migrated into and out of the country. Institutions changed, the administration changed, Pakistan became a nation and the people became the masters of the country instead of the servants of a foreign power.

2) While the government as a whole was relatively stable during the first eleven years of independence, the administration of the agricultural sector was not. Ministers of Agriculture were changed frequently, and with each change of ministers, agricultural policy changed. It was not until late in 1958 or

early 1959 that a definite policy was established for agriculture which has been followed to the present with only minor modifications.

3) During the last seventeen years, seldom has there been an adequate supply of any consumer item, except textiles, on the market for farmer consumption at prices they could afford to pay. Even bicycles, the favorite method of rural transportation in most areas, have been high priced since either their component parts have been imported, or if manufactured locally, the quality has been regarded as being poor and the prices have been as high or higher than the imported items. Consequently, the farmers have not been encouraged either to produce more or to save in order to buy new things to use.

4) While there were many able administrators in responsible positions, there were not enough of them to fill all of the important positions in the government. It took twelve to fifteen years to train a capable officer cadre to take care of the main development jobs so that it was not until 1959-60 that these younger administrators were prepared to fill many of the senior positions.

Now, let us look at the development scores of Pakistan to see how the programs carried on have contributed to agricultural development. Table 14 lists the dates by which effective action had been taken in the various categories in each province, the relative contribution to agricultural development of each category and the development scores for each

Table 14. Pakistan Program Evaluation for the Period 1952-1962; Date of Adoption, Relative Contribution, and Score for Projects Carried On.

No.	Category*	East Pakistan Date	East Pakistan Contribution	East Pakistan Score	West Pakistan Date	West Pakistan Contribution	West Pakistan Score	Pakistan Average Score
1.	Land and Tenure Reform	1950	8	40	1960	0	0	20
2.	Farmer Involvement	1961	0	0	1962	0	0	0
3.	Agricultural Research	1920	6	24	1950	6	24	24
4.	Technological Improvement	1955	6	24	1950	5	20	22
5.	Farmer Training	1959	1	4	1954	3	12	8
6.	General Education	1940	5	15	1948	4	12	13
7.	Transportation-Communications	1943	3	9	1940	8	24	17
8.	Agricultural Education	1954	3	9	1952	5	15	12
9.	Agricultural Investment	1957	3	9	1920	8	24	17
10.	Agricultural Supplies	1958	2	4	1954	4	8	6
11.	Markets and Prices	1956	4	8	1955	4	8	8
12.	Agricultural Credit	1952	4	4	1945	5	5	4
	Total Score			150			152	151

* For items included in each category, see Appendix I.

province and for the country as a whole. It will be noted that essentially nothing was done in some development areas until very late; 1960 or after. No score has been given in these categories since it was thought that a constructive contribution to development would be impossible in the short time remaining until mid-1962. East Pakistan's development score is 150 for the period 1952-1962, and West Pakistan's is 152, making a simple average for the country of 151, compared to an average of 277.6 for the five countries.

The 1952-62 period was then broken down into periods, 1952-1956 and 1957-1962 and development scores were prepared for each period. Referring to Table 15, it will be noted that between 1952 and 1956, many activities that were important to the development of the five countries were either not carried on at all or were conducted ineffectively in Pakistan so that the development score was very low. In East Pakistan, the score was 68 for the period, 112 for West Pakistan, and 90 for the country as a whole.

However, improvements were being made so that for the period 1957-1962, East Pakistan's score more than doubled to 163, West Pakistan's score went up to 172 and the all Pakistan score reached 167, an increase of 55 points (Table 16) during the intervening five years from 1952.

Then, as a matter of interest, a score was determined as of 1962 to be used to make a prediction of agricultural performance for the years 1962-1963 to 1966-1967 (Table 17). For this

Table 15. An Evaluation of the Effectiveness of the Various Program Categories in Contributing to Pakistan's Agricultural Development, 1952-1956.

No.	Category*	East Pakistan Contribution	East Pakistan Score	West Pakistan Contribution	West Pakistan Score	Pakistan Score
1.	Land and Tenure Reform	3	15	0	0	8
2.	Farmer Involvement	0	0	0	0	0
3.	Agricultural Research	3	12	5	20	16
4.	Technological Improvement	3	12	3	12	12
5.	Farmer Training	0	0	1	4	2
6.	General Education	4	12	3	9	10
7.	Transportation-Communications	3	9	6	18	13
8.	Agricultural Education	2	6	4	12	9
9.	Agricultural Investment	0	0	7	21	11
10.	Agricultural Supplies	0	0	2	4	2
11.	Markets and Prices	0	0	4	8	4
12.	Agricultural Credit	2	2	4	4	3
	Total Score		68		112	90

* For items included in each category see Appendix I.

Table 16. An Evaluation of the Contribution of Pakistan's Development Programs to its Agricultural Improvement and its Agricultural Development Scores, 1957-1962.

No.	Category*	East Pakistan Contribution	East Pakistan Score	West Pakistan Contribution	West Pakistan Score	Pakistan Score
1.	Land and Tenure Reform	8	40	0	0	20
2.	Farmer Involvement	1	5	0	0	2
3.	Agricultural Research	7	28	7	28	28
4.	Technological Improvement	6	24	6	24	24
5.	Farmer Training	1	4	4	16	10
6.	General Education	5	15	5	15	15
7.	Transportation-Communications	4	12	8	24	18
8.	Agricultural Education	3	9	6	18	14
9.	Agricultural Investment	3	9	8	24	16
10.	Agricultural Supplies	2	4	5	10	7
11.	Markets and Prices	4	8	4	8	8
12.	Agricultural Credit	5	5	5	5	5
	Total Score		163		172	167

* For items included in each category see Appendix I.

Table 17. An Estimate of Pakistan's Potential Agricultural Improvement based on the Apparent Effectiveness of the Programs Underway in 1962 for the Period 1962-1967.

No.	Category*	East Pakistan Contribution	East Pakistan Score	West Pakistan Contribution	West Pakistan Score	Pakistan Score
1.	Land and Tenure Reform	9	45	6	30	38
2.	Farmer Involvement	5	25	3	15	20
3.	Agricultural Research	7	28	8	32	30
4.	Technological Improvement	6	24	7	28	26
5.	Farmer Training	4	16	5	20	18
6.	General Education	6	18	5	15	18
7.	Transportation-Communications	7	21	8	24	22
8.	Agricultural Education	5	15	7	21	18
9.	Agricultural Investment	6	18	9	27	23
10.	Agricultural Supplies	5	10	8	16	13
11.	Markets and Prices	5	10	4	8	9
12.	Agricultural Credit	6	6	5	5	5
	Total Score		236		244	240

* For items included in each category see Appendix I.

period, East Pakistan has a development score of 236, West Pakistan 244, and the country as a whole has a score of 240.

If our proposed scoring system has any validity, we should be able to make predictions as to the performance of Pakistan during the years under review using the development score. On the basis of a score of 151 for the 1952-1962 period versus 277.6 for the developed countries, we should be able to conclude that Pakistan did not increase agricultural production as much as did the five countries. In fact, we would anticipate that its production increase would be considerably lower than that of the five countries. Second, we would conclude that Pakistan increased production less per annum in the 1952-1956 period than in the 1957-1962 period. Third, we should be able to pinpoint areas where improvement is needed to increase production to a satisfactory level. And fourth, we should be able to predict that production would increase in Pakistan at a rate more nearly approaching that of the five countries in the years 1962-1967 if corrective actions started before 1962 are continued and strengthened. In fact, if Pakistan can raise its score to a level of 280 or better, production should increase at a rate high enough to adequately feed the population, taking into account increased food needs to compensate for present low dietary levels, an expanding population, and a rising per capita income.

To check the validity of the first two conclusions let us study the production records. Parker and Hendrix give the following figures as the annual compound rates of change in total agricultural production during the years from 1952 to 1962

for the five countries: Japan, 5.3 percent; United States, 1.7 percent; Taiwan, 4.0 percent; Greece 4.0 percent; and Mexico, 5.0 percent.[1]

Pakistan's production as recorded by the FAO is shown in Table 18 below.

Table 18. Pakistan's Agriculture Production Index, 1952-56 to 1961-62[2] (1952-53 to 1956-57 = 100).

1952-53	-	100	1957-58	-	102
1953-54	-	98	1958-59	-	102
1954-55	-	102	1959-60	-	108
1955-56	-	97	1960-61	-	111
1956-57	-	103	1961-62	-	114

Thus it can be seen that while the five countries increased production at from four to five percent or more per year (except the United States which was attempting to limit production during most of the period), Pakistan increased production only fourteen percent in ten years or, just slightly over one percent per year. Thus the first conclusion drawn, that Pakistan did not increase production as fast as the five countries between 1952 and 1962 is borne out.

The data of table 18 shows that the second conclusion, that

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[1]Parker and Hendrix, Foundations for Agrarian Development, p. 28.

[2]FAO, The State of Food and Agriculture, 1964, Annex Table 1A, pp. 195-196.

production increased more in the last half of the 1952-62 period than during the first half, is also verified. Production remained almost constant during the years 1952-53 to 1956-57, varying only two or three points on either side of the index of 100 during the five years. However, production increased during the last half of the 1952 to 1962 period (1957-58 to 1961-62) to an index of 114 in 1961-62.

In support of the third conclusion mentioned above, that we should be able to pinpoint areas needing improvement in Pakistan's development program and make suggestions for improvement, turn to table 19 below. This table presents the average development scores of the five countries in comparison with the development scores of Pakistan for the 1952-1962 period and for the period 1962-1967.

This comparison indicates that Pakistan was especially weak, in comparison with the other countries, in the following categories for the 1952-1967 period:

Category	Difference*
1. Land and Tenure Reform	30
2. Farmer Involvement	42
3. Agricultural Research	6.4
4. Technological Improvement	8.4
5. Farmer Training	20.8
6. General Education	6.2
7. Agricultural Education	6.0

* Five Country Score - Pakistan score = Difference (number of points Pakistan is below Five Country Average) in the category.

On the basis of this study, it is the opinion of the author that Pakistan might have improved the agricultural situation materially in the 1952-62 period by concentrating action on programs designed to improve the tenure situation of the farmers, by getting the farmers involved in the development process, and by improving the extension service. Smaller short term gains could have been made by improving research, the general and agricultural education levels, and by introducing more technological improvements.

Still smaller short term gains in agricultural production are indicated as the reward for development activities in other categories during the period.

However, it must be remembered that agricultural development is not necessarily a short term process and that the research, education, and investments of today are the technological improvements, extension programs, and irrigation systems or factories manufacturing agricultural inputs for tomorrow. Therefore, while planning an agricultural development program for the immediate future, plans must be made, and programs started, for development of agriculture in the more distant future, for the long run. Let us now look at what Pakistan has done in planning and preparing for further development.

Referring again to table 19, it will be noted that Pakistan's development score in 1962 for the five years ahead is 240, about the same as that of Greece for the 1952-1962 period. Therefore we would expect that Pakistan during the next few years should

Table 19. A Comparison of the Development Scores for Pakistan for 1952-1962 and 1962-1967 Periods with the Five Countries, 1952-1962.

No.	Category	Maximum Possible Score	Average Score Five Countries 1952-1962	Pakistan's Score 1952-62	Pakistan's Score 1962-67
1.	Land and Tenure Reform	50	50	20	38
2.	Farmer Involvement	50	42	0	20
3.	Agricultural Research	40	30.4	24	30
4.	Technological Improvement	40	30.4	22	26
5.	Farmer Training	40	28.8	8	18
6.	General Education	30	19.2	13	18
7.	Transportation-Communications	30	19.2	17	22
8.	Agricultural Education	30	18.0	12	18
9.	Agricultural Investment	30	18.0	17	23
10.	Agricultural Supplies	20	9.6	6	13
11.	Markets and Prices	20	8.8	8	9
12.	Agricultural Credit	10	3.2	4	5
	Total	390	277.6	151	240

be able to increase production at a higher rate than before and very possibly could reach a rate closely approaching or surpassing that achieved by Greece during the 1952-1962 period.

Fortunately, data is available for the first part of the prediction period and some indications are becoming apparent as to the course of Pakistan's agricultural development. During the last few years, there have been definite signs of improvement in Pakistan's agriculture.

Falcon and Gosch, in papers prepared for the Economic Affairs Division, Planning Department, Government of Pakistan, state that East Pakistan increased agricultural production at a rate of about 3.5 percent per annum, while West Pakistan increased its total production over four percent per annum during the second plan period (1960-61 to 1964-65).[3,4]

Of the 3.4 percent increase in rice production achieved in East Pakistan during the second plan period (1960-61 to 1964-65), about one fourth was the result of increased acreage through irrigation, farming of marginal land, and new land developed by the coastal embankments. The balance came from increased inputs such as fertilizer, better seed, and better cultural practices. (This last item involves a better use of

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[3]Walter Falcon and Carl Gosch, An Analysis of East Pakistan Agriculture During the Second and Third Plan Periods (Draft), (Harvard Advisory Group to the Planning Commission, Karachi, 1965), p. 1.

[4]U.S. AID, Agricultural Growth in Pakistan, (Karachi, 1965), p. 1.

labor and accounts for about one of the 3.4 percent increase).[5]

It is estimated that about half of the incremental increase in crop output in West Pakistan during the second plan period has been due to the increased supply of water for irrigation. The balance of the increase has come from other inputs, mainly fertilizer.[6]

As time goes on and the effectiveness of its development program improves, the author believes that Pakistan should be able to raise its level of agricultural production economically and efficiently, particularly, if it puts special effort into strengthening those factors shown by their development score to be weak.

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[5] FAlcon and Gosch, East Pakistan Agriculture, p. 16

[6] U.S. AID, Agricultural Growth, p. 24

CHAPTER XII

IMPLICATIONS FOR DEVELOPING COUNTRIES

It is believed that the agricultural development of the five countries, Japan, United States, Mexico, Taiwan, and Greece, has some relevance for underdeveloped countries wishing to increase their supply of food and fiber and to generally increase agricultural production as a part of the development process.

Each of the five countries accomplished its early agrarian development without capital intensive projects but they did have increased investment in agricultural labor and working capital. The programs followed were labor intensive until late in the development process so that the farm population was not forced to migrate to the cities to earn a livelihood until the industrial sector had grown enough to absorb much of the surplus. In addition, the increased rate of production, being higher than the rate of population increase, provided a more adequate (although not necessarily a better) diet and reduced the necessity for foreign exchange expenditures for food. In each of the countries, agriculture served as a major source of capital for other sectors until the late years of development, when agriculture itself became a less important sector than industry in the economy. As a result, agrarian development has been achieved at low capital cost and the results have been generally favorable to the economy.

If the experience of Japan, the United States, Taiwan, Mexico, and Greece are to serve as a guide to the further development of the agriculture of Pakistan and other underdeveloped countries, and if these countries are really desirous of making progress and are willing to make the necessary sacrifices, then the proposed road is clearly marked, needing only an interpretation of the signs in the light of conditions existing in the country and the ability to move forward.

The experience of the five countries indicates that land and tenure reform should be considered very seriously as one of the potentially most fruitful ways of stimulating agricultural production. A recent United Nations report states that "...a direct relationship exists between land reform and agricultural productivity and output, mainly because land reform results in a greater incentive to operators and in more efficient farm organization."[1]

Elsewhere, the same report states, "When linked with an agricultural revolution in the technical sense, and with supporting governmental policies as regards agricultural prices, public investment and tax incentives, needed land reforms can yield impressive agricultural development."[2]

Pakistan's score in this category is still low (table 19) in this report, 38 compared to 50 for the developed countries.

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[1]United Nations, Food and Agriculture Organization Progress in Land Reform Third Report, New York, 1962, p.2.

[2]Ibid., p vi.

This indicates that Pakistan can strengthen its program materially by improving the conditions of tenure, especially in West Pakistan. The experience of Taiwan and Japan could be very helpful in this respect. The first steps in land reform have been taken, now it is necessary to make conditions such that the farmer will be willing to invest the necessary labor and capital in the land he tills to make it produce more. Experience has shown that the farmer will invest more in his land if his tenure is secure and if he is sure that he will be able to reap the benefit of his investment. This is not true for the tenant farmer of West Pakistan today and the author believes that this situation needs to be remedied to promote development.

The second important issue is to encourage the farmer to become involved in his own development. He should take part in the planning, financing and execution of projects affecting him. It has often been noted that very little rice or wheat is grown by a minister of agriculture or the Governor of a province; rice and wheat are grown by the farmers and until the farmers are involved in their own development through committees, cooperatives, clubs, or associations, they will not take much interest in development.

The new farmer involvement programs in East Pakistan, developed at Comilla and Mymensingh, should be spread over the country as rapidly as possible. The Mymensingh program is primarily one to improve farm technology and depends on committes of farmers to plan and execute demonstrations, small

irrigation, drainage, seed production, food processing, and other projects of benefit to the farmers. The Comilla program attempts to build a system of cooperatives and other local institutions to reorganize and modernize the rural village. The Mymensingh project can be spread rapidly throughout the country with the present staff of the provincial agriculture departments coordinating and assisting the local and district committees. The Comilla approach will necessarily take longer because of the need for training a large number of cooperative organizers, leaders and credit officials to make the program successful.

The next four issues are closely allied to the first two. The improvement of the farmer and his methods of farming by (1) providing him with better information through research, (2) improving the technology he uses by introducing new, suitable materials and methods from all over the world, (3) training him through extension and information programs, and (4) raising his general education level. These all combine into what Schultz calls investment in human capital. He emphasizes that education, acquisition of knowledge, acquiring new skills, and the preparation to use this new knowledge and skill are important to the development and growth of a country. He went so far as to say in his presidential address before the American Economic Association, "Truly, the most distinctive feature of our economic system has been the growth in human capital. Without it there would have been only hard, manual work and

poverty except for those who had income from property."[3] The experience of the five countries shows that this is especially true in agriculture.

The underdeveloped countries, including Pakistan, should concentrate their research efforts during the early stages of development on the problems of the farmer and in testing and developing techniques that can be used in a traditional agriculture without requiring investment in extensive equipment. The development of simple methods of applying fertilizers to growing crops, controlling weeds in rain fed rice, controlling insects in deep water paddy, better methods of irrigation for increased production, and improved water logging and salinity control, better crop varieties, and thousands of such problems in agronomy, soil science, animal husbandry and agricultural engineering, face the scientists of Pakistan. Until these problems are solved the agricultural technology and production of the country will be hampered. Research is closely tied to technological improvement which in turn depends on educated farmers and a means of getting information to them.

Pakistan can well afford to try many ideas and materials from other parts of the world which have been successful in increasing agricultural production. Among the ideas that might pay off handsomely are such things as using waste molasses as

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[3] T.W. Schultz, "Investment in Human Capital" reprinted in the American Economic Review (March, 1961) and in Morgan, Betz, and Choudhury, (editors), Readings in Economic Development, (Wadsworth Publishing Co., Belmont, California, 1963), p. 199.

a supplement for straw as cow feed, the use of fish flour, tank fish culture, fish feeding, poultry feeding and dairy production on a commercial scale, production of fruits for export, etc.

As new technology is developed and becomes more important to the further development of agriculture, it generally becomes more complex. It becomes more difficult to teach the new technology through simple demonstrations and other methods suitable for a traditional society. Pakistan has reached a stage where an active and progressive extension service is required to take the results of research to the farmer, to carry his problems back to the researchers, and to organize,teach, and assist them in their efforts to increase production.

The introduction of new technology also requires an educated farmer to be able to take full advantage of its potential for development. Pakistan should support the voluntary adult night schools which seem to be springing up over much of the country and a great deal of emphasis should be placed on the publication of agricultural books in the local languages. Teachers, facilities, and books are required in the rural areas to help the farmers learn the necessary mathematics, economics, engineering, sociology, civics, natural sciences, and agriculture so that they can become more useful and productive citizens.

These first six factors are relatively cheap and effective in increasing production and were obviously given a high priority by the leaders of the five countries in the early

stages of their development, and apparently contributed greatly to their agricultural advancement.

The remaining six factors are more capital intensive but none the less important. The experience of the five countries indicates that the development of transportation and communication systems should be among the first projects undertaken which have large capital requirements. This will facilitate farmer mobility, (it will allow him to see what others are doing) and later help in the development of market and price stabilization programs. The growth of communications systems permits the experts to tell many farmers directly about new crops, market conditions, and new technology, so that they can learn and benefit more rapidly. Through radio particularly, the expert can reach a wider audience than would be possible by direct contact. Improved communications in Pakistan would also permit a direct feedback of rural problems to the experts so that there would be a greater tendency for research to be oriented to the solving of real problems in the rural community.

As the population of Pakistan and other underdeveloped nations increase and as the already cultivated areas near their limits of production, it will become incresingly necessary for long term capital investments to be made in agriculture and the agriculture supporting industries. Fertilizer factories, power plants, irrigation systems, land reclamation projects, land colonization schemes, and industries, all must be activated to increase production.

Along with the investment in physical assets must go investment in agricultural training. The Pakistani farmer and his leaders must be taught, through the use of an extension service, short courses, college courses, displays, and demonstrations, how to take advantage of the investments mentioned above for improving production. The youth can and should be taught in the schools and in outside activities, such as 4-H Clubs, or Chandtara (a youth club started in Pakistan as an adjunct of Village AID) Clubs, to take their rightful place in the rural community as farmers and leaders.

As Pakistan's agriculture develops to the point that further increases through the use of labor intensive, improved, cultural practices becomes difficult and more expensive, other inputs must be made available. Fertilizers, seeds, tools, implements, insecticides, and equipment must be used in greater and greater quantities to keep production increasing. It may be satisfactory, in the early stages of development, to allow the knowledge of these inputs to drift down to the farmer and to let their use expand gradually. Later in the development program, they must be available at suitable locations and in sufficient quantities so that every farmer has access to and can use them.

The last two steps taken by the five countries in their agricultural development have been the improvement of the market and price stabilization, and the provision of institutionalized agricultural credit. In a purely subsistence economy,

prices and the availability of markets do not seem to be particularly important to the farmer since he produces very little in excess of his own needs, and that is traded for salt, washing powder, cloth or ornaments. However, as taxes payable in money are imposed, and as more goods become available, the monetary aspects of the market become more important and provision must be made for handling increasingly large agricultural surpluses in the rural areas, moving the surpluses to the growing cities, and selling them to the increasingly large group of industrial workers. Price incentives must be given so that the surpluses will continue to expand and the workers and urban population will continue to be fed. This requires storage facilities, transport and sales facilities, the establishment of grades and standards, and a freely and fast-moving market information system. In most economies, some kind of minimum price assurance seems to be required. Even though there is a short fall in total annual supply, and average annual prices are high, but because of seasonal market gluts, there are low prices at harvest and sale time. These programs have a very high cost, both in capital and in trained manpower.

Among the last of the production factors to be adopted in the five countries and one which appears to have contributed relatively little to overall productivity has been agricultural credit. Traditionally, the sources of the credit needed by farmers in the underdeveloped countries have been the money lenders, the merchants, or relatives of the borrower. This

credit has usually been very expensive in the form of high interest rates, contracts to purchase produce at low prices or other valuable considerations. In order to make it possible for farmers to buy the necessary supplies and to make necessary investments in long term capital, the five countries supported institutionalized rural credit by subsidies, by assisting cooperatives, and by relief loans at low rates. There are probably two or three main reasons for the late development of credit programs for farmers; 1) the very large administrative staff required to service small loans (an average of about $20 in Pakistan); 2) the attitude of many farmers toward borrowing (regarding loans as shameful on the one hand or as relief on the other); or 3) because farmers either had enough money or could get local credit for the small amounts needed in agriculture during the earlier stages of development. In fact, Falcon and Gosch, when writing about West Pakistan, state that, "...farmers have far more resources at their disposal for investment in profitable inputs than was previously thought. Estimates for West Pakistan for the year 1962-63 range as high as Rs. 40 crore (400,000,000), which is substantial for what has always been considered a subsistence economy."[4]

New countries, just getting started on an agricultural development program should study the records of these five countries when preparing their agrarian development plans. If

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[4]Falcon and Gosch, An Analysis of East Pakistan Agriculture, p. 39.

they carry on programs designed to strengthen the low spots in their development score, (which in turn is based on the successful performance of the five countries), it is expected that their agriculture would improve rather rapidly, especially if the program is conducted with good will by an efficient and well trained set of administrators and technicians; if there is a supply of desirable consumer commodities for farmers to buy; if the administration is reasonably stable; and, lastly, if the farmers have been enticed out of their traditional rut.

For the countries that have started developing their agriculture, the material presented here can serve as a guide for testing their agrarian programs to see where they may be lacking and where improvements might be made without requiring the use of excessive amounts of scarce capital and foreign exchange.

After nine years in Pakistan the author concluded that, "In order to beat the problem of food shortages in many countries, the changes that are needed are not large. While it may seem to be a big problem, when placed on an acreage basis the food problem becomes a problem of only a few pounds per acre. For example, to make an extra million tons of rice available for consumption in East Pakistan, we need to increase production only about 100 pounds per acre. This can be accomplished by preparing the land a little better, pulling a few weeds, better rain water control, by using a little fertilizer, or by any one of a number of other practices. Our problem is to teach the farmer how to make use of what is already known about rice pro-

duction and to encourage him to change so that he can profit by it."[5]

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[5]John R. Wilson, Research and the Farmer in a Developing Country, (a paper prepared for the Ford Foundations Representatives Conference, Mexico City, 1964), p. 13.

APPENDIX I

Categories of Development Activities

Below is a listing of the twelve development categories considered in this paper and the major activities included in each category. This should be thought of as only a partial listing since there were literally hundreds of activities carried on in each of the countries described herein which contributed to their development.

1. Land and Tenure Reform:

    a. Land Reform in the traditional sense.
    b. Security of tenure of tenants.
    c. The right to own, buy, and sell land.
    d. The right of personal movement.
    e. The right to engage in any occupation.
    f. The right to mortgage land.
    g. Consolidation of holdings.

2. Technological Improvement:

    a. Import of new technology.
    b. Imports of new varieties and strains of plants.
    c. Import of better animals.
    d. Import of new equipment.
    e. Adaptation of items in a, b, c, and d to local conditions.
    f. Development of new technology adapted to local conditions.
    g. Development of innovations.

3. Farmer Involvement in Development:

    a. Farmer organizations (associations, committees, commissions, cooperatives).
    b. Farmer support for development projects (taxes, dues, commissions on sales, etc.).
    c. Farmer-conducted demonstrations.
    d. Mutual teaching of local groups.
    e. Discussion groups.
    f. Assisting in planning and execution of projects.

4. General Education:

   a. Education at the adult level to increase literacy.
   b. Primary education.
   c. Night schools.
   d. Short courses.
   e. Community schools.
   f. Voluntary schools.

5. Transportation and Communications:

   a. Roads, waterways, and railroads--cross country.
   b. Farm to market roads.
   c. Farm Periodicals.
   d. Radio, television and other mass media.

6. Agricultural Research:

   a. Farmers' problems solved on his own land.
   b. Experiment stations as center of training.
   c. Basic research centers.
   d. Adaptation of foreign technology.
   e. Development of new technology.
   f. Supply of information to extension service and farmers.
   g. Markets and economics.

7. Farmer Training:

   a. Agricultural extension programs.
   b. Demonstration programs.
   c. Agricultural literature.
   d. Short course programs.
   e. Radio and television programs.
   f. Commercial efforts (all of above).
   g. Training schools.
   h. Youth organizations.

8. Agricultural Education:

   a. Agricultural Colleges.
   b. Agricultural schools and high schools.
   c. Vocational agriculture.
   d. Agricultural clubs for youth.
   e. Short courses in agriculture.
   f. Agricultural retraining programs.

9. Investment in Agriculture:

   a. Irrigation.
   b. Land reclamation.
   c. Factories to supply agricultural requisites.

d. Processing plants.
e. Farm equipment factories.
f. Farm supply factories.
g. Transportation--farm to market.
h. Rural public works programs.

10. Agricultural Supplies:

a. Fertilizers.
b. Equipment.
c. Chemicals.
d. Seeds.
e. Irrigation supplies.
f. Tools.

11. Markets and Prices:

a. Roads and railroads.
b. Warehouses.
c. Commercial market services.
d. Food processing plants.
e. Price supports.
f. Market regulation.
g. Subsidies.
h. Freedom of movement of commodities.
i. Grades and standards.
j. Training programs.
k. Market information dissemination.

12. Agricultural Credit:

a. Production credit.
b. Medium term credit.
c. Long term credit.
d. Institutional credit.
e. Private credit.
f. Market credit.
g. Interest rates.
h. Collateral required.
i. Supervised credit.
j. Training in credit.

APPENDIX II

Appendix Table 1. Calorie and Protein Content of National Food Supplies in Selected Countries* (Per Caput Per Day).

Country	Period	Calories	Total Protein (Grams)	Animal Protein (Grams)
United States	1954-56	3150	94	66
	1957-59	3100	94	63
	1961	3100	92	66
Mexico	1954-56	2380	64	17
	1957-59	2400	67	20
	1960	2490	68	22
Japan	1954-56	2100	64	15
	1957-59	2230	68	18
	1961	2290	70	22
Taiwan	1954-56	2210	53	13
	1957-59	2330	57	14
	1961	2400	60	16
Greece	1954-56	2720	87	23
	1957-59	2950	94	27
	1960	2930	95	28
Pakistan	1954-55 - 56-57	1990	46	8
	1957-58 - 59-60	1980	46	7
	1960-61	1970	45	7

* United Nations, FAO, The State of Food and Agriculture, 1963,(Rome, 1963), Annex Table 13B, p. 296.

Appendix Table 2. Fertilizer Consumption in Relation to Arable Land and Total Population.*

	Average Consumption Per 1000 ha of Arable Land[1]						Population Factor[2] 1960
	1949-50			1960-61			
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
	Metric Tons			Metric Tons			
World	3.34	5.19	3.52	7.86	7.55	6.5	1.8
North America	4.39	8.96	4.89	12.57	11.37	9.16	0.9
United States	5.06	10.12	5.52	14.82	12.94	10.61	1.0
Latin America	1.07	1.19	0.48	4.08	2.62	2.33	2.0
Mexico	0.17	0.22	0.04	6.77	2.14	0.45	1.7
Western Europe	13.80	21.23	17.22	30.72	33.94	32.23	3.1
Greece	7.59	7.59	1.52	19.76	15.82	2.44	2.2
Far East	2.62	1.50	0.65	0.65	2.70	2.89	3.4
Japan	50.58	38.82	20.03	124.03	80.88	98.77	15.3
Taiwan	49.73	13.00	0.48	120.08	42.06	41.67	12.2
Near East	2.44	0.67	0.05	3.46	1.15	0.13	1.7
Africa	0.16	0.71	0.16	0.58	0.97	0.40	1.0
Eastern Europe & USSR	2.43	2.65	3.67	6.13	5.91	6.65	1.2

*FAO, The State of Food and Agriculture, 1963, Annex Table 22, p. 226.

[1]Double-cropped area counted only once. Includes land planted to crops, current fallow, temporary meadows, garden land, and land planted to fruit trees, vines and shrubs.

[2]Total population divided by number of Ha of arable land.

Appendix Table 3. Indices of Total Agricultural Production of Selected Countries and Regions* (1952-53 - 1956-57 = 100)

	52-53	53-54	54-55	55-56	56-57	57-58	58-59	59-60	60-61	61-62	62-63
World	94	98	98	102	107	107	113	116	119	120	124
Western Europe	94	101	101	102	103	107	109	113	118	117	123
Southern Europe	90	103	98	105	104	112	114	122	116	119	123
Greece	79	102	99	109	112	128	122	125	117	140	138
North America	99	99	97	101	103	98	106	108	109	108	112
United States	98	98	99	101	103	99	106	109	110	110	111
Latin America	89	92	100	106	113	124	132	131	139	134	135
Mexico	83	88	103	111	115	130	143	139	146	149	158
South America	96	96	100	102	106	110	114	119	117	124	123
Far East	92	98	100	104	107	106	111	115	119	122	124
Japan	96	85	94	114	110	115	116	120	123	123	131
Taiwan	88	94	101	104	112	119	126	123	131	132	138
Pakistan	100	98	102	97	103	102	102	108	111	114	111
Africa	94	98	101	101	106	104	109	111	117	113	120

* FAO, The State of Food and Agriculture, 1964, Annex Table 1A, pp. 195-196.

Appendix Table 4. Indices of Per Caput Agricultural Production of Selected Countries and Regions* (1952-53 - 1956-57 = 100)

	52-53	53-54	54-55	55-56	56-57	57-58	58-59	59-60	60-61	61-62	62-63
World	98	100	99	101	103	101	105	106	106	105	106
Western Europe	95	102	101	101	101	104	106	108	112	111	115
Southern Europe	91	104	98	104	103	109	111	117	111	113	116
Greece	81	103	99	108	110	125	118	119	111	132	124
North America	103	101	97	99	100	93	98	98	98	96	97
United States	102	100	99	100	99	94	99	100	99	98	98
Latin America	100	98	100	100	102	104	106	106	103	104	101
Mexico	89	92	103	108	109	119	127	120	122	121	124
Far East	95	100	100	102	103	100	103	104	105	105	104
Taiwan	95	98	101	101	105	108	110	104	106	104	105
Japan	99	86	94	113	108	111	112	115	116	115	127
Pakistan	105	100	102	95	99	95	93	97	97	98	94
Africa	98	100	101	99	101	98	99	99	102	96	100

* FAO, The State of Food and Agriculture, 1964, Annex Table 1B, pp. 197-198.

Appendix Table 5. Indices of Total Food Production of Selected Countries and Regions* (1952-53 - 1956-57 = 100)

	52-53	53-54	54-55	55-56	56-57	57-58	58-59	59-60	60-61	61-62	62-63
World	94	98	99	102	107	108	114	117	120	120	124
North America	99	98	97	101	104	101	109	110	111	110	113
United States	98	97	99	102	104	102	111	111	112	113	113
Latin America	93	96	100	102	109	112	117	117	119	121	122
Mexico	84	91	103	106	116	131	146	148	151	156	162
Western Europe	94	101	101	102	103	107	109	113	119	119	124
Southern Europe	90	103	98	105	104	111	115	122	116	119	123
Greece	82	105	99	104	111	125	121	126	118	139	128
Far East	91	99	100	103	107	106	111	117	121	122	124
Japan	97	85	94	114	110	115	117	121	125	125	133
Pakistan	97	101	103	95	103	101	101	108	113	114	112
Taiwan	88	95	101	104	112	118	125	122	130	131	137
Near East	93	101	97	100	109	113	117	120	121	121	129
Africa	95	99	101	100	105	103	107	109	114	111	117

* FAO, The State of Food and Agriculture, 1964, Annex Table 2A, pp. 199-200.

Appendix Table 6. Indices of Per Caput Food Production of Selected Countries and Regions* (1952-53 - 1956-57 = 100)

	52-53	53-54	54-55	55-56	56-57	57-58	58-59	59-60	60-61	61-62	62-63
World	98	100	99	101	103	102	106	107	107	105	107
North America	103	100	97	99	100	96	101	100	100	97	99
United States	101	99	100	100	100	97	103	102	101	100	99
Latin America	99	98	100	99	103	103	105	102	101	100	98
Mexico	90	94	103	103	110	120	129	128	126	126	127
Western Europe	95	102	101	101	101	104	106	106	113	111	115
Southern Europe	92	104	98	104	103	109	112	118	111	113	116
Greece	83	106	99	103	109	122	117	121	112	131	120
Far East	95	101	100	102	103	100	103	105	107	106	105
Japan	99	86	94	113	108	111	112	116	118	117	123
Pakistan	102	103	103	93	99	95	93	98	100	98	94
Taiwan	95	99	101	100	105	107	109	103	105	103	105
Near East	98	103	97	98	104	105	107	107	105	102	106
Africa	98	101	101	98	101	96	98	97	99	94	96

* FAO, The State of Food and Agriculture, 1964, Annex Table 2B, pp. 201-202.

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