

**"AGRICULTURAL DEVELOPMENT IN SAUDI ARABIA:
POLICIES AND EVALUATIONS"**

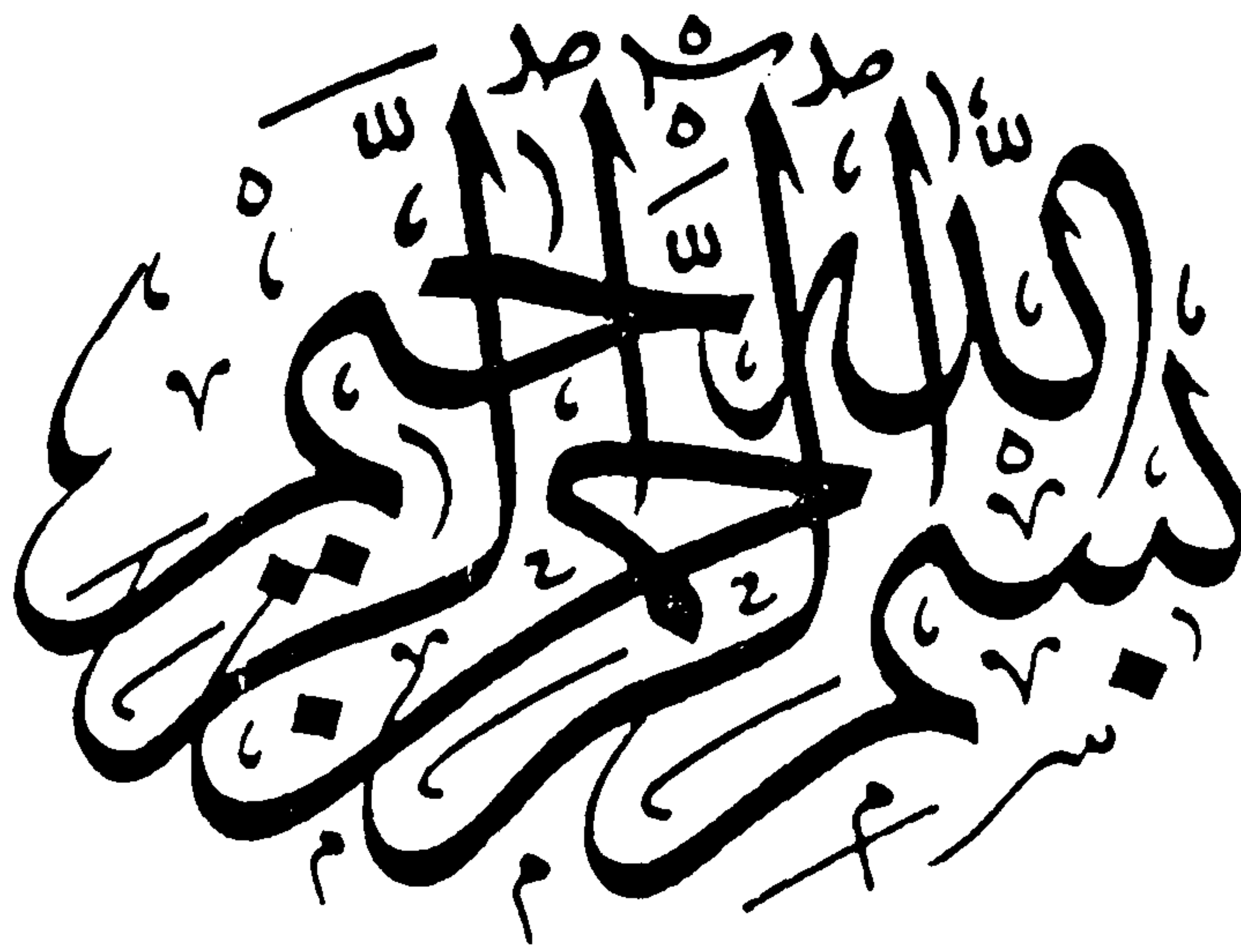
BY

ABDULLAH ABDULLAH AL-OBAID

**A Thesis Submitted For The Degree Of
Doctor Of Philosophy
To The Department Of Economics At The
University Of Leicester
U.K.**

July

1987



In the name of Allah
The Compassionate
The Merciful

ACKNOWLEDGEMENTS

Glory be to Allah, "God", Who taught man how to read and revealed to him what was previously unknown. And peace be upon Mohammed, the unlettered prophet, who was selected by Allah to invite and educate all people to the right way.

رَبِّ أَوْزِعْنِي أَنْ أَشْكُرَ
نِعْمَتَكَ الَّتِي أَنْعَمْتَ عَلَيَّ وَعَلَىٰ وَالِدَيَّ وَأَنْ أَعْمَلَ صَالِحًا
تَرْضَاهُ وَأَصْلِحْ لِي فِي ذُرِّيَّتِي ۖ إِنِّي تُبْتُ إِلَيْكَ وَإِنِّي
مِنَ الْمُسْلِمِينَ ﴿١٥﴾

"My Lord, grant me that I should be grateful for Your favour which You hath bestowed on me and on my parents, and that I should do good such as You are pleased with and do good to me in respect of my offspring, surely I turn to You, and I am of those who submit."

(The Holy Quran, 46: 15)

I would like to express my profound gratitude and appreciation to my supervisor, Mr. Howard Rees, whose constant attention, advice and valuable notes have contributed significantly to the completion of this humble work.

I am also greatly indebted to the College of Agriculture, King Saud University, for providing the opportunity for me to seek my higher education abroad, and for their generous financial support. My sincere thanks also to my teachers in the Department of Agricultural Economics and Rural Sociology, for their continuous help and encouragement during my graduate study.

Also, I am grateful to all colleagues and friends in the Ministry of Agriculture and Water, and in the scattered offices and branches of the Saudi Arabian Agricultural Bank for providing me with valuable research materials and for helping me conduct the field research survey which has been analysed in this study.

I owe the most heartfelt appreciation to my sister who has devoted her life to foster me in a very merciful and sympathetic way since my childhood. Last, but certainly not least, I owe a very special debt of gratitude to my wife and my children; Eman, Osamah and Mua'th for their endless moral support, understanding and patience throughout my stay in the U.S.A. and the United Kingdom.

ABSTRACT

"AGRICULTURAL DEVELOPMENT IN SAUDI ARABIA: POLICIES AND EVALUATIONS"

BY

ABDULLAH ABDULLAH AL-OBAID

Saudi Arabia is largely considered as a single-commodity economy, heavily dependent on oil exports. The government, having realised the risks of this dependency, has taken delineated actions to make the best use of the huge oil-revenues to develop all sectors of the economy. Throughout the planning process, great consideration has been given to the agricultural sector, and various policies and programmes have been undertaken to increase its productivity. Such commitment is justified in view of the different constraints involved, and the fact that this sector is still the largest labour-employing sector in Saudi Arabia.

This study attempts to identify the problems and constraints that face agriculture in Saudi Arabia and to provide an assessment of the effects of government policies and planning efforts in agriculture, particularly during the period of the development plans which started in 1970. The effects of the governments' policies and planning efforts are gauged in terms of their ability to produce enough food to feed the population, and the structural transformation of the agricultural sector from a traditional to a modern one.

In this study, historical, descriptive and analytical methodological approaches have been utilised.

The main goal this study seeks is to provide the Saudi planners and decision-makers with some valuable implications concerning the existing agricultural policies and programmes.

In order to achieve the goals of this study, a review of literature concerning some issues of agricultural development has been conducted, in addition to a profile of the Saudi economy.

CONTENTS

CHAPTER ONE:		PAGE
1:	INTRODUCTION	1
1.1:	An Overview	1
1.2:	The Statement Of The Problem	4
1.3:	Objectives Of The Study	7
1.4:	Methodology And Sources Of Data	9
1.5:	Organisation Of The Study	10
CHAPTER TWO:		
2:	SOME ISSUES OF AGRICULTURAL DEVELOPMENT	12
2.1:	Introduction	12
2.2:	The Dichotomy Of Agricultural Vs. Industrial Development	13
2.2.1:	Industry First Policy	14
2.2.2:	Agriculture First Policy	16
2.2.3:	The "Balanced Growth" Policy	18
2.3:	Agriculture In Economic Theories Of Development .	21
2.3.1:	Growth Stages Theories	21
2.3.2:	Dual Economy Models	24
2.4:	Theories Of Agricultural Development	30
2.5:	The Role Of Agriculture In Economic Development .	40
2.6:	Agricultural Development Policy Instruments	48
2.7:	Planning Agricultural Development	67
CHAPTER THREE:		
3:	THE MAIN FEATURES OF THE SAUDI ECONOMY	72
3.1:	Introduction	72
3.2:	Geography, Tapography And Climate	72
3.3:	Population And Labour Force	76
3.4:	The Composition Of Gross Domestic Product	80
3.5:	The Oil Sector	85
3.5.1:	History	86
3.5.2:	Production, Prices And Revenues	87
3.5.3:	The Effects Of Oil Glut And Price Fall	93
3.6:	The Manufacturing Sector	94
3.6.1:	Oil-Based Manufacturing	95

3.6.2:	Non-Oil Manufacturing	97
3.6.3:	Government Incentives To Manufacturing	100
3.7:	The Agricultural Sector	102
3.7.1:	The Place Of Agriculture In The Saudi Economy ...	102
3.7.2:	The General Characteristics Of Agriculture	105
3.7.3:	Demand For Agricultural Products	114
3.7.4:	Agricultural Production	116
3.8:	The Foreign Sector	123
3.8.1:	Exports	124
3.8.2:	Imports	126
3.8.2.1:	Foodstuffs Imports	128
3.9:	The Saudi Development Plans	131
3.9.1:	The First Five-Year Development Plan	131
3.9.2:	The Second Five-Year Development Plan	133
3.9.3:	The Third Five-Year Development Plan	134
3.9.4:	The Fourth Five-Year Development Plan	136

CHAPTER FOUR:

4:	AGRICULTURAL POLICIES IN SAUDI ARABIA	138
4.1:	Introduction	138
4.2:	The Main Objectives Of Agricultural Development .	139
4.3:	The Agricultural Development Management	142
4.3.1:	The Ministry Of Agriculture And Water (MOAW)	142
4.3.2:	The Saudi Arabian Agricultural Bank (SAAB)	143
4.3.3:	The Other Involved Agencies	144
4.4:	Water Policy	146
4.5:	Land Reclamation And Distribution Policy	152
4.6:	Agricultural Research Policy	155
4.7:	Extension Services Policy	159
4.8:	Agricultural Education And Training Policy	161
4.9:	Monetary Incentives Policy	163
4.9.1:	Agricultural Credit Policy	165
4.9.2:	Agricultural Subsidies Policy	173
4.9.2.1:	Output Subsidies	175
4.9.2.2:	Input Subsidies	175
4.9.3:	Price-Support Policy	182
4.10:	Marketing Policy	184
4.11:	Cooperatives Policy	185
4.12:	Agricultural Projects	188
4.12.1:	Al-Hasa Irrigation And Drainage Project	189

4.12.2:	The Jizan-Valley Development Project	191
4.12.3:	The Haradh Project	192

CHAPTER FIVE:

5:	EVALUATION OF THE AGRICULTURAL STRATEGY IN SAUDI ARABIA: GENERAL FRAMEWORK	194
5.1:	Introduction	194
5.2:	Agricultural Output And Its Rate Of Growth	195
5.3:	Yields Per Hectare Of The Major Crops	199
5.4:	Agricultural Capital-Output (K/O) Ratio	201
5.5:	Standards Of Living	203
5.6:	Self-Sufficiency In Food Production	206
5.7:	Agricultural Imports	211
5.8:	Conclusion	217

CHAPTER SIX:

6:	EVALUATION OF AGRICULTURAL POLICES IN SAUDI ARABIA .	221
6.1:	Introduction	221
6.2:	Evaluation Of Water Policy	221
6.3:	Evaluation Of Land Distribution Policy	228
6.4:	Evaluation Of Research Policy	233
6.5:	Evaluation Of Extension Policy	239
6.6:	Evaluation Of Education And Training Policies ...	243
6.7:	Evaluation Of Credit Policy	248
6.8:	Evaluation Of Subsidies Policy	256
6.9:	Evaluation Of Wheat Price-Support Policy	265
6.10:	Evaluation Of Marketing Policy	275
6.11:	Evaluation Of Agricultural Cooperatives Policy ..	280
6.12:	Evaluation Of The Public Agricultural Projects ..	282

CHAPTER SEVEN:

7:	FIELD RESEARCH AND QUANTITATIVE INVESTIGATION ON THE AGRICULTURAL POLICIES IN SAUDI ARABIA	287
7.1:	Introduction	287
7.2:	Objectives Of The Survey	287
7.3:	Technical Considerations Concerning The Survey Design	288
7.4:	The Questionnaire	289
7.5:	The Hypotheses To Be Tested	290
7.6:	The Statistical Results	293

7.7:	The Background Profile Of The Respondents	293
7.8:	Land Distribution Programme	296
7.9:	Extension Policy	303
7.10:	The Agricultural Training Programmes	309
7.11:	The Credit Policy	312
7.12:	The Subsidies Policy	316
7.13:	The Wheat Price-Support Programme	321
7.14:	The Agricultural Marketing Policy	325
7.15:	Agricultural Cooperatives Policy	327

CHAPTER EIGHT:

8:	CONCLUSIONS AND RECOMMENDATIONS	331
8.1:	Conclusions	331
8.2:	Recommendations	347

APPENDICES	364
BIBLIOGRAPHY	373

LIST OF TABLES

<u>TABLE</u>	<u>PAGE</u>
3.1 Major Towns in Saudi Arabia With Population Of Over 30,000 Inhabitants In 1974 Census	78
3.2 Gross Domestic Product By Oil And Non-Oil Sectors And Kind Of Economic Activity In Producers Values (At Constant Prices Of 1970)	81
3.3 Percentage Distribution Of Gross Domestic Production By Kind Of Economic Activity Within Sectors (At Constant Prices Of 1970)	83
3.4 Crude Oil Production And Reserves, 1970 - 85	89
3.5 Saudi Oil Prices And Revenues	92
3.6 Non-Oil Manufacturing Development In Saudi Arabia	99
3.7 Total GDP, Non-Oil GDP And Agricultural GDP In Saudi Arabia, 1970 - 85	104
3.8 Land Area By Use In Saudi Arabia	109
3.9 Distribution Of Farms By Size And Land Tenure In Saudi Arabia, 1973/74	112
3.10 Agricultural Production Indices In Saudi Arabia 1974 to 1985	117
3.11 Agricultural Production And Indices Of Cereal Products In Saudi Arabia, 1970-85	118
3.12 Production And Indices Of Selected Vegetable And Fruit Products In Saudi Arabia, 1970-84	120
3.13 Meat, Fish, Eggs And Livestock Numbers And Production In Saudi Arabia, 1970-84	122
3.14 Total Exports, Imports And Foodstuffs Imports In Saudi Arabia, 1970-85	125
3.15 Composition Of Foodstuffs Imports In S.A., 1970-85	130
4.1 The Main Non-Renewable Water Aquifers In Saudi Arabia.	149
4.2 The Major Dams In Saudi Arabia	151
4.3 Agricultural Land Distribution In S. A. Up To 1985 ...	154
4.4 Agricultural Research Centres And Experimental Stations In Saudi Arabia.....	156
4.5 The Number Of Agricultural Trainees From 1979 To 83 ..	164
4.6 Monetary Incentives For Agricultural Production	166
4.7 General Annual Credit Movement Provided By The Agricultural Bank, 1965-85	169
4.8 Credit Movement During 1984/85 Distributed By Objectives	171
4.9 The Total Paid Agricultural Subsidies In Saudi Arabia 1973-1984	174
4.10 Amount And Percentage Of Subsidies Distributed By Types, 1975-1985	177
4.11 Wheat Price-Support Policy In Saudi Arabia	183
4.12 Cooperative Societies In Saudi Arabia By Type And Region In 1985	187
5.1 Agricultural Production Indices In Saudi Arabia And Its Neighbouring Countries, 1974-85	196
5.2 Trends In Major Crop Yields In Saudi Arabia	200
5.3 Capital-Output (K/O) Ratio Of The Agricultural Sector In Saudi Arabia, 1975-1985	202
5.4 Food Supply: Daily Per Capita Calories, Protein And Fat In Saudi Arabia	204
5.5 Egg And Meat Production In Saudi Arabia	209
5.6 The Value Of Imports Per Capita In S. A., 1970-86	213

5.7	Import-Substitution In Agricultural Products In Saudi Arabia, 1970-85	215
6.1	National Water Resources-Demand Balance In S.A.	223
6.2	Budgetary Allocations Of The Agricultural Research Programmes During The Third Five-Year Development Plan	236
6.3	The Budgetary Allocations For Agricultural Extension Services In Saudi Arabia, 1980/81 - 1984/85	242
6.4	The Statistical Development Of Total And Agricultural Students In Local And Overseas Colleges, 1970-84	246
6.5	General Collection Movement Of Short-Term And Medium-Term Loans Over 21 Years	253
6.6	Structure Of Subsidies Granted By SAAB Up To 1985	259
6.7	Consumption Of Fertilisers Per Hectare Of Agricultural Area In S. Arabia And Other Arab Countries, 1975-84 ..	263
6.8	Government Total Subsidies, 1971-84	266
7.1	The Formulated Hypothese To Be Tested	291
7.2	Age Distribution Of The Respondents	294
7.3	Marital Status And Family Size Of The Respondents	295
7.4	Length Of Time The Respondents Have Been Associated With Farming	297
7.5	The Educational Levels Of The Respondents	298
7.6	Respondents' Reasons For Asking For Farming Land	300
7.7	Holding Size Distribution Of The Respondents Who Got Their Farming Land As A Government Grant	302
7.8	Respondents' Distribution According To Extension Visits	304
7.9	Distribution Of Respondents' Reasons For Not Being Visited By The Extension Workers	304
7.10	The Distribution Of Respondents According To Extension Visits And Plant Demonstrations, By Locality	306
7.11	The Respondents' Reasons For Using The New Farming Inputs	308
7.12	The Degree To Which The Respondents Follow The Directions Of The Extension Workers	308
7.13	The Respondents' Evaluation Of The Training Programmes	311
7.14	The Respondents' Reasons For Not Attending The Training Programmes	311
7.15	The Respondents' Main Credit Sources In Saudi Arabia .	313
7.16	The Respondents' Reasons For Dealing With The Agricultural Bank According To Their Importance	313
7.17	The Respondents' Reasons For Not Dealing With The Agricultural Bank According To Their Importance	315
7.18	The Respondents' Distribution Of Subsidies By Purpose.	318
7.19	The Respondents' Reasons For Not Getting Subsidies ...	320
7.20	The Respondents' Reasons For Growing Wheat	323
7.21	The Distribution Of Respondents' Positions If The Government Decided To Terminate The Wheat Price-Support Programme	323
7.22	Marketing Problems According To Their Importance As Seen By The Sample Respondents	326
7.23	The Respondents' Reasons For Being Members Of Agricultural Cooperatives	329
7.24	The Respondents' Reasons For Not Being Members Of Agricultural Cooperatives	329

LIST OF FIGURES

<u>FIGURE</u>		<u>PAGE</u>
6.1	Land Distribution By Localities Up To 1985	231
6.2	Lorenz Curve Of Agricultural Land Holdings In Saudi Arabia, 1973/74	234
6.3	Model Of Price-Support To Producers And Ceiling Price To Consumers For Wheat In Saudi Arabia	268
6.4	Trends In Grains Production In Saudi Arabia	274

CHAPTER ONE

1: INTRODUCTION

1.1: An Overview

Like any developing country, the Kingdom of Saudi Arabia is characterised by low levels of labour productivity, high rates of population growth and dependency ratio, a high proportion of the labour force engaged in agriculture, and unskilled labour force, low levels of technology, low literacy and high dependence on international trade. But, unlike many developing countries, Saudi Arabia is a wealthy country, through producing and exporting oil, consequently per capita income is quite high.

Before the discovery of oil in 1938 and during the 1940's when oil had not been exploited in commercial quantities, the Saudi economy depended mostly on agriculture and its related activities. The agricultural sector, although at a very primitive stage similar to other traditional agricultural societies, was the major source of income and employment for the majority of the population. However, during that era, the country was not only self-sufficient in food production, but was able to export a surplus, especially of live animals, to some neighbouring countries.

In the 1950's, Saudi Arabia began to receive substantial oil revenues which helped to initiate changes, and as a result the economy began to assume new dimensions. The oil sector became the dominating factor, generating more than half of the GDP, constituting about 99 per cent of the total value of exports, and earning most of the country's foreign exchange.

Consequently, the economy of Saudi Arabia became a one-product economy, based mainly on oil and its related industries.

The huge revenues from oil exports, which became the major source of government expenditure, brought substantial increases in the incomes of the Saudi people. As a result, living standards have improved and consumption patterns have undergone dramatic changes.

However, the relative importance of the agricultural sector, measured by its contribution to the total GDP, began to decline and domestic food production was eventually unable to satisfy the rapidly increasing local demand which was aggravated by the high population growth, high per capita incomes, high urbanisation and the large number of foreign workers who have been attracted by the country's economic boom. Therefore, as a result of the low productivity-high demand situation, Saudi Arabia has had to import food. During the last fifteen years, the Kingdom has inevitably become heavily dependent on food imports of different kinds, even of some items competitive to the domestic production. No doubt, such situation has adversely affected local production because the imported competitive goods have kept the local farm prices at depressed levels. A major factor which has caused an increase in food imports has been the generous subsidies paid by the government to food importers with the aim of maintaining low food prices for urban consumers. Generally, the value of food imports increased at an annual rate of 31.2 per cent between 1970 and 1980, from SR 1,011 million to SR 14,136 million. In 1981, food imports constituted almost 76 per cent of the country's total food needs and reached SR 17.3 billion.

The government has recognised the risk of overdependence on oil, a depletable resource, and that the current huge oil revenues should be efficiently utilised to develop other sectors of the economy in order to achieve a more balanced rate of growth in the productive sectors and to diversify the country's sources of income. To achieve this objective, medium-term development plans have been put into action since 1970.

The agricultural sector has been seen by the Saudi planners as one of the main productive sectors, therefore, special efforts have been devoted to its development. The ultimate goal has been to maintain a prudent level of self-sufficiency in most of the staple food products. Other major goals have been to reduce the overwhelming dependency on food imports, to improve the people's welfare level, particularly in rural areas, to optimise the use of the country's resources, especially water, and to raise the productive efficiency of the Saudi peasants.

Serious development actions requires adequate capital, therefore, huge amounts of money have been directed to the development of agriculture. The budgetary allocations during the First Five-Year Plan (1970-75), and the Second Five-Year Plan (1975-80) were SR 4.2 billion and SR 38.7 billion respectively. In the Third Five-Year Development Plan, the agricultural sector received SR 72 billion, almost twice the allocated amount for the Second Plan.

Government involvement in accelerating domestic production has been achieved through the means of various approaches to agricultural development. This has been done by providing the required capital, by means of easy credit and intensive subsidies, and other required inputs and services

such as free farming land, extension, research, training, cooperatives and marketing infrastructure. In addition, the government has taken full responsibility for initiating and running large development projects such as desalination plants, dams, irrigation and settlement schemes. Such projects are costly and because the marginal public benefits exceed private benefits by such a wide margin only the State can afford to undertake them.

In fact, the firm commitment from the government side to develop the agricultural sector is highly justified considering the various constraints which face farming in Saudi Arabia. These include the adverse climatic conditions, particularly the intense heat, and the supply inelasticities of cultivated land, water and labour. In addition, the sharp increase in food prices internationally since 1973 and a feeling of insecurity with respect to the availability of adequate food supplies have increased the incentive from the Saudi government to concentrate more on agricultural development despite the difficulties involved.

1.2: The Statement of the Problem

One of the major objectives of agricultural development and its contribution to the economy is to provide an adequate supply of food products to meet the increasing local demand. This objective cannot be achieved unless traditional practices in farming are abandoned and replaced by more advanced ones. In Saudi Arabia, various efforts have been made to modernise the agricultural sector by convincing farmers and agribusinessmen to apply the new technological methods. This has been done by means of delineated different policies, which can

be classified as follows:

A - Monetary Policies:

1. Credit- extended by the Saudi Arabian Agricultural Bank (SAAB), which commenced in 1964.
2. Subsidies - generous subsidies of different percentages on various agricultural inputs and products.
3. Price support - a high guaranteed price for the locally-grown wheat has been paid since 1978.

B - Non-Monetary Policies:

1. Water - ensuring an adequate supply of water for agricultural and urban purposes through initiating hydrological studies, building dams and desalination plants.
2. Land distribution - free farming plots distributed by MOAW to individuals, projects and companies to be used only for agricultural purposes.
3. Extension services - provided through the 112 branches and offices of the Ministry of Agriculture and Water (MOAW).
4. Research - undertaken through the existing 15 centres of specialised tasks.
5. Training - organised and sponsored by the Department of Training in MOAW to serve MOAW employees, college students and farmers.
6. Marketing services - limited to infrastructures and some regulations controlling markets and transactions.
7. Cooperatives - established in agricultural areas to serve farmers and rural people. These cooperatives are supported and regulated by the Ministry of

Labour and Social Affairs.

8. Agricultural Projects - large-scale public projects established in areas with great agricultural potentiality and totally sponsored and run by the Government.

In response to these policies, in varying degrees, agricultural output in Saudi Arabia has registered some expansion. In general terms, output grew at an annual rate of 5.3 per cent during 1970 to 1980. During the next five years, the annual growth rate increased to 8.7 per cent. Self-sufficiency has been maintained in four main products, namely, wheat, dates, milk and table eggs, thanks to the highly encouraging monetary incentives funded by oil revenues.

However, for other grain products, and vegetables, fruits and meat, the policies have produced only limited progress. For these products, a high proportion of the market supplies have come from unrestricted imports. Such imports, increasing over time, have had two negative side effects: competing with and so discouraging domestic production, and causing a drain on the country's foreign exchange.

Unfortunately, although the government has been involving in delineated planning since 1970, no serious efforts have been attempted by the public sector to review and evaluate the applied agricultural policies. As a result, the type and size of effect, negative or positive, of each policy is not known with certainty. In fact, much effort has been concentrated on the short-run monetary policies at the expense of providing effective educational and technical services. Such a situation is not rational, considering the uncertain

future of oil and its related industries, as the main source of national income.

Also, the agricultural policies and programmes are handicapped by one or more of the following problems:

- (1) lack of proper design;
- (2) poor budget estimates;
- (3) inefficient administration;
- (4) unsuitable use of new technology;
- (5) political, social, practical and resource constraints;
- (6) inefficiency in implementation; and
- (7) lack of accountability.

Therefore, evaluation efforts, the systematic application of social research procedures, are urgently needed in order to assess the conceptualisation and design, implementation, and utility of the various policies and programmes, to improve the effectiveness of the policy management and administration, and to meet the various accountability requirements. Such work, if done properly, would alert the policy personnel to the problems involved, and would provide useful information which could be used to judge the success or failure of the policy. Finally, for the policy decision makers, such evaluation information is crucially important in order to justify the continuation, expansion or termination of a policy.

1.3: Objectives of the Study

Having briefly stated the problem and area of interest, we turn now to present the main objectives that we are seeking to achieve in this study. The overall objective is of two-fold; Firstly, to review the existing major agricultural policies

and programmes in Saudi Arabia; Secondly, to evaluate them in order to measure their type and size of effect within the process of agricultural development.

More specifically this study aims at:

1. Providing an overview of the current agricultural status in Saudi Arabia.
2. Identifying the major constraints facing the agricultural sector which adversely affect its level of productivity.
3. Examining the various government efforts to stimulate agricultural production.
4. Assessing the economic performance of the agricultural sector and its contribution to the Saudi economy.
5. Emphasising the viewpoints of the Saudi farmers and agri-businessmen regarding the various agricultural services extended by the government.
6. Identifying and recommending future directions and changes in Saudi Agricultural planning.
7. Contributing to the literature of policy analysis in Saudi Arabia.

To achieve such objectives should enable us not only to assess the effects of the applied policies and programmes, but also to determine the extent to which the government has been successful in its efforts to develop the agricultural sector.

Lastly, it is worthwhile to point out that this study has developed out of the author's interest in the field of agricultural economics and his strong confidence that the agricultural sector has a major role to play in the future economy of Saudi Arabia.

1.4: Methodology and Sources of Data

The methodology employed in this study allows for the evaluation of the effectiveness of the agricultural policies and planning efforts in Saudi Arabia. A descriptive, historical, and analytical methodology has been used in analysing the different aspects of agricultural policy. These include a look at the policy-makers, their objectives, the measures taken to achieve the objectives and the effects of these measures.

The historical aspect has involved a retrospective view, and also to date, of the results of the agricultural policies in Saudi Arabia. For this analysis, data have been abstracted from a variety of official sources, such as the Ministry of Agriculture and Water (MOAW), Saudi Arabian Agricultural Bank (SAAB), Saudi Arabian Monetary Agency (SAMA), Ministry of Planning, Ministry of Finance and National Economy, Grain Silos and Flour Mills Organisation, and others.

In this regard, one of the chronic problems associated with research about Saudi Arabia is the scarcity and unreliability of data. Official and non-official sources give conflicting data without explanation,. However, it should be emphasised that before 1970 there were no consistent time-series data, and eventhough the situation has greatly improved since, the problem of insufficiency and unreliability still remains. Therefore, additional information has been obtained from published and unpublished external sources of books, articles, dissertations, documents and reports.

The analytical aspect of the study's methodology has involved two efforts: First, analysis of time-series data concerning some of the major agricultural policies, whenever

the availability and adequacy of data has enabled us to do so, and; Second, analysis of quantitative data obtained through a field research survey conducted by the author and some colleagues during the summer of 1986 on a sample of Saudi farmers and agri-businessmen throughout the country. For such data frequency and percentage statistics have been employed to make comparisons and to express the data in tabular form.

1.5: Organisation of the Study

This study consists of eight main chapters. Chapter One introduces the study and lays out the problem to be investigated. It also states the study's objectives, the methodology employed and sources of data.

In Chapter Two, an effort has been made to review the literature concerning some issues of agricultural development such as the dichotomy of agriculture vs. industrial development, agriculture in economic theories of development, theories of agricultural development, the role of agriculture in economic development, agricultural policy instruments and agricultural planning. This provides the theoretical basis for this study.

Chapter Three examines the main features of the Saudi economy with emphasis on the agricultural sector and its related aspects. Linkages between the agricultural and non-agricultural sectors have been considered in an attempt to determine the appropriate place of agriculture in the Saudi economy.

Following this economy profile, Chapter Four identifies in a broader sense the major agricultural policies and programmes in Saudi Arabia and their performances, especially

during the period of active planning which started in 1970, during which three Five-Year Development plans were implemented. The people involved in the agricultural policy-making and planning process, the goals and objects are also dealt with in this chapter.

Chapter Five, Six and Seven are devoted to evaluating the agricultural policies and programmes presented in Chapter Four. In Chapter Five, a general framework approach of evaluation is applied using some general indicators such as the rate of growth of agricultural output, trends in yield per hectare of major crops, agricultural capital-output (K/O) ratio, changes in the standards of living of the rural population, self-sufficiency in food production, and food imports. In Chapter Six, an attempt is made to evaluate the agricultural policies and programmes in a disaggregative manner, using secondary data collected from the scattered official sources.

In Chapter Seven, an analytical investigation has been carried out to assess the various agricultural policies and programmes. This has been done by utilising the replies of a sample of Saudi farmers and agri-businessmen to a field research survey designed for this purpose.

Finally, the last chapter deals with some recommendations and policy implications for improving the agricultural sector in Saudi Arabia.

CHAPTER TWO

2: SOME ISSUES OF AGRICULTURAL DEVELOPMENT

2.1: Introduction

According to Luttrel (1976), the performance of the agricultural sector in most developing countries has been disappointing. While the total food production in these countries has been rising just as fast as in the developed countries, the per capita food production rose by only 0.6 percent annually from 1954 to 1964 and did not rise at all from 1965 to 1975. On the contrary, in developed countries the per capita food production in these two decades increased at annual rates of 1.7 per cent and 1.8 per cent, respectively. In view of the above data one observes that, the high progress rate of the agricultural sector in developed countries did not come all of a sudden. It occurred from an efficient long-term process in development designs and actions. On the other hand, the slow and inadequate progress in the agricultural sector in developing countries was a direct result of the inefficient efforts of development. There is thus a positive relationship between the expansion of agricultural production and the development process. In this introductory chapter a review of literature concerning some issues of agricultural development is presented.

The first issue which deserves some attention is the dichotomy of agricultural development versus industrial development. As we are going to see in section two, there exist three schools of thought concerning this issue, and each bases its arguments on historical experiences. Next,

before we investigate the theories of agricultural development in section four, we will review in section three some of the well known theories of economic development which recognise the place of agriculture in the development process. In section five, we will focus on the multidimensional contributions which can be provided by the agricultural development to the overall economy. These contributions represent the crucial role of agriculture which differs with the stage of development. To develop the agricultural sector means a specific policy containing a package of instruments which should be created and practised. Therefore, the most common policy instruments will be mentioned and briefly discussed in section six. Finally, in section seven, the agricultural planning including its objectives, goals, techniques and organisation is discussed.

2.2: The Dichotomy of Agricultural vs. Industrial Development

The issue of agricultural versus industrial development has generated much controversy in the economic history. On this issue there exist, in the main, three schools of thought. Besides, there have been some economists who strongly argue that the priority should be given to the agricultural sector. Others, on the contrary, stress the importance of industrialisation, and call for the efforts to be directed to industry. The rationale behind each of the above viewpoints is based on the following argument; in any developing country, the economy is usually characterised by shortage of capital, scarcity of skilled labour, inefficient management, and lack of other productive factors. In such conditions it is difficult for a developing country to divide these limited economic resources

between agriculture and industry. Furthermore, any attempt to allocate these resources, according to the criterion of balance, may spread them so thin that they go below certain crucial minimum levels which must be increased, if productivity and income are to be raised in any direction. Recognising the necessity of choice, economists are therefore found divided into two camps. Nonetheless, though each group emphasises one of the two sectors, it does not totally ignore the importance of the other sector. The third school of thought is of the view that the two sectors should grow parallel to each other with due attention paid to each. Let us take stock of the main arguments of each group.

2.2.1: Industry First Policy

This group gives more emphasis and priority to the industrial development. Among the economists associated with this school of thought are Leibenstein (1957), Prebisch (1959), Higgins (1959) and Schultz (1964). These "industrialists", though alive to the need for raising agricultural productivity, conclude that it can be accomplished only by giving a "big push" industrialisation programme top priority but each of them provides different justifications.

The Leibenstein viewpoint is that the agricultural environment does not generally lead to economic development. He concludes;

"In sum the growth agents are more likely to be stimulated in an urban industrial setting rather than in an agricultural environment. The mere fact that it often appears that the initial marginal productivity is greater in agriculture than elsewhere does not necessarily imply that the correct investment policy is to concentrate on agricultural investment" (pp. 263 - 64)

Prebisch (1959) holds that improvements in agriculture lead to greater productivity and therefore relatively lower prices. On the other hand, improvements in industry, where labour is more easily organised and prices can be controlled by producers, lead rather to higher wages and profits while prices are maintained or increased. Therefore a country which specializes in agricultural production finds the prices of its exports falling relatively to those of its imports. Thus Prebisch suggested the policy of import substitution and industrialization for Latin American countries. However, Higgins (1959) argues that the only means to a "cumulative improvement in agricultural productivity" is a public policy designed to make labour relatively scarce in agriculture by simultaneously shifting to a more mechanised and larger-scale agriculture and encouraging a rapid rate of industrialisation. According to Schultz (1964) industrialisation generally has favourable effects on agricultural development; First, in urban areas, incomes rise rapidly, thus providing rapid growth in demand for agricultural commodities. Since these commodities are labour intensive, agricultural production can be greatly increased in total and per farm without increasing farm acreages. In addition, the increasing availability of jobs in the industrial sector may actually reduce the rural population, providing scope for even further increase in business size and incomes; Second, capital availability increases owing to industrialisation, which in turn gives rise to farm expansion and modernisation. Rural people who work in urban areas often send money back to home farm. Third, the urban centres provide expanded opportunities for education, travel, and contact with new things and ideas

which widen the horizons of rural people and make them more amenable to change. Finally, industrialisation makes available to agricultural workers a wider range of consumption goods, raising their level of wants and encouraging greater productive effort. In addition to the above justifications for giving the priority to the industrial sector, factories are regarded as the symbol of power, development is synonymous with industrialisation, agriculture is equated with poverty and industry with wealth. Moreover, new factories provide not only jobs for the migrants to the cities, but are regarded as a visual demonstration of development.

2.2.2: Agriculture first Policy

The proponents of this school of thought such as Kuznets (1959), Oshima (1962), Rostow (1963), Nicholls (1964) and others believe that agricultural development should be given a careful priority, especially in the early stages of development. They regard the agricultural sector as the "infant industry" that should be supported and even subsidised to realise its potential comparative advantage in food production. The advocates of agricultural development usually stress the point that increasing agricultural productivity is the right pre-requisite for the industrial development and this, according to them, is both a logical necessity and a matter of historical experience illustrated especially by the case of Japan (Lloyd, 1975, p.14). For example, Kuznets (1959), in his comprehensive studies on industrial structure of labour force and national product both in developed and developing countries, drew the widely-quoted conclusion;

"it is a pre-condition of industrialization as a worldwide phenomena that productivity of labour in agriculture increases sufficiently to feed, at higher per capita levels, a larger proportion of the labour force than could be fed before. And as our estimates have shown in most of the developed countries, product per worker in the agricultural sector increased more than product per worker in the rest of the economy combined. At the danger of stressing the obvious, one may claim that an agricultural revolution - a marked rise in productivity per worker in agriculture - is a pre-condition of the industrial revolution for any sizeable region in the world."

Nicholls (1964) also endorses his view on the pre-requisite role of agricultural development for industrial development in that he says: "until underdeveloped countries succeed in achieving and sustaining a reliable food surplus, these have not fulfilled the fundamental precondition for economic development".

However, it could be argued that rising agricultural productivity supports and sustains industrial development in several ways. First, it provides food for the growing non-agricultural labour force and also raw materials for industry. Second, it permits agriculture to release part of its labour force to meet the increasing demand for labour in industry. Third, it raises agricultural incomes, thereby creating the rural purchasing power needed to buy the new consumer goods produced by industry. Next, by the means of saving and taxes it provides capital to finance the industrial development. Finally, it provides the industry with the needed foreign exchange when agricultural products are exported, or saves foreign exchange when primary products are imported.

With reference to the above justifications for the

"agricultural first" policy and to the failure of industrialisation policies practised in India and Argentina, the proponents of this school of thought strongly recommend the developing countries to give the priority in development efforts to their agricultural sectors. This view is held by Oshima (1962) when he argues that an "agricultural first" policy is needed in view of the present situation of Asia.

Another instance in point is Rostow (1963) who stated that;

"the radical improvement of agriculture in Asia, Africa, and Latin America is, I am convinced, a fundamental condition for the maintenance of a high rate of development in those regions, especially their industrial development".

2.2.3: The "Balanced Growth" policy

For some economists, neither the "industry first" nor the "agriculture first" policy by itself is an appropriate policy for development. Rather they propose a "balanced growth" policy which calls for a "balance" of effort to be given to each sector. Among the notable economists who plead for "balanced growth" development approach are Rosenstein-Rodan (1943), Nurkse (1953), Lewis (1958), and Johnston and Mellor (1961). The "balanced growth" thesis is based on the argument that, isolated development projects eventually fail because of a lack of markets, whereas mutual markets are provided by several lines of development carried on at the same time. Rosenstein-Rodan (1943, p.202) argues that the net or gross investment or output should expand at equal rates in all sectors of the economy including the agricultural and industrial sectors. No particular emphasis is placed on any one sector of the economy, mainly because of

the complementarity between them which makes to some extent all of the two sectors basic. Nurkse (1953) suggests "a frontal attack...a wave of capital investment in a number of different industries" which he regards as "balanced growth". However, to escape the "vicious circle", he suggests that the only way out of the dilemma is "more or less synchronised application of capital to a wide range of different industries".

W.A. Lewis (1958) offers another view, for he believes;

"it is not profitable to produce a growing volume of manufactures unless agricultural production is growing simultaneously. This is also why industrial and agrarian revolutions always go together, and why economies in which agriculture is stagnant, do not show industrial development".

Johnston and Mellor are often recognised with their writing on the role of agriculture in economic development as we are going to see later in this chapter. Nevertheless, they do not advocate the policy of "agriculture first" as one may expect. They rather call for a "balanced growth" policy when they conclude:

"Although this paper has stressed the importance of agriculture's role in development, we part company with those who draw the inference that agricultural development should precede or take priority over industrial expansion...It is our contention that "balanced growth" is needed in the sense of simultaneous efforts to promote agricultural and industrial development."

The "balanced growth" policy recognises the interdependence between the agricultural and industrial sectors. This interdependence between the two sectors, from the point of view of this policy, limits the usefulness of considering the development of the either in isolation from the other. The two sectors are highly interrelated because of the

existence of output and input linkages between them.

From the output link, the two sectors must provide the marketing outlets for their respective products. Industry increases the demand for wage goods, of which food is initially the most important. The resultant growth of the market for agricultural products tends to stimulate the agricultural productivity and therefore to increase the peasants' level of incomes and to improve their standards of living. Industry also provides agricultural labour force with a wide range of consumer goods raising their level of wants and encouraging greater productive effort. Agricultural development, on the other hand, increases the demand for agricultural machines and implements produced by the industrial sector. Consequently, it stimulates more investment in industry.

On the input link between the two sectors, the industrial sector provides the employment opportunities for the people released by the agricultural sector, and this serves the interests of both those who remain in, and those who leave the agricultural sector. At the same time, the agricultural sector benefits by employing factor inputs from industry and this results in the output of new and better agricultural goods. The final demand linkages and input-output relations, according to Bacha (1980), ensure a perfect complementarity in production between agriculture and industry.

To sum up, agriculture and industrialization may not be regarded as two alternatives in the process of economic development but they rather complement each other and a balance in the emphasis of consideration is required.

2.3: Agriculture in Economic Theories of Development

Most of the economic development theories involve a major transformation of the economy from the predominantly agricultural one to the one comprising a large and growing urban-industrial sector. However, the economic development theories which show some special concern with agriculture have mostly been formulated as either growth stage models or dual economy models. Following is the discussion on some well-known economic development theories which describe the place of agriculture in the overall development process.

2.3.1: Growth Stages Theories

The concern of the growth stages theories has been either with the growth of agricultural production as a prerequisite for the development of industry (Marx, 1889; Rostow, 1956; Kuznets, 1959; Nicholls, 1963), or with domestic industrial development as the chief generator of agricultural progress (List, 1885; Chenery, 1955). According to Morgan (1980), growth stages models are empirical reflecting the past rather than the future. They tend to be based mainly on observations of development process in Europe and North America and have little relevance for the Third World. In view of its striking resemblance with the Rostow model, it is taken up in the next paragraph.

Rostow (1960) studied the growth processes of different nations at different points in their economic history and then he formulated a theory of development which assumes that all nations should pass through certain stages of development as they move along the path of economic progress. Rostow

identifies five stages in the transition process from a primitive to a modern economy: the traditional society stage, the preconditions for take-off stage, the take-off stage, the drive to maturity stage, and the stage of high mass consumption. These stages, except the first and last ones, are transition stages rather than a succession of equilibrium position.

Rostow is mainly preoccupied with the process by which a society moves from one stage to another, and his historical analysis is directed to the objective of providing policy guidance to the authorities of the developing countries, since it is useful and almost accurate, for considering the process of development now taking place in some of the developing countries as analogous to the stages of preconditions and take-off of developed countries in the last two centuries (Hayami and Ruttan, 1971). Rostow's approach starts with the empirical premise that deceleration is the normal optimum path of a sector, due to a variety of supply and demand factors operation on it. On the supply side, Rostow introduces the concept of a sequence of leading sectors which follow each other as the basic generators of growth. On the demand side, declining price and income elasticities of demand are introduced as technical factors dampening the growth rate of leading sectors and transforming them to sustaining or declining sectors. As to the leading sectors, technology plays an important role in their emergence.

In the precondition to "take-off" stage, the insights of modern science are on their way to be translated into increased agriculture and industrial output. Many of the developing countries are now entering this stage, and during

this stage agriculture makes massive contributions. In fact, it sets the limits within which economic growth takes place. Concerning the "take-off" stage, Rostow makes the following observation:

"Take-off is defined as requiring all three of the following related conditions: 1. a rise in the rate of productive investment from, say, five percent or less to over ten percent of national income; 2. the development of one or more substantial manufacturing sectors, with a high rate of growth; 3. the existence of a political, social and institutional framework which exploits the impulses to expansion in the modern sector and the potential external economy effects of the take-off and gives growth an on-going character" (Rostow, 1960, p.39)

The maturation stage is the following stage whereby the growth process is considered as self-sustainable (Rostow, 1956, p.25).

The policy implication of this growth stages model is that in order to develop the economies of developing countries, they must go through the same growth process as those experienced by the developed countries. This can be achieved through foreign aid and investment as well as through the export of technology and know-how by the industrial countries.

This model, as any economic development model, is subject to criticism. For instance, Rostow does not provide a scientific analysis to illustrate why a society moves from one stage to another and what are the necessary and sufficient conditions for transition from one stage to another. Though he provides a description of each stage he does not discuss the forces which bring about the required conditions for each stage. The theory is criticised also for

the invalidity of the "take-off" stage for the presently advanced countries. In addition, Kuznets (1964) strongly attacks the analytical criteria used to identify successive stages, the leading sector hypothesis, and the historical validity of Rostow's empirical generalisation concerning the take-off stage for the presently developed nations. Lastly, Rostow equates growth with development with extensive reliance on statistical growth figures as the indicators for development without any regard for how the outcome of this growth is equally distributed among people.

2.3.2: Dual Economy Models

The dual economy theories of development emerged out of an attempt to understand the relationship between a lagging traditional sector and a growing modern sector, and attempt to trace the growing interaction between the two sectors in the process of economic development. Almost without exception, the dual economy approaches of development assume industrial development to occur as a result of the development of a surplus in agriculture. The interest in dual economy is to the fore on the works of W.A. Lewis and of Fei-Ranis, which are discussed below.

2.3.2.1: The Lewis Model

This model is widely known as the "unlimited supply of labour" theory developed by the Nobel laureate W. Arthur Lewis (1954). Lewis distinguishes between two sectors of the economy, a subsistence sector and a capitalist sector. The subsistence (or traditional) sector is characterised by surplus of labour with zero or very low marginal productivity

and without capital (except the non-reproducible capital in the form of agricultural land) and technological progress. On the other hand, the capitalist (or modern) sector is the productive sector, having capital, and can absorb all the transferred labour from the traditional sector. Lewis assumes a constant wage rate in both sectors except that in the capitalist sector this wage is a little higher to attract the labour to migrate. However, at this constant wage paid by the capitalist sector, the supply of rural labour is considered to be perfectly elastic. To the extent that this differential exists, the capitalist sector is able to pay the worker less than his marginal product. The difference is also enlarged by the extent to which capital increases the worker's productivity. The surplus thus accruing to the capitalist is assumed to be saved and reinvested to increase the stock of capital. When the stock of capital increases, the productivity of labour increases, and the capitalist hires more labour from the subsistence sector. This process increases the surplus, adds to capital formation, raises labour's marginal productivity, increases the hired labour, enlarges the surplus, and so on through the cycle until all surplus labour is absorbed into the capitalist sector. In this model as the capitalist sector enlarges having more and more of the transferred labour, its demand for food will increase to feed the growing population. If agricultural output does not increase in line with this demand, the price of agricultural products will rise, and the terms of trade will turn against the capitalist sector. In this case, the agricultural wages in terms of industrial goods will rise faster than industrial wages in terms of agricultural goods

and the wage differential essential to the transfer process will disappear. Agricultural workers will not be so willing to migrate to the industrial sector. This will affect the industrial sector and will reduce the rate of economic growth. Therefore, to maintain the wage differential, agricultural output must increase enough to balance out the increase in demand by the industrial sector and thus prevent the harmful movement in the terms of trade. From the above argument, Lewis concludes that the wage paid by the industrial sector for labour which, in turn, affects the rate of growth of the industrial sector, depends to a large degree on the terms of trade brought about by the relative increase in the productivity of agriculture.

This model implies that the expansion of the industrial sector can be achieved with an agricultural sector fuelling this industrial expansion with its cheap food and surplus labour. In spite of the popularity of this two-sector model as a general theory of development process in Labour Surplus Third World Nations during most of the late 1930's and '60s (Todaro, 1981), it is no more relevant to these countries and has proved much vulnerable on its basic assumptions. In addition, some of the objections to the theory are summarized below:

1. In most of the developing countries it is difficult to define clearly the "capitalist" sector;
2. The assumption of unlimited supply of agricultural labour in the sense that a withdrawal of labour from it will have low or no effect on the total agricultural output is not applicable to all

countries. Even in the highly populated countries such as China, Southeast Asia and some parts of Europe, the shortage of labour situation rather than surplus of labour appears to be existed (Jorgenson, 1961). In this model of unlimited supply of labour, the capitalist sector is regarded as the dynamic sector of the economy, absorbing the surplus of labour from the traditional sector. Where this surplus does not exist, the model breaks down;

3. The doctrine of zero marginal productivity of labour in the subsistence sector has been called into question by many economists such as Oshima (1963), Paglin (1965), Schultz (1964) and others. In theory it is not likely to use the hired labour up to the point where its marginal productivity equals zero. If the wage rate is positive, so would be the marginal productivity of labour. The assumption of zero marginal productivity of labour is very weak in most of the developing countries especially in view of the seasonality of agricultural employment;
4. The proportionality assumption between the rate of labour transfer to the traditional sector and the rate of capital accumulation in the industrial sector is not an accurate assumption; finally
5. The assumption of full employment in the urban areas is, in actual fact, far from reality (Todaro, 1981). Most contemporary research indicates that almost exactly the reverse is true

in many developing countries which means there is substantial open unemployment in urban areas but little general surplus labour in rural areas.

2.3.2.2: The Fei-Ranis Model

The Fei-Ranis (1961) model which divides development into phases is a modification formula of the above-mentioned Lewis model. The economies of developing countries, according to Fei-Ranis are characterised by the coexistence of two sectors; a relatively large and stagnant subsistence agricultural sector in which the wage rate is determined by the institutional forces, and a relatively small but growing commercialised industrial sector in which competitive conditions exist in the inputs markets. They also assume that the subsistence sector is further characterised by the existence of disguised unemployment; zero marginal productivity of labour, and fixed land input. In these conditions, Fei-Ranis argues that the industrial wage will not rise as labour moves from the subsistence sector to industry. What accounts for it is that during the phase I, there is a redundant supply of labour in the subsistence sector. This Phase , as described by them, covers the transfer process from the "breakout" point which is the point at which all labour is located in agriculture to the point at which most of labour has been drawn into the industrial sector so as to move the marginal productivity of people who still remain in agriculture from the zero point. Contingent upon it, the Phase II starts and covers the process from the end of Phase I to the point at which the marginal product of workers remaining in agriculture reaches the "institutional" wage

which approximates the average productivity of labour in the subsistence sector. As these workers now have a positive marginal product, the withdrawal of labour from the agricultural sector will result in a reduction of agricultural output. The terms of trade turn against industry and towards agriculture, and the wage rate in the industrial sector should rise in order to maintain the same purchasing power of the industrial wage in terms of agricultural goods. Phase III is the phase in which the labour in the agricultural sector is paid its marginal product, which is greater than the institutional wage due to the favourable terms of trade. From the model description above we can note three significant points. First, during Phase I, in which we have the so called "redundant" labour, it is possible to transfer labour from the agricultural sector to the industrial sector without reducing agricultural output or increasing the supply price of labour to the industrial sector. Indeed, the transfer of one worker from the agriculture to industry results in an agricultural surplus which then becomes available as an investment fund for the development of the industrial sector. Second, at the time when the marginal productivity of agricultural labour begins to rise above zero, the transfer of one worker from agriculture to industry will affect the agricultural productivity causing the terms of trade turning against industry. This situation can only be offset by some combination of a more rapid rate of technological change in agriculture and/or slowing down in the rate of population growth in the industrial sector. Third, at the point where the labour in agriculture is paid its marginal product wage which is higher than the

institutional wage, the industrial sector should increase the wage rate to compete for labour with the agricultural sector. This wage rate which should be paid by the industrial sector is determined by the terms of trade between the two sectors brought about by the increase in agricultural productivity.

This model of Fei and Ranis is more precise and elaborated than Lewis's model. In its final analysis, unlike Lewis's, rising productivity in agriculture is assumed. This means that agriculture play a " positive role " in supplying both surplus labour and products to the other sectors of the economy. But this did not prevent the model from being criticised. In addition to its simplicity, its assumption of zero marginal productivity of labour (disguised unemployment) is irrelevant to most of the contemporary developing countries. According to Hayami and Ruttan(1971), the zero marginal labour productivity assumption represents a convenient but misleading pedagogical device, and should be relaxed or replaced by more realistic assumption with respect to intersector labour market behaviour in drawing policy implications from the model. There is the problem of how MP is to be measured in practical terms. However, the model is being attacked on its assumption of closed economy which denies the possibility of food and raw materials imports, and its ignorance to the role of capital in agricultural production (Ghatak and Ingersent, 1984).

2.4: Theories of Agricultural Development

Hayami and Ruttan (1971) have summarised in their book "Agricultural Development: An International Perspective" major theories of agricultural development. These theories

are classified by them under the following headings; the conservation model, the urban industrial impact model, the diffusion model, the high pay-off input model, and the induced development model. In these theories the interaction among resource endowments and economic entities (farms, public institutions, and private industries) leads to technical change and productivity growth in agriculture. In these theories technical change represents an essential element in the growth of agricultural production. Let us take up briefly each of the above mentioned models of agricultural development.

2.4.1: The Conservation Model

This model of agricultural development developed in the late eighteenth century on the basis of two sources; first, from the advances in crop and livestock husbandry associated with the English agricultural revolution and from the concept of soil exhaustion presented by the early German soil scientists. According to Habakkuk (1968), the English agricultural revolution consisted of the evolution of an intensive, integrated, crop-livestock husbandry system. In the process, the Norfolk crop-rotation system replaced the open-three-field system in which arable land was allocated between permanent crop-land and permanent pasture. This involved the introduction and more intensive use of new forage and green manure crops and an increase in the availability and use of animal manures. This "new husbandry" permitted the intensification of crop-livestock production through the recycling of plant nutrients, in the form of animal manures, to maintain soil fertility (Hayami and Ruttan, 1971 p.28). The British

doctrine of "new husbandry" was accompanied by a German doctrine of "soil exhaustion" which was developed by the German soil scientists. This new doctrine held that the danger of soil exhaustion was so great that any permanent system of agriculture must provide for the complete restoration to the soil of all the elements removed by a crop. According to Usher (1923); the doctrine of soil exhaustion first took shape in the later part of the eighteenth century, when the humus theory of plant-nutrition was dominant. It was then supposed that plants derived their food from the organic matter in the soil, collectively designed as humus. During the second quarter of the nineteenth century, the soil exhaustion doctrine was extended to include the maintenance of the mineral content of the soil, when the relation of soil minerals to plant growth was recognised.

Agriculture in this model is seen as a relatively self-contained system. The inputs used in this conservation approach are indigenous inputs supplied by the agricultural sector itself. According to this theory of agricultural development, the increase in land productivity was achieved, as during the English agricultural revolution, primarily through labour-intensive methods of fertility enhancement (such as green manuring and forage livestock system), land development (such as drainage and irrigation), and capital formation in the form of livestock and fruit and nut-bearing trees. In this model, the industrial inputs do not play a significant role in agricultural development.

Although the conservation model was capable, in many areas of the world, of achieving reasonably high rates of growth in agricultural production, in the range of 1.0

percent per year, over relatively long periods of time, it is not in itself a complete model to fulfill the increased demand for agricultural products in the contemporary developing countries with rapid population growth.

2.4.2: The Urban Industrial Impact Model

According to Hayami and Ruttan (1971) this model was developed to provide reasons for geographic variations in the intensity of farming and in the productivity of agricultural labour in an industrializing economy. For this model the primary intellectual inspiration was drawn from the early efforts of Johann Heinrich Von Thunen (1783-1850) to determine both the optimal intensity of cultivation and the optimal farm organisation or combination of "enterprises". Von Thunen generalised the Ricardian theory of rent to show how urbanisation determines the location of production of agricultural goods and influences the techniques and intensity of cultivation (Dickinson, 1969).

Schultz (1953), pointed out the implications of the location of urban industrial development for agricultural development in the United States to be as the following;

- "1. Economic development occurs in a specific location matrix...
2. These locational matrices are primarily industrial-urban in composition...
3. The existing economic organisation works best at or near the centre of a particular matrix of economic development and it also works best in those parts of agriculture which are situated favourably in relation to such a centre."

Schultz presented a logical basis for the urban industrial impact approach in terms of more efficient

functioning of factor and product markets in areas of rapid urban industrial development than in areas which did not reach this stage of development.

A series of empirical studies were designed by Ruttan (1955) to test both the validity of the empirical generalisation and the factor and product market rationale of this urban-industrial impact model. Results of these empirical studies have generally sustained the validity of Schultz's empirical generalisation with respect to the impact of urban-industrial growth on geographic differentials in per capita or per worker farm income. The tests of the factor and product market rationale, however, have been much less conclusive. The policy implications of this model of agricultural development appear to be quite applicable to the less developed regions of the highly industrialised countries. In these regions, agricultural development can be accelerated by either increased industrial decentralisation or migration of surplus agricultural labour to more distant urban industrial centres. In contrast, this urban-industrial impact model of agricultural development appears to have limited application to most of the developing countries in which the major problems are of achieving a reasonable rate of economic growth in the industrial sector rather than the geographic distribution of economic activity, and the unavailability of the required technology for rapid agricultural development.

2.4.3: The Diffusion Model

This model implies that, the diffusion of better husbandry practices and of crop and livestock varieties between regions and countries has been a major source of

productivity growth in agriculture. The diffusion model rests on the empirical observation of substantial differences in land and labour productivity among farmers in any agricultural region from the most developed countries to the most less developed ones. In this model the way to agricultural development is through more effective distribution of technical knowledge in productivity among the scattered farmers and regions.

Several studies have showed the extensive diffusion of cultivated plants and domestic animals in the pre-historical and classical civilisations.¹ Farmers in different places and in different times have invented new cultivation methods which, later on, made their way to other places. According to Nou (1967), Young, the ideologue of the English agricultural revolution in the eighteenth century, regarded such knowledge as the only foundation on which scientific farming could be based.

The diffusion approach to agricultural development has provided the major intellectual foundation for much of the research and extension effort in farm management and production economics. This research and extension efforts were accompanied by simultaneous progress in quantitative methods and data processing techniques.

Concerning the agricultural technology transfer between the different nations Hayami and Ruttan (1971) analyzed the

¹ See for example C.O.Sauer, "Agricultural Origins and Dispersals; The Domestication of Animal and Foodstuffs", (2nd edition; Cambridge: Massachusetts Institute of Technology Press, 1969), pp.113-134; N.I.Vavilov, "The Origin Variation, Immunity and Breeding of Cultivated Plants", Trans. K.Starr; Chester Vol.13, Nos.1-6 of Chronica Botanica 1949-50; E. Enderson, "Plants, Man and Life" (Berkeley; University of California Press 1967).

rate of adoptive research in the process of diffusion. They distinguish three phases of this transfer; the first phase is what they call "material transfer" it is characterised by simple transfer of materials such as seeds, plants and animals for direct use. The second phase is "design transfer" which is accomplished through the transfer of certain designs or blue prints, in the form of exotic plants and animal and foreign equipment, for purposes of copying designs rather than for direct use in production. Phase three is "capacity transfer" which is attained through the transfer of scientific knowledge and capacity. It makes it possible to produce locally adopted technology on the basis of a "prototype" technology that exists abroad.

Owing to the limitation of this model, it failed to generate either rapid modernisation of traditional farms or fast growth in agricultural output. This model which is based mainly on the assumption of easy technology transfer from the highly developed countries to the other countries, in my opinion, is too simplistic. In fact, this transfer is highly limited because the technology is location specific. Moreover there exists different variations among countries in climate and resource endowments.

2.4.4: The High-Pay-Off Inputs Model

This model was developed by Theodore W. Schultz (1964) encompassing the central concepts of the conservation, urban-industrial impact, and diffusion models of agricultural development. As Schultz states, "there are comparatively few significant inefficiencies in the allocation of the factors of production in traditional agriculture". An

important implication of this statement is that the productivity of the traditional agriculture generally cannot increase so as to contribute significantly to economic development by the reallocation of traditional factors of production. Instead, the key to transform the traditional agricultural sector into a productive sector is investment to make modern high-pay-off inputs available to farmers in poor countries. According to Hayami and Ruttan (1971), this model implies three types of relatively high productivity investment for agricultural development;

- 1) In the capacity of agricultural experiment stations to produce new technical knowledge;
- 2) In the capacity of the industrial sector to develop, produce, and market new technical inputs; and
- 3) In the capacity of farmers to use modern agricultural inputs effectively.

The champions of this model as Brown (1970) states, have been encouraged by the success of efforts to develop new high-productivity grain varieties (i.e. wheat, rice and corn) suitable for the tropics which are also highly responsive to industrial inputs such as fertiliser and other chemicals, and to more effective soil and water management.

In this model of agricultural development, research and education play a very significant role to produce the suitable high-pay-off inputs.

Although this approach of agricultural development is capable of generating a sufficiently high rate of agricultural growth as practised in many countries, it remains a weak and incomplete model. Education and research are

obviously public goods, not treated through the market place. The mechanism by which resources are allocated among education, research, and other alternative public and private sector economic activities is not fully incorporated into this model. However, this model does not explain how economic conditions induce the development and adoption of an efficient set of technologies for a particular society. Nor does it attempt to specify the process by which factor and product price relationships induce investment in research in a particular direction. Lastly, since generally research and education are largely financed by the government, their supply depends on the effectiveness of the government development programmes and policies which are quite unstable in developing countries.

2.4.5: The Induced Development Model

This model, as developed by Hayami and Ruttan (1971), seeks to explain how technical and institutional changes are induced through the responses of farmers, agri-business managers, scientists, and public administrators to resource endowments and to changes in the supply and demand of factors and products. In this model, the technology alternative available to any society is either a biological technology if the agricultural development is faced by an inelastic supply of land, or a mechanical technology if the agricultural development is faced by an inelastic supply of labour. In this approach of agricultural development, the technical change is treated as endogenous to the development process rather than as an exogenous factor to it.

Public sector investment in agricultural research is

highly emphasised in that it ought to be directed towards releasing the constraints on agricultural development imposed by the factors characterised by a relatively inelastic supply. Beside research, attention must be given to the improvements of credit, marketing, land tenure, price policy, extension and other aspects of agricultural development. The induced development model advanced by Hayami and Ruttan includes such crucial elements for agricultural development as the mechanism of; (a) induced innovations in the private sector, (b) induced innovations in the public sector, (c) interaction between technical change and institutional development, and (d) dynamic sequences of technical change and economic growth.

For the induced innovations in the private sector, it is incumbent on competitive firms to allocate funds to develop a technology which may facilitate the substitution of increasingly more expensive factors for less expensive ones. Concerning the public sector induced innovations, the response by research scientists and administrators in public institutions to resource endowments and economic change represents the critical link in the inducement process. The institutions that direct the use of technology or the "mode" of production can also be induced to change in order to enable both individuals and society to take a fuller advantage of new technical opportunities under favourable market conditions.

In the dynamic process of development, the existence of disequilibrium is a crucial factor in enhancing technical change and economic progress, as it happened in the United States in the mid nineteenth century when the introduction of

reapers was induced as a result of an imbalance in the labour requirements between the planting and harvesting operations. According to Morgan (1980), this famous model was examined mainly in relation to agricultural development in Japan and the United States and it has been also tested by developments in developing countries, more especially by the events of the Green Revolution.

2.5: The Role of Agriculture in Economic Development

The traditional approach to the role of agriculture in economic development is formulated in terms of the "contributions" the agricultural sector can make to the process of economic development. These "contributions" of the agricultural sector have received greater emphasis in the last three decades from even such economists who used to highlight only the contributions of urban-industrial growth. This change in attitude towards agriculture rests on several factors; a) the increasing inability of developing countries to feed their growing population; b) the relative increase in per capita income which leads to an increase in the demand for food in developing countries; c) the rapid degree of urbanisation which increased the number of urban consumers that are to be supplied with food; and d) the recent concern about equal distribution of income. This shift in attitude to agriculture is, at its best, reflected by the shift in agricultural and industrial development perspectives and policies adopted by the policymakers and planners of the developing countries. The most important ways in which increased agricultural productivity can contribute to the general economic development can be summarised in five

propositions, as pointed out by Johnston and Mellor (1961):

- 1) Providing more domestic food and raw materials;
- 2) Providing foreign exchange through agricultural exports;
- 3) Generating domestic saving and capital formation;
- 4) Releasing productive labour to the other sectors; and
- 5) Serving as a market for the products of the industrial sector.

According to Myint (1975), the above "contributions" can be interpreted in two ways: Firstly, as voluntary "contributions" or the spontaneous functions of the agricultural sector reflecting its interrelationships with the rest of the economy in the process of economic development. Secondly, as compulsory "contributions" that can be made to perform by deliberate policy. To illustrate, the agricultural sector can voluntarily contribute to the supply of domestic savings if these savings flow out freely, induced by the higher returns to investment in the manufacturing sector. On the other hand, savings can be squeezed out of the agricultural sector by taxation or by turning the terms of trade against agricultural products. Similarly, the agricultural sector can increase the size of the domestic market, if the farmers decide to spend a reasonable proportion of their income on domestically manufactured goods in preference to imports; but the agricultural sector can also be compelled into contributing to the size of the domestic market by import restrictions, by being treated as the captive market.

The extant literature on the role of agriculture in economic development deals mainly with: first, to provide a

broad historical perspective on the role of agriculture in economic development. Next to draw historical lessons from the experiences of the developed countries during the early stages of their economic development with the purpose of applying these lessons to the contemporary developing countries.² Let us now turn to investigate each of the above mentioned five contributions of the agricultural sector.

The first contribution of agriculture is to support the non-agricultural population by sufficient quantity and quality of cheap food. This is an essential requirement for a healthy society and a productive working population. If the food supply increases slower than the population, it entails a chain of adverse effects on the economy. The domestic food shortages are likely to be offset by expanding food imports, provided that foreign exchange is available. Usually, in most of the developing countries foreign exchange is scarce, and spending part of this foreign exchange on food imports restricts the means to import factors of production such as technology, skilled labour and management which are already in short supply in developing countries. Poor agricultural productivity, in other words, hinders the growth of the rest of the economy and limits the resources available to promoted development. A slowly growing agricultural sector can also result in inflationary pressures. Aggregate

²For details about the point under discussion see S. Kuznets "Economic Growth and the Contribution of Agriculture", International Journal of Agrarian Affairs No.2, (1961); W.H. Nicholls, The Place of Agriculture in Economic Development, in K. Berill (ed.), "Economic Development with special reference to East Asia," (New York; St. Martin's Press, 1964); H.J. Habakkuk, Historical Experiences in Economic Development, in E.A.G. Robinson (ed.), "Problems of Economic Development." (London, Macmillan, 1965).

demand for food in developing countries has been growing not only because of population growth, but also because of the rising per capita income and the relatively high income elasticity of demand for food.³ If food production does not grow to meet this aggregate demand and if food imports are limited by foreign exchange constraints, both the absolute and the relative prices of food will tend to increase. These inflationary effects directly affect the whole population, in general, and the lower income groups, in particular, who spend most of their income on food. The higher prices, and a higher proportion of income spent on food results in a low-level saving, which adversely affects the capital formation. High food prices also call for a new level of wage rates in the industrial sector which causes lower profits and investment levels.

In addition to the provision of an adequate supply of food, the agricultural sector provides raw materials such as fibers, hides, and skins for the processing industries. Failure to achieve targets of raw materials output may mean retarding the progress of industrialisation, or an additional drain on foreign exchange if these supplies are imported.

In countries lacking adequate national resources such as oil, gold, copper etc., the agricultural sector can make a significant contribution to the net foreign exchange

³To measure the rate of growth of aggregate food demand (D) the following equation can be used:

$$D = P + NG$$

Where P = rate of population growth, N = the income elasticity of demand for food, and G = the per capita income growth rate. For more details about this equation see K. Ohkawa "Economic Growth and Agriculture" Annals Histotubashi Academy, October 1956, pp.45-60.

earnings. Such earnings in a country trying to set up its development efforts are extremely important in paying for the growing demand for consumption and capital goods stimulated by income expansion or by the growing inflation. Agriculture provides foreign exchange through expanded exports or through displacement of current and potential imports or through both. The contribution from import displacement may represent a direct displacement of imports of agricultural goods through expanded domestic production or an indirect change through a shift in consumption patterns towards domestically produced agricultural goods and a way from imported goods. In developing countries and at the early stages of development, infant industry is more capital absorptive requiring imported equipment, and agriculture by providing foreign exchange plays a great role in developing industry. According to Baba and Totemoto (1968), Japan was a classic example of a successful attempt to increase agricultural exports of silk, tea, and other products in order to gain the required foreign exchange to help carry on the development projects and establish a solid industrial base in the country.

The third contribution of agriculture is the provision of capital to the other sectors. In most of the developing countries, with the exception of oil producing countries, more than half of their national income is likely to be derived from agriculture and its closely related activities. If that is where the income is, that is where the savings potential will be. The capacity of agriculture to contribute capital for industrial development depends upon the levels of consumption and investment in the agricultural sector which

are low especially at the early stages of development. Consequently, a large part of the savings generated by the agricultural people can be siphoned off to finance the industrial development and this is exactly what happened in Japan in the last part of the nineteenth and the beginning of the twentieth centuries, as mentioned by Ohkawa and Rosovsky (1960). There are many ways of directing the agricultural savings to the benefit of industry. Direct taxation in the form of land tax, output tax, and agricultural income tax is the most practical method. Other methods may include: turning the terms of trade against agricultural goods to increase profits in industry as well as to create favourable effects on savings and investment; enlarging the market demand of the rural community for products of manufacturing industry; and by innovations and more efficient use of available resources in the agricultural sector. Thus more savings are accumulated.

Releasing cheap labour to the other sectors is the fourth contribution provided by agricultural sector. According to the above mentioned "labour surplus" models, labour is the basic contribution that agriculture makes to the industrialisation process. This implies not only the contribution of effective manpower but also of providing an unlimited supply of labour. Apart from this, according to Nurkse (1953) labour also contributes capital embodied in migrant workers in the form of education, and cost of rearing, etc.. The labour contribution stems from two sources as indicated by O.E.C.D. in 1965: a) the natural increase of the farm population, which provides the basis for a continuous outflow of labour; and b) at the early stage

of development, and due to the increase in labour productivity in agriculture, an absolute decline in numbers of farm workers will occur which will find its way into the industrial sector. The rate of labour transfer, of course, depends on the rate of growth of total labour force, the rate of growth of non-agricultural job opportunities and the proportion of labour force in agriculture (Mellor, 1966).

In addition to these methods of contributions, agriculture helps the economic development by providing a domestic market for the finished products (either consumer goods or agricultural equipment) of the industrial sector. The increase in agricultural production will not only provide capital for further investment in the economy, but also the resulting increase in the per capita incomes for the rural population will pave the way for further investment in industry. The smaller the market for industrial products, the fewer the opportunities for profitable activities and the less the inducement to invest in industry. The following argument illustrates why industrialisation in most of the developing countries runs from the very beginning into a major difficulty. According to Nurkse (1962), the trouble is that;

"there is not a sufficient market for manufactured goods in a country where peasants, farm labourers and their families, comprising typically two-thirds to four-fifths of the population, are too poor to buy any factory products, or anything in addition to the little they buy. There is a lack of real purchasing power, reflecting the low productivity in agriculture."

In another formulation, Kuznets (1965) summarizes the

role of agriculture in terms of contributions as "product" contribution, "market" contribution, and "factor" contribution. As the agricultural sector provides food to the increasing population, and raw materials for the industry, it makes "product" contributions. Kuznets also presents a formula to measure the size of this contribution in the context of GNP.⁴ Further, he concludes, that the share of agriculture in GNP declines as the economic development proceeds. The "market" contribution occurs when the markets in rural area are enlarged, and the demand by the rural people for consumer and producer goods produced by the industrial sector increases. Finally, the "factor" contribution is realised when resources such as capital and labour are transferred to industry from agriculture.

To conclude, agriculture can play a very important role in the process of economic development and industrialisation especially in the early stages of development. This role relatively declines when development proceeds. This role is multifaceted and differs from country to country in accord with the diversity in the physical environment, cultural heritage and historical context.

⁴ This formula according to Kuznets is:

$$\frac{Pa.Ra}{\delta P} = \frac{1}{1 + \left(\frac{Pb}{Pa} \times \frac{Rb}{Ra} \right)}$$

Where; Pa = Product of agriculture.
Pb = Product of all other sectors.
P = Total product = Pa+Pb.
Ra = Rate of growth of Pa.
Rb = Rate of growth of Pb.
δP = Increment in total product = aggregate growth.

2.6: Agricultural development policy instruments

There are many aspects concerning the agricultural sector, and for the overall policy for agriculture of a country is an amalgam of various instruments. In this section we would discuss some of these instruments including; land reform, agricultural extension, research, education and training, agricultural credit, price policy, and marketing services. Actually, most of the countries are applying some or all these policy instruments, but the degree of efficiency in applying them differs from one country to another.

2.6.1: Land Reform

In many developing countries, especially in Latin America, the historical and political upheavals have resulted in the concentration of land ownership in the hands of large landlords and plantation owners, while the rest of the land is crowded with under-sized farms on poor soils. In such cases, most of the rural people are landless labourers and their number is increasing due to the population growth. A major study made by Zuvekas (1979) of seven Latin American countries, based on census data during the years 1950-61, found that the distribution of agricultural land was particularly unequal in Columbia, Ecuador, Guatemala and Peru. In these countries, 64 to 88 per cent of the land was held by only 2 to 6 per cent of the farm operators. The landless farmers lease their land from the private landowners, paying rents in cash or in a share of their production, and usually do so under terms that give them little security. Rental agreements are likely to be verbal rather than written and of short term duration. the lack of

tenure security discourages long-term investment, and there is not even much of an incentive to increase the use of current inputs, since most of the gain in production is likely to go to the land-owners in the form of higher cash rents or crop shares. In some places, even the landowners lack the desire of making investments on their land, because their interests, activities, and goals are somewhere else. They are rather speculators interested in ready income from their lands. They neither supply the necessary management to their properties, nor engage in actual farm work. Another tenure problem in some of the developing countries is the confusion in the title to the land. Over great areas that are actually under cultivation, or are potentially cultivable, it is not yet clearly established in some countries whether the land belongs to the state or to some absentee landlord or to the occupant cultivator.

In view of the above problems, the land tenure structure is a major obstacle in agricultural development, and the only solution is a radical land reform policy which is a necessary precondition for agricultural and rural progress.

Land reform means, according to Warriner (1964), the redistribution of property in land for the benefit of small farmers and agricultural workers. This transformation process of land ownership from people with little incentive to use it to people with high incentive to use it will increase the land area cultivated and productivity. However, according to Todaro (1981), land reform policy may take the following forms:

- 1) Transfer of land from large estates to small farms;

- 2) Transfer of ownership to tenants who already work the land;
- 3) The appropriation of large estates for new settlements; and
- 4) The improvement or irrigation and subsequent development of large private or state owned lands into farmer cooperatives.

Nonetheless, the land reform policy cannot be successful if it is not accompanied by provision of adequate credit, technical assistance, marketing facilities and extension services.

2.6.2: Agricultural Extension Services

Agricultural extension, or advisory work as it is called in the O.E.C.D. terminology may be defined as the provision to farm people of informal education, including advice and information, to help them solve their problems. It aims to improve the efficiency of the farm business, increase farm incomes and raise the level of livelihood. Extension services are quite essential to the development of the agricultural sector, especially in developing countries in which almost all the farmers are illiterate or have very low levels of education. The assistance provided by the extension service to farmers differs with the stage of development of agriculture. In the initial stage of development, where farmers use old techniques of cultivation and produce mostly for their own subsistence needs, the extension service has to be production oriented. When the farmers start to produce large marketable surpluses, the extension service

should have other functions in providing them with advice on market outlets, distribution channels, prices, and quality standards. In the high stage of development when farming becomes very specialised and more capital intensive, the extension service should give the farmers advice on industrial production methods and on financial management problems.

In terms of organisational framework, Chang (1963) distinguishes three broad types of organisation of the extension service;

- 1) The dividend type - where each technical department or organisation (of a ministry of Agriculture) has its own extension service. This type, according to Stier (1974), was to be found in most Asian countries during the early sixties.
- 2) The consolidated type, where all extension for agriculture is under one administration except forestry, fisheries and other non-agricultural activities are served by other government units.
- 3) The unified type, where all extension to agriculture in the general sense is under one administration.

In terms of the approaches or concepts by which the extension service is provided to the farmers, F.A.O. (1962) has defined three types which are: a) the "educational" concept, in which, the work of extension agent is to educate farmers in order to influence them to adopt improved practices in production and management; b) the "service" concept implies that the extension agents should provide only services such as multiplication and distribution of improved seeds, the supply of farm implements, fertilisers and

insecticides, without involving themselves in any regulatory work; c) the "all-inclusive" concept, which includes not only informal education for training, but also other services such as supply of farm inputs, reporting of crops, collection of statistics, control of acreage, handling of government loans and credits etc.

Carrying farming problems to the research stations, and the research results to the farmers is one of the important functions of the extension service. Therefore, for efficient extension services, a high degree of coordination with the research stations is essential. Also, for efficient extension services, adequate staff, both qualitatively and quantitatively is highly needed. Opinions differ as to what the ratio between extension workers and farmers should be. The ratio needs to be adapted to local conditions such as the distance between farmers, the mobility of the extension workers, the receptiveness of the farming population, the availability of research results, the potentials for increased production, and so on.

In sum, extension service policy is pivotal on agricultural development programme. Its services differ with the desired objectives and with the respective approaches. It is undoubtedly the best way to provide education to the large number of illiterate farmers in developing countries. The provision of extension services is a responsibility of the public sector or the farming cooperatives. The return on the public expenditure on extension is found to be significant and investment on it is profitable. Therefore, the level of investment on such a policy should be adequate.

2.6.3: Agricultural Research

In advanced countries such as the United States, Britain, and Japan, the increased productivity of agriculture has been due mainly to improved technologies and inputs which are the direct results of successful research programs.

Because the results of agricultural research are to varying degree public goods, in which one person's consumption of new knowledge leaves others no worse off, and once this knowledge is available, it is difficult to exclude others from consuming it, therefore the investment on research must be the responsibility of the government.

A transformation of the technological base of agriculture rooted in research innovation can serve three important policy objectives as Schultz (1964) says. Firstly, the increase in yields and output will help meet the national requirements of food and reduce foreign exchange expenditures on their imports. Secondly, in so far as import substitution means a perfectly elastic demand for agricultural products, increased output through technological improvements will also help raise farm incomes and living standards of the farmers. Thirdly, research can reduce resources used by some crops production and divert these to other higher value agricultural products such as vegetables and animal products for which the demand will grow with rising incomes.

In view of the earlier argument it is evident that research plays a significant role in increasing the level of agricultural productivity and output. Thus, the investment expenditures on research must increase due to the high rate of return. Numerous studies have shown that investment in agricultural research can have high internal rate of

return.⁵ In addition to these studies, the pioneering work in estimating the contribution of research to farm productivity is that of Griliches (1964), who studied the economics of the hybrid corn innovation in the United States which increased the supply of the crop. The benefits of this process were estimated by him as the additional "surpluses" (consumers' and producers') associated with these innovations. The costs were the accumulated research expenditures on hybrid corn projects. Griliches estimated the Internal Rate of Return associated with the hybrid corn programme to be 35-40 per cent.

Effective research programs require well trained technicians whose salaries are high enough to dissuade them from emigrating; continuous contacts with the international research institutes; an easy access for the researchers to journals, abstracts and other publications; and enough funding to finance the different research programs and facilities.

When knowledge is created in the research stations, it must be carried to the scattered farmers. Education and extension services carry the research results to farmers. Therefore the complementarity between these three activities is required.

In view of the numerous problems in the agricultural

⁵ For a summary of these studies which show the high rate of return from research investment, see W. Peterson, W. and Y. Hayami "The technical change in Agriculture" A survey of Agricultural Economics literature, vol.1, ed. Lee R. Martin (Minneapolis, University of Minnesota Press, 1977); Arndt, T.M., Dalrymple, D.G., and Ruttan, V.W.(eds.) "Resource allocation and productivity in National and International Agricultural Research", (Minneapolis, University of Minneapolis Press 1977)

sector (i.e. crop, soil and animal problems), priorities should be established to focus research on the most critical problems.

In most developing countries, the planners and the decision makers underestimate the role of research in increasing the productivity of agriculture by the inadequate levels of investments on research. For example, according to Evenson and Kislev(1970), in 1965, the world total expenditure in research was \$1.1 billion, with close to 60,000 scientists engaged in research activity, in which the shares of developing countries were 11 per cent and 17 per cent respectively. The low research funding is not the only problem confronting the research efforts in developing countries, but also the inadequate number of researchers and well-trained staff, weak organisation, low level of publications, and the lack of communication channels for research results.

2.6.4: Agricultural Education and Training

Education and training provide the very foundation for agricultural development. In subsistence agriculture, traditional patterns of activity dominate the production of food. Rural people lack knowledge of modern agriculture, and if they are to increase their output, they must learn scientific methods and must become able and willing to apply them. Education and training of people on the land is the process by which it may be brought about.

What is of utmost importance is that development requires change in the attitudes and actions of individuals. Education and training for agricultural development must be oriented towards understanding the reasons why change is

necessary, and the results to be expected of change; the processes and procedures by which change in agriculture is achieved; and the risks and uncertainties involved in applying new methods and new enterprises.

The educational and training activities make their contributions to agricultural development through the actions of farmers, as well as through actions of non-farmers who serve farms directly or indirectly, farm leaders, and those who make policies affecting the agricultural sector. Therefore, according to Montgomery (1967), farmers and their families are not the only clientele of agricultural education and training, but rather the non-farmers who serve the farmer locally such as middlemen traders, extension agents, managers of local cooperatives, private businessmen who provide agricultural inputs, and those serving the farmer centrally at research stations.

Increasing agricultural output is the fruitful result of having adequate education and training policies. According to Welsch (1970), the productive value of educational activities has been attributed to a "worker" effect and an "allocative" effect. The "worker" effect arises because increased education may permit a worker to accomplish more with the resources available. This is the marginal productivity of education which is defined as the change in output per unit change of education with the quantities of other factor constant. Increased education may also increase output by improving the farmer's ability to acquire, interpret and evaluate information, including information of new inputs. This is the "allocative" effect of education. In the other hand, "worker" effect is the result of the increase in the

quality of the labour input component of the human factor, which can be brought about by an increased educational level. Similarly, the "allocative" effect is the result of increase and improvement of the decision making function of the management input.

Educational and training programmes are introduced either through the regular public schools such as elementary, middle, secondary and college education, or through specialised farm schools. Programme objectives and curricula are largely determined by purpose and clientele (UNESCO, 1971). In elementary schools, for example, the objectives of agricultural education should be to develop interests in agriculture and to develop awareness of students about the dignity of manual labour and the importance of plants and animals to human beings. At the secondary level, the objectives should be the proficiency in productive farming, developing competence in occupational agriculture, and the development of awareness and knowledge of the scientific principles of agriculture.

At the university level, agricultural education and training should be oriented to the present and the immediate future needs of the agricultural sector, and must focus on practical training on modern farming. Lastly, in the farm schools and farmer training centres, the primary objectives ought to be the development of farming skills and abilities through participation in short intensive practical training. As far as the developing countries are concerned, the educational system neglects agriculture at all levels. School education curricula at all levels are urban-oriented, even in rural areas. School gardens which are designed to

give students some ideas of simple farm technology, are so poorly managed that they reinforce negative attitudes towards agriculture as a low-status occupation.

Therefore, for ensuring a prosperous agricultural and rural development in the developing countries, their educational and training curricula need radical changes to make them more agricultural and rural oriented. Moreover, educational and training programmes for agricultural development must be designed for the problems and needs of the areas. Second, they must be oriented to the situation and the stage of development that now exists, and not to the development stages of the developed countries. Finally, educational processes must be flexible and capable of changing with time and conditions.

2.6.5: Agricultural Credit

Credit as defined is a device for facilitating the temporary transfer of purchasing power from one individual or organisation to another. Credit plays a very crucial role in modernising agriculture, by which farmers can buy and use new inputs of production. Although the initial motivation for offering credit to farmers was said to provide relief to the agricultural sector subsequent to natural disaster, later interpretations have resulted in a broader sense of credit requirements. The recent application of credit policies have included encouraging the development of all aspects of agricultural development including the introduction of technology to farming operations and the improvement of both transportation and marketing facilities within the general framework of national development programmes.

For farmers to increase their productivity, they must spend more on improved seeds, pesticides, fertilizers and implements. Such expenditures must be financed either from savings or by borrowing. Saving in the agricultural sector, especially in developing countries, is limited due to low marginal propensity to save and marginal productivity of capital. The alternative way to farmers, of course, is to borrow from the outside sources. Loans to farmers are usually provided by non-institutional and/or institutional agencies.

A high proportion of the credit in developing countries is usually borrowed from non-institutional sources which consist of friends and relatives, landlords, village shopkeepers, and moneylenders who often charge high interest rates and demand harsh and unreasonable loan terms. In fact, small farmers are forced to turn to these sources of credit for the following reasons: a) small farmers generally have no access to institutional credit unless they are landowners; b) even if they have access to bank credit, their requests are ignored not just because the risk of lending to them is perceived to be relatively great, but also because the administrative costs of processing loan applications are high in relation to the small amount required by farmers with only one or two hectares of land (Lipton, 1976); c) small farmers have special needs for consumer as well as producer credit. But, their demand for consumer credit is often ignored by official credit programs. Some programmes often explicitly exclude consumption credit by providing loans in the form of production inputs rather than cash; and d) administration is often weak or simply corrupt, and loans benefit primarily those who have alternative sources of credit but who prefer

the public institutions because of subsidised interest rates and longer repayment periods. Whatever the justifications may be for getting credit from non-institutional sources, loans from these sources are neither adequate nor production oriented and are largely contracted to meet consumption expenditures. Governments have attempted to provide an alternative to the non-institutional market by establishing their own credit institutions such as the cooperative credit organisations and the agricultural development banks. These institutions provide farmers with three kinds of loans; short-term, medium-term, and long-term loans.

Although in most of developing countries, both the non-institutional and institutional sources of credit are operating side by side, but unfortunately the non-institutional sources, except friends and relatives, provide mostly short-term loans directed mostly to consumption purposes and containing high rate of interest. On the other hand, the institutional sources give quite limited amount of credit.

A serious problem facing the credit policy in most of developing countries is the low rate of credit recovery. To improve the efficiency in the use of credit, the government agencies must find ways to overcome this problem and as well should take a tougher stance on defaults.

Recognising the great role of credit policy in modernising the agricultural sector, and due to the low level of knowledge among the farmers, the supervised credit is the most successful policy for improving agriculture in developing countries. Credit in this policy is accompanied by or coordinated with sufficient amount of extension or educational services to ensure effective investment supervision.

2.6.6: Agricultural Price Policy

Generally, prices play very crucial roles in the production sector. These roles, according to Timmer (1980), are: a) in the choice of the crops to be grown; b) in the choice of technologies used to grow the crops; and, c) in the choice of input levels needed to produce output level.

In most of the countries, both developed and developing, some forms of the price policy are practised. The price policy is either concerned with the prices of products or with the prices of inputs or both. With respect to the "product price" policy, the price guarantee instrument is commonly used. The system of guaranteed product prices contain two elements: "stabilisation" and "support". The first, by providing a minimum price which acts as a "floor", seek to insure farmers against the risk of bad weather, seasonality of production and the inelasticity of demand and supply of farm goods. The second, by providing an incentive price above the "floor" to stimulate more production. The effect of guaranteed prices on production, could be theoretically of twofold; Firstly, by stabilising prices it could reduce the element of uncertainty in agriculture and thereby encouraging production. Secondly, by supporting prices it could enhance profitability and provide incentives for increased output. This price support policy has been followed by some of the developing countries of which Saudi Arabia, with the existing wheat programme, is an example.

In fact, the advocates of this policy argue that higher prices will stimulate production by:

- 1) Causing producers to move closer to their production possibility frontier by better use of resources.

- 2) Encouraging use of more labour and other variable resource inputs to reach higher production function and output level.
- 3) Inducing investment and the discovery and adoption of new agricultural technologies that result in new, lower cost production function.

The above "support price" policy is mainly based on the evidence of positive responsiveness of agricultural production to price incentives which has been supported by many empirical studies (Askari, 1976; Krishna, 1967; Falcon, 1964; and Bardhan, 1970). Such positive responsiveness has been found mostly in developed countries. But as a matter of fact, in some of the less developed countries, where most farmers are producing for subsistence and not for the market and where the impact of the surplus foreign food disposal programme is great, then the response to a price increase might be either zero or negative (Ghatak and Ingersent, 1984).

Another form of "price policy" which has been practised by most of the capitalist as well as socialist countries especially in their early stages of development, is a "negative" price policy in which to lower food prices for the benefit of the urban consumers (Krishna, 1967). Such a policy is sometimes used as a way of transferring resources from agriculture to other sectors. In this case, the agricultural sector will be affected unless it is experiencing a significant technological change and increasing production and productivity at a rapid rate.

With respect to "factor" price policy, because of the low level of use of agricultural inputs such as fertilizer,

pesticide, new seeds, and agricultural machinery, some countries stimulate the farmers to use more of these inputs by the way of price subsidies. As Barker and Hayami (1976) point out that there is ample evidence that the level of modern inputs such as fertilizer is much lower than the optimal level (in which marginal value product equals marginal cost) due to lack of knowledge, risk aversion, and other reasons. Assuming a large gap between actual and optimum levels in input of fertilizer, for example, it is possible that the subsidy on fertilizer, which stimulates increase in its application, may result in a higher level of production, and a net welfare gain to the society. Input subsidy is either paid to the farmers directly when they buy the new inputs or to the traders who sell these inputs to farmer or to the importer of such inputs.

Based on empirical studies, some economists such as Barker and Hayami (1976), Ahmed (1978), argue that "input subsidy" policy is more efficient than "price support" policy in terms of benefit/cost ratio, and requires less cost to the government for the achievement of self sufficiency stage in agricultural production. Moreover, price support policy is likely to require more social cost than benefit because it will induce farmers to use more of the traditional inputs such as land and labour above their economic optimum.

2.6.7: Agricultural Marketing Policy

Marketing service represents an essential part of agricultural development programme because it is the link between the producers and the consumers. Marketing includes all the business activities involved in the flow of goods and

services from production to consumption. Producers and consumers, both influence, and are influenced by, the operating methods and efficiency of the marketing system. For the producers, without accessible markets which provide them with a reasonable return for their efforts, there is little incentive for them to expand production beyond the needs of their families. Consumers on the other hand, require regular and satisfactory provision of food supply which cannot be provided without efficient marketing services.

An efficient marketing system must perform a variety of functions simultaneously. It must provide a timely supply of inputs to the agricultural sector. Besides, it must distribute seasonally produced agricultural output over time and space to consumers and processors at the minimum cost. In the short run, it must mobilise market supplies from fixed production. In the long run, it must integrate local markets into national markets. It must provide detailed market knowledge to farmers on where, when, and for how much products can be sold, which is essential to determining which products to grow and which varieties of these products. The extent to which a market system performs these various functions efficiently depends, according to Lele (1974), on the availability and quality of; 1) the physical infrastructure such as transport, storage, marketing and processing facilities; 2) the financial institutions; 3) the communications network; and 4) the entrepreneurial and managerial manpower.

Transport is one of the essential marketing services. Unless the surplus products of the farmers are transported to the consumption areas, they are of no value to both farmers and consumers. Since transport is so important, inadequate

transportation facilities can greatly hinder marketing development and efficiency. A basic step in improving marketing efficiency is, therefore, to improve the existing transport facilities, or to provide them if they do not exist.

The storage of agricultural products over longer periods of time is another marketing service which is important because of the perishability of products, and the seasonal nature of their production. Lack of storage facilities results in not only foodstuffs damage but also contributes to extreme seasonal price fluctuations of these foodstuffs. Lack of storage facilities also cause the farmers not to respond to market incentives for increasing production. For example, Hayami and Ruttan (1971) pointed out that inadequate storage facilities in the early years of Green Revolution prevented some farmers in the Philippines from growing two rice crops a year. Adequate storage facilities require a high amount of capital investment. So a careful decision is to be made on the type, size, and location of these facilities.

Grading of the agricultural products is another major issue of the marketing system. Grading means sorting the produce into different lots, each with substantially the same characteristics such as size, colour, type, flavour, degree of ripeness or other features which affect the commercial value of the product. The aim of grading is to help buyers select the most suitable produce for the uses they want. The lack of uniform grades and standards can discourage efforts to improve product quality and can also contribute to waste.

Packaging and handling is yet another important market-

ing service. Most agricultural products must be enclosed in some kinds of containers, if they are to be marketed widely and efficiently. The handling of agricultural products, especially perishable ones, calls for a special care all the way from the farm to the consumer. Rough and careless handling causes serious and unnecessary losses to both producers and consumers.

Providing a nationwide price information system is another important marketing service which helps the farmers take correct decisions regarding which crops to plant, when to sell, and the desirability of on-farm or community level storage facilities.

In addition to establishing or improving the above mentioned marketing facilities, due care is paid to upgrading the marketing personnel. Trained people are needed at all levels and in all areas of marketing.

Because different marketing facilities and services require substantial amount of capital and some degree of organisation, government or private institutions should be established to shoulder the responsibility of establishing these services. Some of the market institutions are; 1) Marketing Societies and Boards, 2) Government regulated markets, and 3) Marketing Cooperatives.

In conclusion, it should be borne well in mind that marketing is very closely interrelated with agricultural production. Therefore, modern marketing is very difficult without modern production. Production is important for marketing because the quantity and quality of the products available for marketing and the time periods when they are available, influence how efficiently and effectively a

marketing system can perform its basic functions. For example, if the quantity of a product is small and available for only short or irregular periods of time, then large-scale and low-cost handling, packaging, storagging, grading facilities cannot be used economically.

2.7: Planning Agricultural Development

According to Veer (1971), planning can be defined as the formulation of objectives to be achieved in a more or less distant future, the analysis of possibilities of achieving these objectives, and determining in a functional order the actions which have to be taken. This definition indicates that planning always aims at the future and that it involves three elements: formulation of objectives, analysis of possibilities, and determination of programmes of action.

Agricultural planning and decisions are taken in all countries, regardless of their economic and social systems, but the extent of this planning differs from one country to another because there is no widely-accepted set of principles for ordering agricultural development. Agricultural planning is usually carried out by the public sector, or in rare cases by the private sector under public sector regulations and control. According to Ghatak and Ingersent (1984), in developing countries, agricultural planning should not be left to the private sector that lacks the entrepreneurial skills and leadership and looks after its narrow interests.

Since development in agriculture and in other sectors is clearly interdependent and mutually supporting, an agricultural plan is usually prepared within the framework of a national development plan, or if prepared separately is

based implicitly on assumptions regarding the performance of the whole economy.

Experience shows that agricultural planning takes usually the following three forms; The first is a national plan for agriculture composed of subplans for all the regions of country, coordinated in line with national development objectives and policies. The second form of agricultural planning covers one or more selected regions within a country. This approach is sometimes practised by developing countries who do not have the resources to perform a comprehensive development policy. These countries prefer to direct their effort to one or a few regions where the total returns are likely to be higher than the one if the same resources were spread more thinly. The third type is the one which is a part of a comprehensive plan for a specific region, or where it is considered desirable to develop national resources located in a given region such as a river basin for irrigation.

A logical series of steps in planning the agricultural development in developing countries has been identified by Ojala (1968) on the assumption that data and other information are available. The most important ones include;

- a) Defining clearly the objectives of the agricultural development.
- b) Review of the framework of national magnitudes especially population, income, foreign trade and investment resources like to be available for agriculture.
- c) Assessment of long-term perspectives for agricultural development and the needed changes.

- d) Estimating the future demand for agricultural goods during the plan period.
- e) Setting production targets.
- f) Choosing the appropriate policies.
- g) Successive approximation. and;
- h) Implementation on review.

According to the time horizon, agricultural plans are of three kinds, annual plans, medium-term plans which range from three to seven years with a mode of five years, and long-term plans - having more than ten years. The selection of the plan time depends on the needs of the country and formulated objectives.

The objectives of agricultural development planning differ from one country to another and over time. For fruitful planning, these objectives should be clear and concrete. They range from the attainment of economic and social goals such as increased domestic food production, high income levels and employment opportunities, capital formation, foreign exchange earnings, or improvement of social, health, transport and education facilities. Whatever be the precise objectives, the overall purpose of development planning is to promote human welfare and growth (FAO., 1963). Responsibility for setting the objectives for agricultural development rests mainly with political leaderships. On the other hand, planners have the responsibility of providing the politicians with alternative objectives, together with their relative benefits and costs in economic, social and financial terms. When the clearly defined objectives quantified in specific terms, backed up by policies, investment and other proposed

actions, they became targets. As social and political aspects play a crucial role in the selection of targets, politicians have the final word in this matter. On the other hand, planners have the task of explaining what is involved in choosing the various targets.

Target setting is a difficult task. Set too high, as Mollett (1984) indicates, targets may become very discouraging or even meaningless, and too low, a waste of resources and output.

In order to achieve the above mentioned objectives and targets, suitable policies should be carefully selected. Those selected should lead to optimum use of the available resources subject to the various technical, economic and institutional constraints.

Land reform, extension services, research, education and training, price support, subsidies, credit and provision of inputs are all means for carrying out policies.

To determine and measure the desired policies, the planners should be familiar with planning techniques. Among these techniques are budgeting, linear programming, demand and supply projections, input-output methods, and simulation models. Using these planning techniques requires data, qualified staff, and computers in most cases.

The above description of planning and its well identified and applied objectives, targets, policies and techniques is a common sight in advanced nations. Consequently, their agricultural sectors are highly developed. On the other hand, agriculture in most of the developing countries is underdeveloped due to weak planning. In these countries many agricultural plans do not have

clearly defined objectives. Even where the objectives are clear in some cases the means for achieving them may not have been spelled out in details, quite simply because the required analytical work has not been done. Some plans do not indicate what resources are to be allocated to each project in the programme because there are not enough well-prepared projects. Another problem is that plans which are supposed to include all public investment in agriculture may actually focus on only one or two subsectors such as irrigation projects or land settlement. Moreover, some of the plans in developing countries may attempt at the impossible by including a long list of projects which can not all be completed during the plan period. In some of developing countries, the applied policies are inadequate, and the planning techniques are not practised at all due to the lack of required data and scarcity of qualified persons.

CHAPTER THREE

3: THE MAIN FEATURES OF THE SAUDI ECONOMY

3.1: Introduction

This chapter aims to deal with the main aspects of the Saudi Arabian's economy. In sections two and three, general information about the geography and population of the kingdom has been presented. A quick overview of the economy structure is discussed in section four, along with the composition of Gross Domestic Product. In section five, oil sector is given more attention because of the dominant role it plays in the Saudi economy. The manufacturing sector in its two segments, oil-based and non-oil-based industries as well as the incentives provided by the Government to push this sector are investigated in section six. In section seven, the discussion on the agricultural sector is made in a broader sense, mainly because it is the main theme of this thesis. Since Saudi Arabia has close ties with the international economy, some information about exports and imports in general and agricultural imports, in particular, of Saudi Arabia are presented in section eight.

In the last section the Five-Year Development Plans are briefly taken up with a view to presenting a clear picture about the planned development in a developing country like Saudi Arabia.

3.2: Geography, topography and climate

Saudi Arabia is one of the largest and most arid countries in the Middle East covering an area of 2,240,000

sq.km. (864,869 sq.miles), almost ten times the area of Great Britain. Occupying approximately four-fifths of the Arabian Peninsula, Saudi Arabia is surrounded by Jordan, Iraq and Kuwait on the north, by North Yemen, South Yemen and Oman to the south, the Arabian gulf, the United Arab Emirates and Qatar to the east and the Red Sea to the west. In addition to the country's religious and economic significance, the potential importance of Saudi Arabia's geographical position is readily apparent; it is strategically located between Africa and mainland Asia, lies close to the Suez Canal and has frontiers on both the Red Sea and the Arabian Gulf.

Geographically, the land of Saudi Arabia is divided into six regions, Central, Western, Southwestern, Eastern, Northern and the Empty Quarter.

The Central Region (Nejd) considered as the heart of the country, is a vast eroded plateau containing the Royal Capital of Riyadh. The plateau slopes towards the east, from an elevation of about 4,500 feet in the west to about 2,500 feet at its eastern most limit. A number of valleys cross the region generally in an eastward direction from the Red Sea escarpment towards the Arabian Gulf. The heart of this region is the area of Jabal Tuwaig, an arc-shaped ridge whose steep west face rises between 400 and 600 feet above the plateau. Many agricultural oases exist in this area, of which wheat and vegetables are the main products. The most important of these oases are Buraidah, Unaizah, Al-kharj and Aflaj.

The Western Region (Al-Hijaz) covering an area of 135,000 square miles includes the remainder of the west coast region along with the mountain chain decreasing gradually in elevation as it moves northward, and the coastal plain

bordering the Red Sea widening slightly. In this region is the main business centre and chief port of Jeddah. This region contains also the holiest of the holy cities of the Islamic World - Makkah which houses the Kaaba (the House of God) the holy shrine visited by the muslims from all over the world every year, and Medina, the city of Prophet Mohammed (Peace be Upon Him)¹. Also in this region there exists Taif, the summer capital of the government and the famous city in producing fruits such as grapes and pomegranates.

Asir region is relatively fertile area of coastal mountains in the extreme southwest. Mountain peaks rise to 10,000 feet with enough rainfall for cultivation. Abha, Jizan and Najran are the major cities in this region. Emphasis in this region is presently focussed on agriculture and on the development of summer resort areas.

The Eastern region (Al-Hasa) is a flat area of sedimentary rocks, sloping very gradually into the Arabian Gulf. As this area is much lower than the rest of Saudi Arabia, it has a large number of artesian springs, natural and manmade, which supply water for agriculture in the Al-Hasa and Al-Qatif oases, two of the largest oases in the Arabian Peninsula. This region is the country's wealthiest part, containing the massive petroleum resources.

At the extreme northern part of the country there exists the Northern Region in which Hail, Tabuk, Sakaka, and Al-Jouff are the main towns. Most of this region is covered with grass and scrub steppe vegetation and is extensively used for pasture by nomadic and semi-nomadic herders. Many oases make

¹This phrase is always uttered by muslims whenever they mention any Prophet such as Moses, Jesus, Mohammad..etc.

this region suitable for cultivated agriculture and for meat production through sheep, goat and camel raising.

The South-Eastern part of Saudi Arabia is completely occupied by the so called Rub'-al-Khali (the Empty Quarter). This part is a sand ocean with neither permanent settlement nor nomadic agriculture due to the absence of water.

Topographical features of Saudi Arabia are diverse, beginning with the narrow coastal plain along the Red Sea. A north-south chain of mountains slightly in from the coast separates the coastal plain from a great plateau which slopes gradually to the eastern coast on the Arabian Gulf.

Almost one third of the country's land is covered by sand. There are three main areas of sandy desert - the Great Nafud (5720 sq.km.) in the north, the Rub-al-Khali (640,000 sq.km.) in the south, and the Dahna, a 25-30 km. wide river of sand extending over 1300 km. and connecting the Great Nafud with the Rub-al-Khali.

As far as the climate is concerned, Saudi Arabia lies in the tropical and subtropical zones. Summer and winter are the most identifiable seasons; summer extends the longest, from late May to September, while winter lasts from early December to February. Also as a result of the different elevations in the country, climates and temperatures widely vary along the different seasons and regions. The coastal areas of the Red Sea and the Arabian Gulf tend to be humid in the summer with moderate (50-80 F) in winter. The mountain areas in general are cool all the year round. The central plains are hot and dry in summer and cooler during the winter months. Temperatures in these plains range from a maximum 50c in summer to below zero at night in winter. As a result of the intensive

summer heat, evaporation figures for Saudi Arabia are high, attaining values of 3000mm per annum from open water surface (Beaumont 1977).

Saudi Arabia has no lakes or permanent rivers. Rainfall is seasonal (winter months) and unpredictable and, except in the south-west region, where the effect of the Indian Ocean monsoons are felt, varies on average between 10mm and 150mm. In certain areas such as the Empty Quarter it is totally lacking in some years. Rainfall in the west and southwest regions exceeds 400mm in the mountains and averages 250mm along the Red Sea coast south of Jeddah. But because these areas are hilly, most of the farms are small. In the interior parts when it rains, the showers are local and sometimes take the form of violent storms of short duration. In general, as a result of the inadequate rainfall, irrigation is mainly based on underground water and various dam projects are required to maintain and expand agricultural development.

3.3: Population and Labour Force

The demographic characteristics of Saudi Arabia are not yet accurately known. The bedouin tribes in Saudi Arabia are still basically nomadic and it is not possible to obtain a true count of their numbers. Therefore estimates at best, represent only the guess work. It has been estimated that the population of Saudi Arabia was between 1.5 to 2 million in the early 1930s. Wahba (1938) put the population at 4 million in 1938, of which one third was settled. A census was conducted in 1962-63 but the government did not publish its figures. The U.N. Population Division estimated the mid-1965 population at 6.8 million and projected figures of 7.7 million for mid

1970 and 8.9 for mid 1975. The only official published census carried out by the Government was in 1974, and revealed a total population of 7.01 million. For 1984, the population of Saudi Arabia was estimated by the UN (Population Reference Bureau Inc., 1984) at 10.8 million. In the official census of 1974, it was held that almost 27 per cent of the Saudi population were nomads and unevenly divided among the eleven administrative areas. However, from the 73 per cent of the settled population 34 per cent live in rural areas while more than half were engaged in agriculture.

Urbanisation in Saudi Arabia has been rapid over the last 50 years. The estimated size of the urban population in 1932 was about 100,000 while by 1962-63 this figure had risen to 800,000 (McGregor, 1972). According to table 3.1, 38 per cent of the Saudi people live in towns of at least 30,000 residents. The population of Riyadh, the royal capital was 666,840 in the 1974 census, and that of Jeddah, the leading port and commercial centre on the Red Sea 561,104. For these two cities, the estimated population reached 1.3 million each in 1984, which is almost twice the number in 1974.

The high level of urbanisation has been due mainly to the substantial rural-urban migration, as well as the huge inflow of foreign workers to the country. In 1983, only 10 per cent of the population were considered nomads, compared to over a quarter in 1974. In so far as the population density in Saudi Arabia it was almost 4.7 per sq.km. in mid-1983, using the UN population estimates. This density figure is very low, and Saudi Arabia can be considered as an under-populated country.

TABLE 3.1

MAJOR TOWNS IN SAUDI ARABIA WITH A POPULATION OF
OVER 30,000 INHABITANTS IN 1974 CENSUS

Town	Administrative Area	Number of Families	Population
Riyadh	Riyadh	101,506	666,840
Jeddah	Makkah	97,363	561,104
Makkah	Makkah	67,947	366,801
Taif	Makkah	30,877	204,857
Medina	Medina	35,390	198,186
Dammam	Eastern Province	21,513	127,844
Hofuf	Eastern Province	14,551	101,271
Tabuk	Northern Province	10,696	74,825
Buraidah	Qasim	8,774	69,940
Mubarratz	Eastern Province	7,775	54,325
Khamis Mushayt	Asir	9,142	49,581
Khobar	Eastern Province	9,023	48,817
Najran	Najran	9,149	47,501
Hail	Hail	6,065	40,502
Jizan	Jizan	5,648	32,812
Abha	Asir	5,413	30,150
Total	11	440,832	2,675,356

Total Population of towns over 30,000 inhabitants	=	2,675,356
Total population of Saudi Arabia	=	7,012,642
% of population living in towns over 30,000 inhabitants	=	38%

Source: Kingdom of Saudi Arabia, Ministry of Finance and National Economy, General Department of Statistics
"The Statistical Indicator" 1980 p.32

As far as the natural population growth in Saudi Arabia is concerned, there are no precise data available even in the official census of 1974, owing to inadequate reports of births and deaths, especially in rural areas. It is estimated that the rate of population growth is nearly 4 per cent per year (El-Mallakh, 1982). This rate, if constant would almost double the 1974 figure by 1990. With respect to the age structure, Saudi Arabia like most of the developing countries has a youthful population. According to the United Nations estimates, persons under 15 years of age constitute 44 per cent of the total population.

The dependency ratio², which is defined as the relationship between the dependent age group (0-14, and 65 and over) and the non-dependent age group (15 to 64) is high in Saudi Arabia. Al-Takroni (1984) found this ratio to be 104.1 in 1974. This high ratio reflects the high dependency of the youth and the old on the potentially active people.

The total labour force in Saudi Arabia was over one million in 1966, of which 15 per cent were Non-Saudis. As the development plans were initiated in 1970 which required a high proportion of skilled and unskilled labour the situation changed. During the first Five Year Plan (1970-75), the total labour force grew by an estimated 19.0 per cent from 1,328,000 in 1970 to 1,600,000 in 1975. The growth rate for Non-Saudis was higher than for Saudis, 4.2 per cent compared with 3.7 per cent, but Saudis still comprised about 80 per cent of the

²This ratio can be calculated as follows:

$$R = \frac{P0 \text{ to } 14 + P65 \text{ and over}}{P15 \text{ to } 64}$$

Where R = dependency ratio, P = population

labour force in 1975. According to the Ministry of Planning (the Third Five Year Plan, p.35), the average annual growth rate of the local labour force was 2.4 per cent, but the imported labour force recorded a tremendous increase of 16.5 per cent. In 1980, the total labour force reached 2.5 million, of whom the foreign labour formed 43 per cent. This shows that the country is highly dependent on foreign labour, even when the later plans have tried to reduce their number. The imported labour can be conveniently divided into two types. The first is unskilled workers coming from surrounding areas (e.g. N.Yemen), mostly employed as day labourers in construction or other hand-labour jobs. The second group consists of skilled and semi-skilled workers mostly from other Arabic-speaking countries but some from Europe, the United States, and Asia (primarily South Korea, Philippines and Pakistan). Many of those from the United States work in the oil sector. Arabs from outside the Arabian Peninsula hold the largest share of positions classified as skilled equipment operators, services, sales and agriculture. Westerners dominate the technical and scientific sector and the management sector. South-Asians account for the largest share of the big-scale construction.

3.4: The Composition of Gross Domestic Product

Before delving into the details on the Saudi economy it is pertinent to present first an overall view with reference to the composition of the Gross Domestic Product (GDP) and its growth. Based on the nature of Saudi economy, the total GDP can be disaggregated into oil GDP and non-oil GDP. Table 3.2 shows GDP by economic activities in constant prices for the

TABLE 3.2

GROSS DOMESTIC PRODUCT BY OIL AND NON-OIL SECTORS, AND KIND OF ECONOMIC ACTIVITY IN PRODUCERS' VALUES.
(At Constant Prices of 1970 - In SR Million)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
1) <u>Non-Oil GDP</u>	7587	8040	8607	9720	11183	12636	15138	17692	20252	22522	25184	28318	31503	33721	34962	34035
Agriculture, Forestry and Fishing.	984	1018	1050	1089	1130	1174	1221	1282	1483	1550	1640	1735	1839	2023	2286	2583
Mining and Quarrying ¹	47	49	55	77	97	82	112	134	146	125	128	153	211	191	186	182
Manufacturing ²	431	484	543	600	665	721	828	955	1104	1276	1477	1711	1982	2299	2599	2570
Electricity, Gas and Water ³	273	298	329	381	417	322	345	414	546	725	868	1109	1396	1686	1977	2274
Construction ³	715	692	770	917	1249	2197	3066	3895	4310	4501	4660	5233	6837	5837	5329	4545
Transport, Storage and Communication	1243	1468	1544	1849	2224	1289	1580	1929	2367	2729	3118	3383	3659	3985	4426	4387
Other Services	3894	4031	4316	4807	5401	6851	7986	9083	10296	11616	13293	14994	15579	17700	18159	17494
2) <u>Oil GDP</u>	9566	11542	14014	17413	20063	18903	19112	21626	21513	21999	23869	24653	22383	14309	13033	10883
Mining of Crude Oil and Natural Gas	8106	9922	12427	15556	18158	17339	17510	19852	19650	20112	21652	22487	20233	12038	10464	8298
Petroleum Refining	1241	1355	1304	1378	1417	1300	1359	1523	1591	1688	1749	1745	1716	1749	1979	2027
Construction Associated thereof	219	265	283	479	488	264	243	251	272	199	468	421	434	522	590	558
3) <u>Total GDP</u>	17153	19582	22621	27133	31246	31539	34250	39318	41765	44521	49053	52971	53887	48030	47995	44918

Notes: 1) Excluding mining of oil and natural gas. 2) Excluding petroleum refining.
3) Excluding construction associated with the oil sector.

Source: Saudi Arabia, Ministry of Planning, "Achievements of the Development Plans 1970-1984: Facts and Figures." ; SAMA, Annual Report, 1986.

period from 1970 to 1985, while table 3.3 presents the changes in the relative share of each sector for the same period. It is evident that the separate components of GDP grew at different rates. This may be attributed to the differences of emphasis in the development policies adopted; to the differing responses of individual sectors of the economy to development efforts; to the level of growth achieved; to exogenous factors; or to a combination of all these factors (UNCTAD, 1976). In general, total GDP at constant prices, increased from SR 17,153 million in 1970 to SR 53,887 million in 1982 representing an increase of 314 per cent, or an average of 10 per cent per annum. According to Moliver and Abbondante (1980), this is an outstanding rate of growth compared with other developing countries. Of course, most of this growth is caused by the increases in oil prices initiated during the 1973 Middle East War and continued since that time. At the end of 1982, oil-price increases came to an end and started falling. The oil price fall accompanied by low level of oil production caused the total GDP to fall by 11 per cent in 1983, and by another one per cent in 1984. In 1985, the total real GDP was SR44,918 million, over 16 per cent less than the high level of 1982.

Oil GDP dominates the economy and constitutes the major single component of GDP. To trace the growth of oil GDP, it increased by 82 per cent during the period of 1970 to 1973, and further by 15 per cent within one year later caused by the increase in oil prices.

Despite receding slightly in 1978, the oil GDP grew at an average of 4.5 per cent a year over the period 1974 to 1981. Following cuts in crude output, however, the sector fell by

TABLE 3.3

PERCENTAGE DISTRIBUTION OF GROSS DOMESTIC PRODUCTION BY KIND OF ECONOMIC ACTIVITY WITHIN SECTORS.
(At Constant Prices of 1970)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
<u>1) Non-Oil GDP.</u>	43.6	40.4	37.5	35.4	35.3	39.8	43.9	44.6	48.2	50.2	51.0	53.5	58.5	70.2	72.8	75.8
Agriculture, Forestry and Fishing.	5.7	5.1	4.6	4.0	3.6	3.7	3.5	3.2	3.5	3.5	3.3	3.3	3.4	4.2	4.7	5.7
Mining and Quarrying ¹ .	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4
Manufacturing ² .	2.4	2.4	2.4	2.2	2.1	2.3	2.4	2.4	2.6	2.8	3.0	3.2	3.7	4.8	5.4	5.8
Electricity, Gas and Water.	1.6	1.5	1.4	1.4	1.3	1.0	1.0	1.0	1.3	1.6	1.8	2.1	2.6	3.5	4.1	5.0
Construction ³ .	4.1	3.5	3.3	3.3	3.9	6.9	8.9	9.8	10.3	10.0	9.4	9.8	11.5	12.2	11.0	10.1
Transport, Storage and Communication.	7.1	7.4	6.7	6.7	7.0	4.0	4.6	4.9	5.6	6.1	6.3	6.3	6.8	8.2	9.2	9.7
Other Services.	22.4	20.2	18.8	17.5	17.1	21.6	23.2	23.0	24.6	25.9	26.9	28.5	30.1	36.9	38.0	39.1
<u>2) Oil GDP.</u>	55.0	58.0	61.0	63.3	63.4	59.6	55.5	54.5	51.2	49.1	48.4	46.5	41.5	29.8	27.2	24.2
Mining of Crude Oil and Natural Gas.	46.6	49.9	54.1	56.6	57.4	54.8	50.8	50.0	46.8	44.9	43.9	42.2	37.4	24.9	21.7	18.4
Petroleum Refining.	7.1	6.8	5.7	5.0	4.5	4.1	4.0	3.8	3.8	3.8	3.5	3.3	3.2	3.6	4.1	4.5
Construction Associated Thereof.	1.3	1.3	1.2	1.7	1.5	0.7	0.7	0.7	0.6	0.4	1.0	0.8	0.9	1.3	1.4	1.3
<u>3) Total GDP.</u>	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

NOTES: 1) Excluding Mining of Oil and Natural Gas. 2) Excluding Petroleum Refining.
3) Excluding Construction Associated with the Oil Sector.

Source: Saudi Arabia, Ministry of Planning, Achievements of the Development Plans 1970-1984; Facts and Figures. ;
SAMA, Annual Report, 1986.

9.2 per cent in 1982, and further by 36.1 per cent in 1983. In 1984 and 1985, the oil GDP continued its decline at an average rate of 12.7 per cent.

As far as the contribution of oil sector to the total GDP is concerned, it is the prime moving force behind economic growth in Saudi Arabia and forms the major component of GDP. During 1970 and 1978, the average contribution share has been approximately 58 per cent per annum, with a higher contribution share in 1974 of 63.4 per cent. Since 1979, the share of oil GDP started to decline to reach the lowest level of 24.2 per cent in 1985. This decline in oil GDP, of course, was paralleled by an increase in the share of non-oil GDP.

Because of the Saudi's economy division into oil and non-oil sectors, all other sectors, except oil, are included in the non-oil sector. Agriculture, manufacturing, construction, transport and communication, and services are the major components of the non-oil sector. Non-oil GDP had a consistent growth between 1970 and 1985, increasing by 356 per cent from SR 7,587 million, to SR 34,035 million with an average growth rate of 12.0 per cent per year (see table 3.2). This growth rate which is higher than the rate of oil GDP growth for the same period, is a natural result of efforts made by the Saudi Government to channel oil revenues into the non-oil sector to build up a multi-based economy. In 1985, the non-oil GDP contribution to the economy was 75.8 per cent, compared with 35.3 per cent in 1974. Within the non-oil sector, construction showed the highest growth rate of 22.1 per cent per annum between 1970 and 1982. In 1983, construction growth rate declined by 14.6 per cent, and more by 22.1 per cent in 1985, due to the completion of most of the infrastructure during the

second and third plans (1975-1985). Manufacturing and agriculture, both experienced steady growth over the studied period, having an average growth rate of 13.2 and 5.8 per cent per annum respectively. The value added of agriculture and manufacturing to the total GDP increased from SR 984 million and SR 431 million in 1970 to SR 2,583 and SR 2,570 million in 1985 respectively. Eventhough their values added to the total GDP increased over time, their real contributions to the total GDP were not satisfactory. While the agricultural contribution decreased from 5.7 per cent in 1970 to 5.7 per cent in 1985, the manufacturing contribution registered a slight increase from 2.4 per cent to 5.8 per cent within the same period. The value added of the other non-oil sector components and their contribution to the total GDP may be studied from the enclosed two tables. Next, in view of the important role played by oil, manufacturing, and agricultural sectors in the economy of Saudi Arabia, this aspect has been discussed at length.

3.5: The Oil Sector

The economy of Saudi Arabia is considered mainly as an oil-based economy. Oil production is the most important sector in the country, and in mid 1970's, this sector contributed more than 80 per cent of the total GDP (in nominal term), more than 90 per cent of the government revenue, and 99 per cent of the country's foreign exchange earnings. Saudi Arabia is the biggest oil producer within OPEC (Organisation of the Petroleum Exporting Countries), with about 43 per cent of the organisation's output in 1981, and is the third biggest producer in the world, with about 17.6 per cent of world output. Saudi Arabia's known reserve of oil were officially

stated to be 169 billion barrels in January 1985, allowing 102 more years of production at 1983 levels (Unwin 1986).

Before studying the trends in oil production, prices and the consequent revenues, let us first turn to the oil development history in Saudi Arabia. At the end of this section, the recent effects of oil price reductions and production glut is briefly investigated.

3.5.1: History

The history of oil in Saudi Arabia started in 1923, when a British company obtained a concession to explore oil in the Eastern province. The company did not exercise its rights and four years later the agreement was cancelled (Katanani, 1971).

In 1933, a Saudi sixty years concession was granted to Standard Oil Company of California to explore petroleum. The agreement covered an area of 360,000 miles extending from the Arabian Gulf to westward edge of the Dahna Desert and a preferential area covering parts of central and western Nejd. After intensive search, oil was found in Damman, five years later in 1938.

In 1944 the largest single oil-producing company in the world was formed in Saudi Arabia under the widely well-known name, ARAMCO (The Arabian American Oil Company). By the end of the World War II, four oil fields had been discovered, and the necessary facilities had been established (including a large refinery) to meet post-war demands for crude oil and refined products. Other American firms gradually acquired shares in Aramco, bringing the ownership structure in 1948 to: Standard Oil 30%, Texaco 30%, Exxon 30%, and Mobil 10%.

In 1949 the Saudi government granted the Getty Oil

Corporation a 60-year exclusive concession, totalling 5,000 sq.km. covering its undivided half-interest in the Saudi Arabian-Kuwait Neutral Zone. In 1961 Arabian Oil Company went on stream with production from the offshore of the neutral zone of the Arabian Gulf.

Therefore, oil in Saudi Arabia is produced by three companies, Getty Oil Corporation (onshore), the Arabian Oil Company (offshore) and Aramco which produces almost 96 per cent of the total production.

The Saudi government in 1962 established the General Petroleum and Mineral Organisation (Petromin) which is the first national petroleum company. Petromin's role is to maximise the usefulness of the kingdom's oil, gas and minerals (Al-farsy,1982). It is thus engaged in the production, utilisation and marketing the oil and mineral products. Refining, pipelines, storage, power generation - all also fall within Petromin's responsibility.

In line with moves by other Arab oil-producing countries, the Saudi Government took a 25 per cent share in Aramco in 1973. The share was increased to 60 per cent in 1976 and to a 100 per cent takeover in 1980. State control over Aramco is exercise by Petromin in addition to its above mentioned duties.

3.5.2: Production, Prices and Revenues

The economy of Saudi Arabia is interwoven with the production and exploration of crude oil. Oil was first discovered in 1938, but large scale development did not take place until after the Second World War, when production grew rapidly. As mentioned above, three companies are behind

exploring, producing and marketing the Saudi's oil, and production comes from 37 oil fields operating within the Eastern region of the Kingdom. Ghawar,³ Safaniya, Abgaig, and Berri are the major oil fields.

Oil production in Saudi Arabia increased from 0.5 million barrels per day (bpd), when it was first produced in 1938 to 1,114.1 million bpd in 1968 (Aramco, 1968), representing almost 2,228 folds of increase within this span of 30 years. The rapid expansion in production came as a response to the gradual growth in world demand for oil accompanied by declining oil production of some oil producing countries, particularly the United States.

In recent years, especially since the mid 1970's, the growth of Saudi oil production has been spectacular. As shown in table 3.4, oil production rose from 1,386.7 million barrels (3.79 million bpd) in 1970 to 3,095 million barrels (8.47 million bpd) in 1974, representing a 123 per cent increase. In the depressed market of 1975, Saudi production of crude petroleum fell by 16.5 per cent to 2,582.5 million barrels, but it rose in 1977 to a new peak of 3,358 million barrels (9.2 million bpd). For the first three quarters of 1978, the world supply of oil was plentiful, prices remained steady, and Saudi Arabia kept production below 8.5 million bpd. In 1980, and as a consequence of the Gulf war, the Kingdom raised its oil production, giving a record total production for the year of 3,623.5 million barrels or an average daily production of 9.9 million barrels.

³ Ghawar oil field is generally accepted as the world's largest oilfield covering an area of 241 km. long and 35 km. wide.

TABLE 3.4

CRUDE OIL PRODUCTION AND RESERVES (1970-85)
(Million Barrels)

Year	Yearly Production by Source				Average daily Production	Reserves at end of year
	Aramco	Getty Oil	Arabian Oil	Total		
1970	1295.4	28.7	62.6	1386.7	3.79	138700
1971	1641.6	33.7	65.3	1740.6	4.77	138260
1972	2098.4	28.5	75.0	2201.9	6.01	137070
1973	2677.2	23.5	71.9	2772.6	7.59	136830
1974	2996.5	29.8	68.7	3095.0	8.47	141040
1975	2491.8	31.2	59.5	2582.5	7.07	144580
1976	3053.9	29.7	55.7	3139.3	8.57	151410
1977	2291.2	32.0	34.8	3358.0	9.20	169480
1978	2944.1	29.5	56.3	3029.9	8.30	167060
1979	3376.6	30.1	72.7	3479.4	9.53	168390
1980	3525.1	28.5	69.9	3623.5	9.90	167460
1981	3512.4	27.0	40.1	3579.5	9.81	164820
1982	2309.2	23.6	33.4	2366.4	6.48	168320
1983	1597.0	15.0	45.0	1657.0*	4.54	168790
1984	1435.5	-	-	1493.0*	4.08	n.a.
1985	1110.0	-	-	1158.8	3.17	n.a.

Note: * = Including other Oil Companies.
n.a. = not available

Sources: 1- Kingdom of S.A., Ministry of Planning,
"Achievements of the Development Plans 1390-1404
(1970-1984); Facts and Figures", p 191.
2- Kingdom of S.A., Saudi Arabian Monetary Agency,
SAMA, Annual Report, 1986, p. 201 (in Arabic)
3- "Gas Journal", March 10, 1986.

Slack demand in the West, combined with high oil price (\$34pb) made the government cut its production by 1.2 per cent to 3,579.5 million barrels in 1981. In 1982 world demand for oil continued to fall and, after a further OPEC meeting in March 1982, the Saudi Government declared a new upper limit of 7.5 million bpd for its production (O.E.C.D., 1985). In reality, output had already dropped below that figure. Total production for 1982 was 2,366.4 million barrels, an average of only 6.48 million bpd. Low oil demand accompanied by oil glut continued in 1983, therefore the output was reduced by 30 per cent as compared to the 1982 figure. In 1984 production levels fell once again, and ranged from between 3.4 to 3.6 million bpd in mid-September to 4.3 million bpd in October (O.E.C.D., 1985). However, in 1984 Saudi Arabia was also engaged in barter deals, whereby oil was exchanged for other goods but was not sold through the market. The situation became worse and production continued its fall being two million bpd in mid 1985, the lowest level for nearly 20 years.

As far as prices are concerned, Al-Braikan (1980) classified the oil prices of Saudi Arabia and the other Middle Eastern oil producing countries to pass through three stages. The first stage which ended in 1944 was represented by the domination of the American oil companies over these prices. During this stage Saudi Arabia and the other Middle Eastern oil-producing countries were playing a secondary role in world oil exports. The second stage began with the creation of OPEC which brought forth the idea of collective bargaining. Finally, the OPEC countries gained complete control over their oil prices decisions especially during 1970's.

Saudi oil price became significant only in 1970's after its dramatic increases which were accompanied by gradual increases in production which resulted in accumulated revenues to support the various development outlays. According to Table 3.5, Saudi oil price increased by 75 per cent from \$1.80 per barrel in 1970 to \$3.2 in 1973. Because of the Middle East War in the late 1973, oil price jumped by more than three times to \$10.72 per barrel in 1974. During this year oil revenue was \$22,577.5 million, representing a dramatic increase of 1,760 per cent from the revenue level of 1970. The price rises reflected OPEC's collective will to exploit a favourable market situation. The industrialised countries' fear of a shortfall in petroleum supplies put them completely in OPEC's hands. Therefore, the price increase drama continued to an average of \$15.97 per barrel in 1979, and within one year this price almost doubled to be \$27.17 per barrel in 1980. Consequently, revenues went along with these increases in prices to reach a peak of \$84,466.4 million in 1980 representing a 274 per cent increase from the level of 1974 and a 74 per cent increase from its precedent year.

Saudi oil price registered its historic peak of \$34 per barrel in 1982 and because this was accompanied by the beginning of fall in production, revenue decreased from its peak position of 1981 (\$101,813 million) by 31 per cent to \$70,478.6 million in 1982. In 1983 and later, both prices and revenues continued their decline, causing a very serious setback to the Saudi economy, as is evident from the following discussions.

TABLE 3.5

SAUDI OIL PRICES AND REVENUES (1970-85)

Year	Saudi Oil Price ¹ (\$ per barrel [*])	Oil Revenues ² (\$ million)	Oil Revenues as % of Total Revenues ³
1970	1.80	1,214.0	85.9
1971	2.13	1,884.9	87.3
1972	2.46	2,744.6	89.5
1973	3.15	4,340.1	89.2
1974	10.72	22,577.5	92.4
1975	10.72	25,676.2	84.5
1976	11.51	30,754.9	90.8
1977	12.40	36,540.1	89.7
1978	12.70	32,233.8	87.3
1979	15.97	48,435.2	88.9
1980	27.17	84,466.4	90.5
1981	33.73	101,813.0	89.9
1982	34.00	70,478.6	88.3
1983	29.83	37,351.6	75.6
1984	27.99	31,470.3	70.3
1985	25.85	18,322.9	70.8

* For the equivalent rate of exchange see appendix C

Source: Compiled from different sources;

- 1) Organisation of the Petroleum Exporting Countries, "OPEC bulletin", June 1985, p.49; July/August 1985, p. 21; March 1986, p. 49.
- 2) Saudi Arabia, SAMA, "Annual Report", different issues, 1982 - 1986.
- 3) Saudi Arabia, Ministry of Planning, "Achievements of the Development Plans 1390-1404 (1970-1984); Facts and Figures", table no.1 p.152.

3.5.3: The Effects of Oil Glut and Price Fall

The economy of Saudi Arabia is almost dependent on the oil sector and the collected oil revenues are the main source of government expenditure. Therefore, any reduction of these revenues affect seriously the government services and the planned projects. Since the beginning of 1980's, two developments have taken place: a fall in the world demand for oil, and an increase in oil production outside OPEC organisation. Production outside OPEC grew by 22 per cent from 1979 to 1984, while the world demand slumped from 51.2 million bpd to 45.7 million bpd (The Economist, July 6, 1985). As a direct result of these two events, oil glut associated with price fall become a worldwide phenomenon, of which Saudi Arabia is a victim. In 1985 Saudi Arabia was producing nearly two million bpd, almost one-fifth of the 1981 level of production, and less than half of its OPEC production quota (The Economist, July 27, 1985). This drastic fall in production was coupled with a fall in oil price. Saudi oil was available on a price level of less than \$10.0 per barrel in mid 1986, less than one-third of the 1982 price level. Consequently, oil revenues decreased as well causing the government to be the world's second biggest current account deficit, after the United States. As a result, public spending was down, and the Saudi citizens were being confronted with recession. Government employees in all different positions faced cuts in their benefits and allowances. Real estate rents have fallen by up to 40-50 per cent in the two main cities, Riyadh and Jeddah, where some 40 per cent of commercial and residential buildings are now said to be empty. Industry is as badly affected. The

government is delaying projects not yet begun and delaying payments for those already started. As a result, some foreign and local companies turned insolvent. According to Carim (1985), two contracting companies, National Chemical Industries and Carlson Al-Saudia, collapsed in 1984, partly because of the late payment to them of fees owed by the government.

Employment opportunities declined, and foreign workers were in queues at the airports ready to leave.

In 1986, even though the oil price has increased to reach almost \$18 per barrel due to the agreement among the OPEC members to reduce their production floor, the situation is still serious for the economy of Saudi Arabia, mainly because it is a single source economy. This has given the government a good lesson to pay more attention to the other sectors, particularly agriculture and non-oil manufacturing to be the future base of the economy.

3.6: Manufacturing Sector

Although manufacturing is still in its infant stage and plays a minor role in the economy, it represents the Saudi dream of reducing the country's overwhelming dependence on oil and diversifying the sources of national income. The manufacturing strategy in Saudi Arabia is to develop those industries in which the country has comparative advantages, and industries which can produce import-substitution goods. This recognises the advantages that industrialisation can bring to Saudi Arabia in terms of increased standards of living, greater output and better employment opportunities. The first of these groups includes the petrochemicals

industries which depend on oil and natural gas. The second group consists of non-oil manufacturing to produce goods for domestic consumption. In the following paragraphs mention is made of these two groups as well as the incentives provided by the government to develop them.

3.6.1: Oil-Based Manufacturing

Saudi Arabia is making determined efforts to achieve major industrial development, financed mainly by government revenues from petroleum under the aegis of the second, third and fourth development plans (1975-1990). The cornerstone of the industrialisation programme is the construction of refineries and processing industries to exploit the country's huge reserves of petroleum and natural gas. The major projects are being carried out as joint ventures between the Government and foreign companies.

Petromin (The General Petroleum and Mineral Organisation) is responsible for petroleum refining which are directed chiefly at the domestic market. Besides the three oil refineries in Jeddah, Riyadh and Yanbu, Petromin also has a lubricating oil refinery at Jeddah and a plant at Riyadh, run as a joint venture with Mobil Oil Company.

In addition, the Government established SABIC (the Saudi Basic Industries Corporation) in 1976, to be responsible for the other major industrial projects. Chief among them is the petrochemical development at Jubail, Jeddah and Yanbu, involving the construction of eleven large-scale plants, each of which is a joint venture with foreign companies. According to SAMA annual report (1984), all the three projects began operations in 1984. The Saudi Petrochemical Company was

producing ethylene, and was expected to come fully on stream in late 1985. The Al-Jubail Petrochemical Company started production of low-density polyethylene in November 1984, and the Saudi Yanbu Petrochemicals Company began ethylene production in December 1984. In addition, the Ibn Sina National Methanol Company began production at its Jubail plant (650,000 tons per year) in June 1984, and the Arabian Petrochemical Company, together with the Eastern Petrochemical Company, have commenced production in 1985. In the iron and steel industry, the Saudi Iron and Steel Company (Hadeed) has a capacity of 800,000 tons per year and is a joint venture in collaboration with a German company. The Jeddah Steel Rolling Mill (Sulb) has a capacity of 140,000 tones of steel rods and bars per year, and in 1983 sold 120,000 tons of steel billets. In the fertilizer industry, Al-Jubail Fertilizer Company (Samad) is a joint venture with Taiwan Fertilizer Company and has an annual capacity of 500,000 tons of urea. In 1983 its production was 178,000 tons, but by the beginning of 1985 it had reached its full capacity. Early in 1985 the Saudi Arabian Ferlilizer Company (SAFCO) and SABIC formed a company to build a 1,500 tons per day ammonia plant at Jubail. In general, Saudi Arabia's main objective behined these various industrial efforts is to expand its share of the world petrochemical market from two per cent in 1980 to about six per cent by 1990.

On the other hand, the high emphasis on the oil-based industries in Saudi Arabia, have been criticised on the following grounds; 1) These industries are highly capital intensive (i.e. the initial establishment of SABIC was SR 10 billion); 2) Even though all the foreign partners of joint

ventures are bound to market at least 40 per cent of production in their own countries, the Saudi petrochemical products are facing marketing problems, especially with the European countries who imposed more import controls, and; 3) Most of these industries use gas as the main input. This gas is an associated gas (i.e. it is found in conjunction with petroleum), so the fall in petroleum output during 1982-83 led to shortfalls in the production of gas and its "downstream" products.

3.6.2: Non-Oil Manufacturing

The Saudi Government is encouraging private enterprise to develop smaller-scale manufacture in an environment of free competition. According to EL-Mallakh (1982), this sector experienced modest rates of growth prior to its take-off in the early 1970's. The effect of small, self-sufficient firms as well as more traditional rural ties to agriculture, allowed manufacturing industry to expand only within the parameters of local market conditions. However, as oil revenues became more and more pervasive in the economy, new markets began to develop accompanied by a growing desire to invest in somewhat larger, more productive manufacturing establishments. During the period from 1975 to 1980, the growth rate of non-oil manufacturing was 15.4 per cent - slightly higher than the 14 per cent figure that was projected. For the Third Plan (1980-85) a rate of 6.2 per cent growth was targetted. This decline was a result of the low rate of employment growth that was anticipated for the 198-85 period as well as an expected disappearance of favourable effects from employment shift. Construction materials, especially cement, textiles, electrical

equipments, furniture, food processing and soft drinks are among the main products of the non-oil manufacturing sector.

To have a brief idea about the size of this sector, Table 3.6 might help. The cumulative total of licences issued up to the end of 1985 was 3409 with an aggregate capital of SR 135.6 billion. Of the licensed factories, 1785 with a capital of SR 55.4 billion had started production before 1985, while 79 factories with a capital of SR4,370 million came on stream in 1985. The machinery equipment industry is the largest of the producing industries in terms of established projects. It had 529 plants out of a total of 1,864 and its capital was SR 10.5 billion, or 17.6 per cent of the total capital of SR 59.8 billion. Construction materials came next with 499 operating plants and a capital of SR 18.3 billion. In terms of authorised capital, chemicals, rubber and plastics industry comes in the first place with SR 21.5 billion, 36 per cent of the total authorised capital. With respect to food manufacturing, 291 projects (15.6 per cent of the total projects) were operating in 1985 with a capital of SR 5.6 billion. These food projects range from dairy, meat packing, fruit and vegetable processing, bakeries to carbonated beverages, fruit juices and mineral water.

However, there is a considerable involvement on the part of the foreign investors, both from developed and developing countries. At the end of 1985, the number of plants established under the foreign capital investment regulations stood at 393, with a total capital of SR 18.8 billion, and mostly in petrochemical and metal industries.

TABLE 3.6

NON-OIL MANUFACTURING DEVELOPMENT IN SAUDI ARABIA

(Capital in SR Million)

	Licences Issued			Industries Established		
	During 1985	Cumulative Total	During 1985	Cumulative Total		
	Number of Licences	Authorised Capital	Number of Projects	Authorised Capital	Number of Projects	Authorised Capital
Food & Beverages	38	638	593	11,607	4	435
Textiles & Clothing	8	84	95	1,576	2	32
Leather Products	7	55	42	522	-	-
Wood Products	7	54	128	2,325	4	21
Paper Products & Printing	10	151	166	1,964	8	494
Chemicals, Rubber & Plastics	43	3,721	618	71,201	11	1,495
Ceramics & Glassware	-	-	20	778	-	-
Construction Materials	26	1,025	675	23,910	13	1,432
Metal Products, Machinery & Equipment	59	1,434	945	20,120	29	412
Other Manufacturing	8	55	75	811	6	26
Storage	-	-	52	768	2	23
Total	206	7,217	3,409*	135,582	79	4,370
						1,864
						59,780

* Including the licences of established factories and those under implementation as well as the ones to be implemented.

Source: Saudi Arabia, SAMA, "Annual Report", 1986, p. 120, (in Arabic).

3.6.3: Government Incentives to Manufacturing

The Saudi policy has been explicitly clear that private enterprise would be the main vehicle of industrial growth. In this respect, the Government has established a wide range of incentives and financial institutions. Among the provided incentives are the followings; 1) Native Saudi companies are totally exempt from company taxation, paying only Zakat.⁴ 2) Tariffs and quotas are imposed on competing imports in order to protect local industries. 3) Joint venture projects with at least 25 per cent Saudi equity participation are free from income and company taxation for a period of ten years after first start of production. 4) All manufacturing companies are also exempted from customs duties on imports of raw materials, machinery and spare parts. 5) Saudi products and manufactured goods are preferred by Government Ministries and agencies over similar foreign products as long as they serve the needed purpose (Presley, 1984). In addition to the above incentives, a total of eight industrial estates were established to offer basic infrastructure and services at minimal charge and long-term leasing basis.

Concerning the financial assistance offered to the private sector to carry out the responsibility of manufacturing, the Government established various institutions to provide easy payment loans and technical assistance. The Saudi Industrial Development Fund (SIDF) established in 1974 to provide long-run interest-free loans to private investors. The cumulative total of credit disbursed by SIDF to the various industrial sectors, had reached SR10.13 billion by the

⁴ An obligatory religious levy of 2.5 percent on liquid assets, and considered as one of the five pillars of Islam.

end of the fiscal year of 1985. The loans given by SIDF during 1984 only stood at SR 1.0 billion increasing by 23 per cent over 1983, and 39 per cent over 1982 (SAMA, 1984). Another institution to promote the manufacturing sector in the Kingdom is the Saudi Consulting House (SCH), previously known as the Industrial Studies and Development Centre (ISDC). The SCH is now providing the private sector with the feasibility studies required to obtain industrial licences and credit from the government financial institutions. Joint venture projects entered into by SABIC are financed by loans provided by the Public Investment Fund which was founded in 1971. In 1975 a Royal Commission was set up to be responsible for developing the two industrial complexes at Jubail and Yanbu where most of the projects of SABIC and PETROMIN are located. Finally, concerning planning, supervising, and controlling the manufacturing sector, Ministry of Planning, Ministry of Industry and Electricity, Saudi Arabian Standards Organisation play an important role.

On the other hand, although the non-oil manufacturing sector receives many Government incentives and financial assistance, it still faces overwhelming constraints of which the followings are the major ones;

- 1) The paucity of technological and management know-how;
- 2) The paucity of technical and skilled manpower; and
- 3) Inadequate marketing network and services.

To have sustainable development in this sector, efforts to overcome these constraints must be made.

3.7: The Agricultural Sector

Most of the people in Saudi Arabia live in rural areas, engaged in agriculture and its associated activities. In addition, Beduins⁵ comprise almost 10 per cent of the total population. Many farmers and Bedouins live at the subsistence level, and the surplus of agricultural production does not satisfy the increasing local demand. Therefore, foodstuffs have to be imported to fill the local production and consumption gap.

Palm-dates, wheat, sorghum, millet, alfalfa ,vegetables, and poultry products are the main agricultural commodities produced in Saudi Arabia.

In this section, an overview of the agricultural sector, along with its characteristics, and production is presented, while in the next chapter, a discussion on the governmental policies to develop this sector are dealt with.

3.7.1: The Place of Agriculture in the Saudi Economy

Before the discovery of oil in 1938, the agricultural sector was the major sector of economy, both in terms of employment and income. In that period Saudi Arabia was self-sufficient in food production. However, since producing oil in commercial quantities after the Second World War, and since the economy has expanded, the relative contribution of the agricultural sector decreased year after year.

Agricultural employment decreased from 46.2 per cent of total labour force in 1967 to almost one fifth of the labour

⁵A term Bedouins refers here to the truly nomadic people who live in tents and move throughout the desert with their animals, which are the main source of their living, following rain and pastures.

force in 1984, but it is still the largest employer sector. In nominal terms, the absolute value of agricultural output increased by 41 per cent, from 984 million of Saudi Riyals (SR) in 1970, to SR 1,392 million in 1975, as shown in Table 3.7. In the next five years, the absolute value increased more by 234 per cent, to reach SR 4,648 million in 1980. In 1985, the nominal value of agricultural output was SR 11,141 million, more than eleven times the value level of 1970.

Even though the agricultural production has been increasing over time, its relative contributions to the total Gross Domestic Product (GDP), and the non-oil GDP were small and on the decline. In 1970, the agricultural production constituted only 13 per cent of the nominal non-oil GDP, and 5.7 per cent of the total GDP. In 1977, these figures had fallen sharply to 2.8 per cent, and 0.9 per cent respectively. Thereafter, although the contribution rates of the agricultural sector have improved, but still were very low. However, the small contribution of agriculture to the economy, combined with having a high portion of employment indicate the low productivity of this sector, which in turn is influenced by various factors such as the prevalence of traditional methods of farming, small size of holdings, scarcity of water, harsh climate, lack of adequate infrastructure, and the low level of technology. As a result of the low productivity in agriculture, Saudi Arabia has become increasingly dependent on food imports which require a heavy draw of the available foreign exchanges.

TABLE 3.7

TOTAL GDP, NON-OIL GDP AND AGRICULTURAL GDP
IN SAUDI ARABIA 1970 - 1985

(In Current Prices - SR Million)
(Index: 1970=100)

Year	Total GDP		Non-Oil GDP		Agricultural GDP*			
	Value	Index	Value	% of Total GDP	Value	Index	% of Total GDP	% of Total Non-Oil GDP
1970	17,153	100	7,587	44.2	984	100	5.7	13.0
1971	22,581	132	8,253	36.5	1,016	104	4.5	12.3
1972	27,857	162	9,183	33.0	1,059	108	3.8	11.5
1973	40,087	234	11,403	28.4	1,139	116	2.8	10.0
1974	98,840	576	15,430	15.6	1,242	126	1.3	8.0
1975	139,224	812	28,123	20.2	1,392	141	1.0	4.9
1976	163,893	955	47,323	28.9	1,586	161	1.0	3.4
1977	203,942	1189	67,693	33.2	1,866	190	0.9	2.8
1978	223,818	1305	89,883	40.2	3,908	397	1.7	4.3
1979	247,622	1444	107,238	43.3	4,194	426	1.7	3.4
1980	383,590	2236	130,884	34.1	4,648	472	1.2	3.6
1981	517,994	3020	157,253	30.4	5,571	566	1.1	3.5
1982	522,176	3044	184,282	35.3	6,740	685	1.3	3.7
1983	411,801	2401	205,437	49.9	8,725	887	2.1	4.2
1984	368,399	2148	210,410	57.1	9,611	977	2.5	4.6
1985	326,963	1906	201,454	61.6	11,141	1132	3.4	5.5

* Contains Agriculture, Forestry and Fishing.

Source: Saudi Arabia, Ministry of Planning, " Achievements of the Development Plans 1970 - 1984; Facts and Figures.", Ministry of Planning Press, 1985; also SAMA, " Annual Report", 1986, pp. 89 & 228 (in Arabic).

3.7.2: The General Characteristics of Agriculture

3.7.2.1: Water Resources

Water scarcity represents the most limiting constraint on agricultural expansion in Saudi Arabia. There are no lakes or permanent streams in the country. Even though water resources are inadequate, demand for water increased rapidly in recent years due to the rapid population growth and urbanisation, the development of industry and agriculture. For example, agricultural consumption of water increased from less than two billion cubic meters in 1980, to more than 7.4 billion cubic meters or 84 per cent of the country's water consumption in 1985 (The Economist, 13 July, 1985). To meet this rapidly increasing demand for water, the country depends on four types of water supplies; rainfall, underground water, desalination water and the treated sewage water.

As we indicated before, only in the Southwestern part of the Kingdom rainfall is adequate for farming, otherwise it is very scarce and unpredictable. However, almost all rainfall that actually occurs is associated with thundershowers which usually cause severe erosion and crop destruction. To harness this kind of water resource and to reduce its damage, as well as to store water for agricultural uses, the government has built many dams in selected areas of the country.

As far as underground water is concerned, it is the main source for agriculture, especially in the central and eastern parts of the country where precipitation is light. According to the geological studies, underground water is stored in two reserves called aquifers; the Basement complex, and the Sedimentary basin. The Basement complexes are located in the Western part, and cover nearly 27 per cent of the Kingdom's

land. Water from these reserves is normally tapped by shallow wells, but quality and yield of water from such aquifers vary considerably, dependent on the local environmental conditions. The replenishment of water in these complexes depends upon the yearly rain, and a delay in the rainy season or a short drought can easily cause these supplies to be depleted.

The Sedimentary basin of the country contains the most important water-bearing formations and is composed mainly of sandstone, limestone, shales, marls and alluvium. This water basin is very large, covering almost 73 per cent of the country's area. The deposits of this basin are divided into 28 formations, differing from each other in water quantity, quality and depth. The general movement of these underground waters in these Sedimentary formations is in the form of a down-dip to the east, bringing the greatest concentrations of water into the east where springs occur inland at Al-Hasa area. Al-wasi, Saq, Minjur and Umm El-Radhuma, are the main underground water aquifers in Saudi Arabia, and water from aquifers is usually utilized for agricultural and urban uses by drilled wells or natural springs.

According to Moliver and Abbondante (1980) there are some problems about the dependence on the underground water. First, this water is non-renewable; there is no new water being added to the reserves. Second, as the water is pumped out, the water table is lowered, requiring deeper wells and additional expenses. Next, the water is not entirely fresh. It contains some salt, which increases as wells are sunk deeper.

Desalination water is the third source of water much in use in recent years in Saudi Arabia. Although this source is directed mainly to satisfy the increasing demand for drinking

water in cities, it has benefitted agriculture by reducing the urban demand on underground water. So far the Government of Saudi Arabia has completed building 26 desalination plants producing 500 million gallons of water every day, making it the World's largest country in producing desalinated water.

Finally, sewage water has been used for irrigation after chemical and biological treatments. The water balance projects a supply of 730 million cubic meters (10 per cent of total water demand) from recycling waste water in 2000, compared with nil in 1980.

In addition to the water scarcity problem in Saudi Arabia, inefficient usage is a common practice among the Saudi farmers and urban dwellers. Therefore, the extent to which agricultural production can be expanded in the future will be determined by the success achieved in increasing efficiency in the use of water drawn from underground sources, and improvement in water resource management and conservation. The Government realised this and has made some attempts to encouraged the use of water-saving methods such as sprinkler and drip irrigation systems by farmers. It has also installed water meters in urban houses to monitor the overuse of water.

3.7.2.2: Agricultural Labour Force

Fifty years ago, most of the Saudi labour force used to work as settled farmers in the land, as nomadic sheep- and camel-raisers in the desert, and as fishermen and pearl collectors in the Arabian Gulf and Red Sea. However, the situation has changed dramatically after the discovery of oil. Many farmers left their lands and headed towards the oil fields and urban areas where they could make more money.

The continued migration of agricultural workers significantly gained momentum in the 1970s when Government embarked upon massive construction and industrialisation programmes. Farmers started to sell their farms or just abandoned them to move to urban centres in order to do lucrative jobs or to start their own business ventures. Nomadic people who normally live in deserts and are normally engaged in livestock production started flocking to cities for settlement. According to the 1974 population census, 40 per cent of the total labour force was employed in agriculture and fisheries. Between 1975 and 1980, approximately 100,000 farmers were expected to make the same movement from this sector. As a result of this continuous exodus of farmers now less than 20 per cent of the total labour force is in the agricultural sector and its related activities. In addition to the problem of labour shortage, Saudi farmers lack the adequate skills and entrepreneurship which are indispensable to development. Therefore, to tackle these problems which become constraints for the agricultural development, two forces found their way, high demand on foreign labour and more concentration on human development by public training programmes.

3.7.2.3: Agricultural Land and Soil

Saudi Arabia is the largest country in the Middle East in terms of size. Its land falls within three main categories, arable land, range land and non-agricultural land (table 3.8). Arable land has been estimated at 1.5 to 2.0 million hectares of which about 525,000 hectars, or 0.24 per cent of the total land is under cultivation. Cultivation is carried out in the river valleys, oasis areas, and on the mountain slopes. 99.7

TABLE 3.8

LAND AREA BY USE IN SAUDI ARABIA

Land Classification	Land use	Area ('000) hectares	Per cent
1. Arable	Cultivated Land	525	0.24
2. Range Land	Permanent grass land	1,700	0.75
	Forest	2,780	1.25
	Desert (barren)	75,000	34.10
	Semi-Desert range land	140,000	63.60
	Total	219,480	99.70
3. Non-agri-cultural land	Settlements, roads etc.	116	0.06
Total		220,121	100.00

Source: Kingdom of Saudi Arabia, Ministry of Agriculture and Water, "A Guide to Agricultural Investment in Saudi Arabia", 1979, p.31

per cent of the land is in the form of range land, consisting of permanent grassland, forest, desert and semi-desert range lands. Therefore, most of the land is considered waste land, of which only a small part has an adequate forage plants due to the scarcity of rains, hot weather and the overgrazing by the nomadic herders. FAO (1980) estimated the range conditions as follows:

- Best or excellent 5%
- Good (50 to 75% of original productive plants present) 10%
- Fair (25 to 50% of best forage plants still present) 25%
- Poor (24% or less of better plants present) 60%

The various studies by range-management experts emphasise that more forage could be produced on these lands, by careful livestock management programmes and by various range improvements (Clawson, 1971).

Forests occupy only 1.25 percent of the total land and mainly lie on the slopes and in the valleys of the mountains which extend from southern Al-Hijaz through Asir in the Southwestern part of Saudi Arabia. The principal varieties of trees are date, juniper, acacia, wild olive, sidr (an indigenous tree bearing edible fruit), tamarisk and tamarind. For a long time, the above forest trees were subject to uncontrolled and continuous cutting operations by the rural population to the extent that the country's forest reserves were seriously decreased. As a result, the Council of Ministers approved a set of regulations in 1978 to protect the forestry and wildlife resources (A-Hamoudi 1984).

As far as the soils are concerned, there are different

types due to the variations in the geographical and geological factors in Saudi Arabia. 40 per cent of the total land is covered by mobile sand dunes in which little vegetation is grown. In the western part of Saudi Arabia there exist the desert marls as well as the lavas (Harrat), which are barren and unproductive land. In the Eastern part, especially along the coastal area, there exist salt flats, Sabkah, an impure mixture of salt and sand forming a crust and few inches deep found in moist depressions. Both water and soil are hardly suitable for cultivation in these depressions except in the case of tree-palm which resist saline soil. Growing crops in these salty areas requires controlled irrigation as well as good drainage systems. Alluvial and sandy-loam soils which are good for cultivation are found in the banks around scattered wadis (seasonal small rivers) all over the country. Generally, saline and alkaline soils, resulting from the physiographic features of the country combined with the aridity of the climate, cover most of the land in Saudi Arabia (El-Khatib, 1974). Therefore lands available for agriculture are limited and accompanied with high salinity and low fertility because of the low content of organic matter and nitrogen.

3.7.2.4: Farm Size and Land Tenure:

Agriculture in Saudi Arabia is characterised by small farms operated mostly by owners. The total area of agricultural farms is put at 1,213,462.3 hectares in the 1973/74 agricultural census, and the total number of farmers is reported as 180,671. As shown in table 3.9, out of the total farms, 34,213 or 18.9 percent are less than 0.5 hectare, and 35,032, or 19.4 percent are between 0.5 and one hectare in

TABLE 3.9

DISTRIBUTION OF FARMS BY SIZE AND LAND TENURE IN SAUDI ARABIA 1973/74

Farm Size (in hectare)	Farms			Average		Owned Farms		Rented Farms		Other Forms of Farms	
	Number	% of Total Number	Area	% of Total Area	Farm Size	Number	%	Number	%	Number	%
Less Than 0.5	34213	18.9	9334.3	0.8	0.3	32351	19.4	1319	17.2	543	8.7
0.5 To Less Than 1	35032	19.4	23751.5	2.0	0.7	32891	19.7	1261	16.5	880	14.0
1 To Less Than 2	37637	20.8	50970.6	4.2	1.4	34981	20.9	1307	17.1	1349	21.5
2 To Less Than 5	33537	18.6	100485.7	8.3	3.0	30561	18.3	1385	18.1	1591	25.4
5 To Less Than 10	17722	9.8	118807.2	9.8	6.7	16273	9.8	725	9.5	724	11.6
10 to Less Than 50	18934	10.5	352908.8	29.1	18.6	17003	10.2	945	12.3	986	15.7
50 To Less Than 500	3441	1.9	371619.6	30.6	107.9	2601	1.6	659	8.6	181	2.9
500 And More	155	0.1	185584.6	15.3	1197.3	91	0.1	51	0.7	13	0.2
The Kingdom Total	180671	100.0	1213462.3	100.0	6.7	166752	100.0	7652	100.0	6267	100.0

NOTE: Area in Hectares (1 Hectare = 10 Donums)

Source: Saudi Arabia, Ministry of Agriculture and Water, Department of Economic Studies and Statistics,
" Results of the Overall Agricultural Census for 1973/74.", 1974 , (in Arabic).

size. Only 22,530 farms or 12.5 per cent of the total are 10 hectare or more in size. The overall average size per farm is 6.7 hectares.

The average size of farms differs in different regions in Saudi Arabia. While the average farm size in Asir, in the far southwestern region, is only 1.5 hectare, it is 56.4 hectares in Qassem in the Central Region. This wide variation in farm size can be explained in part by the pattern of land use and labour intensity in production. Farms that are operated on a subsistence basis tend to be small. An average farm of one hectare can yield enough for family subsistence, if it is sufficiently productive (Katanani, 1971).

The small size of holdings in Saudi's agriculture is a major obstacle in its mechanisation and its economic cultivation. The Government has recognised this problem in recent years, and provision was made for free grants of potentially productive land of reasonable size to any Saudi citizen willing and able to farm it.

As far as the land tenure in Saudi Arabia is concerned, Islamic rules are the basic sources for the classification of the boundries of ownership. There are four types of land tenure in Saudi Arabia, Mulk, Waqf, Musha, and State Land. Mulk, means complete ownership either by individuals or joint (usually relatives). As shown in the above table, 166,752 farms, or 92 percent of the total farms are cultivated by owners. Only 4 percent of the farms are under rent. This is a notable difference from most of the developing countries, especially in South and Latin America, where most of the farms are leased by the capitalist owners. According to Al-Sheikh (1971), short-intermediate term lease, long-term lease, crop

sharing, and hired farmers are among the forms of the land rent system in Saudi Arabia.

Waqf, is an Islamic concept meaning a dedicated land or property set aside for charitable purposes. Most of the Waqf lands are taken care by the heirs of the deceased persons who made these Waqfs, while the rest of Waqf which is unknown is taken over by the Ministry of Pilgrimage and Waqfs.

Musha is the third kind of land tenure in Saudi Arabia and is a purely Islamic form of ownership which can be used in any time or place by the public. Unlike Mulk and Waqf, Musha land tends to discourage economic incentives because the absence of definite ownership.

State Land represents any land which is not in the above mentioned forms. Therefore, this land consists of most of the country's land, including the vast amount not suitable for cultivation. From time to time, the State distributes plots of lands to individuals and companies for agricultural or private uses.

3.7.3: Demands for Agricultural Products

As a natural result of the economic boom and its associated rapid increase in per capita incomes in Saudi Arabia, demand for agricultural products, food and non-food, increased dramatically in recent years and may keep on going in the future if the forces behind it continue as well.

The other factors which inflamed the rapid increase in demand for agricultural products can be summarised thus:

1. The rapid population growth of 3.5 to 4 per cent annually as mentioned earlier in this chapter. The Saudi population almost doubled during the period from 1950 to

1980. (Al-Sadairy, 1984).

2. The rapid inflow of foreign workers who were much needed by the various development programmes. The number of foreign workers increased by more than 100 percent within five years, from one million in 1975 to 2.2 million in 1980 (Meri Report, 1985).
3. The increasing level of urbanisation. In the last two decades many rural and agricultural people have come to cities for living, attracted by the lucrative jobs, better services, and greater education facilities for their children. A high percentage of Bedouins (the desert people) who mainly live on pastoral activities also have come to cities and small towns in recent years, for settlement, attracted by the same factors. The three largest cities in Saudi Arabia of Riyadh, Jeddah and Makkah have doubled in size within the last ten years.
4. The expanding changes in tastes and habits of the population. Such a change is usually associated with the introduction of new products, urbanisation, increase in per capita income, and changes in social attitudes.
5. The Government policies of food subsidies and price control, which provide the consumers with many cheap food products.

Based on the above factors, the increased demand could not be met by the domestic production and the imports were the easy complement source.

If the foregoing affecting forces go on unabated in the future, the demand for agricultural products will expand more bringing with it a high level of imports. It is estimated that the demand for chicken, fresh vegetables, fresh fruits

and fresh meat will increase by 122.5 percent, 83.9 percent, 64.1 per cent, and 51 per cent respectively in 1990.

3.7.4: Agricultural Production

As a rational result of variations in climate, soil quality, availability of water resources, and farming practices, agricultural products vary from one season to another and among regions. Although, there is diversity in agricultural production, some products such as sugar and tea are not produced at all in Saudi Arabia, and other products such as coffee, rice and some fruits are produced in a small quantity.

The agricultural sector in Saudi Arabia consists of cereals and crops, livestock and poultry, and fisheries.

In general, agricultural output has increased rapidly in recent years, especially cereals as shown in table 3.10, pushed by the intensive efforts of support provided by the Saudi Government. For some products, the self-sufficiency stage has been reached, while for others, the production does not meet the domestic needs because of the overwhelming increase in local demand.

Concerning cereal production in Saudi Arabia, table 3.11, shows the trends in output. Wheat, which is the main cereal product in the country in terms of production and cultivated area, increased from 130,000 tons in 1970 to 816,000 tons in 1983 with an average annual rate of 17 per cent. In 1984, wheat production reached a momentum of 1.4 million tons. The estimates of 1985 is ever bigger and has been put at 2.05 million tons, or more than 15 times the production fifteen years ago.

TABLE 3.10

AGRICULTURAL PRODUCTION INDICES IN SAUDI ARABIA
(1974 - 1985)

(Index 1979/81 = 100)

Year	Agriculture	Food	Crops	Cereals	Livestock
1974	108.9	109.4	95.2	99.8	57.9
1975	113.2	113.7	98.7	90.6	60.7
1976	104.3	104.6	77.2	78.5	66.7
1977	112.4	112.8	97.6	90.3	67.7
1978	113.5	113.8	93.0	89.8	78.5
1979	112.2	112.4	104.6	108.2	87.4
1980	101.6	101.6	98.0	88.6	102.2
1981	86.2	86.0	97.4	103.2	110.4
1982	110.7	110.6	137.3	183.0	131.1
1983	164.4	164.9	201.3	424.9	173.6
1984	207.4	208.5	259.4	664.2	215.4
1985	263.0	264.7	296.7	806.3	249.3

Source: Food and Agriculture Organisation of the United Nations, FAO, " Production Yearbook.", Vol.39, Tables 4 to 8, pp.77 to 86.

TABLE 3.11

AGRICULTURAL PRODUCTION AND INDICES OF CEREAL
PRODUCTS IN SAUDI ARABIA (1970-85)

(production in '000 tons)

Year	Wheat		Millet		Sorghum		Barley		Maize	
	Produ- ction	Index	Produ- ction	Index	Produ- ction	Index	Produ- ction	Index	Produ- ction	Index
1970	130.0	100	-	-	-	-	-	-	-	-
1971	41.9	32	5.6	100	123.8	100	8.7	100	-	-
1972	39.0	30	7.8	139	52.4	42	9.3	107	1.5	100
1973	63.7	49	9.9	177	27.3	22	11.1	128	0.9	60
1974	153.4	118	11.5	205	115.9	94	15.4	177	3.8	253
1975	132.0	102	10.6	189	127.9	103	16.7	192	1.8	120
1976	92.5	71	16.6	296	153.4	124	12.1	139	7.3	487
1977	124.6	96	12.6	225	139.0	112	13.5	155	4.0	267
1978	120.0	92	13.0	232	152.1	123	14.8	170	1.3	87
1979	140.8	108	14.9	266	167.1	135	15.1	174	3.8	253
1980	141.7	109	8.6	153	109.0	88	5.5	63	1.0	67
1981	187.2	144	7.5	134	91.1	74	6.0	69	2.1	140
1982	416.7	321	5.2	93	60.9	49	4.5	52	1.1	73
1983	817.5	629	7.5	134	47.1	38	1.8	21	0.7	47
1984	1401.6	1078	4.1	73	35.1	28	2.2	25	0.6	40
1985	2048.0	1575	4.9	77	13.0	11	2.1	24	0.6	40

Note: Production Indices; for Wheat 1970=100, for Millet, Sorghum and Barley 1971=100, and for Maize 1972=100.

Source: compiled from; 1) Saudi Arabia, Ministry of Agriculture and Water, "Bulletin of Agricultural Current Sample Survey", different issues, 1970 to 1985. 2) Saudi Arabia, Ministry of Planning, "The Fourth Development Plan, 1985-1990."

Millet production fluctuated over time, reaching a maximum level of 14900 tons in 1979 and a minimum level of 410 tons in 1984. Sorghum and barley, eventhough their production has increased by 35 and 74 per cent respectively between 1971 and 1979, their production levels were disappointing in recent years and have decreased by 90, and 76 per cent respectively in 1985 from their levels of 1971. These decreases in production were mainly attributed to the shift made by farmers to grow wheat which has been highly supported by Government policies.

As to vegetables, the total area of cultivated land went up from 28,300 hectares in 1972 to 62,201 hectares in 1983, rising total production from 613,800 tons to 847,308 tons during the same period (SAMA, 1984). The shift towards the cultivation of vegetables has contributed during recent years to a rise in the value of agricultural output and a change in the pattern of production at the expense of other products. For example, production of tomatoes and eggplants increased by 3.5 times, and 3.9 times respectively between 1970 to 1985 (table 3.12). Production of squash registered more expansion when increased by nearly eight times since 1971. Production of dry onion, which is one of the main vegetable products, fluctuated from one season to another with the highest of 152,000 tons in 1974, and the lowest of 7,000 tons in 1983.

Because of the diverse climate conditions in Saudi Arabia, various kinds of fruits are grown. The Government encourages farmers to plant such products, by providing them with fruit seedlings from time to time, and by offering incentives to establish large scale businesses. Between 1980 and 1985, 12 private sector projects have been approved to grow fruits in different parts of the Kingdom (SAMA, 1984).

TABLE 3.12

- 120 -

PRODUCTION AND INDICES* OF SELECTED VEGETABLE AND FRUIT PRODUCTS IN SAUDI ARABIA 1970 - 1985

(Production in '000 tons)

	Tomatoes	Eggplant	Dry Onions	Squash	Water Melons	Grapes	Citrus	Dates
Year	Production	Index	Production	Index	Production	Index	Production	Index
1970	100	100	9	100	32	100	-	-
1971	98	98	51	567	22	69	6	-
1972	111	111	8	89	15	47	4	100
1973	182	182	22	275	43	134	14	67
1974	201	201	23	256	152	475	31	233
1975	301	301	39	433	50	156	8	517
1976	165	165	21	233	74	231	15	133
1977	197	197	25	278	106	331	34	250
1978	167	167	21	233	95	297	23	567
1979	195	195	30	333	101	316	35	383
1980	200	200	25	278	60	188	36	583
1981	233	233	20	222	14	44	41	600
1982	300	300	43	478	16	50	41	683
1983	264	264	34	378	7	22	40	683
1984	328	328	31	344	20	63	44	667
1985	350	350	35	389	17	53	45	447
								733
								750
								380
								153
								67
								279
								-
								-
								475
								198

Note: * Indices for Squash and Melons 1971=100, other Products 1970=100.

Source: Compiled from;

- 1) Saudi Arabia, Ministry of Agriculture and Water, " Bulletin of Agricultural Current Sample Survey. ", different issues, 1970 to 1985.
- 2) Saudi Arabia, Ministry of Planning, " Achievements of the Development Plans 1970 - 1984; Facts and Figures. " 1985.

Table 3.12 also shows trends in production of some fruit products. Water melons, produced in summer, although fluctuated in production among seasons due to the reasons mentioned at the outset of this section, but have registered an expansion in recent years. Citrus production increased from 13,000 tons in 1970 to 48,000 tons in 1984, with an average annual rate of 13 per cent, and grapes grew at an average annual rate of 12 per cent during the same period increasing from 24,000 tons to 77,000 tons. Finally, dates which are the most important staple food, and grown almost all over the country except in the high mountain areas in the west and south regions, have witnessed a remarkable improvement over the last few years. According to a recent survey, there are about 13 million date trees in the kingdom producing 475,000 tons of dates in 1985, representing an increase of 98 per cent over the production level of 1970.

As far as the livestock sector is concerned, it falls into two groups; First, the traditional livestock sector associated with nomadic life of Bedouins. Nomadic herds of livestock have been grazed in Saudi Arabia for centuries; as elsewhere, the nomads have followed the forage, which in turn has meant following the rain. When severe droughts hit, as the one of the 1960s (Clawson, 1971), livestock losses have often been most serious, since there were no reserves of feed which could be drawn upon. There has never been a detailed and accurate census of livestock in Saudi Arabia or the total area grazed, given the nomadic character of livestock production. The estimated numbers of camels, cattle, sheep, and goats were 436,800, 182,300, 6,352,900, and 3,433,300 respectively in 1985 as shown in table 3.13; Second, the modern livestock

TABLE 3.13

MEAT, FISH, EGGS AND LIVESTOCK NUMBER AND PRODUCTION IN SAUDI ARABIA
(number in '000 head, production in '000 tons)

Year	Camels	Cattle	Sheep	Goats	Poultry	RED MEAT		WHITE MEAT		FISH		EGGS	
						Production	Index	Production	Index	Production	Index	Production	Index
1970	--	--	--	--	--	19.0	100	7.0	100	17.0	100	5.0	100
1971	--	--	--	--	--	22.0	116	7.0	100	18.0	106	5.0	100
1972	58.6	185.9	1237.8	755.2	331.3	25.0	132	8.0	114	19.0	112	6.0	120
1973	--	--	--	--	--	73.0	384	8.0	114	20.0	118	7.0	140
1974	--	--	--	--	--	56.0	295	11.0	157	20.0	118	9.0	180
1975	104.9	281.8	2147.8	1242.2	826.3	47.0	247	14.0	200	20.0	118	12.0	240
1976	106.6	320.7	2243.3	1577.4	741.6	47.0	247	21.0	300	19.0	112	16.0	320
1977	121.7	316.4	2271.3	1730.6	636.4	44.0	232	23.0	329	17.0	100	21.0	420
1978	156.0	352.7	2699.2	2077.5	472.6	36.0	189	26.0	371	18.0	106	27.0	540
1979	166.0	373.3	2764.1	2270.6	538.5	38.0	200	30.0	429	19.0	112	30.0	600
1980	164.4	398.7	2948.6	2240.5	606.2	34.0	179	40.0	571	20.0	118	41.0	820
1981	--	--	--	--	--	49.0	258	57.0	814	33.0	194	50.0	1000
1982	311.1	154.0	5061.9	2444.0	2335.2	65.0	342	82.0	1171	37.0	218	68.0	1360
1983	367.4	198.8	5888.3	2793.5	2015.7	73.0	384	119.0	1700	--	--	96.0	1920
1984	391.2	164.0	5823.5	3098.6	818.2	89.0	468	138.0	1971	--	--	102.0	2040
1985	436.8	182.3	6352.9	3433.3	949.2	93.5	492	141.0	2014	--	--	132.0	2640

- Sources: 1) Saudi Arabia, Ministry of Finance and National Economy, Central Department of Statistics, " Statistical Year Book ", different issues, 1974 to 1981.
- 2) Saudi Arabia, Ministry of Planning, " Achievements of the Development Plans 1970 - 1984: Facts and Figures ", 1985, p. 211.
- 3) Saudi Arabia, Ministry Of Agriculture And Water, " Annual Bulletin Of Current Agricultural Statistics: Sample Survey 1984/85 ", 1986.

sector which takes the form of public and large-scale private projects financed by the Government interest-free loans. The production of livestock and poultry projects accounts for 28 per cent of the total agricultural gross domestic product in 1982 (Saudi Chambers' Council, 1985). By 1985, there were 476 projects of broiler chickens, 355 projects of eggs production and 36 large dairy farms, compared with 169, 136, and 20 projects respectively in 1981. In terms of production, as illustrated in table 3.13, red meat amounted to 93.5 thousand tons in 1985, nearly five times more than the production level of 1970. White meat production also increased but at a faster rate reaching 141 thousand tons in 1985, representing an increase of 20 times. Egg production registered great dividends, increasing by almost 20 times within 14 years from 5000 tons in 1970 to 96,000 tons in 1983. In 1984, egg production became sufficient to meet the entire consumption requirement of the Kingdom (SAMA, 1984).

Finally, though Saudi Arabia is bounded by the Red Sea from West and the Arabian Gulf from East, fish resources have not been adequately harnessed. Few companies are engaged in fisheries, of which the Saudi Fishing Company is the most prominent one. Fish production increased from 17000 tons in 1970 to 37000 tons in 1982 or more than doubled during this period but it still does not satisfy the whole market demand.

3.8: The Foreign Sector

Saudi Arabia plays a significant role in the international economy in that it is among the largest oil producers, endowed with approximately one fourth of the world's proven oil reserves. International trade, predicated

upon the oil's export, is the "backbone" of the Saudi's economy. The high dependence of the economy on international trade can be examined by the ratio of total trade to Gross National product. This reveals that the dependence of Saudi Arabia is almost nine times greater than an open economy such as that of the United States (El-Malakh, 1982). To Saudi Arabia, international trade is the main source of foreign exchange savings in addition to the provisions of certain dynamic benefits such as capital goods, technical and managerial skills and services which are essential to economic growth. In other words, international trade is the "engine of growth" that will inevitably provide the motive power for the Saudi's economic development. In this section, an attempt has been made to discuss the situation of exports and imports especially of foodstuffs in the economy of Saudi Arabia.

3.8.1: Exports

Crude oil and refined products account for nearly all Saudi exports, all other exports (mainly in the form of re-exports, and some of the agricultural products to the neighbouring countries) amounting to a negligible amount. As presented in table 3.14, exports increased at an erratic rate during the last 15 years, reflecting alternately escalating and moderating oil prices. Total exports increased from SR 10,907 million in 1970 to SR 33, 309 million in 1973. After one year exports increased by almost four times to SR 126,223 million, as a direct result of oil price increases in 1974. In 1975, exports decreased by 17 percent over the level of 1974 due to the global economic recession which affected the

TABLE 3.14

TOTAL EXPORTS, IMPORTS AND FOODSTUFFS IMPORTS IN SAUDI ARABIA 1970 - 1985.

(Values in SR million)

(Index: 1970=100)

Year	Exports ¹			Imports				Foodstuffs Imports		
	Total Value	Index	% share of Oil and its Refined Products	Total ² Value	Index	% share of Consumers Products ³	% share of Producers Products ³	Total ² Value	Index	% share In Total Imports
1970	10,907	100	99.7	3,197	100	41.8	58.2	1,012	100	31.7
1971	17,303	159	99.8	3,668	115	43.0	57.0	1,097	108	29.9
1972	22,761	209	99.7	4,708	147	39.2	60.8	1,221	121	25.9
1973	33,309	305	99.6	7,310	229	37.3	62.7	1,686	167	23.1
1974	126,223	1157	99.7	10,149	317	37.6	62.4	2,023	200	19.9
1975	104,412	957	99.2	14,823	464	31.9	68.1	2,301	227	15.5
1976	135,154	1239	99.6	30,691	960	27.0	73.0	3,536	349	11.5
1977	153,209	1405	99.6	51,662	1616	27.4	72.6	5,365	530	10.4
1978	138,242	1267	99.2	69,180	2164	28.1	71.9	7,802	771	11.3
1979	213,183	1955	99.1	82,223	2572	29.5	70.5	10,511	1039	12.8
1980	362,886	3327	99.2	100,350	3139	31.3	68.7	14,192	1402	14.1
1981	405,481	3718	99.3	119,298	3736	31.7	68.3	17,279	1707	14.5
1982	271,090	2485	98.8	139,335	4358	29.5	70.5	18,154	1794	13.0
1983	158,444	1453	97.9	135,417	4236	29.5	70.5	16,586	1639	12.2
1984	132,220	1212	97.3	118,736	3714	n.a	n.a	18,739	1852	15.8
1985	99,536	913	96.6	85,563	2676	n.a	n.a	12,896	1274	15.1

Note: n.a = Not Available.

- Sources: 1) Saudi Arabia, Ministry of Planning, "Achievements of the Development Plans 1970 - 1984; Facts and Figures.", 1985, p. 175
 2) Saudi Arabia, SAMA, "Annual Report", different issues 1974-1986.
 3) United Nations, "Yearbook of International Trade Statistics." different issues, 1963 - 1983.

demand for Saudi oil exports. Based on the continued oil-price increases in 1979, 1980 and 1981, value of exports increased to SR213,183, SR362,886 and SR405,481 million respectively. In 1982, the increase in oil prices began to taper off, and the volume of exports fell down to SR 271,090 million. Thereafter the drama of oil-price decrease continued, accompanied by cuts in oil production. As a result, Saudi exports slumped to SR 99,536 million in 1985, or 76 per cent less than the value of 1981 exports. Of course this dramatic reduction in the value of exports seriously affected the economy of Saudi Arabia, as already mentioned, because of the economy's nature which is largely dependent on oil exports.

As far as the direction of oil exports is concerned, Japan is the largest buyer of Saudi Crude oil, accounting for 23.8 per cent of exports in 1982. The EEC accounted for 35.0 per cent of Saudi exports (France, the largest European buyer of Saudi oil, and the second largest importer from Saudi Arabia, accounting for 9.0 per cent). The United States, the third largest buyer, accounted for 7.8 per cent of total exports in 1982 (compared with 18 per cent in 1977).

3.8.2: Imports

Since the Saudi Arabian economy is still in the process of development and industrialisation, it is heavily dependent upon imports from many countries, financed by the huge revenues of oil exports. The country relies on imports for almost all of its manufactures and much of its foodstuffs. In the last two decades, imports increased at a rapid rate influenced by many factors such as; a) the rapid increase in native population augmented further by influx of foreign

workers; b) the substantial increased in per capita incomes; c) the accumulation of massive foreign exchange receipts, from oil exports to the government, making it a major source of demand for imported capital goods, as well as various other imported items; d) Government policy of subsidies on imports, which encouraged the Saudi businessmen to expand their activities looking for more profits; and e) the substantial lack of industrialisation in Saudi Arabia, constrained by infrastructural, technological, and human skill factors. Therefore dependency on imports, to satisfy the development requirements and the increase in marginal propensity to import in the private sector, became inevitable in Saudi Arabia and will continue in the future given the above effects. According to Presley (1984) the scale of importation can be judged by the annual value of imports per capita. In 1975 this was SR3,797; by 1980 it had increased to SR 16051, a monetary growth of 323 percent over the five year period. As shown in the above table the total value of imports increased from SR 3,197 million in 1970 to SR 30,691 million in 1976. In 1982 imports registered a further increase to reach a peak level of SR 139,335 million, or nearly 44 times greater than the import value of 1970. In 1983, imports decreased by 2.8 per cent and further by 12.3 per cent in 1984 owing to the economic recession of the international oil glut and price fall. By 1985, the value of total imports reached SR 85,563 million, 39 per cent lower than the peak level of 1982. In terms of relative shares of total imports, the private sector is the dominant one. For instance, it accounted for an average share of 72 per cent, while the public sector 24 percent and the oil sector the remaining 4 per cent between 1975-80. Both the

absolute and the relatively large share of private sector imports underscore the official position of encouraging the private sector to take the lead in the industrialisation and development of the Kingdom. On the other hand, imports in Saudi Arabia can be disaggregated to producer and consumer imports. Producer imports dominate the Saudi's imports especially in recent years, reflecting the Government efforts towards the import substitution policy. The share of producers imports, for instance was 70.5 per cent in 1983.

Imports in Saudi Arabia include a wide range of manufactured goods, particularly machinery and transport equipments. Other significant imports are electrical equipments, motor vehicles, building materials, textiles and clothing, and foodstuffs.

In terms of sources of imports, Japan has been the leading exporter to Saudi Arabia in recent years, and in 1985 it took 27.5 per cent of the market, followed by USA (24.1 per cent), the Federal Republic of Germany (11.5 per cent) and France (10.8 per cent).

3.8.2.1: Foodstuffs imports

As we mentioned earlier in this chapter, demand for foodstuffs has increased rapidly in recent years. This increase has been accompanied by inadequate domestic production. The resultant increasing gap between local demand and supply of food products has been met by imports. The Government policy of subsidising the essential imported food products also added its share in enlarging the volume of foodstuffs imports. In 1976 almost half of the total food demand was met by imports. Two years later, food imports

represented 63 per cent of the local needs. The prospect of increased demand for food lends emphasis to the desire of the government and of agricultural producers to increase agricultural output; but it seems highly likely that limited resources of water, arable land and technology will be serious constraints on increasing agricultural output. The total value of imported foodstuffs had increased by more than five times between 1970 and 1977, and further by nearly four times in the next seven years. In 1970 the share of total value of foodstuffs imports was 31.7 percent of total imports. By 1984, though the import of foodstuffs has increased in absolute values, its share in the total imports has decreased dramatically by one half from the previous level of 1970. This phenomenon can be explained by the economic principle of low income elasticity of demand on food, which means that the marginal propensity to spend on food falls when income rises.

Table 3.15 shows the composition of foodstuffs imports. Vegetable products represent the major part of total imports, with an overall average of 41.0 per cent for the period from 1970 to 1985. Prepared foodstuffs, live animals and animal products come next making overall averages of 28.7 and 26.5 per cent respectively. Finally, though the value of imports of animal and vegetable fats, oils and their products has increased from SR 42 million in 1970 to SR 550 million in 1984, their share in the total foodstuffs imports has decreased from 4.2 per cent to 2.9 per cent for the same period.

With respect to areas of foodstuffs imports, Saudi Arabia deals with many developed and underdeveloped countries. Vegetables and fruits are mainly imported from some of the Middle Eastern countries especially Jordan, Lebanon, Egypt and

TABLE 3.15

COMPOSITION OF FOODSTUFFS IMPORTS IN SAUDI ARABIA 1970 - 1985

(in SR million)

Year	Live Animals and Animal Products		Vegetable Products		Animal and Vegetable Fats, Oils and Their Products		Prepared Foodstuffs, Beverages Spirits, and Tobacco		Total Imported Foodstuffs	
	Value	%	Value	%	Value	%	Value	%	Value	%
1970	230	22.7	501	49.5	42	4.2	239	23.6	1,012	100
1971	250	22.8	500	45.6	74	6.7	273	24.9	1,097	100
1972	310	25.4	496	40.6	61	5.0	354	29.0	1,221	100
1973	441	26.2	661	39.2	58	3.4	526	31.2	1,686	100
1974	442	21.8	911	45.5	72	3.6	598	29.6	2,023	100
1975	642	28.0	934	40.6	100	4.3	625	27.1	2,301	100
1976	925	26.2	1478	41.8	147	4.2	986	27.8	3,536	100
1977	1465	27.3	1647	30.7	224	4.2	2029	37.8	5,365	100
1978	2057	26.4	2730	35.0	296	3.8	2719	34.8	7,802	100
1979	2840	27.0	3906	37.2	386	3.7	3379	32.1	10,511	100
1980	4121	29.0	5345	37.7	554	3.9	4172	29.4	14,192	100
1981	4874	28.2	7144	41.3	407	2.4	4854	28.1	17,279	100
1982	4980	27.4	8276	45.6	537	3.0	4361	24.0	18,154	100
1983	4975	30.0	6588	39.7	426	2.6	4597	27.7	16,586	100
1984	4696	25.1	8859	47.4	550	2.9	4634	24.7	18,739	100
1985	3911	30.3	5036	39.1	390	3.0	3559	27.6	12,896	100
Average	26.5		41.0		3.8		28.7		100	

Source: Compiled from;

- 1) Saudi Arabia, SAMA, "Annual Report", different issues 1974 - 1984.
2) = = = "Statistical Summary" 1985. p 83.

Morocco. Live animals are imported from Africa, (particularly Somalia), Turkey and Australia. Prepared and preserved food products are obtained mainly from the United States, Europe and Latin America.

3.9: The Saudi Development Plans

Only in 1970 Saudi Arabia entered the era of planned economy and since then three five-year development plans have been completed, and in 1985 the Fourth Plan was started. As regards the concept of development in Saudi Arabia, two features are worth noting: Firstly, the Government bears the complete responsibility of promoting, guiding and influencing the development process; and, Secondly, without exceptions all the development plans have been financed by the huge revenues brought by the oil sector.

In general, the common key objectives which direct the development plans in Saudi Arabia are: to maintain the country's religious and moral values; to reduce the overdependence on oil sector by diversifying the economic base; to develop the country's manpower resources, and to distribute the benefits of the national wealth among all sectors of the society.

Now we turn to investigate briefly the major characteristics and achievements of each plan, based on the official information released by Ministry of Planning in its development plans books.

3.9.1: The First Five-Year Development Plan

This plan started in 1970, prepared by the Central Planning Organisation, designated later as the Ministry of

planning. The Plan was very modest in size, constrained by the finance especially foreign exchange. In this plan about SR 80 billion was spent mainly on developing basic infrastructure, particularly public utilities, and on improving government services.

The plan projected the GDP to increase on an annual average rate of 9.8 per cent. Oil and non-oil GDP were reckoned to grow on an annual average of 9.1 and 12.0 per cent respectively. Social Services sub-sector had been highly emphasised by the Plan with an allocation of SR 9.3 billion or 22.5 per cent of the total plan outlay, followed by transport and communications sector with 18.1 per cent, and urban development and public utilities with 11.1 per cent. Agriculture and manufacturing received small emphasis in the plan monetary allocations, with 3.6 and 2.7 per cent respectively of the total planned outlay. The projected average annual growth of 4.6 per cent was set for agriculture, while 14.0 per cent for manufacturing.

The main achievements of the first five-year plan can be summarised thus:

1. The Total GDP registered a great success as it increased at 13.5 per cent per annum instead of the projected target of 9.8. This high growth rate of GDP was encouraged by the increases in both oil price and production.
2. Non-oil GDP increased by 11 per cent, only one percent short of the planned figure.
3. The actual average annual growth of construction, transport and communications, and government sectors all surpassed the planned targets.

4. Agriculture and manufacturing though each increased in terms of value added to the total GDP, each failed to reach its planned target. For agriculture the actual rate of growth was 3.6 per cent per annum, whereas the planned target was 4.6 per cent. This failure might be attributed to the allocation of inadequate budget to this sector as we mentioned earlier.

In general, the plan was considered relatively successful, since most of the targets were achieved and it was the first sustained attempt in this direction.

3.9.2: The Second Five-Year Development Plan (1975-80)

In May 1975 the Saudi Council of Ministries approved the second plan to cover the period through 1980. Since the Plan was implemented after the oil price increase of 1973/74 the actual expenditure increased dramatically to SR 700 billion, almost nine times that of the First Plan. Furthermore, the Plan was much more detailed and took all the sectors of the economy into consideration. While the development of human resources and diversifying the income base of the economy remained basic objectives, the Plan concentrated on infrastructure formation and was successful in eliminating many of the physical bottlenecks, especially in the areas of transportation, communications, and residential construction, which had become critical after the 1973/74 oil boom.

In this plan GDP was projected to grow at 10 per cent annually, but due to the low performance of the oil sector which grew only at 4.8 per cent per year, only 8.0 per cent was reached.

The other main achievements of the Second Plan are:

1. An annual increase of 15.1 per cent in the non-oil economy, which reflected the Government efforts to reduce the overwhelming dependence of the economy on oil sector.
2. As the scope and size of the Second Plan required a substantial increase in manpower, the civilian labour force grew at an estimated average of 7.2 per cent per year during the plan period, well above the 3.8 per cent annual growth recorded during the First Plan.
3. Utilities increased at an annual average of 24.4 per cent, representing a 63 per cent increase over the formulated target of 15.0 per cent.
4. Agricultural production increased by 34 per cent, from SR 1221 million to SR 1640 million, with an average growth of 5.4 per cent per annum, instead of the Plan's target of 4.0 per cent.
5. Manufacturing sector also surpassed its target of 15.0 per cent, to reach 17.1 per cent of annual growth.
6. During this Plan, the major industrial projects of Jubail and Yanbu have been established.
7. The inflation rate, which reached 40 per cent in the mid 1970's, has been reduced to single-digit levels through monetary controls and food subsidies.

3.9.3 The Third Five-Year Development Plan (1980-85)

This Plan went into operation in June 1980, with an estimated budget of SR 782 billion. At the end of the Plan, actual expenditures reached SR 1207 billion, or 54 percent increase over the estimated figure. Because major physical

constraints had been reduced during the Second Plan, the priorities shifted from almost exclusive emphasis on infrastructure to diversification of the productive base of the economy. Consequently agriculture and manufacturing received more emphasis in this Plan. The development of the national labour force through vocational and technical training programmes received increasing attention as well. Among the notable achievements and failures of this Plan are the following;

1. Because of the oil glut and the sharp declines in oil prices which started at the end of 1982, oil GDP declined at an average rate of 14.6 per cent per annum. As a result, and because of the influence of the oil sector in the economy, the total GDP grew at a negative rate of 5.8 per cent instead of a positive rate of 3.2 per cent annually.
2. The non-oil economy grew at an average rate of 5.1 per cent per year which is close to the growth rate envisaged in the Plan.
3. Manufacturing increased at an annual average rate of 14.1 per cent.
4. The agricultural sector made great progress in this Plan, for it increased at annual average rate of 8.7 per cent, which is greater than the Plan's target of 5.4 per cent. The agricultural value added in nominal terms has doubled during the Plan's period.
5. The Saudi labour force grew at an average annual rate of 3.7 per cent, compared to the Non-Saudi growth rate of 11.7 per cent. Consequently, the total employment in the Kingdom increased by 15.4 per cent per year instead

of the Plan's projected negative growth of 1.2 per cent per year.

3.9.4: The Fourth Five-Year Development Plan (1985-90)

The Fourth Plan has just started in 1985, and covers the period through 1990. The Fourth Plan's objectives are mainly a continuation of those set out in the Third Plan but five broad themes stand out; a) a clear and definite emphasis on promoting the private sector involvement in economic development. It is estimated that the private sector's share of the Gross Fixed Capital Formation will have to increase to almost 48 per cent, if the sectoral growth rates are to be achieved, b) a stronger focus on diversification within productive sectors, especially manufacturing, agriculture and finance; c) a greater concern for the efficiency of operations, usage of existing resources and facilities, and discovery and development of renewable alternative sources of income; d) a commitment to reduce the number of foreign workers in the Kingdom; and e) to promote economic and social integration between the Arab Gulf Cooperation Council (GCC) members.

In the Plan, many targets have been set, and the essential ones are;

1. The real GDP is expected to grow at 4.0 per cent per year - about midway between the respective rates for the non-oil economy (2.9 per cent), and the oil sector (5.6 per cent).
2. Manufacturing (including Petrochemicals), and finance are expected to increase at annual average growth of 15.5 and 9.0 per cent respectively.

3. A target of 6.0 per cent of annual growth is set to be achieved by the agricultural sector. Almost two thirds of agricultural output growth is envisaged to come from productivity increase.
4. Construction is expected to decline at an average rate of 2.8 per cent annually.
5. The share of Saudi nationals in the total labour force is expected to grow on an annual average of 3.9 per cent. Non-Saudi labour, on the other hand, is expected to decline on an annual average of 5.0 per cent.

CHAPTER FOUR

4: AGRICULTURAL POLICIES IN SAUDI ARABIA

4.1: Introduction

After reviewing the main features of the Saudi economy with particular emphasis on those features related to the agricultural sector, it is appropriate to discuss the undertaken various agricultural policies. These policies have received in recent years high priority within the national economic framework with the objective of diversifying the Kingdom's economy and reducing its dependence on imported agricultural products. This is reflected in the steady growth in budgetary allocations for agricultural development which increased from SR1.4 billion in 1975 to SR8.3 billion in 1979 and to SR12.4 billion in 1983. This recent emphasis has been highly justified since Saudi Arabia cannot continue to rely increasingly on imports paid from foreign exchange earnings derived from oil. National income and population will continue to increase, while oil supplies being depletable, will eventually decline. Therefore, efforts should be concentrated on using revenues adequately to create a self-sustained growing economy with minimal dependence on the oil sector. Given Saudi's economic setting, the fulfillment of such a policy requires more adequate attention to the growth of agriculture whereby the future economic expansion of Saudi Arabia in the long-run will depend on.

Generally the followed policies aim to improve the agricultural sector through; 1) vertical expansion in which to increase productivity of the lands currently under cultivation

by means of introducing new inputs, extension, research, education and other instruments; 2) horizontal expansion which means to expand the cultivated area by means of efficient irrigation system and land distribution; 3) the possible change in the pattern of production, and this can be achieved by providing economic incentives such as price support policy which attract farmers to shift towards producing certain products.

Therefore, the purpose of this chapter is to attempt to identify the various agricultural policies which Saudi's policy-makers currently think are capable of facilitating economic development in the agricultural sector. Within the development process, these policies seek to bring modern technology to agriculture, to raise farm income, to lower costs of production, to increase the average size of farm holdings and to persuade farmers to remain on the land rather than transfer to alternative employment. Before dealing with the various policies which are the main theme of this chapter, the most important national objectives of the agricultural development, followed by the major governmental agents responsible for the management process are investigated. At the end, the essential large-scale agricultural projects are presented as examples of the direct efforts undertaken by the Government to improve the agricultural setting.

4.2 : The Main Objectives of Agricultural Development

As stated in the various Five-Year Development Plans, the main objectives of the Saudi agricultural development which are consistent with national objectives can be summarised as:

- 1) To establish and maintain a prudent level of self

sufficiency in food production, recognising both producer and consumer interests.

- 2) To achieve a satisfactory rate of increase in farm output at minimum cost, by encouraging innovations which exploit the possibilities for technical change most appropriate to the country's natural resources endowments.
- 3) Sound distribution and utilisation of resources for the welfare of this and future generations.
- 4) Attract private enterprise in food production, processing, and marketing through the provision of easy payment loans and subsidies while taking the responsibility of those activities in which the private entrepreneurs are unable or unwilling to enter.
- 5) Improvement in efficiency of agricultural production and the used scarce resources, especially water resources.
- 6) To improve the skill level in the agricultural sector.
- 7) To increase the income of rural people who mainly work in farming and livestock activities.
- 8) To protect the agricultural (including marine) environment.

The Government's strategy for effecting the above objectives is based on the following principles;

- 1) Continuing the detailed evaluation studies of the country's available land and water resources, and therefore to make more land available to public by means of free grants.
- 2) Improving the efficiency of the traditional agricultural sector by the adoption of modern farming methods that minimise labour and water inputs.
- 3) Improve range management through protective measures and

discouragement of overgrazing.

- 4) Encouraging and promoting, through strengthened extension and training programmes, the adoption of selected production systems and improved farm and ranch practices.
- 5) Fostering and encouraging the rational organisation of public and private infrastructures and, particularly, the establishment of market support institutions and distribution practices.
- 6) Research support is provided for studies on problems specific to the country's agriculture and which are oriented towards the application of appropriate modern technology.
- 7) Interest-free loans are provided, in accordance with the needs of both small- and large-scale farmers.
- 8) The provision of output and input subsidies to enhance the use of new agricultural inputs such as fertilizers, improved seeds and insecticides.
- 9) Price support programmes to direct the emphasis towards certain products desired by Government for the purpose of food security.
- 10) Encouraging the private sector, by means of incentives, to develop large scale agricultural projects ranging from integrated agricultural projects, such as the Haradh project, to individual crop, dairy and livestock projects.
- 11) Improving the sector's data base to provide reliable information for analysis by both the public and private sectors and assist the overall management of the agricultural sector.

4.3: The Agricultural Development Management

The Government of Saudi Arabia recognises the deficiency in farming, and serious efforts were being made to correct the situation. These efforts have been channelled through several agencies responsible for developing the agricultural sector. Among the different government agencies, the Ministry of Agriculture and Water and the Saudi Arabian Agricultural Bank, which are the main agents for developing agriculture, deserve special attention.

4.3.1: The Ministry Of Agriculture And Water (MOAW)

MOAW established as a separate Ministry in December 1953 after six years as a directorate under the Ministry of Finance. It is the principal authority and the main policy making body in the country for the development of agriculture and water resources. The Ministry's wide-ranging responsibilities are incorporated in seven broad areas; construction, production, agricultural land development, agricultural services, economic studies, agricultural research and support and training. In addition, it undertakes the operation and maintenance of irrigation and drainage projects that farming communities cannot provide themselves. In general among the main functions of MOAW are;

- 1) Prepare and implement plans and programmes aimed at steady, balanced agricultural development.
- 2) Provide technical and financial services in a manner that creates a suitable environment for agricultural investment.
- 3) Design policies and enforce measures and regulations aimed towards the conservation and optimum use of water

and agricultural resources.

The Minister of Agriculture and Water is responsible for overall agricultural policy in the Kingdom. In addition he is the Chairman of the boards of several authorities including the Water Desalination Organisation, the Al-Hasa Irrigation and Drainage Authority, the National Agricultural Development Company, and lastly the Grain Silos and Flour Mills Organisation.

For the assistance of the Minister of Agriculture and Water, there are three Deputy Ministers who are in charge of Agricultural Affairs, Water Affairs, and Research and Development. In addition to the head office in Riyadh, the MOAW has 18 Regional Directorates, 93 Agricultural Branch Offices in the main agricultural areas and 15 research stations.

4.3.2: The Saudi Arabian Agricultural Bank (SAAB)

SAAB is considered one of the significant achievements which contributed to the development of agriculture in Saudi Arabia as being a financial institution extending interest-free loans needed by farmers to meet their farming expenses, to finance their agricultural projects, and to save them from the high interest rates charged by private money lenders.

The Agricultural Bank started its operation in 1964, as an autonomous institution entirely owned by the Government with a nominal capital of SR30 million and a paid-in capital of SR10 million. SAAB is authorised to grant credit to individuals, cooperatives, and firms engaged in production, processing and marketing of agricultural products to achieve the following objectives:

- 1) Raising the productive efficiency in agriculture through

introducing modern mechanisation.

- 2) Increasing the agricultural economic resources through the horizontal expansion in cultivated land and through land reclamation in the different regions of the kingdom.
- 3) Assisting farmers to cope with economic problems and natural disasters.
- 4) Upgrading and improving the marketing efficiency of agricultural produce.

In addition to the provision of interest-free loans, SAAB is also entrusted with the implementation of a large part of the input subsidy programme in agriculture. Such subsidies are paid for irrigation equipments, agricultural machinery, animal feed, fertilizers, poultry and dairy equipment, as well as for air transport of cows.

The credit and subsidy services offered by SAAB reach the interested Saudi farmers and businessmen through the various branches and offices. Beside the head office located in Riyadh, there are 12 branches located in Riyadh, Jeddah, Buraidah, Abha, Al-Hofuf, Medina, Hail, Al-Jawf, Jizan, Tabuk, Al-Kharj and Taif. To these branches report 58 local offices of which 39 offices have the authority to approve loans up to SR400,000.

4.3.3: The Other Involved Agencies

Besides the Ministry of Agriculture and Water and the Saudi Arabian Agricultural Bank, there are several agencies who play important roles, directly or indirectly, in the process of agricultural development. Briefly these agencies are listed below:

1) **The Grain Silos and Flour Mills Organisation (GSFMO)**

Established in 1972 by a Royad Decree number M14, under the Ministry of Commerce, to undertake the following functions; purchase and storage of local wheat, production of animal feed concentrate, monitoring of animal feed production subsidy, and producing and marketing wheat flour. The GSFMO has seven projects in Riyadh, Dammam, Qasim, Jeddah, Khamis Mushayt, Hail and Wadi Al-Dawaser, with total storage capacity of about two million tonnes. Due to the delay in payment to wheat farmers during the planting year of 1985, the responsibility of GSFMO has been transferred to the Ministry of Agriculture and Water.

2) **Ministry of Labour and Social Affairs**

The contribution of this Government department to the agricultural development is through the supervision of rural cooperatives which benefit the Saudi farmers.

3) **Saudi Arabian Industrial Development Fund**

This fund was established in 1974 to provide the Saudi private businessmen with interest-free loans to establish local industries in which agro-industries are also included.

4) **Ministry of Commerce**

Among its functions are the coordination of agricultural trade policy and the administration of imported food subsidy programmes.

5) Ministry of Education, Universities and Colleges

Through these institutions, education and training programmes in agricultural skills are accomplished. In addition, and mainly through the Universities and Colleges, some efforts in the field of agricultural research are pursued.

4.4: Water Policy

The availability of a reliable water supply in sufficient quantity and of acceptable quality is a necessary condition for the social and economic development in any country. The development of water resources is determined by the pattern of demand and supply forces. On the one hand, population expansion, increased urbanisation, industrialisation and agricultural development determine the quantity and quality of water demand; on the other hand, the availability, quality and cost of water influence both where this growth will occur and the nature of economic development. In a country like Saudi Arabia with scarce and finite water resources, the availability of water is a key element in determining the scale and location of longer-term development projects. Water policy is, therefore, an integral part of a comprehensive development planning process.

The ultimate objectives behind the intensive efforts to develop the water sector can be summarised as follows:

- 1) To meet the present and future water needs of society and agricultural expansion.
- 2) To develop and conserve the present known water resources efficiently.
- 3) To seek new water resources.

In achieving the above objectives, massive programmes have been undertaken by various government agencies. In addition to the Ministry of Agriculture and Water, which is the agency primarily responsible for implementing water policy, three other institutions are also involved in planning, management, development, production and distribution of water supplies;

- 1) The Saline Water Conversion Corporation (SWCC), which is chiefly responsible for the construction and management of water desalination plants;
- 2) The Ministry of Municipal and Rural Affaires. This ministry takes the charge of the construction of all municipal water distribution networks and associated storage and maintenance facilities as well as sewage collection systems and treatment plants at large and medium sized population centres;
- 3) The Al-Hasa Irrigation and Drainage Authority, an autonomous body is in charge of the Al-Hasa project, the Country's largest irrigation and drainage scheme.

The great emphasis to develop and maintain adequate water supply can be grasped from the large volume of capital investment undertaken by the above government agencies on water development. For example, SR53 billion was allocated for water resources programmes between 1980-85 compared with SR34 billion spent for the same purpose between 1975-80. The concern about water is continuing, therefore, nearly SR32 billion has been allocated for the Fourth Plan (1985-90) to meet future water needs. This is becoming particularly critical as the following developments are anticipated:

- a) Urban industrial use of water, which stood at 502

million cubic meter (cu.m.) annually is expected to grow rapidly to a projected 2,279 million cu.m. annually in 1999/2000, as a result of the expanding water demand.

- b) Irrigated agricultural use of water is also expected to grow from 1,832 million cu.m. annually in 1979/80 to 3,220 million cu.m. annually in 1999/2000 as the sector continues its growth.

Now we focus our attention to the major programmes which have been undertaken within the last two decades, by which the agricultural and urban water demand was maintained:

- 1) Since 1965 an extensive programme of underground water investigations and surveys has been undertaken. The country was subdivided into eight regions, largely on the basis of hydrogeological information, and consultant firms were selected to undertake the projects. As a result of these surveys, various rich water aquifers have been found. By 1983 twenty main aquifers have been established, nine of which were being exploited. Table 4.1 shows the main aquifers which supply over 70 per cent of the country's water needs.
- 2) To control flash floods, augmenting underground water resources and filling natural reservoirs with rainwater for drinking and agricultural use, the Ministry of Agriculture and Water has constructed almost 199 concrete and earthfill dams with total water capacity of 750 million cubic meter. One of the largest is the Wadi Najran Dam, completed in 1982 with a storage capacity of 85 million cu.m. of water.

TABLE 4.1

THE MAIN NON-RENEWABLE WATER AQUIFERS IN SAUDI ARABIA

Aquifer	Average Thickness (meters)	Size (in Kilometres)
Saq	300 - 600	1500 x 250
Wajid	950	300 x 250
Tabuk	150 - 170	900 * 150
Minjur	300	800 x 600
Al-Bayyad	600	600 x n.a.
Al-Wasia	500	1450 x 800*
Umm Er Radhuma	240	1000*x n.a.
Dammam	35	n.a.
Noejene	300	n.a.

Notes: n.a. = not available

* = extends into Bahrain, Kuwait and Iraq.

Source: The Kingdom of Saudi Arabia, Ministry of Agriculture and Water, "A Guide to Agricultural Investment in Saudi Arabia", Riyadh, 1979, p.35

The dam has assisted in the irrigation of 10,000 hectares of Arable land. The other major dams and their features are shown in Table 4.2.

- 3) Within the last 15 years, almost 2500 wells were drilled, dug or repaired in various parts of the kingdom for the purpose of water supply, aquifer testing and observation of water levels.
- 4) To meet the increasing demand for water in urban areas, seawater has been used after desalination process. The first project in the kingdom was put into operation in 1969. Since then, the desalination programmes have witnessed considerable expansion. Up to date there are 26 plants producing more than 500 million cubic meters per year.
- 5) During the Third Plan period(1980-85),the Ministry of Agriculture and Water implemented 400 projects for supplying water to the outlying small villages and agricultural settlements and 75 projects for serving medium sized cities and comparatively larger villages. It is expected that, during the Fourth Plan period (1985-90), additional 125 projects for small villages and 50 projects for medium-sized cities and villages will be implemented.
- 6) Sewage water is also exploited in the last two years after chemical treatments and mainly used for irrigation. It is estimated that around 100 million cubic meter of reclaimed sewage water had been made available for use in 1985. These supplies are expected to double during the Fourth Plan and will be available near large cities.

TABLE 4.2

THE MAJOR DAMS IN SAUDI ARABIA

Name of Dam	District Location	Type of Material Used	Length (m)	Height (m)	Storing Capacity (million cu.m.)
Haneifa	Riyadh	Sandy	390	9.5	1.3
Laban	Riyadh	Rockfill	500	12.0	2.0
Nammar	Riyadh	Rockfill	400	8.0	1.5
Dir'iyah	AL-Duriyah	Concrete	380	9.5	3.0
Ha'ir	Riyadh	Concrete	400	14.0	3.8
AL-Kammah	Qassim	Concrete	700	7.0	1.5
Herimlah	Sudair	Sandy	1250	6.0	1.5
Majma'a	Sudair	Rockfill	360	8.0	1.3
Thadek	Sudair	Sandy	850	7.0	2.0
Rawdat-Sudair	Sudair	Sandy	554	14.0	3.0
Semon	Zulfi	Rockfill	150	21.0	1.5
Jizan	Jizan	Concrete	316	35.0	51.0
Abha	Asir	Concrete	350	33.0	2.4
Marid	Al-Asyah	Sandy	500	7.0	1.3
Najran	Najran	Concrete	250	60.0	85.0
Lyyah	Taif	Rockfill	190	45.0	10.0
Turabah	Taif	Concrete	380	21.0	20.0
EL-Hamabig	Dowadme	Sandy	700	7.0	3.5
Tamim	Tamim	Sandy	770	13.0	3.5
Al'arkal	Medina	Concrete	450	11.0	7.0
EL-Geel	AL-Aflaj	Concrete	126	11.5	2.5

Source: Kingdom of S.A., Ministry of Agriculture and Water, "A Guide to Agricultural Investment in Saudi Arabia", Riyadh, 1984, p.66

- 7) A National Water Plan for the rational use and re-use of the water resources available to the Kingdom has been prepared. The Plan calls for a comprehensive survey of water resources, assessment of water requirements for different purposes, formation of a comprehensive water policy and designing rules and regulations for its implementation.
- 8) Because of the inefficiency in water use by farmers and urban users the future emphasis, as indicated by the Fourth Plan, will be on the rational utilization of this scarce resource. In addition, the policy focus will be on the introduction of conservation measures, strict regional water management, the establishment of priorities in water use, the introduction of tariff systems and closer coordination of agricultural and water development plans. Such policy measures will be in accordance with the National Water Plan.

4.5: Land Reclamation and Distribution Policy

To enlarge the area of cultivable land in Saudi Arabia, detailed studies and surveys have been conducted since the early 1960's on the major agriculturally potential lands. These surveys include investigations of soil characteristics, water resources suitable for irrigation, and type of cultivation appropriate to each area. Preliminary studies indicated that the country has about 4.5 million hectares of land which could be reclaimed for agriculture.

Along with these developments, an Arable Land Distribution Scheme has been issued by a Royal Decree in 1968 to set the base for a new era in the horizontal expansion of

agriculture in Saudi Arabia. By this scheme, the reclaimed land could be distributed to the interested individuals, companies and institutions. The Department of Land Utilisation within The Ministry of Agriculture and Water is the body responsible for implementing this programme, and the eligible land for distribution must meet the following conditions;

- 1) Free from any right of ownership or collective use.
- 2) Lies beyond the boundaries of cities or villages.
- 3) Not subject to dispute, legal or otherwise.
- 4) Economic to cultivate in terms of the necessary inputs.

If the above conditions were met, then any Saudi citizen is eligible to obtain a land in the size of 5 to 10 hectares to a maximum of 20 hectares if more land is available. On the other hand, the maximum distributed land per company is 400 hectare, or more after special approval from the Council of Ministers. At least 25 per cent of the distributed land should be utilized or exploited for a period ranging between 2 to 5 years or, otherwise, the land is taken back and redistributed to another beneficiary.

Since the initiation of the Arable Land Distribution Scheme and up to 1985, a total of 713,965 hectares have been distributed. Out of this, and as presented by Table 4.3, 43,865 individuals received 257,735 hectares or 36 per cent of the total distributed land. In addition, 2,344 different agricultural projects and 10 large scale companies, received 41 per cent and 23 per cent of the total distributed land respectively. An interesting point which can be seen from the above table is that almost 73 per cent of the total

TABLE 4.3

AGRICULTURAL LAND DISTRIBUTION IN SAUDI ARABIA
UP TO 1985

(Area in hectares)

Year	To Individuals		To Agricultural Projects		To Agricultural Companies		The Total Distributed Area
	No.	Area	No.	Area	No.	Area	
From 1968 to							
1974	5711	34884.3	-	-	-	-	34884.3
1975	767	5209.5	3	520.0	-	-	5729.5
1976	189	1091.2	3	1200.0	-	-	2291.2
1977	971	5682.3	20	1006.9	-	-	6689.1
1978	4140	34204.8	21	429.0	-	-	34633.8
1979	1559	7812.7	17	523.2	-	-	8335.9
1980	6075	29017.7	29	2661.6	-	-	31679.3
1981	1225	6285.6	76	8967.9	-	-	15253.5
1982	2709	14412.6	122	14665.7	3	20025.0	49103.3
1983	8480	47695.4	638	77530.9	5	127500.0	252726.3
1984	7857	46881.0	774	100510.0	2	12009.0	159400.0
1985	4186	24558.0	651	82680.0	-	-	108238.0
Total	43865	257735.0	2344	290296.0	10	164934.0	713965.0

Sources: 1) Kingdom of Saudi Arabia, Ministry of Agriculture and Water, The Fourth Plan for the Agricultural Sector 1985-1990, Riyadh, 1985, p.7
2) Kingdom of Saudi Arabia, Ministry of Agriculture And Water, "Annual Bulletin Of Current Agricultural Statistics: Sample Survey 1984/85", 1986.

distributed land was conducted only within the last three years, and out of that nearly 77 per cent was devoted to various agricultural projects and companies.. This phenomenon can be explained by two facts; Firstly, during the last three years and due to the intensive Government support to produce more wheat, many Saudi businessmen applied for free land to enter this new profitable business. Secondly, the recent recognition that the agricultural development can be accelerated by having large, highly capitalised and mechanised production units.

4.6: Agricultural Research Policy

Acquiring new and improved factors of production in agriculture is the key to the progress and the principal means of providing for the better utilisation of the available and potential resources in a more economic way. Such improvements are usually carried out by scientists and research workers at research centres and agricultural experimental stations. In Saudi Arabia, this essential role of research is recognised and, therefore, fifteen Research Centres and Experimental Farms have been established throughout the country. As shown from Table 4.4, four research centres specialise in certain fields and extend their services to the whole country. In addition, two centres considered as regional, in which their services cover the Gulf States as well.

In general, the research programme in Saudi Arabia is geared mainly towards problem-oriented research in areas of crop and livestock production, fisheries and range management,

TABLE 4.4

AGRICULTURAL RESEARCH CENTRES AND EXPERIMENTAL FARMS
IN SAUDI ARABIA

Research Centre	Field of Study	Capacity
1) Hofuf	Animal and forage production; soil and water management; drainage and salinity; rice and vegetable production.	Regional*
2) Qatif	Vegetable and fruit production	Local
3) Onaizah(Qasim)	Cereals; Vegetable and fruit production; irrigation	Local
4) Hakmah (Jizan)	Sorghum, cotton, sesame; Alfalfa; Papaya and Mango	Local
5) Dirab (Riyadh)	Horse breeding; dairy; seed multiplication programme	Kingdom
6) AL-Kharj	Cereals; Vegetables and fruit, irrigation system; dairy	Local
7) Jeddah	Locust control centre	Kingdom
8) Haddah Ashma	Tropical citrus fruit, vegetables	Local
9) Baljarshi	Deciduous fruits; irrigation system	Local
10) Bisha	Citrus, dates, grapes and cereals	Local
11) Medina	Poultry, dairy, cattle	Local
12) Marine development (Jeddah)	Fish movement and classification; fishing	Kingdom
13) Range development (Ar'ar)	Water spreading; fodder storage, extension	Kingdom
14) Range and forest station (Taif)	Water spreading; fodder storage	Local
15) Agriculture and Water Research Centre (Riyadh)	Soil and water; crop production and protection; animal health; food science and nutrition; analytical chemistry	Regional*

Note: * = Regional means including the Arabian Gulf States as well.

Source: Ministry of Planning, The Third Development Plan (1980-85), Riyadh, p.145.

locust control, and towards the development and adoption of suitable agricultural technology.

Due to the shortage of Saudi research staff, foreign experts have been attracted to work in the various Research Centres. In addition, many contracts have been made with several international universities and institutions to establish the necessary laboratories and agricultural facilities as well as to develop special kinds of research. Major institutions involved are the following;

- 1) University College of North Wales, Bangor, to conduct extensive research on livestock and forage crop production since the Spring 1970.
- 2) Leichtweiss Institute, and the Technical University of Braunschweig from West Germany to do research on soil, water management and drainage, as well as the production of selected crop under different levels of salinity.
- 3) The Taiwan Agricultural Technical Mission. Initially the Mission's task was limited to carrying out research on rice production in the Eastern province, including varietal trials and hybridization.
- 4) The British White Fish Organisation to conduct studies related to locating rich coastal fishing areas and identifying the best and most feasible methods of fishing.

In addition to the above cooperation with the international institutions, the local universities make special kinds of contribution. Among the Kingdom's seven universities, King Saud University at Riyadh, and King Faisal University at Hofuf have important faculties of agriculture in which limited

research is conducted.

Fruitful research requires capital investment as well as skills. Therefore between 1980-85, the Ministry of Agriculture and Water which is the main institution responsible for agricultural research has allocated SR 526 million for research. This budget has increased by 21.5 per cent to be SR 639 million for the period of 1985 to 1990.

The various efforts which have been taken by the internal and external sources to develop adequate research to be the base for a successful agricultural development have accomplished good results. Some of these good research results are presented below as evidence;

- 1) Massive efforts have been devoted to find the most suitable wheat varieties. As a result, several hybrid varieties such as Mexipak, Jiory, Dirab, Supper X, S76 and S331 have been discovered. These new kinds of seeds have high protein yield and fit the country's climatic conditions.
- 2) With regard to rice cultivation, a new type (Hassawi No.3) yielding 4-5 tons per hectare (more than three times the yield of the old variety) has been developed. The growth period is also shorter than that of the old variety, thereby economising on water and fertilizer and facilitating its relation with the other crops especially wheat.
- 3) Two types of barley seeds (Jizah 121 and Bitcher), and three good varieties of millet (Jizah 3, 7502 and SSTO) have been developed which have high yield per hectare and lower growth period compared to the local types.

- 4) Potato is another product which is undergoing seed selection and improvement. From more than 40 types of imported potato seeds only four types have been selected and improved to fit the local conditions. A total of 380 tons of the improved potato seeds were distributed to farmers during the year 1980/81. During 1983, 642 tons were also distributed.
- 5) Animal breeding stations were established in Medina and Riyadh in 1957 in order to demonstrate better livestock-raising techniques and to aid in improving the local breeds.
- 6) Fisheries research activities extended to include the development of fresh and salt water fish farms and shrimp production under controlled conditions.

4.7: Extension Service Policy

To make people more interested and productive in the process of change, an important specific objective is to change their attitudes towards their respective activities of life. Thus, farmers are to be taught and encouraged, through extension services, in the use of fertilizers, new seeds, improved cultural practices, and better equipment and tools of production.

In Saudi Arabia, the history of agricultural extension services turn back to 1950, when an agreement with The Food and Agriculture Organisation (FAO) was made to assist in establishing an extension system. According to Lateef (1956), the first budgetary provision for a formal extension branch was made in March 1953, but the branch was not established until 1955. The extension branch consisted of one man who

was accepted in January 1956 for a one-year FAO Fellowship in the United States to study the theory, technique and operation of State and Federal extension services in that country.

Since that much progress has been achieved, and now the extension services extend to cover most of the country's agricultural areas through the Ministry of Agriculture and Water's 18 directorates and their 93 attached offices. Each directorate or the attached office is equipped with the following staff;

- One Agricultural Engineer and an Assistant for agricultural extension.
- One Agricultural Engineer and an Assistant for plant protection.
- One Veterinarian and an Assistant.

The total extension officers are 800 of which 154 hold a B.Sc. degree in Agricultural Science, and all provide technical assistance and guidance to the Saudi farmers to maintain a higher yield and better quality agricultural production. In addition, farmers are furnished, free of charge, with spraying equipment, pesticides and veterinary services.

In recent years the extension services have expanded and some of the accomplishments are summarised as follows;

- 1) During the Second Plan (1975-80), 4000 field demonstrations were conducted; 900,000 fruit trees distributed to 10,000 farmers; 2,400 tons of certified wheat seed distributed; nine extension apiaries with 130 beehives were established; 371 beehives were distributed to 213 farmers and pest control work covered more than 80,000 hectare and six

million fruit trees.

- 2) Also during the second plan almost 14,246 hectares representing 3.44 per cent of the total cultivated land were treated with pesticides and almost 1.3 million trees representing 9.13 per cent of the country's total trees were sprayed.
- 3) Within the Third Plan (1980-85), the extension services extended more, and during 1983 and 1984 alone, field demonstrations reached 2,773 and 2,890 viewed by 34,100 and 35,000 farmers respectively.
- 4) In addition, the Extension Workers made 8,464 visits to 5,326 farms in 1983, and 8,675 visits to 5,823 farms in 1984.

4.8: Agricultural Education and Training Policies

Education obviously plays an important role in economic development. It is indeed one of the most crucial factors, if not the most crucial, in the development process. Professor Schultz emphasized this role when he said "The abundance of modern agriculture and industry is not to be had by people who are predominantly illiterate and unskilled. Education and knowledge are indeed important forms of capital". The productive value of education has its roots in two different ways: Firstly, a higher level of education may allow the farmer to accomplish more with the resources that he has; Secondly, a higher level of education may increase the farmer's ability to acquire and use information about the new methodology which facilitate the adoption of new inputs and modernisation.

In Saudi Arabia, most of the farmers are illiterate, and

the academic education is mainly directed to the younger generation through the different institutions and agricultural colleges. There are three colleges situated in Riyadh, Hofuf and Qaseem, which give courses in agricultural sciences. In addition, there are some students pursuing their college studies in agricultural fields abroad, particularly in the U.S. and Europe. Adult education, which is an effective way in educating farmers, now covers most of the rural areas but it is not agriculturally oriented. On the other hand, the illiterate farmers are mostly taught about the new methods of production, protection and technology through the very limited radio and T.V. programmes.

Concerning agricultural training in Saudi Arabia, the first attempt started in Jeddah with six trainees in 1953 with the help of FAO, and the programme was directed mainly to antilocust (Lateef, 1956). As efforts continued since that date, now there are five training centres in Hofuf, Onaizah in Qaseem, Jizan, Riyadh and the Veterinary and Livestock Production Centre in Hofuf. All these training centres are under the responsibility of the Agricultural Training Department at the Ministry of Agriculture and Water (MOAW), which was established in 1967 to design and implement the training programmes. The above mentioned five centres provide vocational training in crop and horticulture, plant pathology, farm management, machinery, irrigation and veterinary care, and mainly directed to the employees of MOAW. Besides, the training services extend to benefit the college students, the interested farmers and the agricultural businessmen. To attract farmers, a grant of SR700 is provided to each trainee, but no adequate number has been achieved.

According to the statistical information released by the Department of Training of MOAW, the total beneficiaries since the start of training programmes in 1967 until 1983, were 5,767 trainees, of which 1,310 were in agricultural production, 159 in livestock production, 483 in irrigation and drainage, 550 in mechanisation, 58 in veterinary and 463 in other various fields (Al-Riyadh Newspaper, 1985). The total number of trained farmers were 634, representing 11 per cent of the total. Table 4.5 shows the recent achievements of the training programmes. Out of the total 2,965 trainees, 1,936 or 65 per cent are from the MOAW employees. The trainees from college students and farmers are 521 and 508 respectively.

4.9: Monetary Incentives Policy

In a developing country like Saudi Arabia with huge revenues coming from oil exports and with large numbers of traditional farmers producing at the subsistence level, the Government intervention to develop the agricultural sector is inevitable. Since the last decade, this intervention has been made through providing various and massive monetary incentives. This policy was required to direct the attention to the long-neglected agricultural sector and to increase its productivity through promoting the adoption of new technologies. Generally, the agricultural monetary incentives take three forms: First, interest-free loans extended equally to traditional and commercial producers by the Saudi Arabian Agricultural Bank and by the Saudi Industrial Development Fund; Second, agricultural inputs and production subsidies provided by the Saudi Arabian Agricultural Bank and the

TABLE 4.5

THE NUMBER OF AGRICULTURAL TRAINEES FROM 1979 TO 1983

Beneficiaries	1979	1980	1981	1982	1983	Total
From MOAW employees	293	254	394	493	502	1936
From College students	40	85	102	86	208	521
From Farmers and their children	73	117	85	122	111	508
Total	406	456	581	701	821	2965

Source: Saudi Arabia, Ministry of Agriculture and Water,
"The Agricultural Magazine", No.4, Jan., Feb., and
March 1985.

Ministry of Agriculture and Water; Third, price support to certain commodities provided by the Grain Silos and Flour Mills Organisation and MOAW. Table 4.6 shows the above mentioned various monetary incentives which have been applied by the different Government agents to promote high progress in the agricultural domain. Because of the important role played by the monetary incentives policy, we now turn to investigate in more detail its main three forms;

4.9.1: Agricultural Credit Policy

Usually there are three main sources of finance; current income, past savings, and loans. Due to the subsistence nature of the agricultural economy and the time-lag between the costs of production and the eventual returns on investment, the farmer would most likely need to borrow. In most of the developing countries the difficulties of obtaining capital of any sort are great, due to low income levels and the considerable inequalities of income distribution, but the situation in Saudi Arabia is different. Loans are widely available to the Saudi farmers and agro-businessmen through the Saudi Arabian Agricultural Bank (SAAB) which had been established in 1964. Loans and credit facilities needed to assist in developing and revival of agriculture are extended to achieve the following goals:

1. Providing cash liquidity required to buy the various agricultural inputs and implements and to finance poultry, dairy, greenhouses projects and agro-industries.
2. Expanding the area of cultivated land.
3. Increasing national income through:

TABLE 4.6

MONETARY INCENTIVES FOR AGRICULTURAL PRODUCTION

Type	Amount	Source
<u>1 - Subsidies</u>		
a - Production Inputs:		
Fertilizer	50% of cost	MOAW
Animal Feed	50% of cost	SAAB
Potato Seed	5 tons free; SR1000/ ton thereafter up to 15 tons	MOAW
b - Machinery and Equipment:		
Poultry equipment	30% of cost	SAAB
Dairy equipment	30% of cost	SAAB
Engines and Pumps	50% of cost	SAAB
Farm machinery	45% of cost	SAAB
Fish trawlers	Variable	SAAB
c - Transportation:		
Air transport of cows	100% of cost	SAAB
d - Output:		
Rice	SR 0.30/Kg	MOAW
Corn	SR 0.25/Kg	MOAW
Millet/Barley	SR 0.15/Kg	MOAW
Dates	SR 0.25/Kg	MOAW
Date Palms planted	SR 50.00/tree	MOAW
<u>2 - Credit</u>		
a - Agricultural Credit:		
All types	Variable conditions	SAAB
b - Agro-industrial Credit:		
All types	Variable conditions	SIDF
<u>3 - Price Support</u>		
Wheat	SR 2.00/Kg*	GSFMO

Note: * Purchase price for years 1985/86 to 1988/89;
from 1979 to 1984 purchase price was SR 3.5/Kg.

Source: S.A., Ministry of Planning, The Fourth
Development Plan (1985-90), p.182

- a) Upgrading the productive efficiency of the agricultural sector in general.
- b) Augmenting and developing agricultural economic resources and increasing rates of agricultural produce.
- c) Processing of agricultural produce.
- d) Improving marketing capability for agricultural produce.
- e) Assisting farmers to overcome economic and natural calamities.

The credit system in general aims to encourage investment in the agricultural sector, thereby broadening the agricultural base and improving the quality of production, marketing and processing, thus facilitating the attainment of an appropriate degree of self-sufficiency. To obtain these ends, SAAB provides three types of interest-free loans to individual farmers, cooperatives, companies and establishments which are basically engaged in agriculture in Saudi Arabia. These types of loans are:

1. Short-term loans for a period not exceeding one year. Such loans are extended to the cultivation and marketing of seasonal crops, for the purpose of providing agricultural production requirements such as seeds, fertilizers, fuels, ploughing, labour wages, livestock fattening, animal and poultry feed.
2. Medium-term loans, which have to be repaid within a period of five years, are used for meeting the fixed investment costs needed for well drilling, acquisition and installation of irrigation equipments and facilities, purchase of farm machinery, transport

vehicles, and fishing gear; starting bee-keeping and livestock production operations; and the construction of durable assets such as poultry houses, dairy farms, food processing plants and cold storage facilities.

3. Long-term loans for financing fallow land reclamation and development projects of wide areas. These loans extend up to 25 years, and few have been granted so far.

In general the granted loans are financed at the rate of 100% if the loan or the obligation due from the farmer does not exceed SR500,000. If the loan is more than SR500,000 up to SR3 million, financing will be 80% of the loan. But if the loan is over SR3 million, financing will be 80% of the first SR3 millions, and 60% of the balance. The loan ceiling given to any project, or the total debts of the borrower should not exceed SR20 millions.

The scale of agricultural expansion in Saudi Arabia is reflected in the growth of loans provided by SAAB to farmers and for agricultural projects. Table 4.7 gives us a summary about the loans movement since the first year of operation up to 1985. As shown by the table there were only 625 granted loans in 1965, of which 573 or 92 per cent were given as medium-term loans. The total amount of money provided during that first year did not exceed SR4.4 million. The total number of loans increased year after year until they reached a peak of 45,128 loans in 1981. On the other hand the highest amount granted was SR4,166 million in 1983. Due to the recent economic recession, both the number and amount of loans have declined. By 1985 the total number of loans went down to

TABLE 4.7

GENERAL ANNUAL CREDIT MOVEMENT PROVIDED BY
THE AGRICULTURAL BANK 1965-1985
(Amount in '000 Saudi Riyals)

Year	Short-Term Loans		Medium-Term Loans		Total Loans	
	Number	Amount	Number	Amount	Number	Amount
1965	52	131	573	4259	625	4390
1966	141	295	1781	8633	1922	8927
1967	885	1083	2261	12020	3146	13103
1968	1232	1542	2500	10478	3732	12020
1969	1227	1676	2447	12201	3674	13877
1970	1793	3009	2563	13127	4356	16136
1971	1741	2575	2640	14052	4381	16628
1972	1234	2266	2631	14292	3865	16558
1973	1537	2916	2940	16677	4477	19593
1974	1741	3545	3673	32759	5414	36304
1975	3835	7182	12416	138323	16251	145505
1976	3073	8244	16629	261189	19702	269433
1977	3633	17288	17744	472550	21377	489383
1978	3572	43713	16726	541954	20298	585668
1979	4609	15286	19149	693786	32758	709072
1980	3557	22734	16225	1105952	19782	1128686
1981	9310	39226	35818	2491640	45128	2530866
1982	5556	29456	31890	2903446	37446	2932902
1983	3454	25271	35432	4140757	38886	4166028
1984	1759	18511	22085	3477252	23844	3495763
1985	1024	17316	13722	2304484	14746	2321800
Total	54965	363265	261845	18669914	316810	18933179

Source: Saudi Arabia, Saudi Arabian Agricultural Bank,
"Annual Report", No. 21, 1985, p.29

14,746 representing a 67 per cent decrease from the peak level of 1981. However, the amount of loans shrank to SR2,321.8 million, or only 56 per cent of the momentum level of 1983. In general, during the 21 years period(1965-85), the total number of loans extended by SAAB reached 316,810 loans with a total value of SR18,933.2 million. From the total, short-term loans represent 27 per cent of the total number (54,965), and only 2 per cent of the total value (SR363.3 million). This low percentage of short-term loans as explained by the officials of SAAB is a reflection to the increasing ability of the Saudi farmers to self-finance such fields.

Concerning the composition of agricultural credit, loans are provided to the Saudi farmers and agro-businessmen for the purchase of new inputs and technologies and for establishing agricultural projects. Table 4.8 shows the recent loans' composition of 1985. Because of the expansion in wheat cultivation, the Kingdom has experienced, in recent years, a significant increase in the number of wheat farms particularly in Qaseem, Riyadh, Al-Kharj and Hail regions. The demand for loans financed by SAAB increased to provide water supplies needed for such farms. Therefore, irrigation equipment of different systems, centre pivots, linear and solid set were the major objectives of such loans, with loans amounting to SR566.4 million or 24.4 per cent of total loans. The number of sprinklers provided by these loans was 2,918. The cost of drilling casing and lining of 4,016 wells required loans in the amount of SR472.1 million or 20.3 per cent of total loans. Loans to provide 10,475 engines and

TABLE 4.8

CREDIT MONEMENT DURING 1984/85
DISTRIBUTED BY OBJECTIVES

Loan objectives	Loan amount in SR 1000	%
Irrigation Equipments	566,354	24.4
Well drilling, Casing & Lining	472,102	20.3
Agricultural Projects	411,224	17.7
Farming Machinery	315,245	13.6
Engines and Pumps	306,971	13.2
Seeds, Seedlings and Shoots	62,737	2.7
Spare Parts and Nettings	48,564	2.1
Agricultural Construction	45,355	2.0
Fertilizers	30,605	1.3
Ploughing and Levelling	18,106	0.8
Pipe Installations	10,836	0.5
Fishing Boats and Gear	12,406	0.6
Bee-hives and Bee-keeping Equipments	7,789	0.3
Greenhouses	7,498	0.3
Mountainous Terraces	2,799	0.1
Wind Breaks	2,065	0.1
Silos	782	-
Labour Wages	359	-
Total	2,321,800	100.0

Source: Saudi Arabia, The Saudi Arabian Agricultural Bank, " Annual Report" No 21, 1985, p.30

9,631 pumps amounted to SR306.9 million or 13.2 per cent of total loans. Consequently, water provision represented by irrigation systems, well drilling, engines and pumps obtained together almost 58 per cent of the provided loans in 1985. The specialised agricultural projects of various types ranked second in the size of demand for loans. The owners of such projects received loans amounting to SR411.2 million representing 17.7 per cent of total loans. The financed projects were 99, consisting of wheat farming projects, poultry, greenhouses and sheep raising and fattening projects. Farming machinery such as harvesters, combines, bulldozers and ploughing machines obtained SR315.2 million or 13.6 of extended loans. Loans for the purchase of improved seeds and fertilizer accounted for SR62.7 million and SR30.6 million respectively or 2.7 per cent and 1.3 per cent of the total loans. These small shares do not reflect the low level of usage, but rather because these inputs are not costly.

In addition to the Agricultural Bank, the Saudi Industrial Development Fund (SIDF) also provides interest-free loans for the establishment of agro-industries such as food processing, marketing facilities, and the manufacture of agricultural inputs. Up to 1985 the agro-industry projects financed by loans from SIDF reached 291 with a total capital of SR5,563 million. These figures represented 16 per cent of the total financed projects and 9.3 per cent of the total distributed capital respectively.

4.9.2: Agricultural Subsidies Policy

Although the credit policy in Saudi Arabia contains an implicit subsidy because of the provision of loans free from interest, the Government, being willing to accelerate the pace of agricultural development has adopted the policy of extending explicit subsidies to agricultural inputs and products so that the private sector will be induced to direct its investments towards agricultural opportunities. These subsidies are extended equally to traditional and commercial producers, as well as firms both Saudi and joint ventures.

The main objectives behind the subsidies policy are:

- 1) To encourage the use of modern agricultural inputs to expand agricultural output.
- 2) Supporting and increasing the income of farmers.
- 3) Holding down the prices of agricultural products to consumers.

The package of subsidies which covers both the agricultural inputs and outputs was first introduced in 1973 with a granted capital of SR4 millions. Because of the gradual increase of demand for new inputs and the consequent expansion in agricultural production, the amount of subsidies increased over time. As presented in Table 4.9, the amount of subsidies had increased to reach SR829 million in 1979, or more than 200 folds of increase within this span of seven years. In 1983, the amount granted as subsidies increased further to reach a peak level of SR1,472 million.

Next we turn to give more details about the structure of subsidies and the contribution made by them to expand the agricultural production in Saudi Arabia.

TABLE 4.9

THE TOTAL PAID AGRICULTURAL SUBSIDIES IN SAUDI ARABIA
(amount in Million SR, Index 1973 = 100)

Year	Amount	Index
1973	4.0	100
1974	20.0	500
1975	69.0	1725
1976	333.0	8325
1977	603.0	15075
1978	772.0	19300
1979	829.0	20725
1980	586.0	14650
1981	766.0	19150
1982	1129.0	28225
1983	1472.0	36800
1984	1173.0	29325
1985	1378.0	34450

Source: 1) Saudi Arabia, Ministry of Planning,
"The Achievements of Development Plans,
1970-84; Facts and Figures.", 1985, P.172.
2) Saudi Arabia, SAMA, Annual Report, 1986

4.9.2.1: Output Subsidies

Aiming to increase the agricultural production, the Government extends subsidies to certain products in which farmers are lacking the desire to produce them. The Ministry of Agriculture and Water (MOAW) is the agent responsible for implementing this subsidy programme, and pit grants to farmers, an amount of SR0.30 per Kilogram (Kg.) of produced rice, SR0.25 per Kg. of corn, and SR0.15 per Kg. of millet and barley.

Dates represent the major agricultural food crop and constitute the main element of diet of many people, particularly the Bedouins. To encourage the production of dates, an amount of SR0.25 per Kg. of dates is paid to farmers as subsidy. In addition, to increase the number of date palms, farmers receive a grant of SR50.00 for every planted offshoot. As a result of this generous support, dates production increased from 257,000 tons in 1976 to 500,000 tons in 1985, representing an expansion of nearly 95 per cent.

4.9.2.2: Input Subsidies

Among the Saudi farmers, the use level of modern inputs such as improved seeds, fertilizers, machinery and the other technologies is much lower than the optimal level (marginal value product equals to marginal cost) due to lack of knowledge, uncertainties and other factors. Thus, subsidisation policy has been required to encourage the use of such new inputs which contribute much to the expansion of agriculture. Most of the subsidies which include agricultural machinery; engines and pumps; animal feed; transportation of

imported cows; and fishing, poultry and dairy projects equipments are provided by SAAB. On the other hand, subsidies on fertilizers and improved seeds are provided through MOAW.

Table 4.10 presents the volume of subsidies paid by SAAB from 1975 to 1985. During this span of eleven years, the amount paid as subsidies increased by almost 30 times from SR46.3 million to SR1,377.9 million, and the total paid subsidies within this period amounted to SR6,741.1 million. The most important items in which subsidies are paid for are the following:

4.9.2.2.1: Engines and Pumps

The provision of a subsidy to agricultural engines and pumps started in 1974 at the rate of 50 per cent of the official price fixed by MOAW. The subsidy is granted because the prices of engines and pumps are high so the farmers find it increasing the already high production cost and consequently the low return on investment. Pumps and engines are very important to agricultural production especially where the majority of irrigated cultivated land depends on water from wells. Therefore this kind of subsidy is highly justified and actually motivated the expansion of these items among the Saudi farmers. In 1975, the number of subsidised engines and pumps were 6,703 and 4,810 respectively which required a subsidy of SR20.4 million. Over time, the allocated amount for subsidies has increased and in 1985 almost SR355.9 millions were granted to subsidise 10,475 engines and 9,631 pumps. The cumulative subsidies for these two items over the period of 11 years were SR2,387.0

TABLE 4.10

AMOUNT AND PERCENTAGE OF SUBSIDIES DISTRIBUTED BY TYPES
1975-85 (Amount in Million SR)

Year	Engines and Pumps	Farming Machi- nery	Animal Feed	Poul- try Equip- ments	Trans. of Import- ed Cows	Fish- ing Gear	Dairy Farms Equi- ment	Palm Date Off- Shoots	Total
1975	20.4	9.0	15.0	1.2	-	-	0.7	-	46.3
1976	56.8	42.7	35.0	-	-	-	-	-	134.6
1977	67.6	42.6	65.9	4.6	1.3	-	-	-	182.2
1978	101.6	45.3	81.7	3.4	3.4	-	1.3	4.9*	241.6
1979	141.5	103.3	95.7	6.1	5.7	31.1	0.7	-	384.1
1980	163.8	115.2	125.7	8.3	11.1	11.0	0.4	-	435.6
1981	297.1	179.1	126.8	3.5	8.5	0.1	0.4	-	615.5
1982	349.0	262.0	327.8	12.5	22.4	-	5.8	-	979.3
1983	472.3	370.6	432.4	15.3	29.2	-	2.0	-	1321.6
1984	361.0	298.2	334.0	12.3	16.4	-	0.5	-	1022.5
1985	355.9	285.6	710.1	14.8	10.8	-	0.7	-	1377.9
Total	2387.0	1753.6	2350.2	82.0	108.8	42.2	12.4	4.9	6741.1
% of Total	35.4	26.0	34.9	1.2	1.6	0.6	0.2	0.1	100.0

Note: * This subsidy paid by SAAB in 1978 and thereafter by MOAW.

Source: Saudi Arabia, SAAB, Saudi Arabian Agricultural Bank in Twenty Years, 1985, p.55

million or 35.4 per cent of the total agricultural subsidies paid by SAAB (see Table 4.10).

4.9.2.2.2: Farming Machinery

A subsidy of 45 per cent of the official price is offered by SAAB on the major agricultural machinery such as ploughing machinery and its accessories, levelling machines, harvesters, combines, winnowers and balers. The purpose of this programme initiated in 1973 is to extend the mechanisation of agriculture instead of using the traditional farming methods. It reduces production costs through the substitution of labour which is a scarce resource by capital which is an abundant resource in this time. This would result also in increasing the net return to farmers in addition to achieving high rates of agricultural development.

As noted from the above table almost SR1.8 billion, or exactly 26 per cent of the total provided subsidies by SAAB, was paid on agricultural machinery. Owing to this financial programme, most of the farmers now own modern machines and the total number of different types of farming machinery financed through SAAB reached 44,059 items in 1983 compared to only 1,125 items in 1975.

4.9.2.2.3: Concentrated Feed

In 1973 the Council of Ministers authorised the payment of a subsidy to concentrated animal and poultry feeds such as soya beans, cotton seed cake, sesame cake, sunflower cake, peanut cake, corn and sorghum feeds. This subsidy accounts for 50 per cent of the cost price provided that the price is not higher than the price of animal feed produced by the

Grain Silos and Flour Mills Organisation. The government grants this subsidy to promote the development of animal wealth and products in order to achieve self-sufficiency. The previous table shows that subsidies paid to concentrated feeds were increasing one year after another due to the increase in poultry farms and cow and sheep fattening projects. The cumulative amount of such subsidies extended by SAAB up to 1985 reached SR2,350.2 million, representing almost 35 per cent of the total granted subsidies.

4.9.2.2.4: Poultry Farms Equipments

This subsidy was issued in 1974 to cover automatic poultry feeders, hatcheries, feed mixers, equipment for slaughtering, refrigerating and freezing, cages, trays for egg gathering and cleaning, crates and cartons for chick packing, bags for feed packing and related equipments. The subsidy for such equipment is fixed at 30 per cent of the cost price (CIF port of arrival) if these are financed by the owner or 20 per cent of the cost price if financed by the Agricultural Bank.

This programme helped in the development of poultry projects and products thereof to the extent that the Kingdom achieved self-sufficiency in eggs and an increasing progress in the production of broiler chickens. Now there are almost 207 layers projects and 284 broilers projects producing 1,852 million eggs and 138,000 tons of white meat respectively. The overall subsidies granted by SAAB for poultry projects since 1975 reached SR82.0 million of which SR14.8 million or 18 per cent was paid during 1985.

4.9.2.2.5: Dairy Equipment

Dairy equipments such as automatic milking equipment and containers for storing and refrigerating milk, vehicles for transport of dairy products, equipments for milk processing and weighing and laboratory equipment for quality control are subsidised since 1974 at a fixed rate of 30 per cent of the CIF value (20 per cent if the equipment is financed by a loan from SAAB). A subsidy is also paid for the transportation of more than 200 cows which equals 100 per cent of the total cost. For these two programmes, the cumulative subsidies up to 1985 amounted to SR121.2 million, of which SR108.8 million were paid for imported cows transportation. The number of dairy farms operating in the Kingdom reached 30 at the end of 1985. These farms had almost 30,000 cows which produced about 125,000 tons of fresh milk.

4.9.2.2.6: Chemical Fertilizers and Improved Seeds

It is now increasingly recognised that the transformation of traditional agriculture depends very much on the use of new technologies. Professor Schultz (1964) has argued that there are "comparatively few significant inefficiencies in the allocation of factors of production in traditional agriculture" and, as such, a reallocation of the existing factors will not lead to an "appreciable increase in agricultural production". He, therefore pleads for a supply of new factors. Among the most critical are fertilizers and improved seeds which are, according to J. W. Mellor (1966) "the two most important forms of inputs in the modernisation of agriculture". In Saudi Arabia, efforts have been made to spread the use of these two new inputs among farmers by means

of monetary incentives. In 1973 a Ministerial Decree was issued to subsidise chemical fertilizers at a rate of 50 per cent of the CIF cost at the port of arrival. Such subsidy is paid by MOAW directly to the importer, provided he complies with the selling price established by the Department of Agricultural Subsidies (DAS) within MOAW. Also subsidy on fertilizers may be paid directly to the farmer when an import license in the amount of his actual farm needs is granted. The need for this programme was obvious; in 1974 less than 11,000 tons of fertilizer were used when the requirement for the land under cultivation was probably as high as 60,000 tons. In recent years, the use of fertilizers in Saudi Arabia has witnessed a rapid expansion and in 1983 the consumption of fertilizers reached 202,000 tons (FAO, 1984). The total paid subsidies on the purchased fertilizers were SR48.2 million in 1981 compared to only SR5.3 million in 1974.

The programme for improved seeds started two centuries ago and still in effect providing the farmers with the good varieties of the main agricultural products such as wheat, barley, rice, potatoes and others. The improved seeds which fit the local environment conditions are the result of research studies on many different imported varieties. To encourage more use, these improved seeds are provided by MOAW under very attractive prices. As an example, seed potatoes of high yielding varieties are distributed to farmers at the following subsidized prices: first 5 tons of seed, free of charge; and up to 15 tons at a nominal price of SR1.00 per Kilogram. Enhanced by this policy almost 642 tons of potatoes seeds were distributed in 1983. In 1984 another 290 tons were distributed.

4.9.3: Price-Support Policy

This policy has been directed mainly to one product which is wheat in order to promote its production to reach self-sufficiency, to increase the farmers' incomes, to lessen wheat imports and to maintain the following other objectives;

- 1) Keeping bread prices at a low level.
- 2) Reducing seasonal fluctuation in bread prices.

According to this policy which started in 1978, the local produced wheat is purchased through the Grain Silos and Flour Mills(GSFMO) at an attractive price of SR 3,500 per ton and sold in the market after processing at subsidised prices. This expensive price of wheat represents more than twice as much as it cost the farmers to produce it and almost six times as much as it costs to import it at the port of Jeddah. Farmers have been attracted by this profitable policy and they direct most of the available resources for the production of wheat. As a result, substantial expansion in wheat production took place in recent years and the self-sufficiency stage has been achieved within a very short period. Table 4.11 speaks for itself and shows the purchased wheat quantities and the amount paid as a price support. In 1978 the programme's first year, only 3,297 tons of wheat were purchased by GSFMO with a total cost of SR7 million. Within four years the wheat production increased by more than 70 times to reach 230,851 tons in 1982. In 1984 the received production by GSFMO has jumped to more than 1.3 million tons, representing 400 tons above the country's self-sufficiency level. Buying this quantity, which benefited 15,911 farmers throughout the country cost the Government nearly SR 4.3 billion. Another increase achieved in 1985, when wheat

TABLE 4.11

WHEAT PRICE-SUPPORT POLICY IN SAUDI ARABIA

Year	Amount purchased (tons)	Amount paid (Million SR)
1978	3,297	7.0
1979	17,505	61.0
1980	32,882	115.0
1981	85,435	298.0
1982	230,851	808.0
1983	674,631	2,351.7
1984	1,346,943	4,284.2
1985	2,032,887	n.a.

Note: n.a. means not available.

Source: Saudi Arabia, The Grain Silos and Flour Mills Organisation, The Annual Report, different issues 1981-1985; SAMA, Annual Report, 1986.

production reached a momentum level of over two million tons.

Since the increase in production was accompanied by a fall in the cost of production and the goal of self-sufficiency had also been maintained, the Government decided that the support price of wheat would be changed as:

- 1) The support price for the fiscal year 1985 will be;
 - (a) SR 3,500 per ton for farmers producing no more than 500 tons.
 - (b) SR 3,000 per ton for farmers producing more than 500 tons.
- 2) The support price for the purchase of wheat during the next four years will be SR2,000 per ton.

However, another objective behind this decision is to induce the farmers to pay increased attention to other crops and agro-related activities as well.

4.10: Marketing Policy

Generally, the Saudi agricultural products reach the market through three distinctive ways;

1. Products reaching the market in the traditional way through the middlemen. These are usually vegetables and forage produced by small farmers.
2. Products reaching the market by the producers themselves. Those producers are usually the owners of large projects such as vegetable, dairy, poultry and eggs projects.
3. Crops reach the market through the Government agent. Mainly wheat at present.

From the above classification it is clear that the local market is dominated by the private sector in which most of

the agricultural produce is marketed through. There are no effective marketing organisations or boards in Saudi Arabia. In addition, the marketing infrastructures are lacking except for some efforts made by the public sector. Such efforts are represented by establishing wholesale markets in Riyadh, Jeddah, Dammam and other major cities. The typical wholesale market consists of a large, open, outdoor area in which wholesale dealing is transacted from lorries or on the ground. Adjacent to the wholesale market there is usually a covered, indoor area, constructed by the Municipalities, where the retailing takes place. Storage capacity for agricultural products are still very limited, and only the public sector has modern silos to store the supported purchased wheat. Presently there are seven large silos in the Kingdom with an overall storage capacity of almost two million tons.

Finally, since the domestic production of most fresh fruit and vegetables in Saudi Arabia is too small to satisfy local demand, there are few surpluses available for processing. Products for which domestic surpluses do exist (sometimes) are not usually those which consumers prefer in processed form, while the local processing industry is still at an initiation stage. Hence, the greater part of all processed and preserved fruit and vegetables are imported to satisfy the local demand.

4.11: Co-operatives Policy

In Saudi Arabia the Cooperative movement is now over two decades old, and since that it has made sound and steady progress in terms of numbers. The growth of cooperation has been on a firm foundation because it is closely related to

the religious teaching of Islam which encourages such things.

Cooperation began in the Kingdom as a voluntary and spontaneous act of the people themselves. The first cooperative was established in 1961 at a village in the northern part of the country called Qarayyat. The people of this village began setting up consumer services and in due course went on to organise multi-purpose activities of a social as well as an economic nature. With this example the idea spread over to cover other areas of the country. After ten years the total number of co-operatives jumped to 55, undertaking various activities. In general, the Cooperatives in Saudi Arabia can be classified to include agricultural, fishing, consumer, marketing, services, professional and multi-purpose activities. All types of cooperatives are administered by the Cooperatives Department of the Ministry of Social Affairs which take the main tasks of supervision and promotion, channelling government support including grants and subsidies, and the provision of general technical guidance. In addition, the Agricultural Bank encourages the establishment of Cooperatives by providing long-term easy payment interest-free loans. As a result of the continuous support of subsidies and loans, the cooperatives have expanded to reach a total number of 163 with 52,300 members in 1984. Table 4.12 represents the latest classification of the Cooperatives in Saudi Arabia. Out of the total, 34 with 8,846 members are considered as pure agricultural cooperatives, and mainly concentrate in the agricultural areas of the Central, Western and Southern Regions. These Cooperatives provide some services to their members in the fields of marketing, machinery rental, agricultural inputs, irrigation and land

TABLE 4.12

CO-OPERATIVE SOCIETIES IN SAUDI ARABIA
BY TYPE AND REGION, IN 1985

Region	Type of Co-operative Societies							Total
	Agric- cul- tural	Multi- Purpose	Ser- vices	Pro- fess- ional	Mar- ket- ing	Con- sumer	Fish- ing	
Central Region	8	38	1	1	-	5	-	53
Western Region	10	27	-	1	-	-	1	39
Eastern Region	2	12	-	-	1	1	1	17
Northern Region	5	12	1	-	-	1	-	19
Southern Region	9	39	-	-	-	2	-	50
Total	34	128	2	2	1	9	2	178

Source: Ministry of Labour and Social Affairs, Saudi Arabia, Department of Cooperatives, "A Brief Report about Cooperative Activities in Saudi Arabia", 1985, (Unpublished Report, in Arabic)

reclamation. In 1981 the total capital of these agricultural Co-operatives was only SR9.2 million which was insufficient to provide adequate services and to make significant contribution to the process of agricultural development.

4.12: Agricultural Projects

In addition to the various incentives and services provided to develop the agricultural sector, the Government represented by the Ministry of Agriculture and Water takes the responsibility of establishing large-scale public projects in which the private sector cannot bear the cost by itself. These projects require large capital investment and yield benefits to the whole society. The agricultural projects in Saudi Arabia are in two types; Irrigation and drainage projects, and settlement projects. As we have mentioned before, Saudi Arabia is an arid country and due to the shortage of rainfall, the underground aquifers are the main source of water. In some parts of the country (especially Al-Hasa), farmers face the problem of soil salinity caused by the overuse of water. In other parts, as in the South West, the enough rainfall is partly exploited because of the topographical feature of the area which is hilly. Therefore, the Government has established an irrigation and drainage project at Al-Hasa, and another project at Jizan Valley to overcome the above two problems.

The second type of projects, i.e. settlement of Bedouins and moving them into urban life, has been one of the essential aims that the Government had worked hard to achieve since 1912 when King Abdul Aziz built settlement towns called "hijar". Recently a large project (the Haradh project) has

been attempted for the same purpose. Therefore, because of their special contribution to the agricultural development, these projects are briefly discussed below.

4.12.1: Al-Hasa Irrigation and Drainage Project

With over 30,000 acres under cultivation, including some 3 million palm trees enclosing the two towns of Hofuf and Mubarratz in addition to over fifty other settlements, Al-Hasa is the largest oasis in the Arabian peninsula covering an area of about 180 square Kilometers (Km). It is "L" shaped and extends about 16 Km. West-East and about 20 Km. North-South. Water in this oasis is coming mainly from almost 330 wells and 60 natural and man-made artesian springs.

For a long time, farmers in this oasis have been faced with two severe problems; soil salinity and the shifting sand dunes. Salinity is the direct result of both the over use of artesian irrigation water which is very saline and the high evaporation due to climatic conditions. However, the oasis is entirely surrounded by desert; mostly sand-dunes to the East and North and rather flat thin sand mantle over a limestone floor to the West and South. Consequently, farmers of Al-Hasa are faced with gradual invasion of windblown sand into their fields and gardens.

Only a small part of the oasis was cultivated due to the above two problems, and agriculture was based primarily on the production of date palms, which provided a cash crop, as well as alfalfa used as feed for livestock.

The Government of Saudi Arabia realised these problems which put constraints to the development of agriculture in the oasis, and two projects have been undertaken.

In 1962 a project to protect the oasis against sand-dunes was started. Various methods and techniques were employed such as erecting sand fences, altering dune shapes, and coating them with oil. The most ambitious task, however, was the planting of a wide band of vegetation. This vegetation consisted primarily of trees (90 per cent tamarisk and 10 per cent eucalyptus) as well as grass cover. By the early 1970's five million trees had been planted with great success. The Al-Hasa farmers no longer have to fear eviction by sand and the village of Ash-shimalyah in Al-Umran has been saved, which otherwise would have been covered with sand by 1968.

The second project started in 1967 by completely dismantling the old water distribution system and substituting it with a modern one, as well as laying out an efficient drainage system. Some 900 miles each of new concrete irrigation canals and drainage ditches were established and nearly 1,000 miles of new access roads were built throughout the oasis at the same time, by Holttzman Company from West Germany. Costing over SR208 million, the project, completed in 1972, and considered as the Kingdom's biggest agricultural scheme, benefitting more than 50,000 persons. The scheme permitted cultivation of some 12,000 hectares in addition to the 8,000 hectares which are under the traditional system. This increase in cultivated land was achieved by using only 8 per cent more water under this new system. With the project a statistical unit was set up to compile data on the size of agricultural holdings and the areas of cultivated and noncultivated land in the region. In addition there are six units for providing advisory services to farmers. A training centre was also established under the supervision of United Nation's

experts. The whole project is run by Al-Hasa Irrigation and Drainage Authority which is an autonomous institution.

4.12.2: The Jizan Valley Development Project

It is one of the most essential valleys in the Southwestern region of Saudi Arabia, and one of the most promising areas with respect to agricultural development. This area receives the highest amount of rainfall with an average of 400 m.m. per year, but most of it normally flows into the sea, damaging the crops and leaving the farmers with little water for cultivation.

The interest of the Government to develop this valley and to protect the farms and villages from the water run-off damages, goes back to 1953 when a reconnaissance soil and land classification survey was carried out by the FAO of the United Nations (Sherif,1977). Further studies and investigations of the area were carried out by Italconsult under the supervision of FAO (Italconsult,1965). As a result of these studies and surveys, Jizan Valley was selected as one of the major areas of immediate agricultural development potentials. Therefore a development plan, including three programmes, was formulated. The first programme was to construct a dam to regulate the flow of the valley water in order to protect the downstream lands against the run-off hazards and to store enough water to enable expansion of agriculture under properly controlled conditions. The dam was constructed in 1970 at a cost of SR42 million, and made of concrete gravity type and it stands 35 metres high and is capable of storing 71 million cubic meters of water of which 51 million are available for irrigation. As a result, the cultivated land

has increased from 20,000 to 70,000 acres.

The second major item in the plan was the construction of an irrigation scheme in the valley to convey the dam water to the fields. The field work necessary for the planning and designing of the irrigation system was carried out by Halcrow and Partners. The last programme of the Valley of Jizan was to establish and operate an agricultural experimental station and initiate extension and training services to upgrade the traditional farmers' skills.

Now the Valley of Jizan project benefits almost 60 villages with more than 50,000 persons involving mainly in sorghum and sesame production and cattle, sheep and goat raising.

4.12.3: The Haradh Project

The project is located in Wadi Sahba midway between Hofuf and Riyadh. The location was chosen for the following reasons;

1. Availability of underground water resources discovered by ARAMCO while it was in the process of oil exploration
2. Favourable soil and topographical conditions.
3. Good communication (a nearby railway line).
4. The existence of Bedouins who live in the nearby areas.
5. Availability of an adjacent gas-oil separator plant.

In 1964 the Government started the project, and since the project was a large-scale one, many foreign companies were asked for assistance. The feasibility studies and preliminary plans were done by the Food Machinery Corporation (FMC), an American Company. Wakuti, a West German firm, was entrusted with the detailed design and supervision of construction. The plan as drawn by FMC called for reclaiming

and levelling 10,000 acres of land, digging 50 wells and installing submersible electric water pumps on the wells. 1,000 Bedouin families were to be settled, each in a 10 acre farm, to provide the basis for the Al-Faisal Bedouin Settlement Scheme. The plans also contained an experimental farm, a canning factory and a training centre. In 1971 the project was completed with a total cost of SR100 million. By the completion of the project, the planned water wells were dug, 10,000 acres of land were reclaimed and an irrigation system of open concrete canals was constructed along with a drainage network. A perimeter road system was built linking the project to the railway station a few miles away and a power station was established, powered by natural gas pumped from the nearby gas-oil separation plant. The most interesting thing is that no settlement has been accomplished due to the lack of response from the Bedouins to permanent settlement and farming. The natural life of Bedouins in Saudi Arabia is merely as camels- and sheep-herders following rain and pasture throughout the desert. Therefore, the settlement project has been postponed and instead the project was to be operated by the Ministry of Agriculture and Water on a commercial basis. In 1977, and due to unprofitability of the project, the Ministry tried to operate the project through the Haradh Agricultural company, a joint venture with an Irish firm, **Mastock**. Unfortunately, this second attempt also failed after one year of operation. Recently a new venture was started with four Saudi investors. The Government has a 25 per cent participation and the new firm is called the **Haradh Agricultural Production Company**. The firm is now mainly involved in milk, wheat, and fodder production.

CHAPTER FIVE

5: EVALUATION OF THE AGRICULTURAL STRATEGY IN SAUDI ARABIA: GENERAL FRAMEWORK

5.1: Introduction

In the previous chapter we dealt with the various agricultural policies which have been carried out by many related governmental agencies in Saudi Arabia to develop the agricultural sector. In this chapter and the next we will attempt to assess these policies in a broader sense, pointing out their partial contribution to the increasing level of agricultural production. We will also study the deficiencies in these policies which affect their level of contribution.

Our methodological approach in these two chapters will be historical, descriptive and analytical, whenever the necessary data are available.

Before we assess the existing agricultural policies in Saudi Arabia in a disaggregative manner, the agricultural development which is the result of such single policies will be evaluated within its general framework. To do this, different relevant indicators will be presented and carefully analysed. These indicators would include the following;

- Agricultural output and its rate of growth.
- Trends in yield per hectare of major crops.
- Agricultural capital-output (K/O) ratio.
- Standard of living of the rural population.
- Self-sufficiency in food production.
- The effects on agricultural imports.

We will now discuss these indicators in more detail.

5.2: Agricultural Output And Its Rate Of Growth.

Attributed to the massive development policies, especially those of monetary incentives such as interest-free loans, subsidies and price support, the agricultural output in Saudi Arabia has grown at an increasing rate. During the First Five-Year Development Plan (1970-75), the actual output grew by 3.6 per cent annually. This rate increased to 5.4 per cent during the next Five-Year Plan. In the Third Five-Year Development Plan (1980-85) the agricultural sector achieved an annual actual rate of 8.7 per cent, easily exceeding the projected rate of 5.4 per cent and rising from SR5572 million in 1981 to SR11,141 million in 1985. The Saudi experience has been unique, given the special characteristics of the agricultural sector, and the recent maintained high rates of growth have not been matched by many other countries.

Table 5.1 shows the agricultural production indices for Saudi Arabia and its neighbouring countries during the last twelve years and clearly shows that Saudi Arabia has achieved the highest rate of growth compared to the other countries studied, particularly in the last three years. Using the per capita productivity, which is a more accurate criterion for evaluation than the output alone, the situation appears to be stable and promising. For example, per capita production of wheat increased from 18.3 kilogram(kg) in 1975 to 88.4 kg in 1983 and even to 204 kg in 1985. For citrus and dates the per capita production levels were 2.8 kg and 46.8 kg respectively in 1975, and in 1983 these figures have increased to 4.9 kg and 47.4 kg respectively. For vegetables, the per capita production was 42.2 kg in 1980, which decreased to 40.6 kg in 1981; but in 1983 the situation improved when the level has

TABLE 5.1

AGRICULTURAL PRODUCTION INDICES IN SAUDI ARABIA
AND ITS NEIGHBOURING COUNTRIES
1974-1985 (1979-81 = 100)

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Egypt	91	92	94	92	95	99	100	101	107	108	109	115
Iraq	89	84	103	98	102	98	101	101	114	111	108	118
Iran	83	85	93	92	98	95	96	110	113	110	110	107
Jordan	92	61	72	76	90	78	111	111	110	124	121	130
Lebanon	109	74	60	49	81	93	112	94	119	107	109	109
Saudi												
Arabia	108	113	104	112	113	112	101	87	113	149	130	245
Sudan	90	94	88	96	101	92	98	111	103	106	99	121
Syria	68	69	80	75	87	83	107	111	115	116	104	117
Yemen.N	84	98	93	81	92	95	100	105	107	97	103	109
Yemen.S	112	111	113	111	101	104	98	97	90	93	91	89

Source: FAO, Monthly Bulletin of Statistics, vol.9, July-August, 1986, pp.16-17.

increased to 48.4 kg.

Livestock production has also increased dramatically, due to the establishment of large-scale and more modernised projects which have been encouraged by the monetary incentives provided by the Government. Therefore, per-capita production of red meat and white meat (including fish) has increased between 1975 and 1983 from 2.8 Kg and 4.7 Kg to 3 Kg and 9.5 Kg respectively. In 1984 these figures reached high levels of 7.4 Kg and 17.9 Kg respectively. There has been a significant increase in egg production. Now, for every Saudi there are available 200 eggs annually, compared to 67.3 eggs in 1979 and 16.7 eggs in 1973. At the opposite, some deficiencies in per capita production have been found, especially in cereal crops except wheat. For example, in 1975, per capita production of sorghum, millet, maize and barley was 17.8 Kg, 1.5 Kg, 0.3 Kg, and 2.3 Kg respectively. But, by 1982 these figures had fallen to 8.6 Kg, 1.2 Kg, 0.2 Kg, and 0.6 Kg respectively. Import subsidies on these products, and the wheat price support scheme which caused most farmers to produce wheat, are the major reasons for these declining figures.

Although the agricultural sector has increased at high rates in absolute terms, the picture is quite different when the other sectors of the economy are taken into account. In 1975, agriculture provided only 3.7 per cent of total real GDP. By 1980, this figure had fallen to 3.3 per cent. Five years later, in 1985, the relative share of the agricultural sector had improved but did not exceed 5 per cent of the total real GDP.

In general, to estimate the product contribution of agriculture to the growth of total product in Saudi Arabia,

Kuznets formula, presented in chapter two, will be used and analysed. According to Kuznets(1965) the share of growth of agriculture product in the growth of total product (GDP), can be computed using the following equation;

$$\frac{Pa.Ra}{\Delta P} = \frac{1}{1 + \left(\frac{Pb}{Pa} \times \frac{Rb}{Ra} \right)}$$

Where:

Pa = product of agriculture or the agricultural share of the total GDP (average of net domestic production)

Pb = product of all other sectors or the other sectors' share of the total GDP (average of net domestic production)

Ra = average annual growth of the agricultural sector

Rb = average annual growth of all other sectors

P = total product = Pa + Pb

ΔP = increment in total product = Pa.Ra + Pb.Rb

Applying the relevant figures to the above equation, using the time series data covering the period from 1971 to 1985, gives the following result:

$$\frac{Pa.Ra}{\Delta P} = \frac{1}{1 + \left(\frac{96.1}{3.9} \times \frac{7.1}{5.8} \right)} = 3.3 \%$$

Thus the product contribution of agriculture to the growth of total GDP during the period studied was 3.3 per cent. In fact this low contribution rate does not imply that agricultural sector is unimportant in the Saudi development process, but rather that it has been overshadowed by the large shares of the other sectors, particularly the oil sector.

5.3: Yields Per Hectare Of The Major Crops

To test the technological progress in the agricultural sector in Saudi Arabia in terms of using more chemical fertilisers, improved seeds, pesticides, machinery and less wasteful irrigation systems, the trends in land productivity of the major crops are investigated. Table 5.2 presents the yield per hectare trends of the major crops over the two periods averages of 1974-76 and 1981-83. The figures show that the yield per hectare increased for every crop except barley, okra and watermelon, which declined at rates of 50 per cent, 21 per cent and 10 per cent respectively. Wheat maintained the greatest progress in productivity, increasing by 87 per cent in the two periods studied, rising from 1.73 ton/ha. to 3.23 ton/ha. The great progress achieved in wheat production was due largely to the exclusive use of improved seeds which have been the prerequisite for participation in the wheat support scheme run by the Government. On the other hand, land productivity of sorghum, maize and millet has also increased, due to the use of new technologies, at rates of 49 per cent, 21 per cent, and 14 per cent respectively. Vegetable products, although their land productivity has increased, do not compare with those of cereals. This might be attributed to the farmers making less use of new technologies, partly because of a lack of extension services provided by MOAW on the use of such technologies, and also to the stiff competition from imported products. Therefore, the absolute increase maintained in vegetable production was probably due to the utilisation of more marginal land rather than to the land productivity.

TABLE 5.2

TRENDS IN MAJOR CROP YIELDS IN SAUDI ARABIA
(AVERAGE THREE YEARS OF 1974-76 AND 1981-83)

(ton/ha)

Crop	Average 1974-76	Average 1981-83	Percentage change
Wheat	1.73	3.23	+87
Barley	1.63	0.81	-50
Maize	0.72	0.87	+21
Millet	0.37	0.42	+14
Sorghum	0.43	0.64	+49
Tomatoes	12.36	13.03	+ 5
Eggplants	7.97	9.29	+17
Okra	6.52	5.15	-21
Dry Onion	18.53	19.42	+ 5
Watermelon	18.02	16.29	-10
Dates	5.47	5.97	+ 9

Source: Compiled from;

- 1) Ministry of Agriculture and Water, Department of Statistics and Economic Studies: Bulletin of Agricultural Current Sample Survey, different years 1974-1981;
- 2) Ministry of Agriculture and Water, The Fourth Agricultural Development Plan 1985-1990. (both in arabic)

5.4: Agricultural Capital-Output (K/O) Ratio

One of the key analytical concepts in growth theory is the capital-output (K/O) ratio. This is the relationship between the total value of agricultural investment in a given year and the total output in that year. This relationship is low and quite stable in the developed countries where the agricultural sectors are highly efficient. A low K/O ratio means that for every unit of capital investment in agriculture, the resultant output increases by more than one unit. In other words, less capital is needed to achieve a given level of output. In developing countries an accurate K/O ratio is not quite possible due to the difficulties in measuring the exact costs (capital), particularly those pertaining to the private sector. To measure this ratio in the case of Saudi Arabia, the total public investment represented by the budget of MAOW, the total credit and subsidies extended by SAAB and the total capital provided by SIDF for agro-industries will be used as a proxy for the total agricultural capital, on the assumption that such financial sources were large and have been benefiting on a large scale most of the Saudi farmers and agri-businessmen. On the other hand, output will be measured by the value of agricultural GDP at current prices. Based on this method, table 5.3 states the K/O ratio of the agricultural sector in Saudi Arabia for the period 1975 to 1985. As shown, this ratio fluctuated over the years and for most of the time exceeded unity, indicating that agricultural investments during these years were not profitable. For 1984 and 1985, the situation changed when the K/O ratio declined to 0.86 and 0.60 respectively. This is, of course, a promising indication of the increasing degree of

TABLE 5.3

CAPITAL-OUTPUT RATIO OF THE AGRICULTURAL
SECTOR IN SAUDI ARABIA, 1975- 1985.

(in SR million)

Year	Agricultural Capital ¹ (K)	Agricultural Output (O)	K/O Ratio
1975	1505	1,394	1.08
1976	2683	1,586	1.69
1977	3039	1,866	1.63
1978	3233	3,908	0.83
1979	4192	4,195	0.99
1980	5331	4,648	1.15
1981	7478	5,572	1.34
1982	8003	6,740	1.19
1983	10232	8,725	1.17
1984	8292	9,611	0.86
1985	6701	11,141	0.60

(1) This capital represents the total budget of MOAW, the total credit and subsidies provided by SAAB and the credit provided by the Saudi Industrial Development Fund (SIDF) for agro-industry.

Source: Compiled from different sources; SAMA, The Annual Report, 1986 ; The Ministry of Planning, Achievements of the Development Plans 1970-83, Facts and Figures; SAAB, The Saudi Arabian Agricultural Bank in Twenty Years, 1985; Ministry of Agriculture and Water, A Guide to Agricultural Investment in Saudi Arabia, 1984, p.10

efficiency of the agricultural investment in Saudi Arabia.

5.5: Standard Of Living

One of the basic objectives of agricultural development in Saudi Arabia is to improve the standard of living generally and of the rural people in particular. It is recognised that this objective can be achieved partly through increasing the level of agricultural production whereby incomes would also increase. As already mentioned, the agricultural sector has been growing at high rates, especially in recent years. Therefore, to test the effect of such progress on the improvement in living standards of the rural people, changes in the quantity and pattern of food availability need to be studied. Table 5.4 shows the changes in the diet of the Saudi population over a number of years.¹ As indicated by the figures, the daily per-capita calorie intake in Saudi Arabia was 1908 calories in 1964-66, 26 per cent, less than the world average which stood at 2,409 calories.² During the same period, the daily per-capita consumption of protein and fat was 49 grams and 32 grams respectively, both below the world average levels. In the following period studied of 1969-71, the Saudi diet level went down, when the daily per-capita calorie and protein both declined, to 1892 calories and 48.9 grams respectively. Attributed to the economic boom and the

¹ Data concerning general population are used here to represent rural population because most people live in rural areas and work mainly in agriculture. Furthermore, data concerning the diet of rural people in particular do not exist.

² It is recognised that a comparison of calories intake with the world average is not necessarily an indication that the intake in Saudi Arabia is too low. This depends on climate, occupation and sex. The purpose of the discussion is mainly to emphasise the improvement in living standard in Saudi Arabia.

TABLE 5.4

FOOD SUPPLY : DAILY PER-CAPITA CALORIES, PROTEIN AND
FAT IN SAUDI ARABIA (THREE YEARS AVERAGE FOR SELECTED YEARS)

Year	Calories (number)	Protein (grams)	Fat (grams)
<u>1964-1966</u>			
Saudi Arabia	1908	49.0	32.0
Developing Countries	2069	51.9	30.5
Developed Countries	3169	91.6	105.5
World	2409	64.1	53.7
<u>1969-1971</u>			
Saudi Arabia	1892	48.9	32.4
Developing Countries	2118	52.5	31.4
Developed Countries	3239	93.8	111.6
World	2452	64.8	55.3
<u>1974-1976</u>			
Saudi Arabia	2004	54.3	38.9
Developing Countries	2191	53.6	33.1
Developed Countries	3327	97.7	119.9
World	2506	65.8	57.2
<u>1981-1983</u>			
Saudi Arabia	3048	84.6	92.3
Developing Countries	2409	58.5	40.3
Developed Countries	3398	99.4	128.3
World	2665	69.1	63.1

Source: F.A.O., Production Yearbook, vol. 39, 1985

massive money investment in agriculture (as well as in other sectors) which started in 1973/1974 when oil prices increased dramatically, great improvements have been achieved, especially in the last few years, in the standard of living measured by food consumption. For example, during 1981-83, the daily per capita of calorie, protein and fat reached 3,048 calories, 84.6 grams and 92.3 grams respectively. These levels compare favourably with developing countries and with world levels (see the above table). Nevertheless, recent dietary information indicates that the Saudi people are now consuming more fat than protein. This is the opposite of the situation which prevailed up to the period 1974-76.

Changes in the level of per-capita income can also be used to measure improvements in living standards in Saudi Arabia. In 1970, this figure was SR2,697, but had increased more than seven-fold to SR19,337 in 1974. Overtime, the income per head of population has continued to grow, reaching SR58,149 in 1982. This level represents SR43,000 in real terms at 1980 prices.

In sum, the standard of living in Saudi Arabia has improved considerably, mostly in recent years. In this respect, transferred credit and subsidies, the major tools of agricultural development in Saudi Arabia, play a very important role. In addition, imported food subsidies, which make food available and cheap, play a crucial role in raising the people's standard of living. The subsidised imported food products are rice, sugar, wheat flour, milk powder, cooking oils, frozen meat and animal feed. The Government paid more than SR19 billion as subsidies on imported food products up to 1984.

5.6: Self-Sufficiency In Food Production

Saudi Arabia was self-sufficient in food production until the 1940's when the country's petroleum resources began to be economically exploited. Since that time Saudi Arabia has received increasingly significant oil revenues and has become more open to the rest of the world. As a result, per capita income has improved and has allowed people to consume both quantitatively and qualitatively more food items. Domestic production could not keep pace with the increasing demand, therefore Saudi Arabia became gradually less self-sufficient in almost all food products except dates. The widening gap between production and consumption has been met by imports. This unsatisfactory situation has been recognised by the Saudi Planners, and therefore, to establish and maintain a prudent level of food self-sufficiency has been one of the major objectives behind the intensive efforts to develop the agricultural sector. It is also recognised that self-sufficiency in some products, such as rice, sugar, coffee and tea is impossible at least in the near future. Rice and coffee are produced in very limited area and in very small quantities, while sugar and tea are not produced at all in Saudi Arabia. Domestic demand for these products is met mostly by imports.

Concerning domestically grown food products, there have been great achievements in recent years in response to the huge government investment efforts. The increasing yearly trend of wheat production is an example. In 1972, domestic wheat production was 42 thousand tons, representing only 19.3 per cent of the country's total consumption. Six years later, the domestic production share had increased to 28.8 per cent of the total consumption. The real take-off in wheat product-

ion started with the introduction of the price support scheme in 1978. Since then, wheat production has improved significantly to reach 50 per cent self-sufficiency in 1982 and 72.4 per cent in 1983. In 1984, Saudi Arabia achieved complete self-sufficiency when production totalled 1.4 million tons. In recognition of these short-period accomplishments Saudi Arabia was awarded, in November 1984, a certificate of merit by the Food and Agriculture Organisation (FAO) of the United Nations. In 1985, wheat production reached more than two million tons, exceeding the country's total need. Because of its high production costs the Saudi wheat surplus cannot compete on the international markets. As a result, some of the wheat surplus has been given as gifts to countries such as Bangladesh and Egypt,³ and to some parts of Africa as famine relief aid.

This policy of wheat self-sufficiency has been criticised on the basis that it is too costly. The guaranteed price paid by the Government to wheat producers, per ton, is almost three times the international price.⁴ Though it might be argued that, from the comparative advantage point of view, Saudi Arabia should not produce wheat, as it is cheaper to import it from the large-scale producing countries, for the Saudi Planners food security is an overriding objective and would be advocated even at the expense of efficiency. Food security is a safeguard against possible blackmail or boycott, or it may be a hedge against economic contingencies such as supply shortages on world markets. Saudi Arabia is also now over

³ In 1986, Saudi Arabia gave Egypt 200,000 tons of wheat as a gift.

⁴ Before 1985, the guaranteed price of wheat was SR3,500 per ton, six times greater than the international price.

self-sufficient in the production of dates, one of the richest and oldest food commodities in the country. In 1986, dates production exceeded 500 thousand tons, compared to 342 tons in 1980, and 401 tons in 1982. The recent high production level has enabled Saudi Arabia to export dates to neighbouring countries, and contributed in kind in large, well packed quantities to the World Food Programme annually since 1981.

Production of fruit and vegetables has also increased significantly in the last few years, but not to a level to satisfy all the domestic needs. To a great extent, domestic production of such products has been affected by the competition from imports. Therefore, imposing tariffs and quotas on imported fruit and vegetable products would increase their prices and also the prices of such products grown domestically. Eventually, this will lead to an increase in domestic production, and self-sufficiency might be attained.

Similar efforts have also been made by the Saudi Government to develop the poultry and livestock sectors. Attributed mainly to the adequate interest-free credit and subsidies, considerable progress in production has been achieved. For instance, egg production was 551.5 million eggs in 1979 representing 67.2 per cent of the country's total needs. By 1983 production had increased by 217 per cent to reach 1,748 million eggs, satisfying 98 per cent of the country's total consumption (table 5.5). Since 1984, Saudi Arabia became more than self-sufficient in egg production and the surplus has been exported to some of the Gulf states.

TABLE 5.5

EGGS AND MEAT PRODUCTION IN SAUDI ARABIA

	1979	1983	1984	1985
<u>Eggs (Million);</u>				
Domestic production	551.5	1748.0	1852.0	2037.0
Imports	269.3	39.2	-	-
Exports	-	5.2	6.6	8.0
Total consumption	820.8	1782.0	1845.4	2029.0
S.S.R. ¹	67.2	98.0	100.4	100.4
<u>White Meat² (Tons);</u>				
Domestic production	58611.0	162995.0	170341.0	172267.0
Imports	159937.0	230897.0	231128.0	170403.0
Total consumption	218548.0	393892.0	401469.0	342670.0
S.S.R.	26.8	34.0	42.4	50.3
<u>Red Meat (Tons);</u>				
Domestic production	14628.0	70115.0	70115.0	93470.0
Imports	175056.0	220473.0	182717.0	161140.0
Total consumption	189684.0	290558.0	252832.0	254610.0
S.S.R.	7.7	24.1	27.7	36.7

NOTES: (1) S.S.R. Stands for Self-Sufficiency Ratio
 (2) Including fresh fish

Source: Saudi Arabia, SAMA, "Annual Report", 1985 & 1986.

On the other hand, eventhough meat production (red and white) has been increasing at a rapid annual rate (nearly 49.8 per cent between 1979 and 1984), the self-sufficiency ratio has remained quite low, and a large part of the total domestic demand is still met by imports. As the above table shows the domestic production of red and white meat (including fish) satisfied only 36.7 per cent and 50.3 per cent respectively of the total consumption in 1985. The low rates of self-sufficiency in the production of meat can be attributed partly to the greater growth in demand which has been encouraged by increased incomes, population growth, urbanisation and the nature of traditions concerning meat consumption. In addition per capita meat consumption has also increased in recent years affecting the stage of self-sufficiency. For instance, the meat per capita consumption reached to 67.5 kilograms in 1985 compared to 49.8 kilograms in 1979.

However, at the end, it should be pointed out that the above argument regarding self-sufficiency in some food products in Saudi Arabia is open to question, considering the following statement of Ritson(1977) which says, ".....the self-sufficiency argument involves not only the proportion of the consumption of a particular product, but also the proportion of the inputs used in the production of the product which are themselves domestically produced." The only elements of the agricultural programmes that are essentially Saudi are the soil, water and the Saudi owners. Otherwise, all the other important inputs, such as improved seeds, insecticides and pesticides, pumps, engines and other machinery, and their spare parts are wholly imported.

5.7: Agricultural Imports

Given the increased expenditure on agricultural goods, imports can be viewed as another indicator, although an indirect one, for evaluating the performance of the Saudi agricultural sector. Up to the early 1940's, Saudi Arabia was not only self-sufficient in food production, but also was exporting a small surplus of live animals. After that time, Saudi Arabia began to depend gradually on food imports. While imported food was less than 10 per cent of the total food supply in 1947, the figure rose quickly to about 36 per cent in 1962. During the 1970's and the early 1980's, the domestic demand for agricultural products grew rapidly due to the high population growth, higher incomes, urbanisation, changing consumption habits, the growing number of foreigners working in the country, the free import policy as well as the extended subsidies on food imports. As a result, Saudi Arabia became a net importer of almost all food products. For instance, in 1977 almost 74 per cent of the total food consumption was met by imports. By 1981, the figure had risen to 76 per cent. The value of imports reached SR 17,278 million in 1981, compared to SR 5,356 million in 1977. By 1984, the value of food imports was SR 18,739 million, representing 15.8 per cent of the total imports' value and 5.1 per cent of the total GDP. No doubt this huge expenditure on food imports caused a heavy drain on the available foreign exchange. Though Saudi Arabia is not subject to the same severe foreign exchange constraints as many developing countries, such massive expenditures on food imports represents a waste of resources, especially in the case of those crops which can be produced economically at

home. It also heightens the country's dependence on foreign suppliers and increases its vulnerability to a food boycott and to the yearly fluctuations in crop conditions in producing countries.

Therefore, it has been the aim of the agricultural development programmes to lessen the volume of food imports and the related dependency on foreign markets through increased domestic production at faster rates than the increasing domestic demand. Two measures will be used here to test the effects of such development programmes on the level of food imports in Saudi Arabia; the movement trend of the annual value of agricultural imports per capita, and the extent of import substitution during the development plans period.

Concerning the value of agricultural imports per capita, table 5.6 shows its movement during the period 1970 to 1986. The value of imports per capita was only SR159 in 1970, but within a decade it had increased more than ten-fold to reach SR1673. By 1982, this figure had increased to its highest level of SR2022. Therefore, during this thirteen years period, domestic food production, even though growing steadily, increasingly lagged behind the rapidly growing domestic demand. On the other hand, from the presented information in the preceding table it can be easily noticed that some improvement has happened in the last two years when the per capita food imports have declined to SR1,325 and SR829 respectively. The last figure was representing a decline of 59 per cent from the value level of 1982. But we should not conclude that such improvement was merely the result of the increase in domestic production, because the effects of the

TABLE 5.6

THE VALUE OF IMPORTS PER CAPITA
IN SAUDI ARABIA (1970-1986)

Year	Agricultural Imports (in SR Million)	population (Million)	Imports per capita (SR)
1970	1011	6.36	159
1971	1097	6.52	168
1972	1221	6.68	183
1973	1686	6.85	246
1974	2022	7.02	288
1975	2301	7.20	320
1976	3536	7.43	476
1977	5365	7.67	699
1978	7802	7.92	985
1979	10432	8.20	1272
1980	14136	8.45	1673
1981	17278	8.70	1986
1982	18154	8.98	2022
1983	16586	9.25	1793
1984	18739	9.50	1973
1985	12985	9.80	1325
1986	8377	10.10	829

Sources: (1) Saudi Arabia, SAMA, Annual Report, different issues ,1975-1985.
(2) Al-Riyadh Newspaper, No.6663, 20 September 1986
(3) Saudi Arabia, Ministry of Planning, The Second Five-Year Development Plan (1975-80), and the Third Five-Year Development Plan (1980-85)

recent recession and the consequent slowing down market demand for food was great and should be taken into consideration. This would be more pointed out when we deal with the size of food import-substitution in the next paragraph.

The extent of food import substitution, which refers to the process when domestic food production replaces foreign sources of food supply, is another important measure by which to assess the performance of the agricultural sector. There are many methods of measuring import substitution, but all are based upon one rule, to measure the change in the pattern of imports and domestic production, whether in absolute or percentage terms.

The choice of method is entirely arbitrary since they are all descriptive. The method used here is that of Aker (1968), whereby the import substitution is measured over a series of years and also over a current period.

Let, O = domestic output

M = imports

A = total supply ($O + M$)

R = ratio of imports to total supply (M/A)

dR = change in R

Therefore,

$dR.A$ current = value of import substitution.

The period studied is between 1970 and 1985 in which basic changes in the agricultural development policy occurred in Saudi Arabia. As shown in table 5.7, the value of import substitution is indicated by a negative (-) sign. On the other hand, when the value of $dR.A$ is positive (+) it indicates an output displacement rather than import substitution.

TABLE 5.7

IMPORT SUBSTITUTION IN AGRICULTURAL PRODUCTS
IN SAUDI ARABIA (1970-85)

(in SR million)

Year	Agricultural Output (O)	Agricultural Imports (M)	Total Supply (A)	M/A (R)	dR %	dR.A
1970	984	1011	1995	50.7	-	-
1971	1016	1097	2113	51.9	1.2	25.4
1972	1059	1221	2280	53.6	1.7	38.8
1973	1139	1686	2825	59.7	6.1	172.3
1974	1242	2022	3264	61.9	2.2	71.8
1975	1392	2301	3693	62.3	0.4	14.8
1976	1586	3536	5122	69.0	6.7	343.2
1977	1866	5356	7231	74.2	5.2	376.0
1978	3908	7802	11710	66.6	-7.6	-890.0
1979	4195	10432	14627	71.3	4.7	687.5
1980	4648	14136	18784	75.3	4.0	751.4
1981	5572	17278	22850	75.6	0.3	68.6
1982	6740	18154	24894	72.9	-2.7	-672.1
1983	8725	16586	25311	65.5	-7.4	-1873.0
1984	9611	18739	28350	66.1	0.6	170.1
1985	11141	12985	24126	53.8	-12.3	-2967.5
-----			-----			-----
Total			199175			-3682.7

Source: Data concerning Agricultural Output and Imports were compiled from SAMA, Annual Report, different issues 1975-1986. Other data in the table were computed by the author.

In general, in the period under study, an import saving of SR3682.7 million has been achieved. However, this absolute figure can be presented in proportional terms to indicate the average yearly import substitution ratio (S). This ratio is computed as:

$$S = \frac{\sum dR.A}{\sum A} \times 100$$

Based on the data of the above table, the yearly average import-substitution ratio (S) in Saudi Arabia will be;

$$S = \frac{3682.7}{199175} \times 100 = 1.85 \%$$

In addition, this ratio can be used to find the relationship between the total investment in agriculture and the agricultural import savings or dissavings. This relationship can be shown for the period under study by taking the average annual total investment in the agricultural sector as an indicator of the sector's ability to displace foreign goods. The total yearly investment figure in agriculture between 1970 and 1985 averaged SR 3,962 million. Therefore, for every SR 3,962 million invested in agriculture, Saudi Arabia was able to substitute only 1.85 per cent of its consumption of agricultural imports, which is equivalent to SR 68.13 million. This low value of import substitution indicates that the process of reducing the level of dependency on agricultural imports in Saudi Arabia will take a long time, with the assumption that the past average annual investment will prevail in the future.

Furthermore, before we conclude this section, it should be pointed out that the above found small size of food import-substitution in Saudi Arabia has been overestimated. In explaining this fact two important points would be considered. First, if we look back to the presented figures in the above table we can notice that the total availability of agricultural products has been moving in a trend with respect to the total imports rather than to the domestic output. Second, in recent years the declining rates of the agricultural imports were greater than the increasing rates of the domestic production. For instance, between 1984 and 1985, the domestic production has increased in value by 16 per cent, from SR9,611 to SR11,141 million, while in the same period the value of agricultural imports have declined by 31 per cent, from SR18,739 to SR12,985 million. Therefore, this would reflect the fact that the recent decline in food imports in Saudi Arabia and the implied import saving which has been estimated by the above analysis were caused mostly by the decline in total market demand which was the direct result of the recent recession, rather than by the increase in domestic production.

5.8: Conclusion

Real development planning in Saudi Arabia's agricultural sector began 1970, when the First Five-Year Development Plan put in action. Since then, emphasis has been given to develop this important sector with the aim of increasing its share in the total economy. This has been reflected in the various policies and programmes, and the budgetary allocations which have increased each year. In such development efforts, various objectives were set to be achieved, the major ones being: to

increase local production to satisfy the changing and increasing local demand; to reach a prudent level of self-sufficiency in food production; to encourage innovations and exploit the possibilities for technical change most appropriate to the country's natural resources endowments; to improve efficiency in agricultural production and the resources used, including capital investment; to lessen the dependency on food imports; and to improve the standard of living of the rural people.

In this chapter we have attempted to assess the performance of the agricultural sector during the development planning period using the above objectives as indicators.

First, we have shown that the agricultural sector has grown at an annual healthy nominal rate, especially in the last ten years which cover the periods of the Second and Third Development Plans. The most progress has been made in the production of wheat, dates, eggs and poultry. But, in spite of this absolute expansion, the sector's contribution to the total GDP has been very minor. Using Kuznets method, for the period 1971-85, the size of this contribution was only 3.3 per cent.

The application of new technologies among the Saudi farmers has been tested through studying the trends in land productivity of the major crops. Most progress has been achieved in the productivity of wheat, which increased by 87 per cent between the two periods studied. On the other hand, land productivity has increased in some crops while in others it has decreased. In general, most of the increased production, especially in vegetables, could be attributed to the expansion in cultivated land rather than to an increase in land productivity(i.e. horizontal rather than vertical

expansion).

Concerning capital investment efficiency in the agricultural sector, the capital-output(K/O) ratio has been used to study the period 1975 to 1985. Although this ratio has fluctuated over the years, it has exceeded unity in most cases, indicating the low level of efficiency and low capital absorptive capacity of the agricultural sector. However, the situation has improved during the last two years, when the K/O ratio declined to 0.86 and 0.60 respectively.

The standard of living of the Saudi rurals, measured by the average daily intake of calories, protein and fat, has improved, especially in recent years. Transferred credit and subsidies to the agricultural sector and the heavy monetary support for food imports have brought an increase in the nominal and real per-capita income, which is the direct factor behind the improvement in living standards.

The attempt to achieve a position of food self-sufficiency has also been used to measure the performance of the agricultural strategy in Saudi Arabia. As we have shown, complete self-sufficiency has been reached in only three products, namely wheat, dates and eggs. For other food products, the self-sufficiency is still far from being attained in spite of the high absolute increase in production because of the dramatic increase in local demand. Consequently, the gap between the local demand and supply is met largely by food imports. Saudi Arabia has a deficit in most food products, and in 1981 the volume of food imports represented almost 76 per cent of the total demand. In addition to other undesirable effects, the heavy dependency on imports has caused a heavy drain on the available foreign exchange. In recent years the

agricultural policies effects on reducing the size of food imports have been felt, but for some products it will be a long time before satisfactory results are achieved.

In sum, we can say that agricultural development in Saudi Arabia has made some progress toward achieving its planned objectives. But this progress has been approached mostly during the last few years eventhough the real development planning started in 1970.

In the next chapter some investigations will be made into the various agricultural policies and programmes. This will enable us to ascertain the size of the contribution which these policies have made. In addition, the major shortcomings of these policies will be emphasised in order that they may be acted upon in future planning.

CHAPTER SIX

6: EVALUATION OF AGRICULTURAL POLICIES IN SAUDI ARABIA

6.1: Introduction

As we stated before, this chapter is a continuation of the previous chapter, in which we deal with evaluating the existing various agricultural policies in Saudi Arabia. It is hoped through this work whereby we analyse the important aspects of these policies to clear their positions as development tools. This of course would provide the Saudi Planners with some useful information which might be considered in future planning.

Now we turn to evaluate the various policies, in sequence, as they have been presented in chapter four.

6.2: Evaluation of Water Policy

To achieve the planned agricultural policy, with its important social and economic consequences, depends on the availability of sufficient water resources, without which the development could not have been carried out. Because of the size of the country which is mostly of a desert nature, and the huge distances separating the cultivatable areas (these areas total not more than two per cent of the country's land), intensive efforts were made to utilize all available water resources. Exploitation was undertaken to find new sources and full control was established over such resources to facilitate the implementation of the delineated plans.

Because rainfall is scant and uncertain, and there are no lakes or permanent rivers in Saudi Arabia, water is the most

binding constraint on expanding agriculture production. studies have indicated the possibility of more than doubling the presently cultivated area in a relatively short time if additional water could be made available.

There are four sources of supply to meet the increasing demand for water by the Urban, Industrial and Agricultural sectors; underground water, the main source, rain and flood water, desalinated sea water and sewage water after it has been chemically treated.

Huge amounts of oil-money have been invested to assure an adequate supply of water from these sources. During the Third Five-Year Development Plan (1980-85), SR52 billion was allocated for such purposes. This represented 84.1 per cent of the total money allocated to the whole agricultural development programmes, and 4.3 per cent of the plan's total expenditure. For the present Fourth Five-Year Development Plan(1985-90), the budgetary allocation for the water policy has decreased to SR32 billion, due mainly to the completion of most of the planned desalination plants. As a result of this investment, substantial progress has been made, bringing increased water for the different consumption uses. By 1985, detailed hydrological studies regarding underground water sources were completed and 199 dams constructed. Furthermore, 400 million cubic meters (c.m.) of desalinated seawater and 100 million c.m. of chemically treated sewage water were also available. Table 6.1 shows the national water supply and demand balance in 1980 and 1985. From the figures, two important facts emerge. First, there has been a dramatic increase in the agricultural sector's water consumption in recent years, reaching a high level of 7,430 million cubic meters in 1985, almost four times the level

TABLE 6.1

NATIONAL WATER RESOURCES-DEMAND BALANCE
IN SAUDI ARABIA

	Million Cubic Meters per year		Percentage Share
	1980	1985	1985
<u>Demand</u>			
Agriculture	1,860	7,430	84
Domestic, Industrial, Other	502	1,400	16
Total	<u>2,362</u>	<u>8,830</u>	<u>100</u>
<u>Resources</u>			
Surface water	485	900	10
Underground water;			
- renewable	660	950	11
- non-renewable	1,154	6,480	73
Desalinated seawater	63	400	5
Reclaimed waste water	-	100	1
Total	<u>2,360</u>	<u>8,830</u>	<u>100</u>

Source: Saudi Arabia, Ministry of Planning, The Fourth Five-Year Development Plan 1985-90, p.139

of consumption of five years before. This represents 84 per cent of the total water consumed by all sectors. Second, 84 per cent of the total water supplied is underground water of which almost 87 per cent is non-renewable. Therefore, irrigated agriculture in Saudi Arabia depends mostly on underground water which must be regarded as a depletable resource. In addition, plans for the utilisation of underground water are not based on obtaining an equilibrium between the amount of natural recharge of the aquifers from rainfall and the amount of water discharged by the wells. Consequently, the level of water in such sources gradually declines.

Traditional methods of irrigation, such as flooding, are widely used by the Saudi Farmers. Under this method farmers draw-off water from old mud canals which are filled by water pumped from underground reservoirs, flood their fields and return the left-over water to the main mud canal. As a result, a considerable amount of water is lost through the unlined mud canals as well as through evaporation and seepage. In addition, loss of plant nutrients by leaching and increased soil salinity result from those inadequate irrigation methods. According to Al-Shiekh (1983), large areas of land have been taken out of production in Khybor region, near Medina, because of the formation of salt flats (Sabkkah) caused by poor water management. Unfortunately water over-use methods of irrigation are still prevalent among farmers, because no strict rules and charges are yet applied. In most farms, there are more ordinary and artesian wells than are needed because of the weak regulations and controls set by MOAW. It has been established that, on average, there are 2.43 ordinary and artesian wells per farm and that the average area of cultivated land serviced

by each well is very small, almost 1.54 hectare (SAAB, 1981). Therefore, water, the most valuable and scarce resource in Saudi Arabia, is mostly wasted and inefficiently used.

The problem of inefficiency in water consumption has been recognised by the Government since the initiation of the first development plan in 1970. But, only limited efforts have been made to tackle this problem. These include modern irrigation systems and equipment (central pivot sprinklers in particular), which have been recently encouraged through the provision of interest-free and easy payment loans. For instance, in 1984 the SAAB contributed loans to the value of more than SR700 million for the procurement of 3,766 irrigation pivots for farmers. This represented 20 per cent of the total credit movement during that year. In 1985, an additional 2,918 sprinkling pivots were provided through loans amounting to SR566 million, or 24.4 per cent of total loans. The efficient use of water and labour, both scarce resources in Saudi Arabia, make pivot sprinklers attractive to the farmers, especially those who produce wheat on a large scale. Wide use of pivot sprinklers in Libya has shown that they operate at about 80 per cent efficiency and lose only about 20 per cent due to evaporation and other wastage (Tuncalp and Yavas, 1983). In addition to being efficient, pivot sprinklers help to control salinity, aid germination and early seedling growth and eliminate the pollution of underground water caused by soluble nitrogen and other chemicals (Al-Shiekh, 1983). On the contrary, the value of sprinklers in an arid environment is limited and can produce undesirable results. Sensitive crops, such as citrus, grapes and some vegetables, can be damaged by sprinklers when poor quality water of relatively low sodium and

chloride concentration is used under conditions of low humidity. Drip irrigation systems are also used in Saudi Arabia but on a small scale, being limited to irrigation of orchards and vegetables in greenhouses.

To alleviate the shortage of underground water, sewage water has been utilised for growing crops where solutions have been found to health hazards and pollution problems. The first project for the re-use of treated sewage water was executed in Riyadh few years ago. It produces about 200,000 cubic meters of treated water daily, which is transported through a system of pipelines to the farms of Al-Dir'iyya and Dirab. Similar projects are planned in Medina, Dammam and Al-Qaseem. By the year 2000 it is projected that this source of water will contribute 15 per cent to the total water sources. This is an important potential water source for agricultural development in Saudi Arabia and should be given full consideration in future plans.

In urban areas water consumption has also increased rapidly in recent years due to urbanisation, population growth and local and foreign migration. For example, in Riyadh, the capital city, consumption in 1956 was only 10,000 meters daily, but by 1977 this figure had increased by fifteen times (Al-Zokair, 1981). Of course, this rapidly growing rate of consumption reduces the volume of underground water, the main source for agricultural use. Therefore, the Government has built many desalination plants along the Red Sea and Arabian Gulf coasts. By 1986, there were 26 plants producing more than 500 million cubic meter per year. But despite its contribution, this modern method of water production has been criticised along three bases. First, it is a very expensive source of

water supply. The estimated cost is about \$1.00 per cubic meter based on an energy cost of \$80 per ton (El-Malakh, 1982). Second, the life of a desalination plant is only 15-25 years, and large amounts of capital are needed to replace damaged equipment (Beaumont, 1977). Third, the plants are power consuming. In fact, for the time being the high cost of desalination plants is justified in Saudi Arabia because money does not yet present a constraint, and gas which is the primary power source of these plants is currently abundant.

From the foregoing investigation, it is obvious that priorities in the extensive public investment on water policy has been oriented more toward resource development and infrastructure and is governed largely by the need to eliminate critical supply shortages in some areas. Water management and conservation measures to ensure efficient use of this scarce resource are inadequate, although the measures have been seriously considered in all the development plans. Pivot sprinklers, which minimise water wastage, are very expensive and are only acquired by the large-scale wheat and forage producers. Similarly, drip irrigation systems are limited to the capital-intensive greenhouse businesses. Farmers should be encouraged, through extension and price subsidy, to use these efficient irrigation systems on a wider scale.

On the other hand, in urban areas, a progressive system of tariffs has been introduced to restrict the excessive use of water. Unfortunately, this policy has not been effective, because the applied charges are heavily subsidised.

Lastly, public awareness of the importance of water as a valuable element in life and the negative consequences of wasting this resource have, on the whole, been sadly lacking.

6.3: Evaluation of Land Distribution Policy

Increased agricultural production may be achieved through an improved level of technology (i.e. using improved seeds, chemical fertilisers and farm machinery) on existing land which currently provides low yields per hectare, and/or through land increasing programmes. In Saudi Arabia, increasing the land under cultivation has been one of the major policies, especially during the last ten years. According to the latest official statistics, almost 4.2 million hectares or nearly 1.2 per cent of the country's total land is classified as arable land of which more than 2.5 million hectares are now under cultivation (Al-Jazera, 1986). This figure represents nearly a five-fold increase in cultivated land since 1971. A large portion of the increased agricultural land can be attributed to the Public Land Distribution Programme (PLDP) which commenced in 1968. As stated in the previous chapter, the total distributed land reached 713,965 hectares up to the end of 1985. Of this total, 82 per cent, or 584,721 hectares, have been distributed within the last five years. Individual farmers and specialised agricultural projects and companies are the main beneficiaries of the programme. Together with the credit and subsidies made available by SAAB, the PLDP has provided the basis for the current agricultural expansion in Saudi Arabia.

To test empirically the association between the distributed land and agricultural output, the following log function in a one year lag form has been estimated: ¹

$$\text{Log } (Y_t) = c + a \text{ Log } (L_{t-1})$$

¹ A one year lag form has been selected to take in account the time needed for land preparation, water well digging and the production cycle.

Where Y_t is the value of agricultural GDP at current prices in time t in SR million, and L_{t-1} is the distributed land in time $t-1$ in hectares.

Using annual time-series data for 1975-85, the following is the statistical result of the Ordinary Least Squares (OLS):

$$\text{Log } (Y_t) = 4.746 + 0.375 \text{ Log } (L) \\ (5.98) \quad (4.78)$$

$$R^2 = 0.74$$

$$D-W = 1.79$$

$$F = 22.82$$

$$SER = 0.354$$

The equation shows that about 74 per cent of the variations in the agricultural GDP are explained by land distribution variable (L). The t -statistics (the figures between parenthesis) for this variable is significant at the 1% level of confidence. However, the $D-W$ indicates the absence of autocorrelation among the OLS regression residuals. Accordingly, we can conclude that there is a positive relationship between land distribution and agricultural output in Saudi Arabia. For every one per cent increase in distributed land, there is an increase of 0.375 per cent in the value of agricultural output

On the contrast, there are some negative effects caused by the existing land distribution programme. These are presented by investigating the following questions:

1. Are the distributed lands suitable for cultivation in terms of soil fertility, availability of adequate water, land smoothness, and closeness to marketing areas?
2. What are the long-term effects on the underground water, the most scarce and limiting factor of agricultural expansion, and;
3. What are the effects on farm size structure, and on the

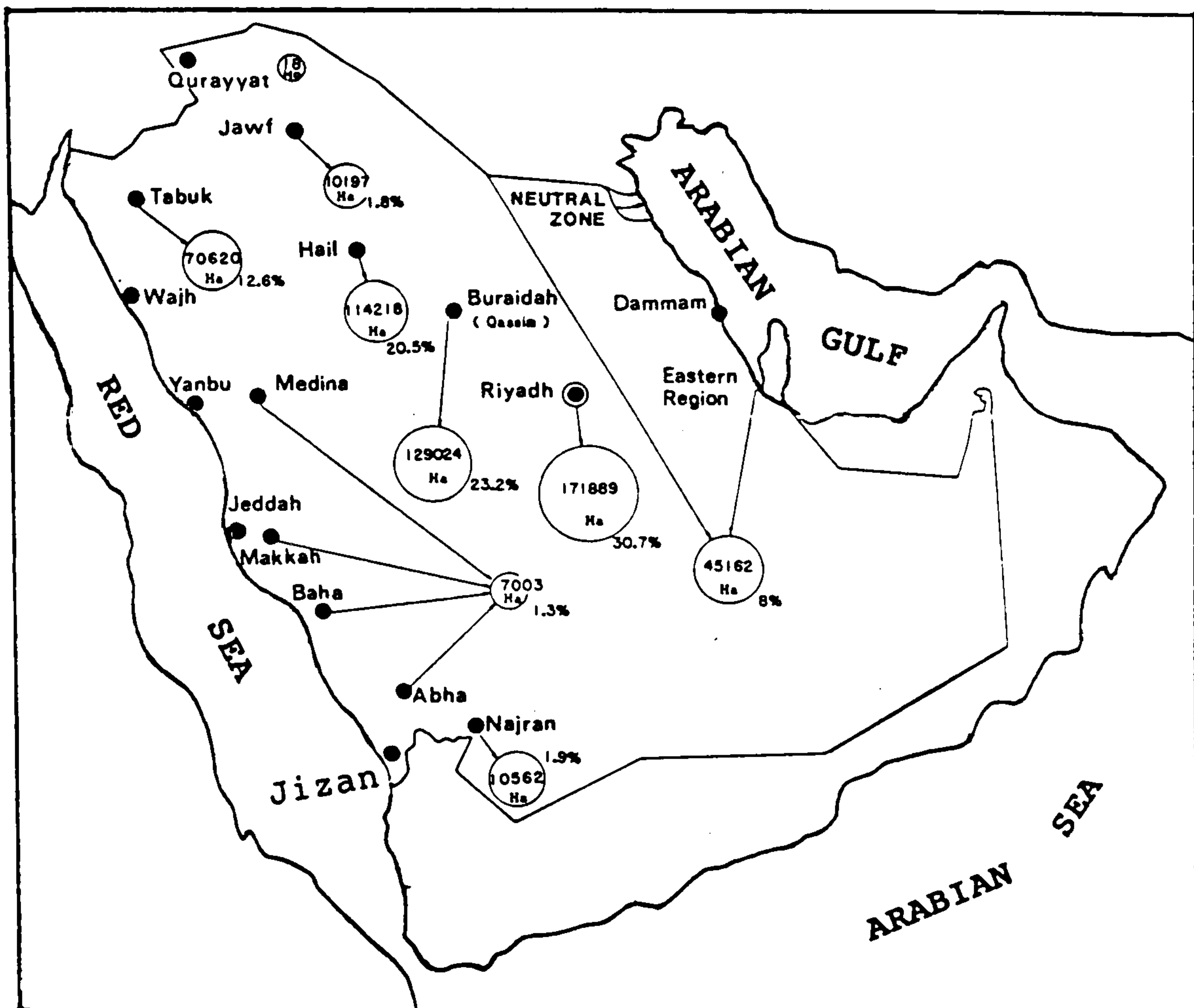
equality of land distribution among the Saudi farmers?

Concerning the first issue, before the initiation of the land distribution program in 1968, a general hydro-agricultural survey was carried out by the Ministry of Agriculture and Water with the co-operation of FAO experts. For this purpose the country's land was divided into eight zones and, by 1970, the study of six zones had been completed. Almost 4.5 million hectares have been found to be suitable for cultivation in terms of soil fertility and adequacy of underground water. However, this does not mean that all the distributed lands are suitable in terms of their soil and water resources. In some cases, the farmer might be forced to abandon his granted land, simply because he cannot, due to his limited finances, reach the underground water, which may be very deep in his land area. For example, during interviews which took place in Saudi Arabia in the summer of 1986, one Saudi businessman said that he had been granted a reasonably sized piece of land near Al-Kharj, but he was unable to utilise it because the underground water was very deep and tapping it would have required more investment than he could afford. Also, some of the distributed plots are on mountains or steep hills and cannot be farmed without levelling improvements. Such improvements, requiring the use of tractors, are expensive, especially in remote areas, and some farmers cannot afford to have the work done. The result is that these areas are often left uncultivated. To deal with these special cases, the Government should support the farmers by bearing some of the digging and land improvement costs.

As far as the second issue is concerned, the long-term effects on water, the geographical distribution of the distributed plots provides the answer. Figure 6.1 illustrates

FIGURE 6.1

LAND DISTRIBUTION BY LOCALITIES
UP TO 1984



Source: Kingdom of Saudi Arabia, Ministry of Planning,
The Fourth Development Plan 1985-1990, p.185.

the land distribution by localities and the percentage of this distribution up to 1984. As can be noticed, almost 75 per cent of the distributed lands were in the three areas of Riyadh (31%), Buraidah (23%) and Hail (21%). These three areas, in the middle of the Kingdom, are covered by sedimentary rocks, mostly sandstone, limestone, shale, marls and alluvium, which contain most of the important non-renewable underground water formations. This implies more long-term extraction of this valuable resource of production.

The view taken on this project is that the Ministry of Agriculture and Water, the main body responsible for the programme, should limit the distributed lands in these areas. More land could be distributed in the Southwestern part of the country where there is sufficient rainfall for farming.

With respect to equality in land distribution, this scheme favours large-scale agricultural projects and companies rather than the majority of individual farmers. Since the beginning of the land distribution scheme in 1968, and up to 1985, 257,735 hectares have been distributed among 43,865 individuals, an average area of 5.9 hectare per farmer. On the other hand, 290,296 hectares have been distributed among 2,344 agricultural projects and 164,934 hectares among 10 large-scale agricultural companies.

Considering the above average size of distributed land per farmer, this scheme has not solved the problem of small-scale farming, which is one of the main constraints facing agricultural development in Saudi Arabia.

On the other hand, the average size of distributed land for each agricultural project is 123.8 hectares and for each agricultural company, 16,493.4 hectares. This land distribution

structure aggravates the problem of inequality in land distribution in Saudi Arabia. To measure quantitatively the equality degree in agricultural land distribution, the official statistics of 1973/74, presented in table 3.9 of chapter three, will be used. While 38.3 per cent of the farmers had less than 3 per cent of the total area, almost 78 per cent of the farmers had 15.3 per cent of the total area. In contrast, 84.6 per cent of the total area was cultivated by only 22 per cent of the farmers. Based on these ratios, the Lorenz Curve (Figure 6.2), and Gini Coefficient²(0.78), illustrate the inequality in agricultural land distribution in Saudi Arabia. Unfortunately, this problem of inequality has been enlarged more by the present land distribution programme.

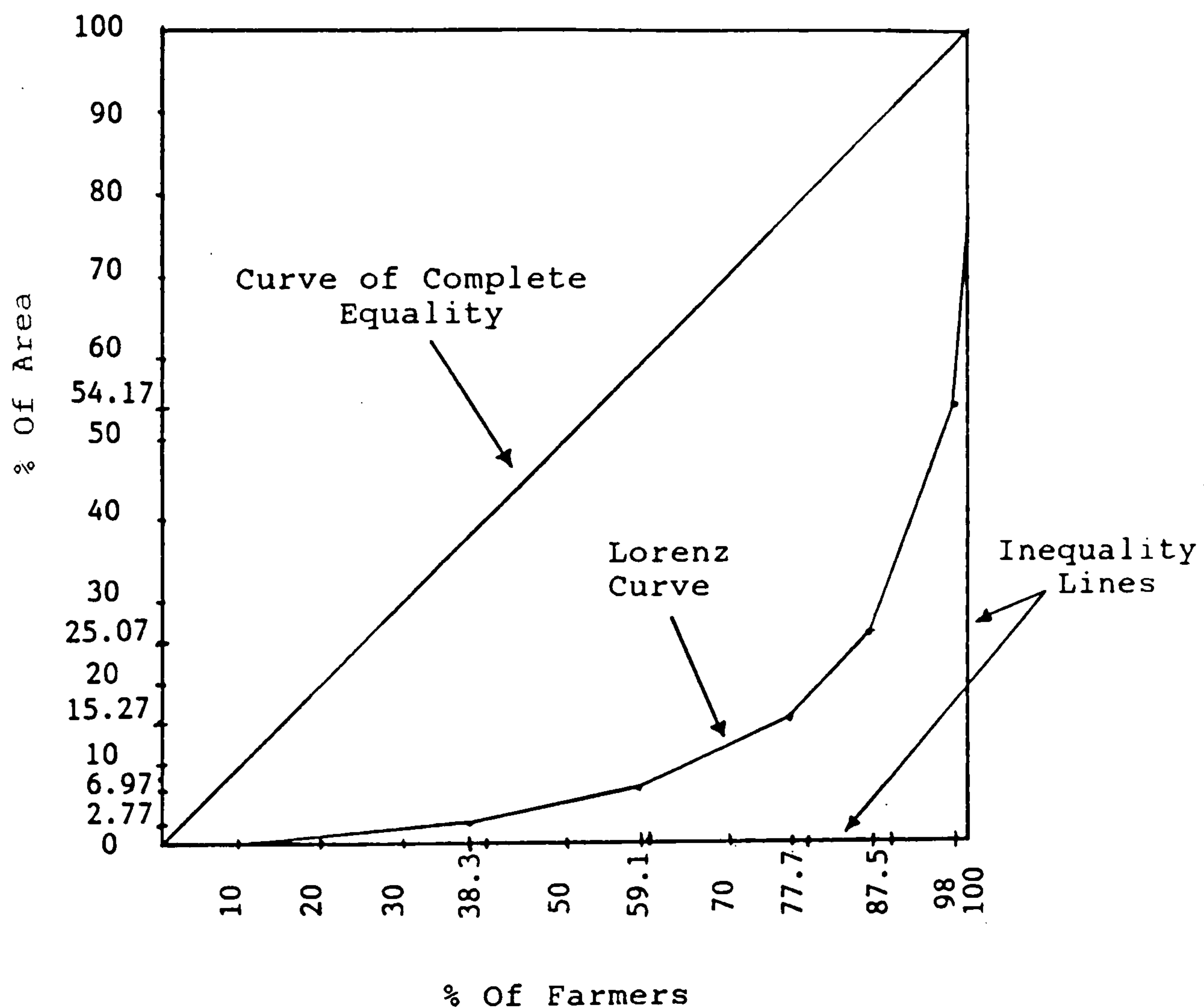
6.4: Evaluation of Research Policy

An important element in the policy of agricultural development in Saudi Arabia is technological change, leading to increased productivity of existing inputs and the use of new ones. As T.W.Schultz (1964) has argued, "an improvement in the quality of inputs", especially of new technologies with a relatively high pay off, is crucial to achieve a transformation in traditional agriculture. These can be provided only by sustained research efforts leading to a continuing stream of technical innovation. The agricultural research efforts in Saudi Arabia are primarily carried out under the auspices of

²The Lorenz Curve is used here to show the actual quantitative relationship between the percentage of farmers and the percentage of their farming area. Gini Coefficient is an aggregate numerical inequality measure calculated from the Lorenz Curve and ranges between zero (complete equality) and one (complete inequality). For more details see M. Todaro, Economic Development in the Third World, second edition, 1981, (London, Longman), pp.122-25.

FIGURE 6.2

LORENZ CURVE OF AGRICULTURAL LAND HOLDINGS
IN SAUDI ARABIA 1973/1974



Source: Calculated by the Author from table 3.9 in chapter III

the Ministry of Agriculture and Water with a relatively minor amount of research by the Universities. Throughout the country, there are fifteen research stations in which various studies about crop and livestock production, fisheries, range management and locust control are conducted. As mentioned in the previous chapter much has been achieved especially in the area of discovering new crop varieties which suit the local environment. Research programmes do not merely serve the Saudi citizens but rather extend to serve the Gulf States producers.

Some connections have been established with specialised foreign institutes and universities. Co-operation with FAO, the University College of North Wales, and the British White Fish Organisation are examples.

In recent years, research efforts have been strengthened and have received more recognition, particularly through the appointment of a third Deputy Minister for Development and Research within the MOAW.

But, to provide an accurate picture of the research policy in Saudi Arabia, the other side of the coin has to be looked at. This involves investigating the shortcomings of the existing research policy.

At the top, there exists the problem of paucity of funds provided by the Government. Table 6.2 shows the budgetary allocations for the different research programmes during the Third Five-Year Development Plan (1980-85). As shown, the total money allocated was only SR525.6 million, of which SR 137.1 million or 26 per cent was devoted to a single research centre, namely the Regional Agricultural and Water Research Centre at Riyadh.

As can be seen from the figures, although the research

TABLE 6.2

BUDGETARY ALLOCATIONS OF THE AGRICULTURAL RESEARCH PROGRAMMES
DURING THE THIRD FIVE-YEAR DEVELOPMENT PLAN

(in SR '000)

Research Programme	1980/81	1981/82	1982/83	1983/84	1984/85	Total
Agriculture & Water Research Centre (Riyadh)	23,920	49,594	30,115	20,047	13,380	137,056
Hofuf Research Ctr.	6,503	9,786	8,205	6,086	6,424	37,104
Qaseem Research Ctr.	11,258	30,452	8,292	10,761	4,533	65,296
Hakmah (Jizan)	18,258	19,478	2,570	732	732	42,237
Taif Research Ctr.	9,615	12,110	12,112	8,709	8,692	51,238
Range Development at Jouf	7,569	14,543	9,215	5,213	5,441	41,981
Locust Control Ctr.	660	5,001	4,411	3,664	998	14,734
Marine Development	13,397	13,858	7,608	9,376	9,521	53,760
Machinery Testing Centre	5,208	774	1,177	1,291	1,415	9,865
Livestock Surveys and Studies	5,485	9,000	6,000	-	-	20,485
Land Surveys and Studies	3,148	3,081	3,359	3,637	3,915	17,140
Sand Control	8,102	7,686	4,720	5,572	8,571	34,669
Total	113,608	175,363	97,884	75,088	63,622	525,565

Source: Kingdom of Saudi Arabia, Ministry of Agriculture and
Water, The Third Five-Year Development Plan (1980-85)
The Operating Plan, PP.100-112

budget was SR 175.4 million in 1981/82 , instead of increasing thereafter, it decreased to a level of only SR 63.6 million in 1984/85. This phenomenon does not tally with MOAW's claimed concern about increasing research. Even the relatively high financial allocation of 1981/82 was not adequate in terms of its proportion of the total GDP that year, equalling only 0.03 per cent. This proportion is very low, especially when compared with the proportion in the developed countries even as early as 1955/56, which was 0.66 per cent in the U.K., 0.5 per cent in the U.S.A., 1.9 per cent in Canada and 2.0 per cent in Sweden (O.E.C.D, 1962). Such a low level of investment in research should not occur in a country like Saudi Arabia with its huge oil-revenues and low agricultural productivity. An increase in research investment would be expected to increase agricultural productivity in subsequent years and, hence, shift the supply curve to the right. On an economic basis, investment in research can easily be justified. For instance, the internal rate of return associated with investment in agricultural research is high, ranging between 20 and 50 per cent, as indicated by the various studies.³ Therefore, from the viewpoint of effective utilisation of public funds for economic growth, investment in agricultural research should be increased, both in absolute terms and relative to investment in other publicly financed schemes.

A shortage of local research experts and workers is another factor that has narrowed the area of agricultural research (MAOW, 1985). Although there are three agricultural colleges

³For information about these studies please see Pinstrup-Andersen Per. "Agricultural Research and Technology in Economic Development", (London, Longman, 1982), p.102.

in Saudi Arabia, few graduates wish to work in the research stations, and this can probably be attributed to two reasons: 1) the salary structure is not adequate to attract skilled people who instead can obtain high-paying jobs in the urban areas; 2) most of the college graduates, who are unfortunately taught more theoretical bases, prefer administrative desk jobs. Consequently, foreign skills have been the only alternative to fill the gap caused by the shortage of native research staff. But the country cannot depend on foreign experts in the long-term, and some policy measures to attract more local skills should be considered.

Another issue is the scope and functions of agricultural research. From the information available, it is clear that most of the work is concentrated on testing the suitability of the imported seed varieties to the local climatic and soil conditions. As a result, suitable seed varieties of wheat, barley, millet, rice and potatoes have been discovered. These new varieties are usually multiplied in the research stations and then distributed to the farmers. On the other hand, research efforts concerning livestock, fisheries, and range improvement are limited, in spite of the existence of related specialised research centres. Moreover, there is a lack of research in the areas of farm organisation and management, rural sociology, agricultural mechanisation, credit, marketing, and water saving techniques, where development is extremely urgent and scientific research can contribute greatly to their advancement. However, most of the research studies in Saudi Arabia are geared toward technical rather than economic or social considerations.

Adequate connection with extension policy is lacking, and as a result, the diffusion and adoption processes of the

research results are quite limited. Furthermore, this problem is aggravated by the fact that, very few research reports are produced and distributed.

6.5: Evaluation of Extension Policy

In almost all developing countries, Extension Services are very necessary for those farmers who are either illiterate or less well educated. Theoretically, Agricultural Extension can be regarded as an informal out-of-school educational service for training and influencing farmers to adopt improved practices in crop and livestock production, mechanisation, management, conservation and marketing. Also it is an educational tool to carry the results of agronomic and economic local and foreign research to the producer in the field and to convey his problems to the research centres. Thus the primary function of Extension is to promote the process of technological change within the agricultural sector.

In the Saudi case, the educational role of extension is limited, and most of the extension work is purely mechanical and mainly serving the plant sector. The Extension Services provide farmers (in most cases those who request assistance) with pesticides, tree seedlings, veterinary medicine, fertiliser samples, and so forth. On the other hand, few Extension programmes are conducted and few demonstration plots are grown each year. The effectiveness of these programmes and demonstration plots is further weakened because they receive little publicity. As a result many farmers are unaware of their existence in the area. Furthermore, these programmes are not designed to identify and respond to the farmers' specific and immediate needs (Al-Hudaithy, 1983).

Even the mechanical supplied services which represent the main function of the extension policy are inadequate. For example, during the Second Five-Year Development Plan only 142,460 donums and 1.3 million trees were sprayed with pesticides representing only 3.4 per cent and 9.12 per cent of the total cultivated land and total trees respectively. For the Third Five-Year Plan (1980-85), it was planned to increase the above percentages but to only 7.5 and 19 per cent respectively.

The main factor which determines "communication" between extension agents and the farming community is the number of extension personnel in relation to the number of farmers and the agricultural area served. There were 500 to 600 extension personnel in Saudi Arabia in 1971 (Katanani, 1971) and by 1980 the number had increased to 800 (MAOW, Third Five-Year Plan, 1980). This means that each extension worker has to serve 1,740 farmers and 7,600 donums of agricultural land. Comparing this figure with the situation in developed countries where the extension worker serves an average of 400 to 500 farmers (Schickele, 1968), it is obvious how ineffectual is the service provided by the extension workers in Saudi Arabia. Due to staff shortages, the extension services cannot extend to cover the majority of farmers. According to Basabrain (1983), 42 per cent of the farmers surveyed in the Western Region of Saudi Arabia did not receive visits from the extension agents. In another study conducted by SAAB in 1982, of the 844 farmers contacted, only 35.2 per cent felt they had benefited from the extension services provided by the scattered directorates of Ministry of Agriculture and Water. The quality of the extension workers is also very important; of the available 800 extension workers in 1980, only 154 were agricultural college graduates,

almost all the rest having secondary technical agricultural school diploma. Moreover, most of the extension workers have a theoretical background in natural sciences and technical subjects rather than practical experience. This, of course, weakens their position when they have field contacts with the farmers. Consequently, farmers do not trust many of the extension workers. Concerning the regional distribution of the extension services there is no available information, but such services are concentrated more in the areas which have representative directorates of the Ministry of Agriculture and Water or in the areas which have large-scale irrigation projects such as the Al-Hassa and Wadi-Jizan projects.

About the extension method, Al-Odaibi (1983) concluded from the existing extension functions that the process works in a one-way direction and with a "top-down" approach. To describe the process, Al-Odaibi added: "Instead of emerging from the actual problems and needs of farmers, programmes in fact are predetermined by higher officials and implemented by the local extension workers. Farmers are seldom, if ever, consulted or included in the planning stage. They are expected to accept what is offered regardless of their actual interests, needs and aspirations". Although the quantitative and qualitative problems of the extension workers were recognised, as indicated by the Second Five-Year Plan (1975-80, p.120): "...the need to improve extension by increasing the number of agents, training, and raising the quality of the service is fully recognised", only limited efforts have been made to improve the situation. The recent budgetary allocations for the extension services were inadequate and did not match up with the hopes to improve these services. Furthermore, these are biased toward certain

mechanical services such as plant protection and improved seeds. Table 6.3 shows the budgetary allocations for extension services during the Third Five-Year Development Plan (1980-85). As presented, the total amount allocated was SR227.9 million of which 52 per cent was allocated for the plant protection programme alone, and 22 per cent for seed improvement. However, although the monetary allocations for all the extension programmes have increased year by year to reach SR53.3 million in 1985, but as a proportion of the agricultural GDP during that year, this represented only 0.56 per cent or only .02 per cent as a proportion of the total national income. In fact, the last figure is even less than the ratio of "more than a quarter of one per cent of national income" which is regarded by A. W. Lewis (1955) as the desirable minimum level of a developing country's financial commitment to extension.

To sum up, the Extension Policy in Saudi Arabia is handicapped by the above mentioned shortcomings which limit the process of extending agricultural innovations to farmers by means of out-of-school education. Serious efforts should be made to strength the extension services to make them more effective within the present process undertaken to help develop the agricultural sector. Some suggested proposals will be included in the last chapter.

6.6: Evaluation of Agricultural Education and Training Policies

The modernisation of low productivity agriculture is governed by the ability of agricultural workers to use new production techniques in an efficient way as soon as they become available. This ability needs to be created and improved by well delineated programmes of education and training.

TABLE 6.3

THE BUDGETARY ALLOCATIONS FOR AGRICULTURAL EXTENSION
IN SAUDI ARABIA (1980/81-1984/85)

(in SR '000)

Programme	1980/81	1981/82	1982/83	1983/84	1984/85	Total
Plant protection	20,460	22,210	23,954	25,676	26,292	118,592
Improved seeds	8,061	8,763	10,502	11,008	11,110	49,444
Mobile Veterinary Units	1,542	2,184	2,826	3,468	4,110	14,130
Agricultural Media	1,480	1,352	1,724	2,095	2,468	9,119
Agricultural Extension	2,120	3,342	5,353	4,204	5,683	20,702
Dissemination of Bee Keeping	2,501	2,945	3,530	3,323	3,644	15,943
TOTAL	36,164	40,796	47,889	49,774	53,307	227,930

Source: Kingdom of Saudi Arabia, Ministry of Agriculture and Water, "Third Five-Year Development Plan (1980-85), The Operating Plan", pp.70-78.

The role of education and manpower training in development is clear but the policies, techniques and content of the processes used are subject to question. In Saudi Arabia the general education system typically neglects agriculture at all levels. All schools curricula are urban-oriented, even in rural areas. School gardens, which are supposed to give students experience in simple farm technology, are rare. Secondary Schools tend to be viewed as a continuation of higher education and simple training courses to develop middle-level skills in plantation, agricultural engineering, and extension are not provided. To ensure long-term agricultural development, the Government should ensure a high rate of investment in human capital, and the starting point for this would be to improve the educational system and make it more concerned with agriculture. According to Sutherland (1968), the introduction of agriculture into schools would serve to introduce the fundamental ideas and techniques of cash cropping, and keep agriculture in the forefront of students' thinking. Also, this would help maintain the interest of young people in agricultural occupations and further serve to modify the traditional farming practices.

Technical education is limited in Saudi Arabia, there being only one Secondary Agricultural Technical School, at Buraidah in Al-Qaseem Region. This school provides three years general courses in agriculture. Unfortunately, this kind of education is not very popular, even among some of the students who enroll for it. This is because some students, who are unable to continue their education for one reason or another, join the agricultural technical school even though they do not intend to work on the land because of the social attitudes towards farming. The number of those attending the

agricultural school is extremely low compared to the number attending the various other secondary schools of technical education. As an example, in 1985 there were only 153 students in the former schools, less than 2 per cent of the corresponding figure in the latter which had 10,372 students (SAMA, 1985). This means that for every hundred students in technical education there are two students at the agricultural school. As a result of this situation the implementation of successive agricultural development plans in the country has always been impeded by a lack of intermediate-educated and trained workers of different skills.

Concerning University education, there are three agricultural colleges, in Riyadh, Hofuf and Qaseem, in addition to some students who are seeking their education abroad, mainly in the United States and Europe. Table 6.4 shows the statistical development in local and foreign agricultural colleges between 1970 and 1984. As shown by the table, the number of students attending local agricultural colleges has increased year by year, reaching a maximum of 1,638 students in 1984, an increase of almost 50 per cent from the level of 1979, and 1506 per cent from the low level of 1970. This increase in the number of agricultural students over the years cannot be taken in isolation as a measure of the success of the agricultural university education policy; its yearly proportion of the total enrolled students should also be considered. In the period studied, such proportion reached only 3.2 per cent as a maximum in 1975, otherwise it was under 3 per cent each year.

For overseas college students, the situation is worse; in 1970, there were only 12 agricultural students, less than one

TABLE 6.4

THE STATISTICAL DEVELOPMENT OF TOTAL AND AGRICULTURAL STUDENTS
IN LOCAL AND OVERSEAS COLLEGES (1970-84)

Year	Local College Students ⁽¹⁾			Overseas College Students ⁽²⁾		
	Total I	Agricultural II	II as % of I	Total III	Agricultural IV	IV as % of III
1970	6,508	102	1.6	1,950	12	0.62
1971	7,801	161	2.1	1,874	-	-
1972	8,504	200	2.4	2,029	6	0.30
1973	10,002	258	2.6	2,793	1	0.04
1974	12,936	369	2.9	2,975	38	1.28
1975	16,171	523	3.2	6,185	33	0.53
1976	21,127	603	2.9	9,065	187	2.06
1977	25,019	676	2.7	8,768	290	3.30
1978	33,196	871	2.6	9,976	353	3.54
1979	45,357	1,090	2.4	10,816	363	3.36
1980	47,990	1,156	2.4	10,035	346	3.45
1981	54,509	1,139	2.1	11,921	220	1.85
1982	64,290	1,323	2.1	12,521	180	1.44
1983	75,118	1,537	2.0	11,097	141	1.27
1984	80,469	1,638	2.0	10,092	109	1.08

Sources: (1) Saudi Arabia, Ministry of Higher Education, Directorate General for the Development of Higher Education, "Progress of Higher Education in Saudi Arabia During the Years 1970-1980", Riyadh, Table No.2, p.144.

(2) Saudi Arabia, Ministry of Higher Education, Directorate of General for the Development of Higher Education, Data Centre, "Statistics of Higher Education in the Kingdom of Saudi Arabia" 1983/84, Issue No.7.

per cent of the total number of students who study abroad during that year. Thereafter, although the number has increased, but as proportion it was very low. The low number of students studying agricultural subjects indicates the lack of importance attached to these fields. In fact, the problem is aggravated more by the following factors: 1) students who enter the agricultural colleges have little experience in agricultural production and practically no experience in modern agriculture; 2) the college curricula tend to emphasize theoretical science rather than practical science; and 3) most emphasis is placed on physical and biological sciences rather than the engineering, business, economics and managements areas.

The agricultural training policies are no better than the above mentioned education policies, and both affect the agricultural development in Saudi Arabia. The Department of Training in the Ministry of Agriculture and Water (MOAW) is the main agency sponsoring short-period training courses on agriculture and its related activities through its training centres in Riyadh, Hofuf, Onaiza and Jizan. The students of such training courses are mostly employees of MOAW, interested farmers, and agricultural college students. In 1983, there were 821 trainees, of whom 502 or 61 per cent, were MOAW employees, 208 or 25 per cent were college students and 11 or 14 per cent were farmers and their children. Although the trained farmer is paid SR700 per month, the policy has not attracted enough of them. There appears to be three distinct reasons for this. First, most of the farmers receive no information about the dates, times and places of the training courses. Second, the majority of farmers live in areas far from the training centres and it is not practical for them to leave their farms and

attend these centres. Third, as indicated by the Fourth Agricultural Plan (1985-90), the SR700 monthly allowance is not even enough to pay part of the farmers' expenses.

From the foregoing description of the agricultural education and training policies in Saudi Arabia and their related weaknesses, it would appear that the present policies are not receiving adequate attention from the responsible governmental agencies. Consequently, their effects on the present agricultural development process are not very tangible.

6.7: Evaluation of Credit Policy

An adequate and dependable source of credit is important in developing agricultural resources, especially in countries where farmers produce at the subsistence level and do not have the ability to meet the increasing expenses and costs of agricultural activities. In Saudi Arabia, the Government recognised this essential role of credit in the process of development, and established the Agricultural Bank (SAAB) in 1964. This Government intervention into credit services was justified because of the special problems of the agricultural sector and because of the exploitive and inadequate short and medium term loans given by the non-institutional sources. As mentioned previously, SAAB extends three sorts of interest-free loans: short-term, medium-term and long-term loans to the Saudi farmers and agro-businessmen.

The credit provided is mainly in the form of production credit restricted to improving production rather than being channelled to non-productivity outlets. Since the establishment of SAAB, the number of beneficiaries and the amount of paid capital have increased year by year, therefore, indicating the

importance of the credit policy.

To measure quantitatively the contribution of the credit policy in Saudi Arabia to the process of agricultural development, the value of agricultural production is regressed against the total agricultural credit extended by SAAB for the period 1965 to 1985, using the following equation:

$$Y_t = a + bX_t \quad (1)$$

where: Y_t = total value of agricultural production in SR billion in year t .

X_t = value of agricultural credit in SR million in year t .

$t = 1, \dots, 21$.

Based on the logical argument which says that in the agricultural sector at least one year of adjustment mechanism might be required before the effects of the agricultural investment become evident;

Therefore equation (1) becomes:

$$Y_t = a + bX_t + cX_{t-1} \quad (2)$$

Where: X_{t-1} represents a one year lag in the value of agricultural credit.

Applying Ordinary Least Square technique (OLS), the following statistical result is estimated:⁴

$$Y_t = 1.326 + 0.0008X_t + 0.0015X_{t-1} \quad (3)$$

(6.16) (2.46) (4.28)

$$\bar{R}^2 = 0.93 \quad F = 140.88 \quad D-W = 0.98 \quad SER = 0.78$$

Figures in parenthesis are t-statistics.

The low value of D-W, suggests an autocorrelation among

⁴The equation was also estimated with a time trend variable as well as a log function but gave unsatisfactory results.

the residuals of equation (3), causing the value of \bar{R}^2 to be overstated. Therefore, an autocorrelation test using the Cochrane-Orcutt method has been used which gave the following result:

$$Y_t = 1.506 + 0.00075X_t + 0.0014X_{t-1} \quad (4)$$

(3.83) (2.34)^t (4.43)^{t-1}

$$\bar{R}^2 = 0.81 \quad F = 39.53 \quad D-W = 1.60$$

$$SER = 0.68 \quad = 0.60 \quad (t = 2.64)$$

The test indicates that although \bar{R}^2 has declined to 0.81, the other statistical criteria have improved. The t-statistics for both X_t and X_{t-1} are significant at 1% level of confidence, and the value of D-W indicates the absence of autocorrelation among the residuals. The relationship shows that more than 80% of variations in the value of agricultural production (Y_t) are explained by the level of credit in this year (X_t) and lagged one year (X_{t-1}). Based on the goodness of fit in the above equation, there exists a positive association between the value of agricultural output and the level of capital investment provided through credit. However, the value of agricultural output in a given year would increase more as response to the investment in the previous year rather than in the same year.

In addition, the credit policy in Saudi Arabia might be measured considering other indicators such as the geographical diffusion of credit services, trends in number and volume of credit and the size of land serviced by loans.

Concerning the geographical diffusion of credit services, in 1965 when the operation commenced, SAAB had only five branches and fourteen offices in addition to the main office in Riyadh. After ten years, in 1975, the number of branches and offices had increased to 10 and 43 respectively. Now, SAAB

operates 12 branches and 58 offices in the scattered agricultural areas throughout the country. By the end of 1981, SAAB employed a staff of 1,913 of whom 512 were university graduates. Attributed to the great diffusion of credit services most of the Saudi farmers and agro-businessmen have benefited from the provided loans, and to them SAAB represents an essential factor influencing them to continue their activities. As an evidence, Al-Zokair (1981) found that 93.3 per cent of the farmers of Al-Kharj were dealing with SAAB and had some kind of loan. In addition, Al-Hudaithy (1983), when he examined the role of SAAB and extension services in the changing pattern of agriculture in the Al-Qaseem region, found that almost 91 per cent of the 200 farmers interviewed considered SAAB to be a major incentive which influenced them to stay on their farms.

As far as the trends in number and value of extended loans are concerned, in 1965 in SAAB's first year of operation, only 625 loans to the value of SR4.5 million were distributed. A decade later both the number and value of loans increased by 2500 per cent to 16,251 loans and by 3,133 per cent to SR145.5 million respectively. In 1981, the number of loans reached 45,128, some 56 times more than the loans extended in SAAB's first year of operation. On the other hand, the value of loans reached its highest level of SR4,166 million in 1983. As mentioned in the previous chapter, because of the recent recession in the economy of Saudi Arabia, both the number and value of extended loans have declined.

The amount of land serviced by SAAB loans has increased over the years as has the number and value of extended loans. In 1979, the land serviced by interest-free loans amounted to 3,884,811 donums, representing 67 per cent of all cultivated

land. This was a great achievement when in 1971 less than 3 per cent of cultivated land was serviced by loans (Katanani, 1971). Furthermore, due to the increasing demand by farmers for the credit provided by SAAB, the amount of land serviced by such credit has increased to nearly 8 million dunums in 1983.

Considering the above-mentioned measures, it would appear that the credit policy in Saudi Arabia has been a major tool for speeding the required change of agricultural development. Farmers have been able to meet their farming expenses, to finance their agricultural projects and to avoid being exploited by the private money lenders' illegitimate high interest rates.

However, apart from its positive measures, the credit policy has experienced difficulties which in one way or another have affected its contribution to the agricultural development. The most serious problem has been the low rate of credit recovery. The collection of loans has a significant economic impact as it affects the period of turnover allocated for agricultural loans. The more loans that are collected at their date of maturity the more beneficial the policy becomes. Loans collection is the cornerstone in the use and utilisation of the greatest part of the funds available to the SAAB for financing agricultural activity. Table 6.5 shows the general collection movement of the short and medium-term loans extended by SAAB since its first year of operation and up to 1985. As the table shows, the credit recovery rate has fluctuated from year to year, reaching its highest level of 89 per cent in 1965 and its lowest level of 55.8 per cent in 1981. Over the twenty one year period only 64 per cent of the total due loan instalments were collected, 36 per cent being in default. However, the

TABLE 6.5

GENERAL COLLECTION MOVEMENT OF SHORT-TERM
AND MEDIUM-TERM LOANS OVER 21 YEARS

(in SR,000)

Year	INSTALLMENTS DUE			INSTALLMENTS COLLECTED				
	From Previous Years Not Collected	In Current Year	Total Due	From Ins- tallments Due In Previous Years	From Ins- tallments Due In Current Year	Colle- cted Before Matur- ity	Total Collec- ted	% Of Collec- tion
1965	-	77	77	-	68	-	68	89.0
1966	-	1431	1431	-	1189	-	1189	83.1
1967	319	3905	4225	268	3133	-	3401	80.5
1968	853	7252	8105	701	5616	-	6317	77.9
1969	1784	9519	11304	1436	6949	-	8386	74.2
1970	2979	13959	16939	2221	10617	-	12839	75.8
1971	3945	17240	21185	3001	13949	-	16951	80.0
1972	3141	17515	20656	2944	13000	-	15944	77.2
1973	5087	18097	23184	4024	13480	-	17505	75.5
1974	5889	24230	30120	5518	17700	-	23219	77.1
1975	6900	20548	27448	3989	14128	-	18117	66.0
1976	9741	45612	55354	5933	31603	-	37536	67.8
1977	19203	99040	118243	13795	68547	-	82342	69.6
1978	40129	184891	225020	25533	127599	1557	154690	68.0
1979	89447	300342	389789	53220	202399	1838	257457	66.0
1980	148660	420844	569505	77211	281119	2431	360763	63.3
1981	166475	307066	473541	77547	186691	2756	266995	55.8
1982	190129	437563	627692	105631	289940	3988	399560	63.0
1983	256822	655164	911987	141764	467213	6407	615385	66.8
1984	331035	969299	1300335	169601	681815	7265	858682	65.5
1985	479252	1270350	1749602	209854	842784	7952	1060590	60.2
Total	1761790	4823944	6585736	904191	3279539	34194	4217836	64.0

Source: Saudi Arabia, SAAB, Saudi Arabian Agricultural Bank
In Twenty Years, 1985, p.72; SAAB, The Annual Report,
NO.21, 1985.

credit recovery ratio varies from one area to another. In some areas it may be lower because of the production patterns and the nature of farming. In general, the low rate of credit recovery can not be attributed to a single factor, but rather to a number of factors, the major ones being as follows:

- 1) Farmers may be faced by an emergency situation, such as a natural disaster, shortage of water, diseased crops, or the death of the borrower. These may force the SAAB to grant a period of grace for the repayment of the loan once the SAAB is sure of the circumstances.
- 2) The low price of agricultural products in certain years may cause a loss to the farmer who then cannot pay his debt to the SAAB at the time due.
- 3) The loan instalment date may not coincide with the harvesting season and sale of products such as dates and grains. This may force the farmer to delay repayment of the loan until he sells his crops.
- 4) Loan instalments due from Bedouins, who were given loans to finance the purchase of sheep and vehicles are difficult to collect because of the nomadic way of life. A study conducted by SAAB (1984) using a sample of those who deal with the agricultural bank, found that nearly 82 per cent of the loan defaults were among the Bedouins. In fact, this problem should not be overstated because a very limited number of loans have been extended to such people.
- 5) Short-term loans are sometimes not based on cash flow analysis and actual needs, but rather according to the estimated budgets prepared by the farmer, possibly without the assistance of the field representative. As a result, the size of the loan is often either much smaller or much

larger than the amount that can be used efficiently. Medium-term loans, on the other hand, are based on the size of the cultivated land and the subjective judgements of loan analysis. The larger the farm, the more credit the farmer is generally able to obtain from the SAAB. According to M. Takroni(1980), this method of evaluating credit needs ignores the income generating potential of the farm units and other important farm and farm operator characteristics that are essential indicators of the applicant's credit-worthiness and repayment capacity.

- 6) Arrangements for adequate recovery of the loans are very weak. Although loans are extended on the basis of personal security and/or collateral, there is no mechanism to compel repayment. Rules and regulations for dealing with delaying debtors are not consistent with the strict commercial banking practices. The SAAB has never, through any legal process, seized any of the property pledged as collateral in the case of loans default. Because of this unaggressive approach, borrowers have become less concerned about paying the loan installment at the due time. In recent years, SAAB has taken steps to correct the situation and to increase the recovery rate by supporting the collection staff in the branches, introducing incentives for collectors and arranging intensive continuous campaigns throughout the year to contact borrowers and lagging customers in an effort to safeguard the Bank funds. Unfortunately, such efforts have not yet brought about high levels of collection rates.

Another major deficiency of the credit policy in Saudi Arabia is the lack of co-ordination with extension services. SAAB functions mainly as a financial institution, extending

credit without expert guidance as to the best use of such credit. Furthermore, technical assistance concerning the new technologies financed by the SAAB loans, such as agricultural machinery, irrigation systems, chemical fertilisers, etc., is not adequately provided. As a result, the extended loans have been used inefficiently by most of the farmers who have little or no formal education and a low level of technological knowledge.

6.8: Evaluation of Subsidies Policy

In order to promote agricultural investment and growth and to improve inter-sectoral trade, the Saudi Government has offered wide-ranging subsidies to the farmers and agro-business investors. These subsidies are of two kinds. First, an input subsidy which aims to encourage producers to adopt modern technology in the form of chemical fertilizers, better seed varieties, machines and implements. These inputs when sufficiently applied would increase the production level by shifting the supply function to the right. Second, a production subsidy which aims to increase the level of output, therefore, improving the farmers' income. Details of these subsidies and their composition have been given in the previous chapter. Our objective here is to touch on some of the critical issues concerning these subsidies, such as their effect on agricultural growth, their structure over time, the areas of concentration, and finally their financial implications.

In a developing country like Saudi Arabia, where the national income is high but most of the people live in rural areas, subsidies are essential to bring about the transferring of agriculture from the traditional to the more advanced sector. Theoretically, these subsidies should allow for the use

of more resources and better technology, thus contributing to production growth. In an empirical way, this relationship between subsidies and productivity can be tested with the aid of regression analysis. Using annual data for the period 1973-1985, the following equation including a one year lag variable has been estimated (based on the same argument as with credit).

This model gave the following statistical results using the Ordinary Least Square (OLS) technique:

$$Y_t = 0.34 + \underset{(2.41)}{0.0029} X_t + \underset{(2.68)}{0.0033} X_{t-1}$$

$$\bar{R}^2 = 0.93 \quad D-W = 0.81 \quad F = 69.82 \quad SER = 0.85$$

Where: Y_t = the total value of agricultural output in SR billion in year t.

X_t = the agricultural subsidies in SR million in year t, $t=1, \dots, 13$.

Figures in parenthesis refer to t-statistics.

The above result shows that D-W is quite low, which indicates the existence of autocorrelation among the error terms. Therefore, an auto-correlation test using the Cochrane-Orcutt method has been carried out and gave the following result:

$$Y_t = 0.997 + \underset{(3.27)}{0.0025} x + \underset{(3.45)}{0.003} X_{t-1}$$

$$\bar{R}^2 = 0.71 \quad D-W = 1.62 \quad F = 12.62$$

$$SER = 0.67 \quad = 0.67 \quad (t = 3.0)$$

The test indicates that although \bar{R}^2 has declined to 0.71, the other statistical criteria have improved. The t-statistics for X_t and X_{t-1} , are significant at the 1% level,

and the value of D-W has improved. The relationship shows that more than 70% of variations in the value of agricultural output are explained by the level of subsidies this year and lagged one year. The resulting positive relationship could be used as a policy implication for the Saudi planners indicative that the higher the expenditure on the subsidies, the higher the agricultural output will be, taking into consideration a one-year adjustment mechanism.

As far as the structure of subsidies is concerned, table 6.6 shows the main areas of input subsidies provided by SAAB up to 1985. It is obvious that most of the extended subsidies (SR2,387 million or 35.4 per cent) went on water engines and pumps. No doubt such equipments are essential in an arid country like Saudi Arabia where farming depends mainly on underground water for irrigation. But on the other hand, the huge subsidies have encouraged farmers to obtain more and more of these equipments and to change them very frequently; even when they have developed only partial faults. As a result, the average life of these engines and pumps is short, only about three years as is shown by one of the studies (SAAB, 1981).

Animal feed is second in terms of subsidies which amounted to more than SR2,350 million, representing 34.9 per cent of total subsidies. This subsidised animal feed is mostly imported and is used mainly by poultry and dairy farms. On the contrary, the local-grown animal feed receives a very low subsidy (see the previous chapter). The total amount of subsidy paid for local animal feed was only SR30 million between 1974 and 1981 (MOAW, 1982), compared with SR546 million paid as subsidies for imported animal feed products during the same period. As a result of this policy, domestic production has

TABLE 6.6

STRUCTURE OF SUBSIDIES GRANTED BY THE
AGRICULTURAL BANK (SAAB) UP TO 1985.

Types	Amount of Subsidy in SR,000	% of Total
Engines and Pumps	2,387,070	35.4
Animal Feed	2,350,222	34.9
Farming Machinery	1,753,511	26.0
Transportation of Imported Cows	108,762	1.6
Poultry Farms Equipment	82,015	1.2
Fishing Gear	42,230	0.7
Dairy Farms Equipment	12,396	0.2
Total Subsidies	6,741,071	100.0

Source: (1) Kingdom of Saudi Arabia, SAAB, The Saudi Arabian Agricultural Bank in Twenty Years, 1985, p.55.

(2) Kingdom of Saudi Arabia, SAAB, The Annual Report, Vol.21, 1985, p.41.

registered a very low growth in recent years. In fact, it would be for the benefit of the Society at large if the subsidies on imports were channelled to the local farmers who produce the same products. Local production would increase and farmers' incomes would improve as well.

Agricultural mechanisation has received great attention from the planners being of the essential factors affecting agricultural expansion in Saudi Arabia. Its contribution has been realised by augmenting the power, expanding the processes and increasing the precision of farming operations. The total subsidies extended by SAAB on various kinds of agricultural machinery have reached SR1,754 million, or 26 per cent of the total subsidies. Agricultural machinery is now widely disseminated among the Saudi farmers, especially those who have large farms. The increasing level of mechanisation, enhanced by the subsidies, is highly justified considering the following two important points. First, the land area of the country is very large, therefore, the potentiality of increasing agricultural production through horizontal expansion is great. Second, there is a shortage of farming labour due to the low population density and the continuous migration to urban areas. In this situation, labour-saving technology (mechanisation), is very important.

On the other hand, the subsidisation policy might be criticised on the grounds that it encourages excessive possession of various kinds of machinery which have been imported from many countries. According to Sial (1985), "there are more than two dozen tractor makes and models with power ranging from 15-90 hp imported into the Kingdom from all over the world during the past decade." As a result, inadequate maintenance,

a shortage of skilled labour and spare parts are the most serious problems facing the Saudi farmers. Because of these problems, the operational life and utilisation of machinery have been very unsatisfactory. A study conducted by SAAB in 1981 on mechanisation and agricultural development in Saudi Arabia showed that the average life of tractors, ploughs and combine harvesters was 2.8, 2.75 and 2.9 years respectively.

Therefore, to improve the agricultural policy, the MOAW should establish a machinery evaluation programme to test machinery in the field for its suitability to the local environment and the import permits should then be restricted to selected models. Also, more attention should be given to the maintenance services and the provision of spare parts. In-field training courses and extension services concerning the best use of machinery and simple maintenance would be very fruitful. Also, it is essential to provide agricultural machinery on a rental basis, either through MOAW or local co-operatives. This would benefit small farmers who cannot afford to buy machinery and would increase production efficiency.

Chemical fertiliser, which is widely considered to be one of the most important new inputs in the modernisation of agriculture, is subsidised in Saudi Arabia as in many developing countries.⁵ This subsidy commenced in 1974 at a rate of 50 per cent of the imports cost and was paid by MOAW. Despite this generous rate of subsidy, the total amount of subsidy paid on chemical fertiliser was SR136 million, only 3.3 per cent of the total subsidies extended to the agricultural sector between

⁵For a list of countries which subsidise chemical fertiliser, see Per Pinstrup-Andersen, Agricultural Research and Technology in Economic Development. (Longman, London and New York, 1982)

1974 and 1981. As indicated by the Fourth Five-Year Plan (1985-1990), this low volume of subsidy is attributed mainly to the inadequate imports channelling and distribution system, which caused a shortage of fertilisers in many parts of the Kingdom. Because of this inherent problem as well as the deficiency in extension services concerning the use of this new input, the level of application is very low among Saudi farmers. Table 6.7 shows the consumption of fertilisers per hectare in Saudi Arabia, and as a comparison with other Arab countries, during the period of 1975-1984. It is clear that Saudi Arabia is the lowest (except for the last two years) in terms of fertilizers application. This should not be the case considering the fact that oil, which is the main raw material for producing such products, is plentiful in Saudi Arabia. Therefore, an increase in the use of fertilisers should be of great concern in the efforts to develop the farming sector. Establishing a distribution company, improving the extension services, and even increasing the present rate of subsidy on fertilisers are among possible methods to encourage more use of this new input. The high level of investment that is required on this input can be easily justified on an economic basis. The rate of return on fertilisers in terms of yield per unit area is quite high in many countries as has been confirmed by many studies (FAO/ FIAC, 1976).

This relationship is also established for the case of Saudi Arabia using the regression analysis. To the time-series data (1970-84) of fertiliser use and yields per hectare of wheat (the main product) was fitted a linear equation using the

TABLE 6.7

CONSUMPTION OF FERTILISERS PER HECTARE OF AGRICULTURAL
AREA IN SAUDI ARABIA AND OTHER ARAB COUNTRIES
(1975 - 1984)

	(Kg/Ha)									
Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
World Average	19.5	10.2	10.6	12.4	12.4	24.4	13.0	4.8	14.5	27.1
Algeria	3.6	2.6	3.2	3.9	3.9	3.9	4.0	4.2	4.1	4.1
Iraq	3.6	4.6	5.8	10.8	10.8	10.8	8.1	8.1	9.5	9.5
Libya	3.8	4.7	3.5	4.0	4.0	4.0	5.1	5.1	5.9	5.9
Oman	0.4	0.4	0.5	0.3	1.2	1.2	1.6	3.6	0.9	1.3
Saudi Arabia	0.1	0.1	0.1	0.3	0.3	0.3	0.8	0.8	2.3	2.5
Sudan	3.0	1.2	0.5	0.5	0.5	0.5	1.1	1.1	1.2	0.6
Syria	4.6	4.9	6.2	9.0	9.0	9.1	9.5	9.8	12.8	12.8
Tunisia	6.4	7.2	5.8	8.0	7.7	7.7	11.0	11.0	9.8	9.5
Yemen, N.	0.7	0.2	0.3	1.4	1.4	1.6	1.2	1.4	1.6	1.9

Source: Food and Agriculture Organisation (FAO) of the
United Nations, Fertiliser Yearbook, vols. 26 to 35
(1976-1985).

ordinary Least Squares method. This gave the following result:

$$Y = 1.46 + 0.0098 X \\ (6.09)$$

$$R^2 = 0.73 \quad F = 35.74$$

$$D-W = 1.7 \quad SER = 0.88$$

Where, Y = Yield of wheat in ton per hectare.

X = Fertiliser consumption in kilogram per hectare

Figures between parenthesis are t-statistics.

As long as the statistical results are good, this would assure a positive relationship between fertiliser consumption and wheat productivity. For every kilogram of fertiliser the yield of wheat would increase by 0.0098 ton (or 9.8 kilogram). This ratio compares well with the ratio of 1:10 commonly assumed for developing countries as a whole (Pinstrup-Andersen, 1982).

Production subsidies in Saudi Arabia, which are the second type of subsidies, are limited to certain crops such as rice, corn, millet and barley and are paid by MOAW. Because of the low rate of subsidies, the production of such crops has not been encouraged much. As a result, the increasing domestic demand for these products is largely met by imports which are highly subsidised. Palm dates and off-shoots are also subsidised with the aim of increasing the production of dates which represent one of the staple food products in the country. The amount paid as subsidy for this purposes reached SR128 million between 1981 and 1983. Though date production has increased in recent years, the quality has not improved much because the subsidy is paid irrespective of quality.

Concerning the financial implications of the agricultural subsidies and the magnitude of the cost, they would be

best seen by relating them to the annual budgetary expenditures on other forms of government subsidies which include imported food subsidies, social security subsidies and electric companies' subsidies.

As shown in Table 6.8, agricultural subsidies have increased in absolute terms over the years, from SR4 million in 1973 to nearly SR1.5 billion in 1983. But, as a proportion of total Government subsidies the situation is different and fluctuating from year to another. They were at a minimum of 4.9 per cent in 1974 and a maximum of 29.7 per cent in 1977. Thereafter, such subsidies as a proportion decreased to reach a low level of 11.2 per cent in 1982. In fact, during the last five years of the period studied, agricultural subsidies were the lowest among all other forms of government subsidies. However, if the agricultural subsidies are related to the imported food subsidies, the table shows that except for 1977, 1978 and 1979, subsidies on imported food were always exceeding subsidies paid to the domestic farmers. Therefore, one may conclude that the subsidisation policy in Saudi Arabia is mainly for the benefit of the consumers rather than the producers.

6.9: Evaluation of the Wheat Price-Support Policy

Wheat is one of the major agricultural products and one of the basic foods in Saudi Arabia. Before the discovery of oil in the 1930s, wheat production was sufficient to satisfy the local demand. Over the years, however, production could not keep up with the increasing demand caused by rising incomes, urbanisation and an increase in the number of incoming foreign workers. Therefore, wheat had to be imported in large quantities to fill the increasing gap between domestic supply and demand.

TABLE 6.8

GOVERNMENT TOTAL SUBSIDIES
(1971 - 1984)

(in SR million)

Year	Agricultural subsidies (I)	Imported food Subsidies (II)	Social Security Subsidies	Subsidies to elec- tric Companies	Total sub- sidies (III)	I as % of II	I as % of III
1971	-	-	38.7	1.0	39.7	-	-
1972	-	-	45.0	1.0	46.0	-	-
1973	4.0	-	54.7	15.0	73.7	-	5.4
1974	20.0	300.0	75.8	14.0	408.8	6.7	4.9
1975	69.0	750.0	357.5	13.0	1189.5	9.2	5.8
1976	333.0	700.0	499.7	25.0	1557.7	47.6	21.4
1977	603.0	600.0	653.1	175.0	2031.1	100.5	29.7
1978	772.0	700.0	864.2	312.0	2648.2	110.3	29.2
1979	829.0	800.0	971.2	563.0	3163.2	103.6	26.2
1980	586.0	1450.0	1005.1	749.0	3790.1	40.4	15.5
1981	766.0	3000.0	985.6	1234.0	5985.6	25.5	12.8
1982	1129.0	5000.0	1390.6	2586.0	10105.6	22.6	11.2
1983	1472.0	4150.0	1586.3	2816.0	10024.3	35.5	14.7
1984	1173.0	1600.0	1540.0	3548.0	7861.0	73.3	14.9

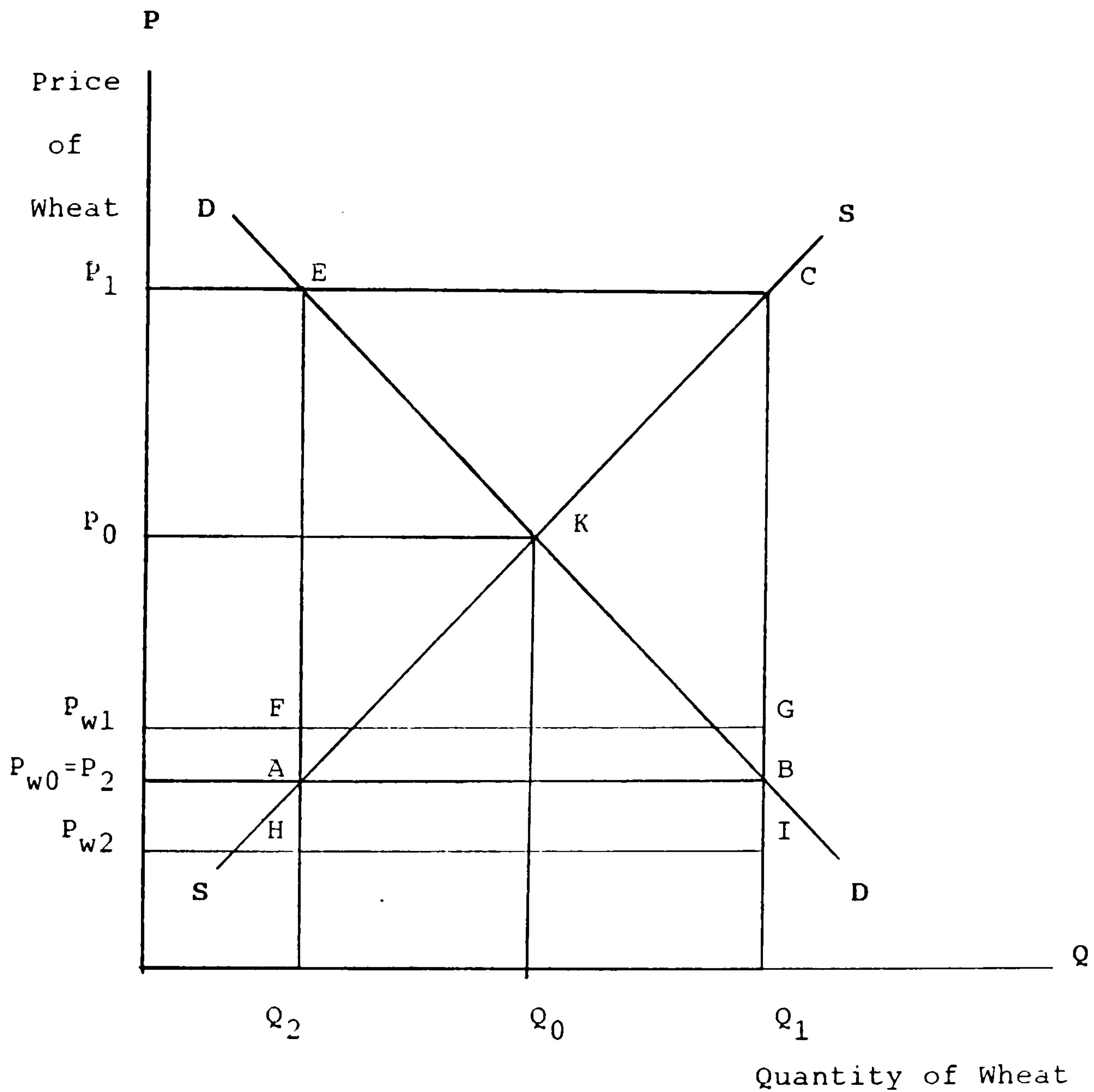
Source: Kingdom of Saudi Arabia, Ministry of Planning;
The Achievements of Development Plans, 1970-84;
Facts and Figures, p.127.

To correct the situation, the government in 1978 initiated a price support programme for the locally grown wheat. The major aims of the policy are: to increase farmers' incomes; to reduce wheat imports thereby saving foreign exchange; and to improve the people's welfare level by subsidising the consumer prices of wheat and wheat products.

Before assessing this policy, it is worthwhile to examine the theoretical rationale behind it. Figure 6.3 depicts a simple model illustrating the mechanism of wheat price-support to producers, and a ceiling price to consumers. SS represents the wheat supply curve, while DD is the market demand curve. The free market price and quantity(i.e. in the absence of such a scheme) are shown by P_0 and Q_0 respectively. To maintain the objective of self-sufficiency in wheat production, the price paid to producers is set at P_1 which is higher than the free market price P_0 . Production will expand in a response to this attractive price to reach Q_1 . Without Government intervention in the consumer price of wheat, the quantity demanded will be restricted to Q_2 . But, if the Government wants to maintain a low consumer price, then consumers may be left to pay the price consistent with demand at the new output (P_2). In this case an income transfer from the Government will be used to make up the difference to wheat producers by means of per unit subsidy (P_1P_2).

In this model, the area (P_2P_1CB) represents the net budget cost of the scheme or the income transferred into agriculture. This budget cost or transferred income would continue to expand as long as supply elasticity is positive - ceteris paribus. The effect on producer surplus is measured by

FIGURE 6.3



MODEL OF PRICE-SUPPORT TO PRODUCERS AND CEILING PRICE TO CONSUMERS FOR WHEAT IN SAUDI ARABIA.

the area P_0P_1CK , which is also the so-called "economic rent" or the gain to the resources engaged in wheat production as a result of the price support programme. On the other hand, KCQ_1Q_0 represents the alternative earnings of the resources elsewhere; therefore the area KCB represents the net social cost of implementing the programme. The more elastic the supply of wheat the greater the social cost - ceteris paribus.

Foreign exchange savings which result from this policy can be easily shown by the model. Normally, the world price of wheat is lower than the local free market price (P_0), and if we assume it is at P_{wo} which is equal to the target price (subsidised) for domestic consumers (P_2), then the foreign exchange savings would be the area ABQ_1Q_2 . Similarly, the foreign exchange savings are the area FGQ_1Q_2 , if the world price is higher than the local target price ($P_{w1} > P_2$), or the area HIQ_1Q_2 if vice versa. In the absence of a price support programme, the quantity of imported wheat which would satisfy the local demand at P_2 is shown by AB .

Based on the above model, we come now to our objective of evaluating the wheat price-support policy in Saudi Arabia. The procedure followed will be to study the effects (positive and negative) which emerged from this policy. This will provide adequate bases concerning the policy trend and its place in the Saudi Arabian economy.

Starting with the positive effects of the wheat price support policy, the following are the most noticeable:

- 1) Wheat production has been greatly stimulated and the self-sufficiency stage has been reached within a short period of time unparalleled elsewhere. Production has increased from almost 125 thousand tons in 1977, a year

before the price support programme commenced, to 132 thousand tons in 1978. During the last five years production has made great leaps. For instance in 1984, production rose to 1.4 million tons, exceeding the local consumption by 400 thousand tons. In November 1984, the Government won a Food and Agriculture Organisation (FAO) award for achieving total self-sufficiency in wheat production. In 1985, production continued to grow and reached 2.05 million tons, representing an increase of 46 per cent over that of 1984, and over 16 times greater than the production level of 1977. The production level for 1986 has been estimated to be more than 2.5 million tons. On the other hand, per capita production, which is one of the measures widely used to assess the success of such a programme, has also increased to 16.3 kg in 1977, to 45.9 Kg in 1982 and even to 136.8 Kg in 1984.

- 2) Farmers' incomes have increased as a result of this policy. The income transferred to wheat producers by the Government has increased nearly nine-fold within only one year, from SR7 million in 1978, the first year of the programme, to SR61 million in 1979. This amount increased to SR115 million in 1980 and to SR298 million in 1981. Due to the positiveness in the elasticity of wheat supply, output has risen to very high levels. As a result, the transferred income has also increased tremendously. In 1983, the amount of capital paid by GSFMO to the wheat producers was SR2.4 billion, and expanded to SR4.28 billion in 1984. This last figure represents nearly 45 per cent of the agricultural GDP, and 1.3 per cent of the total GDP during that year.
- 3) The price support programme has stimulated the efficient use of traditional inputs such as family labour as well as

modern inputs. In addition, farmers have been encouraged to use new, high yielding technologies such as improved seeds, chemical fertilisers, pesticides and machinery. Consequently, the effects on yield per hectare is likely to be even more positive. In 1985, the average wheat yield in Saudi Arabia was 3,091 kilogram per hectare (Kg/ha), compared to the world average yeild of 2217 Kg./ha (FAO, 1985). This level of yield is also high compared to the situation in some of the Arab countries, being 650 Kg/ha in Iraq, 1,006 Kg/ha in Jordan, 1,496 Kg/ha in Syria, 750 Kg/ha in Algeria and 1,646 Kg/ha in Sudan (FAO, 1985). Furthermore, the intensive use of pivot sprinklers for irrigation has increased the area of wheat production and reduced the demand for labour which is in short supply in Saudi Arabia.

- 4) The general welfare level has been improved by providing wheat and wheat products at very low prices. For example, wheat flour, the main ingredient of the bakery industry, is highly subsidised and sold at one-fifth of its cost. The main objective of the policy is to increase the ability of low income consumers to aquire this basic staple food.
- 5) Wheat imports have decreased sharply, and as a consequence foreign exchange has been saved. Saudi Arabia used to import large quantities of wheat to meet the increasing domestic demand. In 1981, wheat and flour imports decreased by 19 per cent from the 1979 imports of 828 thousand tons. Imports decreased again to 283 thousand tons in 1983. Based on the world market price for wheat of \$158 per ton in 1983 (UNCTAD, U.N. 1985), the estimated foreign exchange saving from the increased domestic production stimulated by the price-support programme is \$86 million.

In addition, the programme made some savings in the amount of subsidies which the Government used to pay to wheat producers in order to provide low price wheat for the consumers. According to GSFMO (1982) these savings were estimated at SR1,439 million up to 1982.

- 6) The price support programme reduced the risks and uncertainties which face the Saudi producers and consumers due to the variability of the climate, seasonality of rainfall and the inadequate system of marketing. Under the price support programme, farmers are assured of a fixed price whenever they bring their wheat production to GSFMO. Furthermore, to reduce marketing costs there are seven grain silos with a storage capacity of more than two million tons located in different parts of the country. This storage capacity and the spatial distribution of the silos are two positive indicators of the effectiveness of the price-support programme.

On the other hand, the major negative effects of the wheat price support programme which have been seen by the author would include the followings:

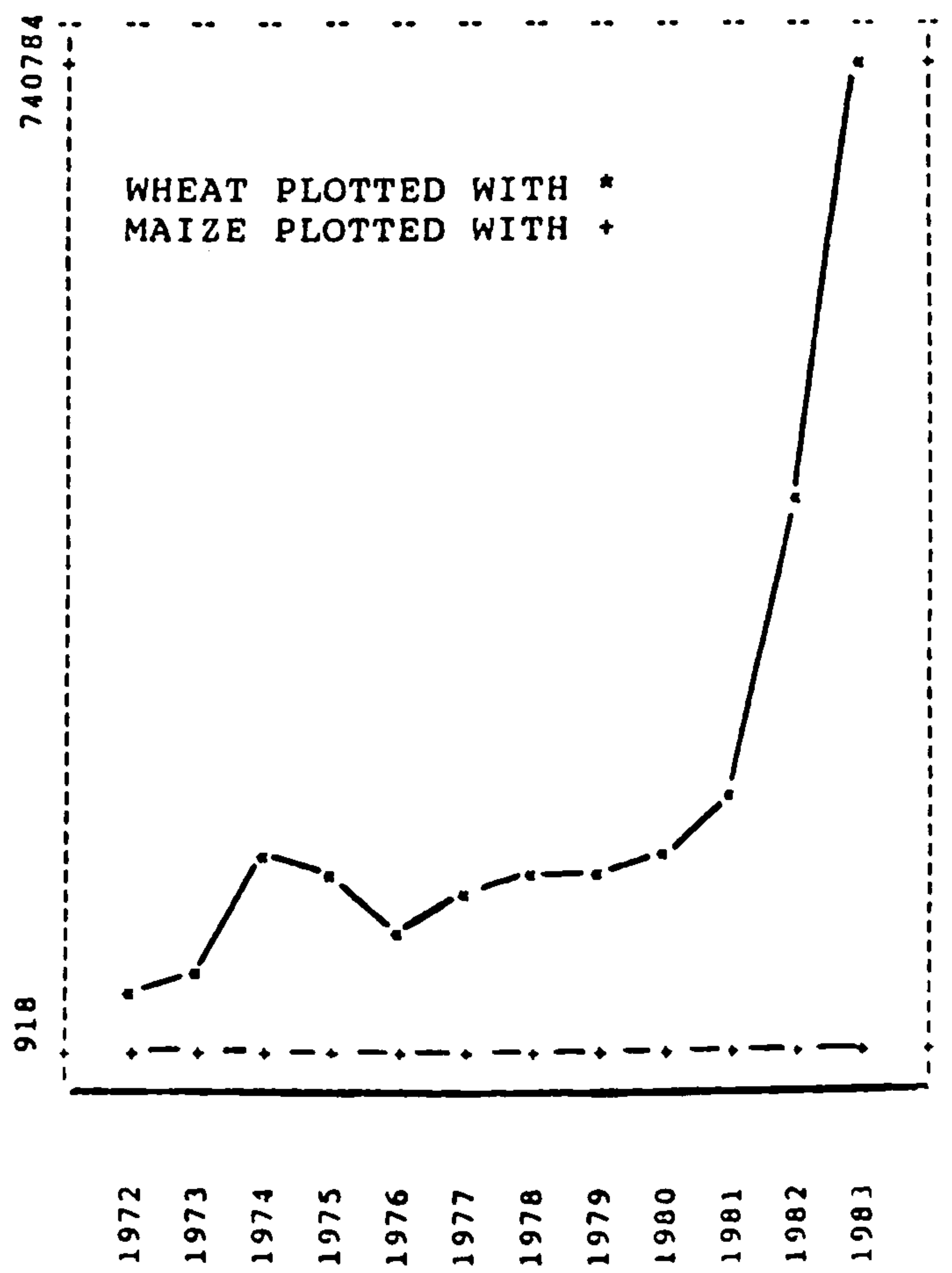
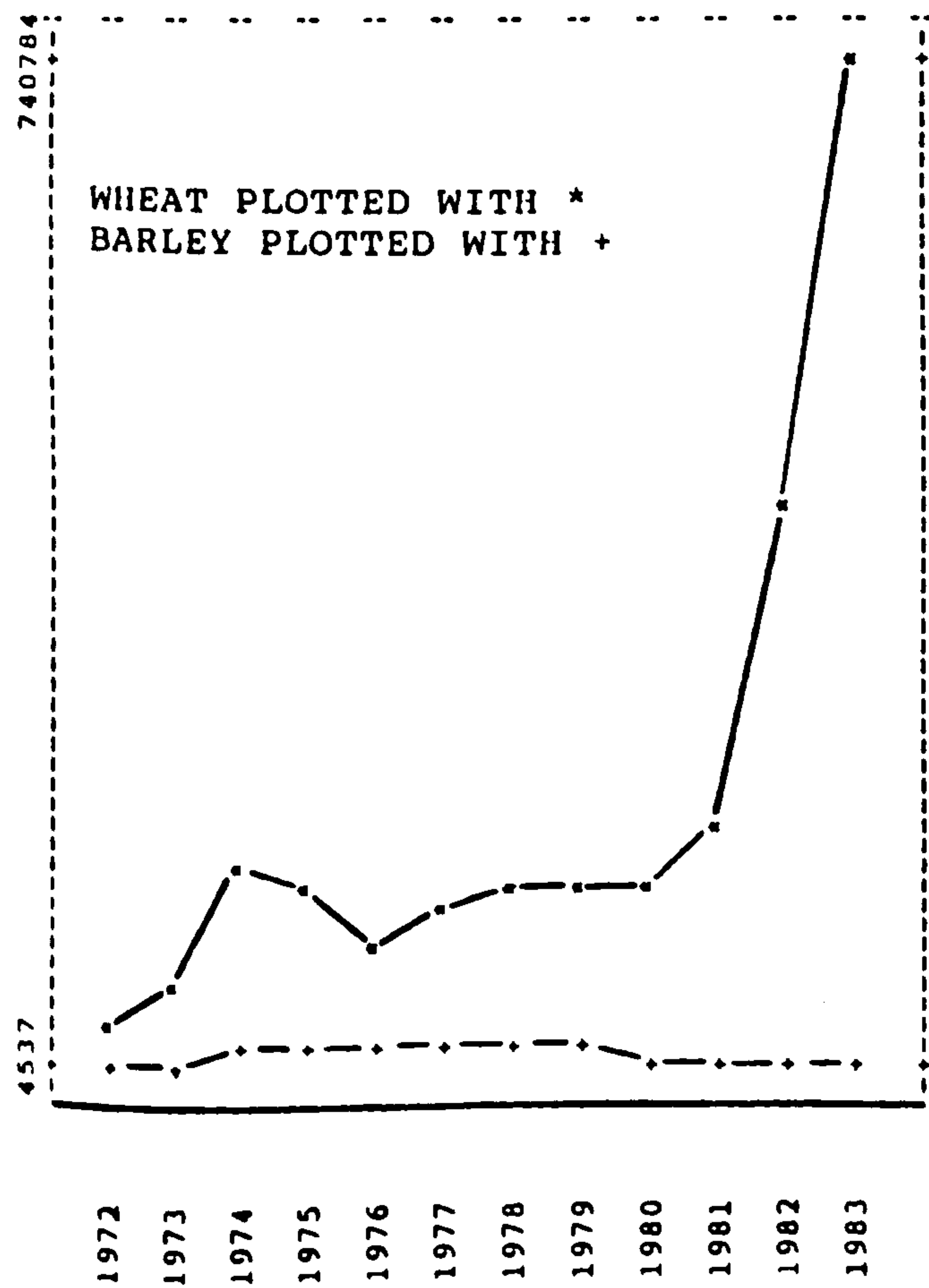
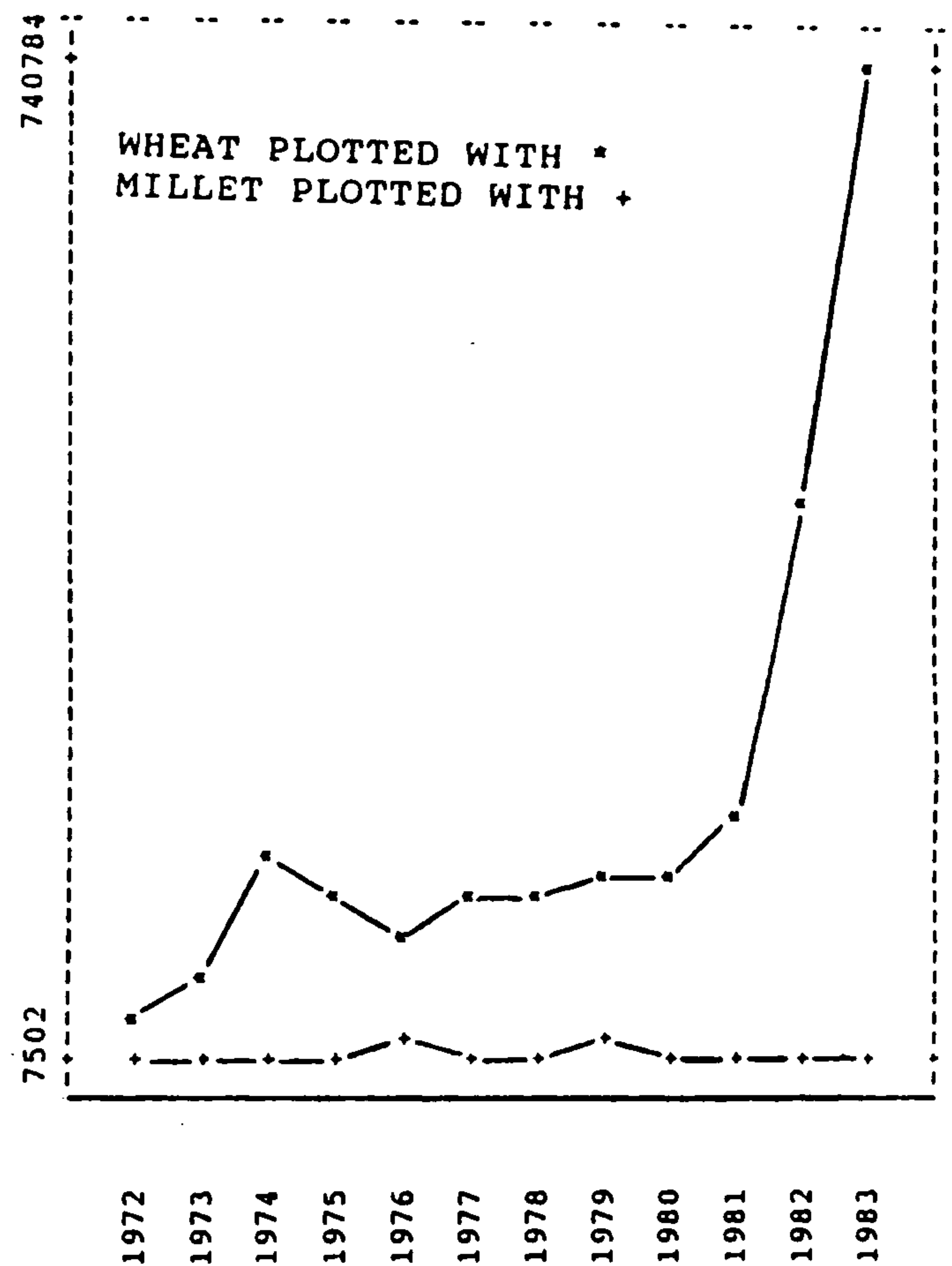
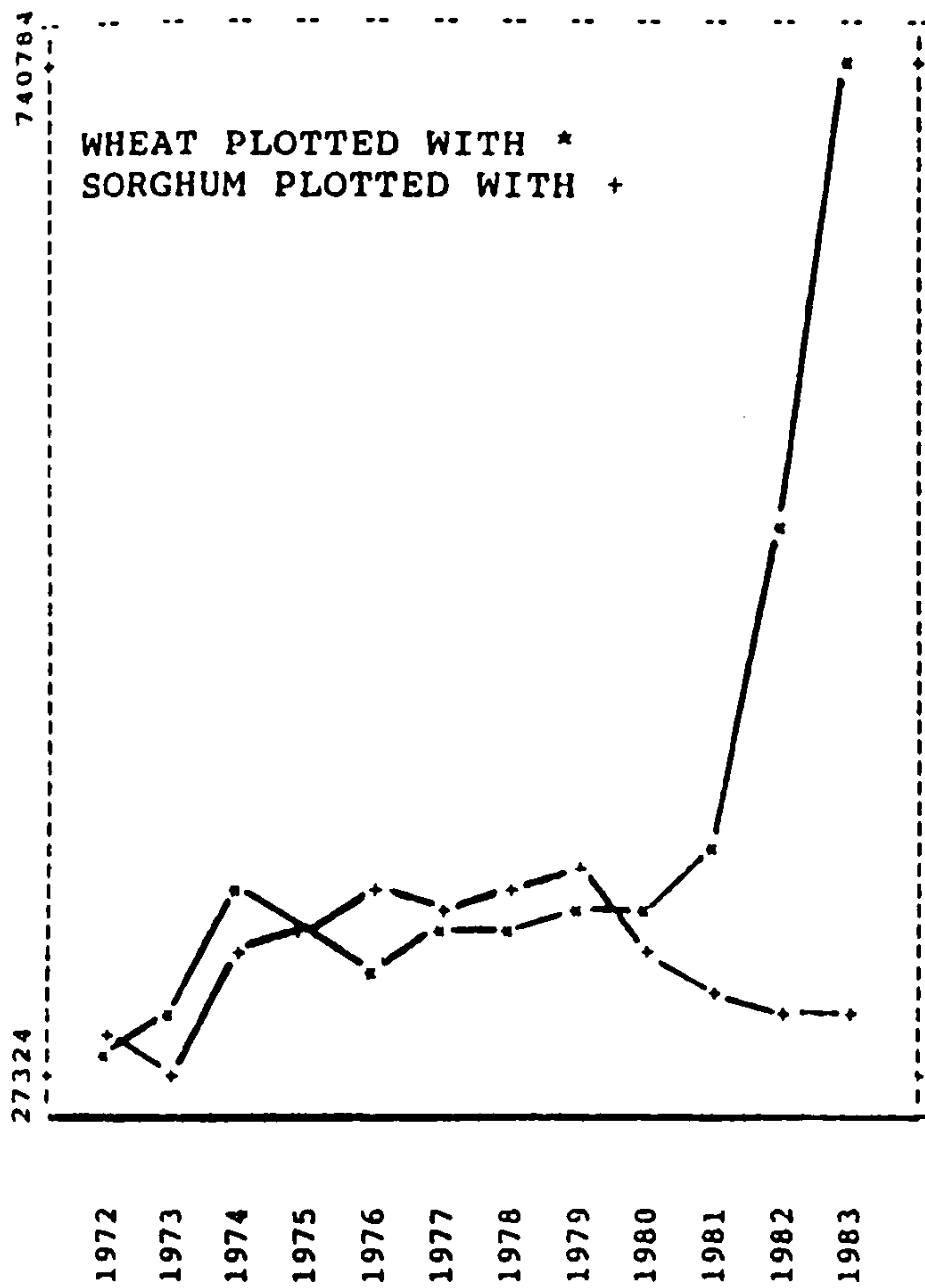
- 1) The policy is very costly and results in continuous and increasing deficits. While the budget cost was only SR7 million in 1978, it increased to SR2,352 million in 1983. However, this cost doubled within one year to SR4,284 million in 1984. In 1985, the cost could amount to SR5,000 million, representing 2.3 per cent of the total Government expenditure during that year. On the other hand, because such a policy induces the use of traditional inputs such as land and water, above their economic optimum, the resulting

social costs are high.

- 2) Due to the very attractive wheat price, which was SR3,500 per ton but was reduced to SR2,000 per ton in 1985, most of the traditional resources such as land, capital and labour have been directed to the production of wheat at the expense of other grain crops such as barley, millet, sorghum and maize. The result has been low production levels of these crops and a high volume of imports. Figure (6.4) shows the unhealthy situation concerning the trends in grain crops in Saudi Arabia. Obviously farmers are biased in favour of wheat production compared to other crops because by growing wheat they can become wealthier. Even some of the dairy farmers who have been given free land on which to grow barley to feed their cattle, import the barley, grow wheat instead and pocket the difference in the price. The Government, instead of supporting the prices of local grain products other than wheat, encourage their imports through import subsidies. The Kingdom now imports very large quantities of grain products, and the yearly cost of the imported barley is almost three times that of the wheat it produces.
- 3) The high support price for wheat tends to encourage unwarranted production in the long run and at the same time directs proportionately higher financial benefits to those who produce most. The government has not yet found a way of helping small farmers without also helping large farmers more, and this had led to a questioning of the social as well as the economic justification of the policy measures. In addition, the majority of less-well-off farmers in the mountainous South-West Region part do not benefit from the programme because their area is not suitable to grow wheat.

FIGURE 6.4

TRENDS IN GRAINS PRODUCTION IN SAUDI ARABIA



- 4) Attributed to this policy, farmers have brought more and more land into wheat cultivation, thereby causing a drain on the underground water reserves. Presently, almost 42 per cent of the available water is used for wheat cultivation (Chamber of Commerce, 1985). This problem of water over-consumption has been aggravated by the fact that most of the large-scale wheat farms are in the central part of the country where the underground water is non-renewable.
- 5) Although this policy has relieved some of the burden on foreign exchange by reducing wheat imports, foreign exchange has been heavily used to import other grain crops whose local production has not been attractive to the Saudi farmers. In 1984, imported barley was the number one product among the imported items in Saudi Arabia in terms of its value. During that year more than SR3.8 billion was spent on importing 5.9 million tons of barley. If to this figure is added the value of other grain imports, then the volume of foreign exchange spent on them would be very large.

In concluding this section it should be pointed out that this policy has been initiated by the Saudi Government during its economic prosperity era as one of the main tools to develop the agricultural sector. But, because of the negative effects of its financial and social costs and the nature of Saudi economy which is unstable, such a policy can not be used as a long-term policy.

6.10: Evaluation of Marketing Policy

As stated by Mellor (1976), marketing services are increasingly important in the process of economic development as a result of three basic factors: (1) as a consequence of

urbanisation, farmers tend to sell a large proportion of their production and have become more specialised; (2) rising incomes cause greater growth in the demand for non-staple food products such as vegetables, milk and meat, which are perishable and require costlier marketing services, than in the demand for relatively easy-to-handle staple grains; (3) rising per capita incomes increase the demand for marketing services such as grading, processing and packaging which have higher income elasticities than the product itself. Therefore, efforts to develop the agricultural sector and to increase the level of production should pay great attention to initiating and improving marketing facilities, such as proper transport; reasonable storage and refrigerating capacity; quality control; market information, etc. Such facilities, if existed at an adequate level, would encourage increased production by reducing marketing costs and would thereby provide higher incomes for farmers. This in turn would cause consumer prices to fall and this would expand the market and thereby raise the level of producers' incomes.

In Saudi Arabia, marketing without doubt is the primary problem facing agricultural producers. This has become an overwhelming problem in recent years, especially when production increased more in response to the monetary incentives provided by the government. The study conducted by the Saudi Arabia Agricultural Bank (SAAB) in 1982 illustrates this point. In the opinion of the 844 farmers surveyed in different parts of the Kingdom, marketing was their major problem, based on the following reasons:

- 1) Long distances between farms and major markets.
- 2) Paucity of paved roads, causing high transportation and

product spoilage costs.

- 3) Low prices received at the local markets because a high proportion of the price paid by the consumers goes to the middlemen and retailers.
- 4) Inadequate cold storages, especially for perishable products: therefore, farmers are obliged to sell for any price offered.
- 5) Scarcity of and expensive labour and agricultural machinery which are of considerable help in certain farming operations, such as harvesting and collecting the produce. As a result, a high proportion of the produce is left unharvested.

In another study in which the Council of Chambers of Commerce (1985) investigated the problems facing the major agricultural projects in Saudi Arabia, almost 40 per cent of the farmers involved in the 120 projects studied said that they faced marketing problems. For further discussion on the deficiencies of marketing services in Saudi Arabia at a disaggregated level see below.

Transportation facilities, particularly for perishables, are limited, causing some spoilage of locally grown fruits and vegetables. For instance, the spoilage in tomatoes was very high, as indicated by the study conducted by the Ministry of Agriculture and Water (The Third Agricultural Plan 1980-85). Lack of transportation facilities increase the transportation costs borne by the farmers who live far from the main markets and this of course reduces the profit margins if it does not eliminate them completely. I was informed a few years ago, by a relative farmer from Sudair Region, that when he took his produce of watermelon to the main market of Riyadh

(a journey of almost 200 km) the net money he received did not even cover the transportation cost. Now, although the situation has improved significantly and up to the end of 1985 almost 82,000 kilometers of primary, secondary and feeder roads had been constructed throughout the Kingdom (SAMA, 1985), but there is still room for improvement, especially considering the large area of Saudi Arabia (almost 2,250,000 km.) and the geographical distribution of the agricultural areas which are scattered over many parts of the country.

Storage facilities are very limited among the private sector producers and the only adequate and well organised storage facilities are provided by the government to store and process the home-grown wheat. There are presently seven grain silos and flour mills throughout the country with a storage capacity of more than two million tonnes. In addition, the Government now asks any agricultural company or individual farmer producing more than 500 tonnes of wheat to build their own storage facilities as a requirement of purchasing their wheat under the price-support scheme. On the other hand, the refrigerated storage capacity falls short of that needed for domestic produce and imported food stuffs. Cold stores are used mainly for imported foodstuffs and by the large-scale poultry producers. Therefore, the majority of farmers do not have proper storage facilities and as a consequence they face great difficulties in adjusting production to demand in view of the uncertainties of weather and yields and the relatively low price elasticities of demand for the basic farm food products. To help solving such a problem SAAB extends interest-free loans to farmers to build their own storage and refrigerated facilities, but this has not yet encouraged many farmers to

build these facilities, as the loans are very limited. For example, in 1985, only SR782,129 or 0.03 per cent of the total extended loans were granted to build private grain silos (SAAB, 1985). In fact, to encourage the construction of these facilities, the Government should look for more attractive alternatives, namely to provide some sorts of subsidies or to encourage financially the agricultural co-operatives to undertake these services.

Marketing is also hampered by a lack of standards and grades which hinder the farmers' ability to operate a dual price system. The problem is further aggravated by the actions of the middlemen, who usually mix different quality products and sell them at one price.

Information on current and prospective market conditions, including product prices, are virtually absent from the marketing system in Saudi Arabia. As a result, there is over-supply in some locations and under-supply in others. Also, there are often extreme price differences between rural and urban areas and extreme seasonal price fluctuations.

Actually, most of the above-mentioned marketing problems are a direct result of the absence of large-scale well administered marketing boards and societies. Despite great technical and financial efforts to develop the agricultural sector, the establishment of such marketing boards and societies has not yet commenced.

As far as the present Government's role in marketing policy is concerned, it appears to be limited to the establishment of wholesale markets for agricultural products in the main cities and to setting laws which regulate the transactions made in these markets. The laws and regulations have been directed

mainly to maintain and control competition and to prevent any kind of monopoly or collusion being practiced by the producers. In addition, the Government sets laws which define the standards of practice and operation of markets and the men working in them, and also laws which regulate the health standards for meat, milk, milk processing and other food products. Such roles played by the Saudi Government for the existing marketing policy are inadequate and need to be reconsidered and strenthed.

6.11: Evaluation of Agricultural Co-operatives

In most developed and developing countries, some forms of agricultural co-operatives exist, through which certain objectives such as increasing the level of agricultural production, introducing new technology, increasing productive efficiency and increasing per capita income are achieved. The functions of such co-operatives range from providing new inputs of production and marketing the produce, to the provision of extension and credit services.

In Saudi Arabia, although the co-operative movement has now existed for more than two decades, its progress and contri-bution toward agricultural development is negligible. This weak position of the co-operative movement can be attributed to two main reasons. First, the number of co-operatives classified as agricultural and mainly serving the farming sector is very small. In 1985, only 34 out of 178 co-operatives were considered to be agricultural co-operatives, the rest mostly providing multi-purpose and consumer services. Second, the operation of these agricultural co-operatives are mostly limited to the provision of some production inputs such as new

seeds, fertilizers, pesticides, simple farming implements, and machinery spare parts. Marketing and large machinery rental services are lacking. Other services which are urgently needed by the Saudi farmers, such as extension services and channelling government loans and grants, are not undertaken by the agricultural co-operatives. In the contrary to the provided limited functions, the co-operatives face some problems as lack of finance, unorganised marketing systems, lack of co-operation from the associated members and poor management.

In a study of the agricultural co-operatives and their role in the Saudi agricultural development, conducted by SAAB(1982/83), it was found that 76 per cent of the co-operatives surveyed had financial problems, and 36 per cent marketing problems. However, lack of members' co-operation and poor management were problems mentioned by 34 per cent and 33 per cent of the respondents respectively.

Before discussing the problems of finance, it is necessary to review the available sources and their capacities. First, the Co-operatives are equally eligible as individual farmers and agricultural projects, to obtain interest-free loans from SAAB. In addition, the Ministry of Labour and Social Affairs represented by the Directorate of Co-operatives, provides different subsidies, including the following:

- 1) 20 per cent of the initial capital investment;
- 2) 50 per cent of the cost of building an administration centre for the co-operative;
- 3) 25 per cent of the total cost of any production project initiated by the co-operative;
- 4) 10 to 50 per cent of the manager's salary if appointed as a full-time worker, and;

5) 50 per cent of the total losses in case of bankruptcy.

Therefore, it may appear that the financial problems which the co-operatives face are overstated here. But the situation is different, especially with regard to obtaining loans from SAAB. Many requirements have to be met before the loan is granted. This lengthy procedure reduces the number of co-operatives dealing with the bank. In 1981, only three agricultural co-operatives received loans, amounting to SR 624,912 , nearly 0.03 per cent of the total loans granted by SAAB in that year. To get more effective and productive co-operatives it is necessary to review the present credit policy, and this would imply minimising or even terminating some of the complicated requirements. Accordingly, the number of co-operatives dealing with SAAB would increase and also the provided services.

There are insufficient staff and, more important, they are inadequately trained. Problems are also caused by a distrust of the management and lack of loyalty among members. There are few meetings, which are very poor in quality and not effective enough to encourage the trust of the co-operatives.

Lastly, marketing services are very limited among the co-operatives' activities. The above study by SAAB (1982/83), indicated that only 14 per cent of the agricultural co-operatives were dealing with marketing. The situation is similar for machinery rental services and does not fulfill the needs of the majority of farmers who operate on small plots and do not have the financial ability to acquire expensive machinery. Unfortunately, those farmers are badly affected by the expensive rental charges set by the co-operatives.

6.12: Evaluation of the Public Agricultural Projects

Large-scale agricultural projects, which require large capital investment and benefit the community at most, are usually undertaken by the state. In Saudi Arabia, the most important projects of this nature are the Al-Hasa Irrigation and Drainage Project, Wadi Jizan Agricultural Development Project and the Haradh Settlement Project. These were planned mainly according to the natural resource endowment and also some social and political considerations. The feasibility studies provided by the foreign consultant firms for such projects were usually influenced by the "engineers" view-point rather than the "economists". Therefore, economic considerations have not been taken into account, or if they have been, have been given less consideration. Even when these large-scale public projects have been operating for several years, there has not been any serious efforts to evaluate them on a cost-benefit basis. Unfortunately, it is not possible even here to make such an analysis, due to the shortage of required data, especially those pertaining to the yearly stream of direct and indirect costs and benefits generated by the projects, and the opportunity cost of the invested capital in other comparative ventures. Without such economic analyses an evaluation taken here would be mostly historical and descriptive.

The Al-Hasa project is officially regarded as the largest single agricultural project in Saudi Arabia in terms of its capital investment and agricultural potential. In Al-Hasa Oasis, two correlated sub-projects were undertaken, one to protect the area against the moving sand-dunes, and the other to build a more efficient water distribution system and

drainage network to overcome the problem of water salinity which resulted from the over-use of water under the traditional irrigation methods. The sand protection project, which commenced in 1962 and was completed in the early 1970s entailed the planting of almost five million Tamarisk and Eucalyptus trees and represented one of the most successful projects in Saudi Arabia. Now Al-Hasa farmers no longer fear sand encroachment onto their farms. In addition, a modern concrete water distribution drainage system throughout the oasis was completed in 1972. As a result, an additional 12,000 hectares of fertile land were made available for cultivation through the diversion of saline water away from the oasis area via the new drainage system. This additional land was achieved by using only 8 per cent more water under the new distribution system, an obvious indication of more efficiency in using the available water for farming.

Another major development scheme has been completed at Wadi Jizan in the Southern Region. A dam has been constructed, which was finished in 1970, which has a storage capacity of 51 million cubic meters of water. This has contained the seasonal torrents that once swept down the Wadi, washing away topsoil, uprooting plants and seeds and even drowning livestock and destroying homes and other buildings on the plain below. In addition, the Jizan Dam collects and stores water for farming use. However, an irrigation scheme was constructed which is now distributes the damwater among the downstream farmers. In general, the whole project benefits now more than 50,000 people living in almost 60 villages.

Although the amount of cultivated land and the benefits to the people have increased through the above two projects,

neither has solved the problem of small holdings nor of the prevailing traditional way of farming. Therefore, most of the farmers are still producing at the subsistence level.

While the above irrigation projects have been partially successful, the Haradh Settlement Project represents a failure in planning. This project originated as a Bedouin settlement and agricultural scheme of 4,000 hectares but, after the completion of the planned infrastructures in 1971, no settlement was maintained. According to Al-Sheikh (1970), the main reason for this was that, the social, cultural and traditional backgrounds of the Bedouins were not fully taken into account when the project was initially designed. The Bedouin are camel- and sheep-herders, following rain and pasture throughout the desert and have very little farming experience. If the settlement per se is an objective, then for this kind of people the most suitable and rewarding would be a settlement for camel- and sheep- producers.

Following the unsuccessful settlement attempt, the project was converted to a commercial agricultural project in 1971, indulging mainly in fodder and animal production and run by MOAW through Haradh Agricultural Company. Unfortunately this company was not successful and during its six years of operation experienced yearly losses, reaching a maximum of SR28.4 million in 1976. This amount of loss was representing almost twelve times the generated income during that year (Ibrahim, 1981). In 1977, a joint venture with the Irish Company, Mastock, was established to run the Haradh Project, but because the firm had little knowledge of the area, this new venture also failed after one year with a loss of SR23.3 million. In fact, all losses were covered by the Saudi Govern-

ment because the project was considered a public project. Lastly, in 1979, the project became a private venture managed by four Saudi investors in addition to the Government.

Generally, the Haradh project was not at any time a profitable commercial venture, due to many factors, some inherent in the nature of the project and the kind of economic activities it was engaged in. Other factors may include the following:

- 1) Administrative problems. According to Ibrahim (1981), the project board of directors was changed at least four times during the seven years of operation. In addition, the board met only once at the project site, otherwise all of its meetings being held in Riyadh - almost 300 km. away.
- 2) Labour problems. The wage structure was not attractive, causing a shortage of both skilled and unskilled labour.
- 3) Marketing problems. Haradh is an area uneconomically remote from the urban areas which represent the main markets for the project's products.

Finally, with regard to the financial implications of these public projects, each was costly in terms of its capital investment. As an example, the initial cost for the Al-Hasa project was SR208 million, not counting the yearly expenses of operation, maintenance and administration. Therefore, such projects, with their huge capital investment, require a highly intensive production in order to achieve high economic returns. These projects should be based on valuable cash crops, intensive vegetable cultivation and livestock production. But, unfortunately, most of the farmers still follow the traditional way of farming and marketing small shares of production.

CHAPTER SEVEN

7: FIELD RESEARCH AND QUANTITATIVE INVESTIGATIONS ON THE AGRICULTURAL POLICIES IN SAUDI ARABIA

7.1: Introduction

Having reviewed the various agricultural policies in Saudi Arabia and evaluated them on the available information published by the official sources, in this chapter we intend to present a field research aspect based on designing a survey and on interviews with Saudi farmers and agri-businessmen in the different regions of the Kingdom. This chapter also aims to provide a link with the previous chapters and give other viewpoints regarding the various agricultural policies and programmes. Such a work would seem to be necessary as without taking into consideration the opinions of those whom the agricultural policies are aimed to help, the decision-makers would not know the exact direction of such policies and the size of their contribution. In addition, such work is important because it can provide information concerning the major deficiencies of the policies and, therefore, make any future adjustments easier.

Before we present in detail the statistical findings of our survey, we will briefly go over some of the basic relevant points, including the objectives of the survey, technical considerations concerning its design, the questionnaire, and the main hypotheses to be tested in this study.

7.2: Objectives of the survey

To evaluate the existing agricultural policies and programmes in Saudi Arabia, based merely on the available

official data, would not be enough and would give biased results. Therefore, in this study, our main objective is to emphasise the points of view of the beneficiaries of these policies and to link them with the findings of the previous investigations. Then, a study of both findings should provide us with a basis on which we can understand the real capacity of the existing agricultural policies and programmes in Saudi Arabia and their future potentials.

7.3: Technical considerations concerning the survey design

This field research was conducted during the summer of 1986 by the author and some colleagues who work in the scattered branches and offices of the Agricultural Bank (SAAB) in Saudi Arabia. The target population includes farmers and agri-businessmen in all regions of Saudi Arabia (see appendix B), with emphasis on the central region because of its greater agricultural potential.

Because most of the farmers are illiterate or less well educated, the personal interview method was considered an appropriate way of gathering the necessary information. In some instances assistance was given, but only to explain the survey questions. Well educated farmers were given the chance to answer the survey questions by themselves in order not to influence their replies.

Almost 1000 farmers and agri-businessmen throughout the country were selected as randomly as possible, and 738 questionnaires were completed. These became our final sample size to present the current agricultural status in Saudi Arabia. However, this number does not include a few incomplete or not clear replies which were later excluded.

Before we started our work, a pilot survey was carried out on a limited number of farmers in order to test their response to the questionnaire. This allowed us to make necessary amendments in order to maximise the survey returns and minimise the error rate on answers. In addition, this enabled us to categorise, to a reasonable degree, any of our open-ended questions.

7.4: The Questionnaire

The questionnaire which was translated into arabic, the native language of the people of Saudi Arabia, contained introductory short statements about its content and purpose. This was done to make the questionnaire easier to complete and help put the respondent in the proper frame of mind to answer the questions.

The survey included 31 closed-ended questions (see appendix A). These types of questions are very popular since they provide a greater uniformity of responses and are more easily coded and processed. The questionnaire also included questions contingent on responses to some of the main questions. The proper use of contingency questions can facilitate the respondent's task in completing the questionnaire in that he does not have to answer questions that are irrelevant to him. An example of this would be question number 7 in the questionnaire, which says:

7. Has someone from the extension office visited you?
(a) Yes () (b) No ()

If your answer is yes, then how many times?
(a) Once a year ()
(b) Twice a year ()
(c) Three times a year ()
(d) More than three times ()

The questionnaire was designed mainly to provide two sorts of information. First, information which describes the nature of the sample, such as background demographic characteristics of the respondents including their ages, marital status, size of the household, education level and length of time associated with farming. Second, information related to the purpose of this study which aims to understand the farmers' views regarding the various policies and programmes initiated by the Government in order to develop the agricultural sector. This type of information will be the main input used in this study to examine our formulated hypotheses.

7.5: The Hypotheses to be tested

In the previous chapter an attempt has been made to evaluate the various agricultural policies and programmes which have been designed to help the Saudi farmers and agri-businessmen to reach an acceptable level of agricultural productivity. It has been discovered that some policies and programmes have contributed more to the process of agricultural development than others. Moreover, for every policy or programme some positive as well as negative effects have been found and pointed out.

Therefore, in this chapter, some of the above findings will be set up as testable hypotheses using the information gathered in our field research survey.

The hypotheses have been classified in accordance with the various agricultural policies and programmes as shown in table (7.1).

TABLE 7.1

THE FORMULATED HYPOTHESES TO BE TESTED

Policy or Programme	The Formulated Hypothesis	Hypothesis number
1) Land Distribution Programme	- It is an effective programme and has affected positively agricultural production.	--- (1)
	- It has a negative effect on the depletable underground water resources.	--- (2)
	- It has not solved the problem of small farm holdings.	--- (3)
2) Extension Policy	- Extension services are inadequate to cope with the recent needs of Saudi farmers.	--- (4)
	- Extension workers have not been effective in channelling the new technology to farmers and solving their problems; therefore, the farmers distrust the extension workers.	--- (5)
3) Agricultural Training Programmes	- The agricultural training programmes in Saudi Arabia are weak and ineffective and do not attract an adequate number of farmers and agri-businessmen.	--- (6)
4) Credit Policy	- The Agricultural Bank (SAAB) represents the major source of credit to the Saudi farmers and agri-businessmen.	--- (7)
	- SAAB is an effective institution, playing an essential role within the agricultural sector.	--- (8)
5) Subsidies Policy	- The Saudi Agricultural sector is highly subsidised.	--- (9)
	- Most subsidies are in the form of input subsidies, covering mainly irrigation facilities and agricultural machinery, rather than production subsidies.	--- (10)

TABLE 7.1 continued

Policy or Programme	The Formulated Hypothesis	Hypothesis number
6) Wheat Price-Support Programme	- Because of the high price-support paid by the Government, many farmers in Saudi Arabia are now growing wheat.	---(11)
	- Most of the existing wheat producers would stop growing wheat if the Government decided to terminate the price-support programme.	---(12)
7) Marketing Policy	- Marketing is the major obstacle facing the majority of Saudi farmers and agri-businessmen.	---(13)
	- Marketing societies are needed urgently and would solve most of the other marketing problems.	---(14)
8) Agricultural Cooperative Policy	- The Agricultural Cooperatives in Saudi Arabia play a minor role in the agricultural sector because of their limited number and their ineffectiveness in attracting an adequate number of farmers and rural people.	---(15)
	- Lack of adequate services and bad management are the two most serious deficiencies of the existing agricultural cooperatives.	---(16)

7.6: The Statistical Results

The collected raw data has been transformed by a method of coding into a standardised quantitative form for computer processing and analysis. This has been made simply by the assignment of numerical codes to represent the survey questions. The statistical package for social science (SPSS) has been used to analyse the coded data. Based on the questionnaire's construction which did not allow us to have an ordering sample, only descriptive statistical techniques such as frequencies, ratio and cross-tabulations, have been used in our study.

Before we come to the main objective, evaluating the various agricultural policies and programmes through testing the above-mentioned formulated hypotheses, it is worthwhile to observe the background profile of the respondents.

7.7: The Background Profile of the Respondents

The survey respondents were asked to provide some background information concerning their ages, marital status and family size, education and length of time associated with farming. The reason for including such questions in this study was to provide a general picture of the situational data which could help in understanding the results of this study.

Therefore, the age distribution of the respondents is given in table 7.2. As the figures show, 264 farmers, 35.8 per cent of the sample, were 50 years of age and over, and 429 farmers, 58.1 per cent, were 40 years of age and over. Only 93 farmers, 12.6 per cent, were less than 30 years of age.

Table 7.3 provides data about the marital status and family size of the respondents. Only 49, 6.6 per cent, were singles, the remainder being married, often with large families.

TABLE 7.2

AGE DISTRIBUTION OF THE RESPONDENTS

Value	Frequency	Per Cent	Cumulative per cent
0	43	5.8	5.8
1	1	0.1	5.9
2	92	12.5	18.4
3	173	23.4	41.8
4	165	22.4	64.2
5	264	35.8	100.0
Total	<u>738</u>	<u>100.0</u>	

Where: 0 = no answer,
1 = less than 20 years,
2 = 20-29 years
3 = 30-39 years,
4 = 40-49 years,
5 = 50 years and over.

TABLE 7.3

MARITAL STATUS AND FAMILY SIZE OF THE RESPONDENTS

Value	Frequency	Per Cent	Cumulative per cent
0	2	0.3	0.3
1	49	6.6	6.9
2	31	4.2	11.1
3	36	4.9	16.0
4	49	6.6	22.6
5	73	9.9	32.5
6	84	11.4	43.9
7	414	56.1	100.0
Total	<u>738</u>	<u>100.0</u>	

Where: 0 = no answer,
1 = single,
2 = married with no children,
3 = married with one child,
4 = married with two children,
5 = married with three children,
6 = married with four children,
7 = married with five or more children.

For instance, 414 respondents, 56.1 per cent of the sample, had five or more children. This high percentage of married farmers and large families was to be expected, since marriage and a stable household are considered necessary and are highly encouraged by Islam.

As to the length of time that the respondents had been associated with farming or the agri-industry, many farmers were new to this activity and were probably encouraged by the recent agricultural policies and programmes, especially those of financial incentives such as credit, subsidies and price-support policies. As illustrated in table 7.4, almost 47 per cent of the respondents had been in farming for less than 10 years, and almost 60 per cent for up to 14 years. On the other hand, 253 respondents, 34.3 per cent of the sample, had been in farming for two decades and more.

Data about the sample respondents level of education are presented in table 7.5. As shown, the majority of farmers, 244 or 33.1 per cent of the sample, are illiterate. Also, 139, 18.8 per cent of the sample, had no formal education although they could read and write. In fact, these high percentages of illiteracy and low levels of education apply only to the heads of households since most children presently attend school. Farmers with a high school or college education accounted for 16.0 per cent and 6.1 per cent respectively of our sample.

7.8: Land Distribution Programme

As we mentioned earlier, this programme has been in effect since 1968, and by the end of 1985 the total distributed land had reached more than 713 thousand hectares. In chapter 6, we

TABLE 7.4

LENGTH OF TIME THE RESPONDENTS HAVE BEEN
ASSOCIATED WITH FARMING

Value	Frequency	Per Cent	Cumulative per cent
0	3	0.4	0.4
1	200	27.1	27.5
2	144	19.5	47.0
3	95	12.9	59.9
4	43	5.8	65.7
5	253	34.3	100.0
Total	738	100.0	

Where: 0 = no answer,
1 = less than 5 years,
2 = 5-9 years
3 = 10-14 years,
4 = 15-19 years,
5 = 20 years and more.

TABLE 7.5

THE EDUCATIONAL LEVELS OF THE RESPONDENTS

Value	Frequency	Per Cent	Cumulative per cent
0	1	0.1	0.1
1	244	33.1	33.2
2	139	18.8	52.0
3	101	13.7	65.7
4	90	12.2	77.9
5	118	16.0	93.9
6	45	6.1	100.0
Total	738	100.0	

Where: 0 = no answer,
1 = can not read nor write,
2 = can read or write but with no schooling,
3 = primary school,
4 = middle school,
5 = high school,
6 = college and above.

attempted to study the association of this programme with the total agricultural output and we found a positive relationship. This empirical finding has been formulated as hypothesis no.1 to be tested by our sample. Therefore, the respondents were asked if they had benefited from such a programme or not.

Of the 724 farmers and agri-businessmen who answered this question, 154, 21.3 per cent, said that they got their farming lands from the Government as grants. This means that more than a fifth of the existing farming lands have been distributed by the government free of charge to the various farmers and agri-businessmen.

This proportion is high and no doubt affected positively the agricultural production in Saudi Arabia. Furthermore, land grants by purpose can be used as another aspect to support our discussion. As shown by table 7.6, although 45 respondents, 29.8 per cent of those who have been granted free land, have requested the land to be used mainly for wheat cultivation, the majority of respondents, 50.3 per cent, said they asked for the land because they did not have land and they were interested in farming. In fact, this is an optimistic phenomenon and reflects the importance of farming activities in the eyes of the Saudi people.

To test hypothesis no. 2, which says "the land distribution programme has a negative effect on the depletable underground water resources", the respondents who have been granted free lands were classified according to their localities. This shows the main areas in which the free lands were distributed. Of the 154 respondents who have been granted free land, 81 and 44 were in the Central and Northern Regions respectively (see appendix B). This means that 81.2 per cent

TABLE 7.6

RESPONDENTS' REASONS FOR REQUESTING FARMING LANDS

Value	Frequency	Percentage
1	45	29.8
2	18	11.9
3	76	50.3
4	12	8.0
Total	<u>151</u>	<u>100.0</u>

Where 1 = To use it mainly for wheat cultivation.
2 = Because the land is close to my place of residence.
3 = Because I do not have land and I am interested in farming.
4 = Other reasons.

of those in our sample who were granted free lands, were concentrated in the Central and Northern Regions in which, as we indicated before, farming depends mainly on underground water aquifers which are not rechargable. On the other hand, only two of our respondents who were granted farming land were from the Southern Region, where farmers depend mainly on rainfall rather than underground water. Therefore, our hypothesis can easily be supported by the findings of our survey.

Concerning the relationship between the land distribution programme and the size of distributed land, we hypothesise that this programme did not solve the problem of small holdings which is the prevalent phenomenon among Saudi farmers. This hypothesis is based on the official data presented in chapter 4, which reveals that the average size of distributed land since the beginning of this programme up to the end of 1985, was 5.9 hectare (59 donums) per individual. To examine this hypothesis using the data of our sample, a cross-tabulation between questions no. 2 and no. 6 of our questionnaire (see appendix A) is made and shown below in table 7.7. It is noticable that the situation is different, the majority of distributed plots being large rather than small. According to the presented figures, only 12.3 per cent of the sample distributed land was under 50 donums and less than a third was under 100 donums. On the other hand, 40 per cent of the respondents granted land had plots of 500 donums and over. Therefore, it seems that the above-mentioned hypothesis is easily rejected because the survey findings indicate that the land distribution programme has solved the problem of small holdings and not the reverse. But this conclusion might not be

TABLE 7.7

HOLDING SIZE DISTRIBUTION OF THE RESPONDENTS WHO GOT THEIR
FARMING LAND AS A GOVERNMENT GRANT

(N = 154)

Value	Frequency	Per Cent	Cumulative per cent
1	8	5.2	5.2
2	3	1.9	7.1
3	8	5.2	12.3
4	24	15.6	27.9
5	27	17.5	45.4
6	24	15.6	61.0
7	26	16.9	77.9
8	34	22.1	100.0
Total	154	100.0	

Where: 1 = 5 but less than 10 donums,
2 = 10 but less than 20 donums,
3 = 20 but less than 50 donums,
4 = 50 but less than 100 donums,
5 = 100 but less than 200 donums,
6 = 200 but less than 500 donums,
7 = 500 but less than 1000 donums,
8 = 1000 donums and over.

true when we consider the fact that the distributed plots were small but, because they were distributed in areas originally owned by the State and in many cases were not adjacent to privately-owned lands, the people who have been granted these lands usually override the surrounding areas to make the farming plots many times bigger than the legitimate granted size. In most cases Government officials do not know about the enlarged plots or choose to take no action unless disputes arise over the plots.

7.9: Extension Policy

When we discussed this policy in the previous chapter we said that it has been weakened and handicapped by serious defects, such as its limited educational efforts, shortage of staff and low budgetary allocations. This has detracted from its role of being an essential way of helping the illiterate and less educated farmers to adopt improved practices in their different farming activities. Therefore, we came to the conclusion that the extension policy in Saudi Arabia was inadequate to cope with the recent needs of farmers. This statement has been formulated as hypothesis no. 4, which is tested using our survey data. The respondents were asked multi-questions regarding the extension policy and its related aspects. Firstly, they were asked if they had been visited by extension workers or not. Except for two respondents who did not answer this question, 337, or only 45.8 per cent of the sample, said that they had been visited by extension workers. Apart from this low rate of extension service, the number of visits per farm is also low. As shown in table 7.8, of those who were visited by extension workers, 126, 37.7 per cent, were

TABLE 7.8

RESPONDENTS' DISTRIBUTION ACCORDING TO EXTENTION VISITS

Value	Frequency	Per Cent	Cumulative per cent
1	126	37.7	37.7
2	84	25.1	62.8
3	41	12.3	75.1
4	83	24.9	100.0
Total	334	100.0	

Where: 1 = once a year, 2 = twice a year,
3 = three times a year, 4 = more than three times.

TABLE 7.9

DISTRIBUTION OF RESPONDENTS' REASONS FOR NOT BEING VISITED BY
THE EXTENSION WORKERS.

Value	Frequency	Per Cent	Cumulative per cent
1	36	9.1	9.1
2	209	53.0	62.1
3	57	15.5	77.6
4	92	23.4	100.0
Total	394	100.0	

Where: 1 = There is no Extension Office in our area.
2 = The Extension workers come only by request,
and I did not ask them to do so.
3 = There are not enough Extension workers to
cover all the area's farms.
4 = I do not know why nobody came to visit me.

visited once a year and 84, 25.1 per cent, twice a year. Secondly, the major reasons given by the majority of the respondents (i.e. 54.2 per cent) for not being visited by extension workers are classified in table 7.9. As shown by the figures, the main reason given by the respondents was that the extension workers visit only by request and they did not make this request. This was the reason given by 53 per cent of the respondents who had not been visited. However it would be wrong to give the impression that those farmers could have been visited by the extension workers if they had requested them to do so, for there is a severe shortage of extension personnel. Thirdly, the plant demonstration service is worse and only few of our respondents said that they had seen plant demonstrations; 244, only 33.5 per cent, of the sample. Fourthly, the distribution of extension services is another important aspect which is highlighted by our survey data. Unfortunately, the extension services are usually concentrated more in areas which have large-scale irrigation projects, such as Al-Hasa and Wadi-Jizan. Table 7.10 shows that 79.6 per cent and 53.1 per cent respectively of the respondents from the Al-Hasa area had been visited by extension workers and had seen plant demonstrations. For the respondents from the Jizan area, those percentages were 64.7 and 61.8 respectively. The major reason for this concentration is because these areas have well established and organised extension units as a part of the planned projects.

If we give due consideration to the above survey findings concerning the extension policy, then it is easy to accept the above formulated hypothesis which indicated the inadequacy of the extension policy in Saudi Arabia.

The second hypothesis to be tested in relation to the

TABLE 7.10

THE DISTRIBUTION OF RESPONDENTS ACCORDING TO EXTENSION VISITS
AND PLANT DEMONSTRATIONS, BY LOCALITY

Agricultural Area	Respondents				
	Total number I	Visited by Extension Workers II	Have seen plant demonstrations III	II to I	III to I
Hail	55	15	20	27.3	36.4
Qaseem	126	62	41	49.2	32.5
Riyadh	113	53	37	46.9	32.7
Sudair	124	67	46	54.0	37.1
Al-Kharj	56	17	12	30.4	21.4
Al-Hasa	49	39	26	79.6	53.1
Taif	32	11	2	34.4	6.3
Medina	41	5	3	12.2	7.3
Al-Baha	37	13	8	35.1	21.6
Jizan	68	44	42	64.7	61.8
Abha	30	6	6	20.0	20.0
Total	<u>738</u>	<u>337</u>	<u>244</u>	<u>45.7</u>	<u>33.1</u>

extension policy is hypothesis no. 5, which says ... "The extension workers have not been effective in channelling the new technology to farmers and solving their problems; therefore, the farmers distrust the extension workers."

To examine this hypothesis, our respondents were asked if they are using the new inputs of farming, such as chemical fertilisers, improved seeds and insecticides. Therefore, those who gave positive answers were asked to select, from five reasons provided, the major reason why they use these new inputs. Although the majority of respondents, almost 87 per cent, said they use the new inputs in their farming, but only 59 of them, 9.3 per cent, said that it was because of the recommendations of the extension agents (table 7.11). On the other hand, the majority gave one of two reasons: because they increase crop yield and because they give better crop quality.

The respondents were also asked to what extent they followed the directions of the extension workers. As shown in table 7.12, 49.4 per cent of those who had been visited by extension agents said they follow their directions all the time. A similar proportion said they sometimes follow their directions and 1.6 per cent said not all all. Of course, the percentage of those who follow the directions of the extension agents all the time is low and reflects the ineffectiveness of those agents in their relation with the farmers. This ineffectiveness might be attributed mainly to the extension agents' lack of experience and their theoretical backgrounds. In addition, because some of the extension agents are not native, there has been a lack of communication with the farmers. In any case, the information provided by our survey respondents seems to support the above hypothesis.

TABLE 7.11

THE RESPONDENTS' REASONS FOR USING THE NEW FARMING INPUTS

Value	Frequency	Percentage	Cumulative percentage
1	258	40.5	40.5
2	18	2.8	43.3
3	59	9.3	52.6
4	292	45.8	98.4
5	10	1.6	100.0
Total	<u>637</u>	<u>100.0</u>	

Where: 1 = Increase in crop yield, 2 = provision of subsidies
 3 = Recommended by the extension agents,
 4 = Better crop quality, 5 = water problems.

TABLE 7.12

THE DEGREE TO WHICH THE RESPONDENTS FOLLOW THE DIRECTIONS OF THE EXTENSION WORKERS

Value	Frequency	Percentage	Cumulative percentage
1	162	49.4	49.4
2	160	48.8	98.2
3	6	1.8	100.0
Total	<u>328</u>	<u>100.0</u>	

Where: 1 = All the time, 2 = Sometimes, 3 = Not at all

7.10: The Agricultural Training Programmes

As stated previously, these programmes have been designed and supervised by the Department of Training in the Ministry of Agriculture and Water (MOAW), and executed through the training centres in Riyadh, Hofouf, Onaiza and Jizan. The clientele of these programmes have been the employees of MOAW, agricultural college students, and farmers and agri-businessmen. From the statistics released about those who have completed the training courses, we found that the smallest portion was from the farmers and agri-businessmen, in spite of their monthly allowance of SR 700. Furthermore, the following major shortcomings of the training programmes have been found:

- 1- The number of training centres is very limited, and they are in cities far away from most of the farmers' homes.
- 2- The financial incentive provided was not at all encouraging.
- 3- The programmes have been designed to suit the situational and educational levels of the MOAW employees rather than the less educated farmers.
- 4- The programmes were usually poorly publicised, so that most farmers did not know about them.

Therefore, we said that the agricultural training programmes were very weak and were not effective in attracting the Saudi farmers and agri-businessmen. This conclusion was set as hypothesis no. 6 to be examined by our study. The survey respondents were asked whether they have attended training programmes or not. Only 64 respondents, 8.8 per cent of the whole sample, gave a positive answer, while the great majority said that they did not attend such programmes. An interesting

finding was that when those respondents who had attended training programmes were asked to evaluate them, the majority spoke well of the programmes. As illustrated by table 7.13, 35.5 per cent of the respondents said that the programmes were very good and 33.9 per cent said they were good. Furthermore, except for two respondents who said that the programmes were not suitable for them, nobody said the programmes were bad. Hence, if this is the case, then why the great majority of the farmers did not attend such training programmes? Before we present our respondents' answers to this question, it should be pointed out that most of the farmers in our sample (60 per cent) who attended some kind of training programmes, were well educated and had at least high school diploma. This reflects the fact that such training programmes were designed to suit the situational and educational levels of the MOAW employees and the well educated rather than the less educated farmers. Now, if we investigate the main reasons which prevented the respondents from attending the training programmes, table 7.14 provides the result. As shown, 436, 68.1 per cent, of the sample respondents said that the main reason was because they did not know about these programmes, while 137, 21.4 per cent, told such programmes are usually held in far away locations. Also, 2.7 per cent said that they did not attend because of the high living costs in the places in which the training programmes are held in, while 7.8 per cent said that they had wanted to attend these programmes but had not been able to because of the limited number of places available.

In general, the above reasons represent the major defects which caused the ineffectiveness of the agricultural training

TABLE 7.13

THE RESPONDENTS' EVALUATION OF THE TRAINING PROGRAMMES

Value	Frequency	Per Cent	Cumulative per cent
1	22	35.5	35.5
2	21	33.9	69.4
3	17	27.4	96.8
4	0	0.0	96.8
5	2	3.2	100.0
Total	<u>62</u>	<u>100.0</u>	

Where: 1 = very good, 2 = good, 3 = not bad
4 = not good, 5 = not suitable.

TABLE 7.14

THE RESPONDENTS' REASONS FOR NOT ATTENDING TRAINING PROGRAMMES

Value	Frequency	Per Cent	Cumulative pe cent
1	436	68.1	68.1
2	137	21.4	89.5
3	17	2.7	92.2
4	50	7.8	100.0
Total	<u>640</u>	<u>100.0</u>	

Where: 1 = I did not know about these programmes.
2 = They were too far from my place of residence.
3 = They were costly and I could not bear the cost.
4 = I wished to attend, but was not able to because
of the limited number of places.

programmes as a means of upgrading the low level of skills of the Saudi farmers and agri-businessmen. This concluding statement is very consistent with the above hypothesis which is now supported by our study.

7.11: The Credit Policy

Based on the findings of the previous chapter concerning the credit policy in Saudi Arabia, two hypotheses could be formulated:

..."...The Agricultural Bank (SAAB) represents the main source of credit to Saudi the farmers and agri-businessmen."...(No. 7)
..."...SAAB is an effective institution, playing an essential role within the agricultural sector."...(No. 8)

To test hypothesis no. 7, the survey respondents were asked to state, from the alternatives provided, their main source of credit, which included friends and relatives, village money lenders, commercial banks and the agricultural bank (SAAB). As shown by table 7.15, of the 734 respondents who answered this question 667, almost 91 per cent, said that SAAB was their main source of credit. Next came friends and relatives, although mentioned by only 5.4 per cent of the respondents. On the other hand, loans from village money lenders (merchants) and commercial banks were used by only 2.6 and 1.1 per cent of the sample respectively. Indeed, the low number of respondents who dealt with money lenders and commercial banks as their source of credit is not surprising when we consider that people in Saudi Arabia, as Muslims, are prohibited by the Islamic law (Sharia) from dealing with interest and that these two sources charge interest as part of their money transactions.

TABLE 7.15

THE RESPONDENTS' MAIN CREDIT SOURCES IN SAUDI ARABIA

Value	Frequency	Per Cent	Cumulative per cent
1	40	5.4	5.4
2	19	2.6	8.0
3	8	1.1	9.1
4	667	90.9	100.0
Total	<u>734</u>	<u>100.0</u>	

Where: 1= Friends and relatives, 2= Village money lenders,
3= Commercial banks, 4= Agricultural Bank.

TABLE 7.16

THE RESPONDENTS' REASONS FOR DEALING WITH THE AGRICULTURAL
BANK (SAAB) ACCORDING TO THEIR IMPORTANCE (N = 667)

Value	Frequency	Percentage
1	550	82.5
2	425	63.7
3	210	31.5
4	146	21.9

Where: 1 = Does not charge interest on the provided loans.
2 = Easy repayments.
3 = Easy procedures.
4 = It provides me with all money that I need.

The respondents who said that they were dealing with SAAB were asked to state the main reasons for doing so. From four reasons given, the respondents were asked to select more than one reason if they felt it appropriate. This allowed us to list the reasons according to their importance. Table 7.16 (above) which represents the final result, shows that the interest-free transaction was the major reason for dealing with SAAB. This reason was given by 82.5 per cent of the respondents (N = 667). Easy repayment of the loans provided by SAAB came second, selected by 63.7 per cent of the respondents. Easy procedures, and adequate provision of all the required money came third and fourth in importance as reasons for dealing with SAAB. Whatever the reason, it is obvious that the great majority of Saudi agricultural producers deal with SAAB as their main source of credit. This conclusion leads smoothly to support the above formulated hypothesis.

On the other hand, we tried to explore the main reasons for those who did not deal with SAAB (N = 67). Similarly, they were asked to select more than one reason, when appropriate, from the six provided. As shown in table 7.17, the two most important reasons were; that they could not satisfy the SAAB's conditions; and, they felt that SAAB's procedures were complicated. These two reasons were given by 38.8 per cent and 28.4 per cent respectively. In fact, most of those who said that they could not get loans from SAAB because of its complicated procedures were those who could not meet SAAB's standard conditions. Concerning the conditions, I asked some of the SAAB's officials about the major one, which most of those who did not deal with SAAB could not meet, and I was informed that land ownership was the major requirement. This particular

TABLE 7.17

THE RESPONDENTS' REASONS FOR NOT DEALING WITH THE AGRICULTURAL
BANK (SAAB) ACCORDING TO THEIR IMPORTANCE (N = 67)

Value	Frequency	Percentage
1	26	38.8
2	19	28.4
3	8	11.9
4	6	9.0
5	5	7.5
6	4	6.0

Where: 1 = I could not meet its required conditions.
2 = Its procedures are complicated.
3 = Far away from my place of residence.
4 = I require money for consumption uses, which
the bank does not deal with.
5 = It does not provide me with all the money that
I need.
6 = I do not know if there is an agricultural bank.

requirement is necessary to safeguard both the SAAB and its beneficiaries. The other reasons and their weights are shown in the same table.

As far as examining the second hypothesis (no.8) is concerned the above information provided by the respondents could be used as supporting arguments in addition to the respondents' data on question no. 17 in our questionnaire. The respondents were asked about the importance of the Agricultural Bank as a major incentive in influencing them to stay in farming. Except for nine respondents who did not answer the question, 631, 86.6 per cent, emphasised the essential role of the Agricultural Bank in keeping them as farmers and agri-businessmen.

Availability of adequate credit is very important especially in countries in which farmers do not have the ability to finance their various investment opportunities. In this case, credit plays an essential role in moving the agricultural sector from its traditional phase to a more modern one. In this respect, SAAB represents the main institution in Saudi Arabia providing credit to meet the various agricultural investments. In fact, a great part of the existing agricultural expansion in Saudi Arabia can be attributed to the availability of this credit.

7.12: The Subsidies Policy

Concerning this policy two hypotheses are formulated based on the empirical descriptive information provided in chapter 6; "...The agricultural sector in Saudi Arabia is highly subsidised."... (No. 9)

"...Most of the provided subsidies are in the form of input subsidies covering mainly the irrigation facilities, agricultu-

ral machinery and animal feed, rather than production subsidies."... (No. 10)

To test the first hypothesis, questionnaire item no. 19 was utilised. This question asked the respondents if they had received some form of subsidy or not. The respondents' replies indicated that the majority of them (86.7 per cent) had received some form of subsidy; only 13.3 per cent indicated that they had not. In fact, the actual number of those who have received subsidies is more than the above percentage because for some inputs, such as fertilisers and animal feed, subsidies are paid directly to the importers in order to sell them at low prices. In such a situation, some farmers might not feel that they are granted a subsidy when they buy such inputs, though it is implied in the retail price. Generally, the large number of farmers and agri-businessmen who have received some form of subsidy provided by the Government reflects the fact mentioned by the above hypothesis, which says that the agricultural sector in Saudi Arabia is highly subsidised.

To determine the structure of subsidies received by our respondents, a question on this subject was applied in the questionnaire formula. Table 7.18 presents the distribution of subsidies by purpose and according to their importance. The data derived from this table shows that most of the subsidies were in the form of input subsidies rather than output subsidies. Irrigation facilities - pumps and engines - and agricultural machinery were the major inputs utilised by the farmers and, through these two inputs, 87.4 per cent and 72.3 per cent respectively of the survey respondents said that they had received subsidies. Only 15.6 per cent and 3.3 per cent

TABLE 7.18

THE RESPONDENTS' DISTRIBUTION OF SUBSIDIES BY PURPOSE (N = 635)

Purpose	Frequency	Percentage
(1) <u>Input subsidy</u> ;		
Pumps and engines	555	87.4
Agricultural machinery	459	72.3
Chemical fertilisers	99	15.6
Improved seeds	30	4.7
Animal feed	21	3.3
Industrial equipment for poultry and dairy farms	18	2.8
Cows Air-Transportation	4	0.6
(2) <u>Output subsidy</u> ;		
Dates	192	30.2
Grain crops	89	14.0

respectively said that they had received subsidies for chemical fertilisers and animal feed. In fact this last low percentage does not contradict the information provided in the previous chapter, in which we said that the animal feed came in second place after engines and pumps in terms of the amount of subsidy paid by the Government, but because this item is used mainly by the poultry and dairy projects and in the animal rearing of the bedouins, few of whom we contacted in our survey. In addition, only 4.7 per cent declared that they had received subsidies through buying improved seeds, because some seeds are distributed free of charge by MOAW.

Concerning the output subsidy, from the data presented in the preceding table it is clear that this subsidy was biased toward the production of dates. This is supported by 30.2 per cent of the respondents, against 14.0 per cent who said that they received subsidies on their production of grain crops such as sorghum, barley, maize and millet. These four grain crops have been planted by 26.0 per cent, 22.0 per cent, 17.5 per cent and 12.2 per cent respectively of our respondents but, because of the low rates of subsidies paid on the output of these grains, few farmers ask for these subsidies from the main agency, the Ministry of Agriculture and Water.

As some respondents claimed that they did not receive any form of subsidy, an investigation was made to discover the main reasons for this. Table 7.19 presents the results, and a striking fact to emerge is that though the majority of respondents (43.4 per cent) said that they knew about these subsidies, they did not apply for them. To study the reasons for this phenomenon, a cross-tabulation between items no. 14 and no. 20 in the questionnaire (see appendix A) was constructed

TABLE 7.19

THE RESPONDENTS' REASONS FOR NOT GETTING SUBSIDIES (N = 99)

Value	Frequency	Per Cent	Cumulative frequency
1	43	43.4	43.4
2	30	30.3	73.7
3	15	15.2	88.9
4	11	11.1	100.0
Total	<u>99</u>	<u>100.0</u>	

Where: 1 = I did not apply for them
2 = I could not fulfill the required conditions
3 = I applied but I could not get them
4 = I did not know that there were any subsidies available.

Consequently, it was found that 57 per cent of those who did not receive subsidies because they did not apply for them were dealing with the Agricultural Bank (SAAB) as their main source of credit. But as we mentioned before, almost all those dealing with SAAB get subsidies because the credit is in kind rather than in cash and the inputs financed by the credit are subsidised. Some of the farmers, especially those who are illiterate, may not recognise the subsidies as such because they do not receive them in cash. Another striking result shown by the figures was that 11.1 per cent said that they had no idea about the subsidies. But, following the same procedure as above, we found that 64 per cent were dealing with SAAB for credit. Hence, though some farmers said that the subsidies were unknown to them, in reality some have received these subsidies.

From the foregoing analysis it appears that the available subsidies in Saudi Arabia are not accompanied by adequate publicity programmes. This would also explain the low level of extension services linked with the credit provided by SSAB.

Not fulfilling the required conditions was mentioned by 30.3 per cent of the respondents as one of the major reasons that prevented them being granted the extended subsidies. In fact, the conditions are the same as those required to be eligible for SAAB's input credit.

7.13: The Wheat Price-support Programme

This programme was started in 1978, with the aim of motivating the Saudi farmers to grow wheat in order to reduce the volume of its imports and to satisfy the increasing local demand for this basic food item. Because of the high purchase price set by the Government, apart from the existing farmers

who have devoted large portions of their land to growing this product, many other citizens have entered the profitable business of wheat growing. As a result, wheat production has achieved a growth rate unparalleled elsewhere. Therefore, in our field research we have tried to measure the size of the farmers' response to this programme by testing the following formulated hypothesis:

..."Attributed to the high price-support programme, many farmers are now growing wheat."... No. 11

In order to test this hypothesis, our respondents were asked if they were growing wheat and if so what are their main reasons for doing so. The questionnaire sample showed that 469, 64 per cent, said that they are growing wheat. This percentage would be larger if we exclude the farmers from the southern region (especially in Jizan) who do not grow wheat due to the unsuitability of the environment. On the other hand, Table 7.20 provides a clear picture of the main reasons which encouraged the Saudi farmers to grow wheat. The majority of respondents (63.3 per cent) indicated that the price-support programme was the major reason why they grew wheat. Suitability of the soil was given by 21.0 per cent as one of the main reasons why they grew wheat. However, good local market demand and availability of sufficient water were given by only 8.8 and 6.9 per cent respectively of the respondents. In general, if we consider the high percentage of respondents who said that they grow wheat because of the encouraging purchase price paid by the Government, represented by the Grain Silos and Flour Mill Organisation (GSFMO), and also consider the fact that the local market demand (without Government intervention) is attracting

TABLE 7.20

THE RESPONDENTS' REASONS FOR GROWING WHEAT

Value	Frequency	Per Cent
1	41	8.8
2	98	21.0
3	32	6.9
4	295	63.3
Total	<u>466</u>	<u>100.0</u>

Where: 1 = good market demand
 2 = suitability of soil to grow this product
 3 = availability of sufficient water
 4 = because of the price-support programme

TABLE 7.21

THE DISTRIBUTION OF RESPONDENTS' POSITIONS IF THE GOVERNMENT DECIDED TO TERMINATE THE WHEAT PRICE-SUPPORT PROGRAMME

Value	Frequency	Per Cent	Cumulative per cent
1	83	18.3	18.3
2	132	29.1	47.4
3	238	52.6	100.0
Total	<u>453</u>	<u>100.0</u>	

Where: 1 = The decision would not affect me and I would continue to grow wheat.
 2 = I would reduce my production-level of wheat.
 3 = I would stop growing wheat and I would grow other crops instead.

only a small portion of wheat output, then the inevitable conclusion is that the wheat price-support programme has succeeded in attracting many farmers to grow wheat and to achieve a satisfactory level of production. Therefore, based on this conclusion, the above hypothesis (No. 11) has been accepted. This leads us to set another hypothesis which might be shaped as:

..."Most of the existing wheat farmers would stop growing wheat if the Government decided to terminate the price-support programme." ... No. 12

This hypothesis was examined by utilising questionnaire item no. 24, in which the wheat-growing respondents were asked what they would do if the Government stopped the price-support programme. Table 7.21 above presents the distribution of respondents' replies and it is clear that the majority, 52.6 per cent, would stop growing wheat, while 29.1 per cent said that though they would not stop growing wheat completely they would reduce their level of production. Only 83 or 18.3 per cent indicated that a Government decision to terminate the existing price-support programme would not affect them and they would continue to grow wheat. In fact those few farmers grow local wheat varieties for their own consumption and sell the rest in the local market.

From the foregoing analysis, it is evident that the present price-support programme for wheat is very effective in bringing about a high level of production, and that any attempt to terminate this programme on a sudden would greatly reduce the number of producers and consequently the level of production.

7.14: The Agricultural Marketing Policy

When in the previous chapters, we tried to assess the existing agricultural marketing policy in Saudi Arabia, we arrived at the following conclusions; First, marketing was a major problem for the majority of farmers and agri-businessmen. Second, marketing societies are urgently required and would solve most of the other marketing problems. These statements are used here as hypotheses (No. 13 and No. 14) to be tested by utilising the information provided by the questionnaire replies. In doing so, the sample respondents were asked first whether they experienced marketing problems or not. This was an important question because the answers provided a starting point from which we determined the extent of the effect of such problems. Of course, if the effect is considerable, then this would require more urgent and intensive efforts to overcome these problems. According to the questionnaire, 80 per cent of the respondents confirmed that they were facing marketing problems, while the other 20 per cent, who were mostly small farmers, said that such problems did not yet affect them. As the first category was the most important to us, the respondents were asked to indicate which of the listed five problems, based on the investigations emphasised in chapter six, affected them most. Table 7.22 presents the classification of these problems according to their importance. As clearly shown, the absence of marketing societies is one of the major marketing problems. This is recognised as the main problem by 488, 84 per cent, of those who indicated that they had marketing problems. The lack of adequate storage facilities was stated to be the second largest problem by 62.3 per cent of the respondents. Long distances to the markets and high transportation

TABLE 7.22

MARKETING PROBLEMS ACCORDING TO THEIR IMPORTANCE AS SEEN BY
THE SAMPLE RESPONDENTS (N = 581)

Value	Frequency	Per Cent
1	488	84.0
2	362	62.3
3	198	34.1
4	196	33.7
5	166	28.6

Where: 1 = The absence of marketing societies,
2 = The absence of adequate storage facilities,
3 = Long distances to the markets,
4 = High cost of transportation,
5 = Hard roads.

costs were considered to be problems by 34.1 per cent and 33.7 per cent respectively of the sample respondents. On the other hand, lack of hard roads was stated to be a problem by only 28.6 per cent of the respondents. It emerged from the above analysis that marketing problems in Saudi Arabia are very serious, and the lack of specialised marketing societies and of adequate facilities were given by most of the respondents, especially those who produce on a large scale, as the two major obstacles facing them. Therefore, a quick and adequate solution to these two problems is urgently required, especially at a time when agricultural production is expanding at all levels. Attempts to solve these problems should be given top priority in any efforts to develop the agricultural sector, and the private and public sectors should cooperate to bring about a tangible solution.

7.15: Agricultural Cooperatives Policy

Our aim in this part is to look at another way of evaluating the existing agricultural cooperatives in Saudi Arabia. Our sample responses will be used to examine the following two hypotheses which have been based on the investigations made in the previous chapter; "The agricultural cooperatives in Saudi Arabia play a minor role within the agricultural sector due to their limited number and their ineffectiveness in attracting an adequate number of farmers and rural people." ... (No. 15)

..... "Lack of adequate services and bad management are the two most serious deficiencies of the existing agricultural cooperatives." ... (No. 16)

In order to test these hypotheses, questionnaire items no.

25 and no. 26 were utilised. First, the respondents were asked whether or not they are members of agricultural cooperatives. Accordingly, 65, or 9.0 per cent, of those who answered this question indicated that they are members, and the great majority (91.0 per cent) indicated that they are not. This response was expected since there are only a small number of agricultural cooperatives covering only few areas and provide very limited facilities. However, we tried to understand the motives of those few respondents who are members. As shown in Table 7.23, 30 respondents, 46.9 per cent, declared that the cooperatives provided various benefits, and this was the main reason why they became members. In fact, most of these farmers have capital shares in the cooperatives, and therefore benefit financially, or have farm small plots, therefore, are satisfied with the limited services provided by these cooperatives. On the other hand, 34, 53.1 per cent, mentioned other reasons for being members of the agricultural cooperatives, their main reason being that a cooperative existed in their area.

To complete our discussion, we have looked at the main reasons why the majority of our respondents were not members of existing agricultural cooperatives. As Table 7.24 shows, out of 637 who answered to the question, 377 said that they were not members because there were no cooperatives in their area, while 168 said that though there were cooperatives in their area they had not become members because they felt that the services provided were not of much benefit. Only 44 respondents mentioned social reasons for not joining and 12 indicated that they had previously a bad experience with Cooperatives.

TABLE 7.23

THE RESPONDENTS' REASONS FOR BEING MEMBERS OF
AGRICULTURAL COOPERATIVES

VALUE	FREQUENCY	PER CENT	CUMULATIVE PER CENT
1	23	35.9	35.9
2	30	46.9	82.8
3	7	10.9	93.7
4	4	6.3	100.0
TOTAL	<u>64</u>	<u>100.0</u>	

Where: 1 = Because there is an Agricultural Cooperative in
our area,
2 = Because of the various benefits provided for the
members,
3 = Social reasons, 4 = Educations reasons.

TABLE 7.24

THE RESPONDENTS' REASONS FOR NOT BEING MEMBERS OF
AGRICULTURAL COOPERATIVES

Value	Frequency	Per Cent	Cumulative per cent
1	377	59.2	59.2
2	168	26.4	85.6
3	12	1.9	87.5
4	44	6.9	94.4
5	36	5.6	100.0
Total	<u>637</u>	<u>100.0</u>	

Where: 1 = There is no agricultural cooperative in my area.
2 = There is an agricultural cooperative in my area
but it does not provide good services.
3 = I have had a bad experience with a cooperative
in the past.
4 = Social reasons. 5 = Because of bad management.

Bad management, was given by only 36, 5.6 per cent, of the respondents as the reason for their not joining a cooperative. This being completely opposite to what has been suggested in the hypothesis.

In general, and from the foregoing analyses, one gets the impression of support for the first hypothesis (No. 15), and the first part of the second hypothesis (No. 16), because it appears obvious that bad management is not considered by the respondents to be a serious deficiency of the existing agricultural cooperatives.

CHAPTER EIGHT

8: CONCLUSIONS AND RECOMMENDATIONS

8.1: Conclusions

Recognising the dangers of relying on one source of income, exported oil, the government of Saudi Arabia has been intensively attempting to utilise the huge oil revenues to develop all sectors of the economy. In this process, the complementarity between sectors has been realised, hence a "balanced growth" policy of development has been emphasised. Delineated and active planning in the form of Five-Year development plans have been implemented since 1970. In these plans serious efforts have been made to develop the agricultural sector, considering the various constraints involved, and the importance of this sector as a major source of livelihood for a high percentage of the population. Such efforts have been officially organised through different instruments of policies and programmes with the aim of achieving definite objectives such as increasing the level of productivity to keep pace with the increasing demand, to lessen the heavy dependence on food imports, to improve the standards of living of the Saudi people in general, and to achieve sound distribution and utilisation of resources for this and future generations. As a direct result of these policies and programmes, agricultural output has expanded over time, and during the 1970's the annual growth rate reached 5.3 per cent, compared to a rate of 3.18 per cent during the 1960's. Self-sufficiency in some agricultural products such as wheat, dates, milk and table eggs has been achieved. For

other food products, output has also increased but at lower rates, not matching the rates of growth in local demand. Consequently, the resultant supply-demand gap which increased over time, has been filled by food imports.

In this study, attempts have been made to review and assess the existing agricultural policies and programmes in Saudi Arabia. The major objective has been to provide some details of the contents and effects of these policies and programmes and their contribution to the process of agricultural development. In our analysis, historical, descriptive and analytical approaches have been utilised.

Based on the findings of this study, we now point out the major conclusions regarding each policy and programme.

Water Policy

Availability of adequate water is one of the most important constraints facing farming in Saudi Arabia. As mentioned in Chapter Four, the four sources of water are rainfall, underground water, desalinated seawater, and chemically treated sewage water. To ensure an adequate supply from these sources for the different consumption uses, massive oil-money investments have been made by the various official agents in charge of water development. Extensive hydrological surveys and studies to discover new sources of underground water have been undertaken and a great number of concrete and earthfill dams constructed. Moreover, twenty-six seawater desalination plants, producing nearly 500 million cubic meter (c.m) per year, have been completed in addition to which more than 100 million c.m. of sewage water after chemical reclamation is now available for farming purposes. But unfortunately, such greath

efforts have not been matched with suitable appreciation from the demand side. Saudi farmers and urban dwellers are still using water excessively and inefficiently. Traditional methods of irrigation, such as flooding, are still widely used by farmers, causing a waste of this valuable resource and increasing the salinity of soils and water. Efficient water systems such as pivot sprinklers and drip irrigation methods are used but only by few producers, mainly those with capital-intensive businesses such as wheat farms and vegetable greenhouses. Efforts have been made to encourage wider use of these modern irrigation systems by providing interest-free loans, but because such systems are expensive and require special skills to operate, their use is still limited.

However the water problem in Saudi Arabia has been accompanied by inadequate management and conservation measures. Rules and regulations concerning the use of water are not strictly applied. In urban areas, a progressive system of tariffs has been introduced to restrict the over-use of water, but this policy has not been effective because of the low levels of charges which are heavily subsidised. Lastly, public awareness of the importance of water and its conservation, as a valuable source of life, still leaves a lot to be desired.

Land Distribution Policy

The Government of Saudi Arabia, recognising the importance of increasing food production through horizontal expansion, started an Arable Land Distribution scheme in 1968. Up to 1985, a total of 713,965 hectares had been distributed to interested individuals, companies and specialised projects. Although this programme commenced in 1968, most of the plots

have been distributed during the last few years. This is explained by the recent establishment of private agricultural companies and the increasing demand from the public for land to grow wheat which has now become a very profitable business due to the high support-price programme sponsored by the government.

Concerning the geographical distribution of free plots, most are in the central region because of the existence of vast cultivatable state lands; but farming in this region depends mainly on non-renewable underground water sources. Therefore, one of the problems associated with this scheme is the adverse effects on underground water supplies.

In general, the Land Distribution Scheme is considered to be an effective policy which has contributed greatly to the recent growth of agricultural production in Saudi Arabia. Empirically, we found a positive association between this scheme and agricultural output which indicates that for every one per cent increase in the distributed land, there is an increase of nearly 0.4 per cent in the total agricultural GDP.

Research Policy

Various agricultural research is undertaken in Saudi Arabia through the fifteen research centres and experimental stations run by the Ministry of Agriculture and Water. Of the existing centres, two are considered regional in that their services also extend to the Gulf States. Most research is directed toward the problems in the plant sector and in the form of adaptive research in which foreign-generated technology is used under local conditions. The development of specific varieties of wheat, rice, barley and potatoes is an

example. In addition, minor research is also carried out by the existing three agricultural colleges in Saudi Arabia.

To strengthen research activities and to benefit from the experiences of other countries, cooperation with some foreign institutions and universities have been established.

On the contrary, there are some problems associated with the existing agricultural research policy which affect its level of efficiency. The major ones can be summarised as: shortage of local research skills, low level of allocated funds, and poor performance of the extension services in diagnosing and refering the farmers' problems to the research centres and conveying and communicating the results to the farmers. While the first problem has been tackled, especially in the short-term, by attracting some foreign experts to work in the various agricultural research centres, the other two problems remain unsolved.

Extension Policy

Based on our discussion in the previous chapters concerning this policy, we come to the following conclusions:

1. Extension services are provided through the scattered directorates and attached offices of the Ministry of Agriculture and Water, and are mostly in the form of technical assistance such as distributing fertiliser samples and tree seedlings to cultivators, pest and weeds spraying, plant demonstrations and veterinary services.
2. The number of extension workers falls well short of the farmers' needs, and as a result, the extension services are limited to only few farmers. In our field research survey, only 45.8 per cent said that they had been

visited by extension workers.

3. The educational competence of the extension workers is low, attributed mainly to inadequate preparation and training, particularly in terms of communication skills and other related areas. Most of the extension workers are taught the theoretical background in natural sciences and technical subject rather than gaining practical experience.
4. Due to the shortage of extension workers and the low level of competency, the role of extension services in the diffusion process of the new technology produced by research is limited.
5. Plant demonstration services, which are an effective way of teaching farmers the new technology, especially in Saudi Arabia where the majority of farmers are illiterate or less well educated, are not sufficient. Only 33.5 per cent of our survey respondents said that they had seen plant demonstrations.
6. There is relatively little appreciation of the role of extension in the process of agricultural development. This is most evident in the low level of budgetary allocations of public funds. For instance, in 1985 the money allocated for all extension programmes was SR 53.3 million, representing only 0.56 per cent of the total agricultural GDP, or only 0.02 per cent of the total national income.
7. Most of the emphasis in the services provided has been directed to the plant sector at the expense of other important areas such as soil, irrigation, marketing, machinery service and the animal sector.

8. The extension policy in Saudi Arabia also lacks clearly defined objectives and suffers from poor programme planning and communication methods.

Agricultural Education and Training Policies

1. The general education system, including adult education, which has now reached most of the rural areas, neglects agriculture at all levels. As a result, this would divert the interest of the new generation away from farming and its related activities.
2. Agricultural education is now mostly supplied through the three agricultural colleges at Riyadh, Hofuf and Qaseem. Unfortunately, the curricula in these colleges emphasise theoretical sciences rather than practical science.
3. Technical education is very limited in Saudi Arabia, being provided by the only Secondary Agricultural Technical School, at Buraidah in the Qaseem Region. Due to poor planning and low incentives, the school does not attract an adequate number of students.
4. As with the agricultural education policy, the training policy has proved ineffective in the recent process of agricultural development due to poor planning, paucity of funds, and weak methodology.
5. The training programmes, which are organised and sponsored by the Training Department of the Ministry of Agriculture and Water (MOAW), are oriented mainly to train the employees of MOAW rather than the less educated Saudi farmers and agri-businessmen.
6. The number of farmers who have benefited from the available training programmes is very limited, due to the

following reasons:

- a) The publicity concerning the places and times of these programmes has been very weak. From our survey respondents, 68.1 per cent confirmed that they did not know about these training programmes.
- b) The monthly allowance for those attending training programmes (SR 700) is not adequate.
- c) The training programmes are usually held in urban areas far away from the farmers' locality.
- d) The training programmes have been designed to suit the situational and educational levels of the MOAW employees rather than the less educated farmers.

Credit Policy

1. Unlike in many other developing countries, institutional agricultural credit is widely available in Saudi Arabia to farmers and agri-businessmen through the Agricultural Bank (SAAB) which was established in 1964 to encourage investment in the agricultural sector. According to our survey results, 667 respondents or 91 per cent of the total sample said that they are dealing with SAAB as their main source of credit.
2. Interest-free loans and easy payments have been classified by our survey respondents as the two main factors for their intensive dealings with SAAB.
3. The credit policy can be identified as one of the most important policies affecting agricultural development in Saudi Arabia. In an attempt to measure quantitatively the size of contribution of this policy, the value of agricultural production has been regressed against the

total agricultural credit extended by SAAB for the period 1965 to 1985. As shown before, the results have revealed a positive relationship. On the other hand, 86.6 per cent of our survey respondents emphasised the role of SAAB as a major incentive for them to continue their various farming activities.

4. Contrary to the above positive measures, there are some shortcomings associated with the present credit policy in Saudi Arabia. The most serious problem has been the low rate of credit recovery. Over the twenty-one year period of SAAB's operation, only 64 per cent of the total due loan instalments have been collected, 36 per cent being in default. In addition, there is the problem of weak links with the extension services, the loans usually being given with little guidance concerning their best uses.

Subsidies Policy

1. The agricultural sector in Saudi Arabia is highly subsidised. According to our survey replies, 86.7 per cent of the respondents indicated that they have received some forms of subsidy.
2. Most of the subsidies have been in the form of input subsidies, covering mainly irrigation facilities, agricultural machinery, fertilisers, animal feed, poultry and dairy farm equipment. On the other hand, some subsidies are paid on the production of certain crops, such as dates and grain products.
3. In a high income country like Saudi Arabia, where farmers are characterised by a low marginal propensity to save,

subsidies have become the way of transferring the agricultural sector from the subsistence to the more modernised sector. In an empirical way, we tried in Chapter Six to investigate the size of contribution of this policy to the process of agricultural expansion in Saudi Arabia. Accordingly, the relationship between the value of extended subsidies and the total agricultural GDP have been estimated. Using the Ordinary Least Square (OLS) technique, a positive relationship has been established.

4. The production of grains (except wheat which is under a high price-support scheme) has not been encouraged by the present low rate of subsidy.
5. Because of the wide range of subsidies, Saudi producers have accumulated new machinery and equipment, but because of low efficiency and poor maintenance the life average of such machines and equipment is short.
6. Subsidies are also paid on imported food products such as sugar, rice, oils, wheat flour, frozen meat and milk powder in order to maintain low prices for the Saudi people. In fact, the amount paid in subsidies on imported products is usually greater than that paid as subsidies on agricultural inputs and local production. So, we have come to the conclusion that the subsidies policy in Saudi Arabia is mainly oriented for the benefit of consumers rather than producers.
7. Because of the large amount of subsidy paid on imported animal feed products, and the small amount of subsidy paid for local production, the local production of animal feed is highly oppressed even though conditions are suitable for its expansion.

8. From the few respondents to our field research questionnaire, who said that they had no idea about the subsidies available, it appears that there were no adequate publicity programmes concerning these subsidies and the rules governing them. This would also explain the weak position of the extension services in this respect.

Wheat Price-Support Programme

1. This programme was initiated by the Saudi government in 1978 in order to create investment opportunities in the agricultural sector and to stimulate the production of wheat which for a long time had been imported in large quantities to meet the increasing local demand.
2. Many farmers were attracted by the wheat price-support programme and have directed most of their available resources to the production of wheat. Our survey showed that 64 per cent of the respondents are growing wheat and the majority of them (63.3 per cent) indicated that the major reason for this is the price-support programme. Wheat production has increased over time and a self-sufficiency stage has been reached in a time unparalleled elsewhere. As a result of this achievement, the government won an award of merit from the Food and Agriculture Organisation (FAO) of the United Nations in 1984.
3. Farmers' incomes have increased as a result of this programme. The income transferred to wheat producers by the government has increased by more than 61 times, from SR 7 million to SR 4.28 billion between 1978 and 1985.
4. The programme has encouraged producers to make more use of the new inputs such as machinery, chemical fertilis-

ers, and pesticides. Consequently, this has had an even more positive effect on the yield per hectare.

5. Wheat imports have decreased considerably, with a consequential saving of foreign exchange.
6. This programme has greatly reduced the uncertainties which the Saudi farmers and consumers faced due to the unsettled climate, variable seasonal rainfall and lack of efficient marketing services.

However, the wheat price-support programme in Saudi Arabia can be criticised on the following bases:

- a) Because of the high purchase price regardless of the amount of wheat produced, this programme has proved very costly. This has caused continuous and increasing Government budget deficits. Also, because the programme requires the use of inputs of land and water above their economic optimum, the social costs of the programme's implementation are high.
- b) Because of this programme, most traditional resources, such as land, capital and labour, have been directed to the production of wheat at the expense of other grain crops. Consequently, the production of such grain crops has been depressed and imports have been used as the easy alternative. Such imports have also been encouraged by the generous import subsidies.
- c) Because of the programme, the pattern of income distribution in Saudi Arabia has been negatively affected. The attractive price paid for wheat has fostered a continuous increase in production, with the farmers who produce most gaining the highest financial benefits. However, the majority of less well-off farmers in the

mountainous south-west region of Saudi Arabia do not benefit from this programme because their land is not suitable to grow wheat.

- d) Because of the price-support programme, more and more land has been cultivated for wheat production with a subsequent reduction of underground water reserves. The depletion of water supplies has been made worse because most of the large wheat farms are situated in the central region of Saudi Arabia where the underground water is non-renewable.
- c) Although the programme has helped to relieve the burden on foreign exchange by sharply reducing wheat imports, foreign exchange has been heavily used to import other grain crops, particularly barley, whose domestic production has not been attractive to the Saudi farmers.

Marketing Policy

1. Although agricultural production has expanded in recent years in response to the various government efforts to develop the agricultural sector, inadequate marketing services still represent the overwhelming problem facing the Saudi producers. This is evident from the replies of the great majority of our field research respondents (80 per cent) who confirmed the existence of marketing problems.
2. Long distances between production centres and major markets, paucity of paved roads, high transportation costs, inadequate storage facilities, lack of standards and grades, inefficient packaging and handling methods, absence of a nationwide market price information system

and the exploitation of middlemen and commission dealers are the major problems facing the Saudi farmers in marketing their produce.

3. As a result of these problems, huge fluctuations in price levels and production in the domestic supply of major agricultural products (mainly vegetables) are the dominant pattern in most parts of the country.
4. Marketing societies and boards, which would help solve most existing marketing problems, have not yet been considered despite the numerous efforts devoted to modernising the agricultural sector.
5. The government's marketing policy role has been confined to building wholesale markets in the larger cities for the agricultural produce and to introducing some regulations and measures for the markets' transactions.
6. Existing agricultural cooperatives, although they provide their members with some marketing services, do not contribute much to reducing the associated marketing problems.

Cooperatives policy

1. Of the existing 178 various cooperatives, only 34, or 19 per cent, are agricultural cooperatives mainly serving the farming sector. As a result such cooperatives are found only in a relatively few areas and serve only a few farmers. Only 9 per cent of our survey respondents stated that they are members of such cooperatives.
2. The contribution of these cooperatives to the process of agricultural development in Saudi Arabia is very negligible. This can be attributed first to the small number of these cooperatives and second to the nature of their

functions which is limited to providing some agricultural inputs such as new seeds, fertilisers, pesticides, simple agricultural implements and machinery spare parts. However, such provision is mostly inadequate.

3. Lack of finance, unorganised marketing systems, lack of cooperation from the associated members, poor management, and insufficient adequately trained staff represent the most chronic problems facing the existing agricultural cooperatives in Saudi Arabia.
4. Although interest-free credit is provided through SAAB, few loans are received by the cooperatives due to the fact that numerous requirements have to be met before a loan is granted.
5. The present cooperatives have almost no links with extension, research and training services. Therefore, this policy is not effective in introducing new technology to the farming society.

Agricultural Projects

1. Except for the unsuccessful settlement attempt in the Haradh area, all public agricultural development projects are in the form of irrigation and drainage projects.
2. These projects are undertaken by the government due to the large investment involved and the nature of benefits which extend to the whole society.
3. In the Al-Hasa irrigation and drainage project, the problem of moving sand-dunes on the area's farms has been tackled. Soil salinity has also been reduced by the construction of a drainage system. As a result of this project, an additional 12,000 hectares of fertile land has been brought

under cultivation.

4. The dam constructed in the Jizan Valley has greatly reduced the danger of water run-off that once swept down the Valley causing severe damage to the topsoil, plants, seeds, livestock and even homes and other buildings. A water distribution network has also been established. In general, the whole project is now benefitting more than 50,000 people living in almost 60 villages.
5. Although the Haradh project was planned as a settlement scheme, no settlement has taken place. This is because of poor planning in that the social, cultural and traditional backgrounds of the target population (Bedouins) were not fully taken into consideration when the project was initially designed. Bedouins are camel-and sheep-herders, following rain and pasture throughout the desert and have very little experience in settled farming. This project now involves agricultural activities and is run as a commercial enterprise.
6. The existing agricultural development projects still face some problems, such as administrative and marketing problems. Moreover in these projects, the problem of small farming plots, influenced by the traditional way of farming, is not yet solved.
7. All the existing agricultural projects were planned mainly according to the natural resource endowment and political and social considerations. Economic justifications were virtually ignored when constructing the required feasibility studies. These studies were usually influenced by the decision-makers and the viewpoints of the "engineers" rather than by the "economists".

8.2: Recommendations

With reference to the foregoing conclusions and generalisations, the following recommendations are made to help the Saudi planners and decision-makers formulate future adjustments for improving the conditions of the existing agricultural policies. These recommendations are stated as specific points and classified according to each policy.

Water Policy

A. Because of the tendency of the Saudi people to use excessive amounts of water, several measures that could contribute to reduce excessive use should be undertaken, including the following:

1. Strengthening the existing water-management system to make it more effective in regulating and scientifically coordinating the use and construction of water pumps in accordance with land and water topography.
2. Establishing and enforcing new rules and regulations to regulate the use of water, such as limiting the maximum amount of water used per day or the maximum time allowed per day for the operation of pumps.
3. Research should be conducted to determine for each type of crop the water requirements and irrigation frequency taking into account the crops growth stages and the effects of weather conditions.
4. Improving existing irrigation methods by organising and coordinating the flow and distribution of water and encouraging wide use of modern irrigation methods such as pivot sprinklers and drip irrigation. This

could be achieved by providing similar subsidies as those given for agricultural machinery and equipment. Greater efficiency in water use, improving existing irrigation methods and introducing new ones, is largely dependent on the information the farmers receive about such methods and how willing they are to change their prevailing attitudes. To disseminate the necessary information and encourage the farmers in the use of new technology must be the crucial role of the extension services.

5. Greenhouse production of vegetables and fruits should be encouraged, because they offer an opportunity for increasing food production with minimal use of scarce water and soil resources.
6. Intensive public awareness campaigns to bring to the attention of everyone the importance of water and the necessity to conserve this valuable resource, should be carefully designed and implemented. All media means should be utilised, including using the language of religion which deals with this subject positively and affects greatly the minds of people.

B. Efforts should continue to provide an adequate supply of water for the different uses. Increasing attention should be directed to utilise more sewage water after chemical treatment for agricultural uses near large urban areas.

Land Distribution Policy

1. More precise hydrological studies should be made before distributing farming lands. As mentioned previously some recipients have complained about the unsuitability of the

- distributed plots in terms of adequacy and easy access to underground water and the low organic content of the soil
2. The distribution of land should be kept to a minimum in areas where farming depends mainly on non-renewable sources of underground water. Instead, more free lands for farming could be distributed in the southwestern region where there is enough rainfall.
 3. To ensure the effectiveness of the Land Distribution Scheme, the rules and regulations which control the operation of this scheme should be strengthened and strictly applied.

Research Policy

To make the agricultural research policy more effective within the development process, the following recommendations should be followed:

1. Research should be directed toward seeking practical solutions to the major problems facing the various agricultural activities. However, research should be conducted in fields which are presently almost neglected, such as marketing, credit, subsidies, management, rural sociology and water-saving techniques.
2. Where the research centres are in places far away from the urban areas and their multi-dimensional attractions, local research skills should be attracted by better financial incentives.
3. Contacts with international research institutes must be continued, and researcher's access to journals, abstracts, and other research publications should be increased.

4. Maximising the profit per hectare rather than the yield per hectare should be the future objective of research, especially in the crops sector.
5. More problem-oriented research should be undertaken by the agricultural colleges. Also more cooperation and coordination should be fostered between these colleges and the research centres.
6. There should be strong links between the research centres and the extension workers and the research results should be transmitted to farmers quickly and simply.
7. Because the existing research services are not capable of solving all the problems associated with the agricultural sector, priority should be considered in the research efforts. This could be done by evaluating the research programmes in terms of their real costs and benefits. Internal rate of return should be considered for the justification of such programmes.
8. Because intensive and productive research efforts need large investment, the public funds required for research should be raised.
9. To overcome some of the major constraints facing agricultural expansion in Saudi Arabia, research efforts should be directed towards introducing new technology which will make maximum use of the scarce resources of land, labour and water.

Extension Policy

Due to various policy shortcoming, the extension services in Saudi Arabia are in need of urgent corrective action on several fronts relating to functions, organisation and

methodology. The following are some recommended corrective actions:

1. The educational function which aim at helping farmers to make the best use of the available resources to improve agricultural productivity and hence their standard of living, should be emphasised more, instead of the current emphasis on providing mechanical services.
2. The Extension Service should become involved with many more aspects of agriculture and not concentrate solely on the plant sector.
3. An effective extension policy needs delineated planning. There should be formulated a systematic programme for each region, setting out in detail a plan of work for the season and evaluating progress at the end of the season.
4. The number of extension workers should be increased, especially natives, and they should be involved in a wider range of agricultural activities. Monetary incentives in the form of high salaries, office facilities and housing would help in this matter.
5. To improve the competency of the existing extension workers, intensive training programmes should be designed and implemented, in which technical training and communication skills should be emphasised.
6. Easily understood channels of communication should be established and the extension contacts with farmers regarding agricultural innovations should be in a simple language.
7. More plant demonstrations should be staged and these

should be distributed more evenly among the various areas.

8. For the satisfactory performance of the multiplicity of functions that have developed and are undertaken by the extension services, funds must be adequately increased.
9. The available media means should be exploited more to disseminate extension information. Such a method would allow contact with many farmers in an easy and inexpensive way.

Agricultural Education and Training Policies

To make these policies more productive we propose the following improvements:

1. Some courses in agricultural principles and practices should be taught in all levels of general education schools, especially those in rural areas. This would introduce children to the world of work and develop in them a better appreciation of agriculture and its role in society. Children not able to work today would be better prepared to do so tomorrow.
2. More Agricultural Technical Schools are urgently needed, especially in rural areas. The "how-to-do-it" skills of modern farming should be an important part of the curricula. To attract more students to such schools, the present monthly allowance should be increased. Also, outstanding students should be eligible for entrance to local agricultural colleges.
3. Agricultural college curriculums should be oriented more toward practical training on modern farming. More emphasis on the social sciences, particularly economics

and rural sociology, would give college students a better understanding of these aspects of the development process. To increase the enrolment level in the agricultural colleges, graduates should be given priority in the free farming plots distributed by MOAW. However, graduates should not be directed to administrative positions but should be encouraged to do practical works.

4. The existing agricultural training programmes should be reviewed and evaluated to keep pace with the present dynamic process of agricultural development.
5. More space in these programmes should be devoted to farmers and their children. To attract this group the following adjustments should be considered:
 - a. There should be more publicity concerning the training programmes, their places and dates.
 - b. The training programmes should be conducted in places adjacent to the farmers' localities.
 - c. The design and contents of the programmes should be modified, when necessary, to fit the capabilities of the farmers.
 - d. The present monthly allowance should be raised to SR 1500, as has been suggested by the Fourth Agricultural Development Plan.
6. The development of skills and abilities essential in plant and animal production and the efficient management of farming practices should be among the major objectives of the training programmes. The principles of simple decision-making and book-keeping should also be dealt with.

Credit Policy

The credit policy should be continued, providing interest-free loans to the Saudi farmers and agri-businessmen, but, to increase its affectivness the following two recommendations should be considered in future planning:

1. Measures should be established to increase the rate of credit recovery. Before a loan is granted the SAAB's officials should analyse very carefully the borrower's capacity to repay the loan without undue difficulty. In such an analysis, the average production costs, yields, prices and income should be precisely accounted. This would prevent the applicant from getting himself into a worrying financial position and would also ensure a high rate of recovery. Rules and regulations for dealing with delaying debtors should be consistent with commercial banking practices. Finally, SAAB should take a tougher stance on defaulters.
2. To give credit to farmers and agri-businessmen without showing them how to make efficient use of it and without insuring adequate utilisation of the other resources, often results in more problems than those that the loans ware intended to solve. Therefore, it is recommended that in order to bring about a desirable impact on agricultural production the provision of credit should be accompanied by and coordinated with a sufficient amount of technical advice. Accordingly, an institutional system integrating the two activities should be developed under the name of "supervised credit".

Subsidies Policy

For the time being and in the near future this policy should continue because of its important role in modernising the agricultural sector in Saudi Arabia, but the following measures are required to increase its level of effectiveness:

1. The present rates of subsidies should be reviewed in order to determine their economic justifications. Accordingly, some subsidies might be reduced, while others might be increased.
2. Subsidies paid on unrestricted imported quantities of agricultural machinery and equipment have resulted in excessive use of these inputs, therefore, such subsidies should be reduced and more efforts must be directed to increase the level of efficiency in using these machines and equipment.
3. Because of the present, often wasteful, unrestricted imports policy, the Ministry of Agriculture and Water should establish a means of evaluating imported machinery to determine its suitability for the local conditions in Saudi Arabia. Import licences could then be issued for the most suitable machinery.
4. The present policy of subsidising the new inputs of farming, such as chemical fertilisers and pesticides, has not been enough to encourage adequate application of such inputs among Saudi farmers. Effective administration and active distribution channels are urgently needed.
5. To encourage production of more grain crops such as barley, millet, sorghum and maize, the present low rate of production subsidy should be increased.

6. There should be a re-evaluation of the subsidies paid for imported agricultural products. Food products, such as wheat flour and milk, as they are now locally produced in sufficient quantities to meet the local demand, their imports should not be subsidised. On the other hand, the very large subsidies paid for the imported animal feed products should be stopped, and such subsidies should be directed to encourage more local production of these products.
7. To ensure more informational diffusion concerning the structure of the provided subsidies and the regulations governing them, adequate publicity programmes should be planned and implemented.

Wheat Price-Support Programme

1. The Government should not make any decision which would involve a sudden termination of this programme. Such a decision would greatly reduce the number of wheat producers and consequently the level of production. As indicated by our questionnaire replies, 52.6 per cent of wheat producers would stop production if the price-support programme is stopped.
2. Where the production level of wheat exceeds local needs, the present purchased price should be reduced or production quotas should be set among the producers, especially large-scale businesses. This would also help to reverse the adverse trend towards the replacement of other crops by wheat.
3. Before reducing the present supported price for wheat, inclusive economic studies concerning the real costs of

production should be precisely planned and conducted.

4. Local demand should be stimulated more, through media publicity, to encourage more consumption of wheat in order to replace the present pattern of over-consumption of rice which is wholly imported .
5. To reduce the large volume of imports of other grain crops, such as barely, maize, and sorghum, local production should be stimulated using monetary incentives. These would include abandoning the import subsidies on these crops and using these subsidies in the form of price-support programmes to buy their local production as with wheat. As a result of such a policy, positive effects would emerge in income distribution because the less well-off farmers in the south-west region would benefit by producing more grain crops other than wheat which is not suitable in their area.

Agricultural Marketing Policy

To overcome the various marketing problems which badly affect agricultural growth in Saudi Arabia quick remedies should be applied;

1. One such remedy could be the establishment of specialised marketing societies such as a vegetables marketing society, a poultry marketing society, a dairy products marketing society and the like, which could be financially supported by the Government. Such marketing societies would improve the present deficient marketing structures by:
 - a) coordinating transport and storage facilities;
 - b) regulating quality standards and gradings;

- c) disseminating information concerning market conditions including product prices;
- d) eliminating the intermediaries who extract some of the farmers' profit margins.

Such marketing societies would be better able to respond to market trends and give more reliable information to their members. They would also be able to tailor their activities more efficiently and help to increase the incomes of some particular groups of farmers. However, such marketing societies could contribute greatly to increasing the overall efficiency of the marketing system in Saudi Arabia, which presently is poor, estimated by Khaliffah in 1981 to be only 30 per cent.

2. Increasing the level of government intervention in agricultural marketing is urgently required. This would imply strengthening and enlarging the existing laws and regulations which set standards of practice and operation of the markets and people operating in them. Consideration should be given to set regulations which protect consumers from products and practices that might harm them. These would include:
 - a) laws to establish minimum quality and amount of contents for most packaged products;
 - b) laws for labelling the contents, the use of good preservatives, artificial colouring, etc.;
 - c) law of ethics for advertising;
 - d) laws which determine commission fees and regulate margins and prices.
3. To encourage the Saudi farmers and agri-businessmen

to acquire more marketing facilities, such as adequate storage, refrigeration, packaging and grading equipment, subsidies should be provided along with the extended credit by SAAB to buy such facilities.

4. As an alternative or supplement to the idea of marketing societies, the existing agricultural cooperatives should be reformulated and strengthened to indulge in active marketing functions especially in rural areas.
5. Marketing research, training and extension services are also necessary for the improvement of marketing efficiency and thus for the producers and consumers welfare.

Cooperatives Policy

The government should take practical measures to improve the existing cooperatives and encourage the establishment of new ones in order to enable them to play an important role in facilitating greater farm production by performing various services needed by farmers which are not otherwise available or not performed satisfactorily by the other agencies. Some practical measures could be taken as follows:

1. Firstly, proper assistance in planning and guidance should be emphasised by the Ministry of Labour and Social Affairs as the agent for these cooperatives.
2. Easy access to SAAB's credit should be considered, and this could be done by minimising the requirements set by SAAB for loans.
3. Improving the cooperatives' management by arranging adequate training programmes.

4. Channelling through the agricultural cooperatives, especially in the remote areas, some agricultural services which are presently provided by the Ministry of Agriculture and Water such as extension, simple research and plant demonstrations.
5. Some measures should be introduced to motivate the agricultural cooperatives, especially in remote areas, to help farmers market their produce.
6. Part of the Government's financial assistance to cooperatives should be in kind, such as supplying agricultural machinery. The objective would be to supply this machinery to the small farmers on a very attractive rental basis.
7. Constructing public awareness programmes, especially in rural areas, on the importance of cooperative activities in improving farming practices and increasing the level of well-being.

Agricultural Projects

1. Because of the large capital investment, it is necessary to evaluate agricultural projects before implementation, i.e., ex ante evaluation, and after implementation, i.e., ex post evaluation. This implies examining each project in relation to its contributions - direct or indirect, final or intermediate, tangible or intangible - to the particular objectives. The expected costs of the project and the anticipated future returns from it would be estimated and rates of return computed using appropriate procedures. Such procedures when executed properly would ensure that the available resources (natural and

financial) are allocated by the management among those projects which will make the maximum net contribution towards achieving the objectives of the government.

2. Along with the established agricultural irrigation projects, the problem of small farming plots should be solved if increasing the level of production is among the objectives to be achieved.
3. Future irrigation projects should not only emphasise the expansion of the irrigated land area but also increase the efficiency of water management. Improvements in the use of water resources would greatly contribute to increasing production.
4. If it is decided to attempt another settlement for Bedouins, it would be necessary to involve them in the decision-making process. However, the most suitable type of settlement for such people is as camel-and-sheep producers, not as farmers.
5. To maintain the effectiveness of agricultural projects, emphasis should be given to administrative and managerial skills. In the absence of such skills it may not be possible to maintain the projects initially planned objectives.

General important recommendations

1. Farmers and agri-businessmen in Saudi Arabia could be influenced in their farming methods and encouraged to increase production, by appealing more to their economic, social and religious values. This would apply particularly to the Moslim communities who would respond more positively if an approach was made in a

religious context.

2. Due to the recent overwhelming increase in demand for goods and the related over-consumption of such goods, some measures should be found to reduce this consumption pattern and to change its structure. Religious values and market mechanisms would be effective in maintaining such a strategy.
3. The agricultural development process in Saudi Arabia should be viewed in relation to the total economy. Efforts should be directed to agriculture's supportive industries such as local small-scale industries, agro-industries and handicrafts. Support for these ancillary industries would bring benefits in the shape of more employment opportunities and would encourage people to remain in the agricultural areas instead of moving to the urban areas.
4. Fishing, a hitherto practically neglected sector, can be very profitably developed. The coastal waters of the Arabian Gulf and Red Sea are very rich in fish resources.
5. The Ministry of Agriculture and Water, the principal agent for agricultural development in Saudi Arabia, should be strengthened by a sufficient number of adequate human skills in the areas of planning and decision-making.
6. Adequate and sufficient data are required for analysis, assessments and precise planning. Urgent efforts should be made to review and strengthen the current agricultural information system.

Final Remarks

As can be imagined the study domain concerning the agricultural development is wide and touches on many questions of policy and development. Inevitably the subject is treated with a broad brush, in general terms. Needless to say, some of the issues that are so dealt with in this thesis can still be subjected to further in-depth investigation.

APPENDICES

•

APPENDIX A

QUESTIONNAIRE

Dear Farmer,

At the beginning let me introduce myself to you. I am a Ph.D. student in Agricultural Economics at Leicester University, U.K., sponsored by King Saud University in Riyadh. At present I am doing my research about the agricultural development in Saudi Arabia and the attached questions are related to my research. Therefore I would appreciate your co-operation if you would allow a few minutes to answer these questions. Your answers will be confidential and will be used only for this research purpose, so please be as precise and honest as you can.

Thank you very much.

Sincerely yours,

Abdullah Al-Obaid.

Note:

Please do not mention your name or your address because there is no need for them.

* Please put () for the right answer.

* You can put more than one () if you find it necessary.

(1) Which kind of land tenure do you have?

- | | |
|----------------------|-----|
| (a) Individual owner | () |
| (b) Joint owner | () |
| (c) Sharecropper | () |
| (d) Tenant | () |

(2) What is your farm size?

- | | |
|-----------------------------------|-----|
| (a) From 5 to less than 10 dunums | () |
| (b) 10 to less than 20 dunums | () |
| (c) 20 to less than 50 dunums | () |
| (d) 50 to less than 100 dunums | () |
| (e) 100 to less than 200 dunums | () |
| (f) 200 to less than 500 dunums | () |
| (g) 500 to less than 1000 dunums | () |
| (h) 1000 dunums and over | () |

(3) Which of the following age groups are you in?

- | | |
|------------------------|-----|
| (a) Less than 20 years | () |
| (b) 20 - 29 years | () |
| (c) 30 - 39 years | () |
| (d) 40 - 49 years | () |
| (e) 50 and over | () |

(4) What is your marital status?

- (a) Single ()
- (b) Married ()
- (c) Married with one child ()
- (d) Married with two children ()
- (e) Married with three children ()
- (f) Married with four children ()
- (g) Married with five or more children ()

(5) How long have you been a farmer?

- (a) Less than 5 years ()
- (b) 5 to 9 years ()
- (c) 10 to 14 years ()
- (d) 15 to 19 years ()
- (e) 20 years and more ()

(6) Have you got your land as a grant from the Government?

- (a) Yes () (b) No ()

If Yes, why did you ask for it?

- (a) To use it mainly for wheat cultivation ()
- (b) Because the land is close to my place of residence ()
- (c) Because I do not have land and I am interested in farming ()
- (d) Other reasons ()

(7) Has someone from the extension office visited you?

- (a) Yes () (b) No ()

If Yes, how many times?

- (a) Once a year ()
- (b) Twice a year ()
- (c) Three times a year ()
- (d) More than three times ()

(8) If your answer to question 7 is No, what do you think the main reason is for this?

- (a) There is no extension office in my area ()
- (b) The extension workers come only by request, and I did not ask them to do so. ()
- (c) There are not enough extension workers to cover all the area ()
- (d) I do not know why nobody came to visit me ()

(9) If you have been visited by extension workers and they gave you some guidance and information do you follow them?

- (a) Yes, all the time ()
- (b) Yes, sometimes ()
- (c) Not at all ()

(10) Have you seen any plant demonstrations conducted by your extension agents or any other agents in your area?

(a) (Yes) () (b) (No) ()

If Yes, how many?

(a) one demonstration ()
(b) two demonstrations ()
(c) three demonstrations ()
(d) more than three demonstrations ()

(11) What is your educational level?

No schooling

(a) cannot read or write ()
(b) can read and write ()

Schooling

(a) primary ()
(b) middle school ()
(c) high school ()
(d) college and above ()

(12) Have you attended any training programmes arranged by the Ministry of Agriculture and Water?

(a) Yes () (b) No ()

If Yes, how do you evaluate them?

(a) very good ()
(b) good ()
(c) not bad ()
(d) not good ()
(e) not suitable ()

(13) If you have not attended any training programmes, what is the main reason?

(a) I did not know if there were any programmes ()
(b) They were too far from my place of residence ()
(c) They were costly and I could not afford the cost ()
(d) I wished to attend, but I had no chance because of the limited number of places ()

(14) If you are in need of agricultural loans to whom do you go?

(a) to friends and relatives ()
(b) to village money lenders ()
(c) to commercial banks ()
(d) to the Agricultural Bank ()

(15) If you deal with the Agricultural Bank, what are the major reasons?

(a) because it does not charge interest on the provided loans ()

- (b) it can provide me with all the money I need ()
 - (c) easy procedures ()
 - (d) easy repayments ()
- (16) If you do not deal with the Agricultural Bank, what are the reasons?
- (a) I do not know if there is an Agricultural Bank ()
 - (b) complicated procedures ()
 - (c) does not provide me with all the money I need ()
 - (d) far away from my residence and requires many visits ()
 - (e) I require money for consumption uses, which the Agricultural Bank does not provide ()
 - (f) The Bank does not lend me money because I cannot fulfill its conditions ()
- (17) Do you consider the existence of the Agricultural Bank a major incentive influencing you to stay on the farm?
- (a) Yes () (b) No ()
- (18) For what purposes do you ask for loans?
- (a) to buy chemical fertilizers ()
 - (b) to buy seeds ()
 - (c) to buy water pumps and engines ()
 - (d) to buy agricultural machines ()
 - (e) to buy dairy and/or poultry equipments ()
 - (f) to pay my farm workers ()
 - (g) to buy spare parts for the owned machines ()
 - (h) to buy central pivot systems for irrigation ()
- (19) Have you received any kind of agricultural subsidies provided by the Government?
- (a) Yes () (b) No ()
- If Yes, for what purposes?
- (a) fertilizers ()
 - (b) agricultural machinery ()
 - (c) water pumps and/or engines ()
 - (d) dairy and/or poultry equipment ()
 - (e) agricultural products (i.e. barley, rice, sorghum, millet, etc.) ()
 - (f) date palms offshoots or palm dates ()
 - (g) improved seeds ()
 - (h) air transportation on imported cows ()
 - (i) animal feed ()
- (20) If you did not receive any kind of subsidies, what do you think was the main reason?
- (a) I did not apply for them ()
 - (b) I applied but I could not get them ()
 - (c) I did not fulfill the required conditions ()
 - (d) I do not know if there are any provided subsidies ()

(21) Which one of the following products do you grow?

- | | | | |
|-----------------------|-----|----------------|-----|
| (a) wheat | () | (f) barley | () |
| (b) maize | () | (g) sorghum | () |
| (c) rice | () | (h) vegetables | () |
| (d) fruits | () | (i) palm dates | () |
| (e) animal feed crops | () | (j) millet | () |

(22) If you grow wheat what is the main reason for doing so?

- | | |
|--|-----|
| (a) good market demand | () |
| (b) suitability of soil to grow this product | () |
| (c) availability of sufficient water | () |
| (d) because of the price-support programme | () |

(23) If you are a wheat producer, and the government decided to reduce again the paid price, what is the lowest price you would accept to sell your wheat to the Government?

- | | |
|----------------------------------|-----|
| (a) 1.75 riyal per kilo | () |
| (b) 1.50 riyal per kilo | () |
| (c) 1.25 riyal per kilo | () |
| (d) 1.00 riyal per kilo | () |
| (e) less than one riyal per kilo | () |

(24) If you are a wheat producer, and the Government decided to terminate the price-support programme, what would you do?

- | | |
|--|-----|
| (a) This decision would not affect me and I would continue growing the same quantity | () |
| (b) I would reduce my production level | () |
| (c) I would stop growing wheat and grow other crops instead | () |

(25) Are you a member of an Agricultural Co-operative in your area?

- | | | | |
|---------|-----|--------|-----|
| (a) Yes | () | (b) No | () |
|---------|-----|--------|-----|

If Yes, what is the main reason behind that?

- | | |
|--|-----|
| (a) the existence of agricultural co-operative in our area | () |
| (b) the various benefits provided to the member | () |
| (c) social reasons | () |
| (d) educational reasons | () |

(26) If you are not a member of an Agricultural Co-operative, why?

- | | |
|--|-----|
| (a) there is no Agricultural Co-operative in my area | () |
| (b) does not provide good services and benefits | () |
| (c) I have had bad experience with it in the past | () |
| (d) social reasons | () |
| (e) because of the bad management | () |

(27) Do you use the new inputs of farming such as fertilizers, improved seeds, and insecticides?

(a) Yes () (b) No ()

If Yes, what is the main reason?

(a) increase in crop yields ()
(b) provision of subsidies ()
(c) always recommended by the Extension agents ()
(d) better crop quality ()
(e) water problems ()

(28) Do you have any marketing problems?

(a) Yes () (b) No ()

If Yes, what are the major ones from the following:

(a) the long distance to market ()
(b) hard roads ()
(c) high cost of transportation ()
(d) absence of adequate storage facilities ()
(e) the absence of marketing societies ()

(29) How far is the main market from your farm?

(a) less than 10 km. ()
(b) 10 - 19 km. ()
(c) 20 - 29 km. ()
(d) 30 - 49 km. ()
(e) 50 - 99 km. ()
(f) 100 km. and more ()

(30) What is your main source of water?

(a) rain ()
(b) underground water by wells ()

(31) Do you get a sufficient supply of water for irrigation?

(a) Yes () (b) No ()

Thank you for your co-operation.

APPENDIX B

SAMPLE DISTRIBUTION BY AREA

Region	Number Of Respondents	Percentage Of Respondents
Central	419	56.8
Southern	135	18.3
Western	73	9.9
Northern	62	8.4
Eastern	49	6.6
Total	<u>738</u>	<u>100.0</u>

THE DISTRIBUTION OF RESPONDENTS WHO HAVE BEEN
GRANTED FREE LAND ACCORDING TO LOCALITY

Region	Number	Percentage	Cumulative Percentage
Central	81	52.6	52.6
Northern	44	28.6	81.2
Eastern	15	9.7	90.9
Western	12	7.8	98.7
Southern	2	1.3	100.0
Total	<u>154</u>	<u>100.0</u>	

APPENDIX C

EXCHANGE RATES: SAUDI RIYAL(SR) PER US\$

1970	\$ = SR 4.5000
1971	\$ = SR 4.4886
1972	\$ = SR 4.1500
1973	\$ = SR 3.7162
1974	\$ = SR 3.5500
1975	\$ = SR 3.5176
1976	\$ = SR 3.5300
1977	\$ = SR 3.5251
1978	\$ = SR 3.3996
1979	\$ = SR 3.3608
1980	\$ = SR 3.3267
1981	\$ = SR 3.3825
1982	\$ = SR 3.4282
1983	\$ = SR 3.4548
1984	\$ = SR 3.5238
1985	\$ = SR 3.6221
1986	\$ = SR 3.7033

Source: IMF (International Monetary Fund),
"International Financial Statistics",
Yearbook, 1986.

BIBLIOGRAPHY

- Ahmed, R., "Price Support Versus Fertiliser Subsidy For Increasing Rice Production In Bangladesh", The Bangladesh Development Studies, Vol.6, No.2, Summer 1978.
- Aker, A.H., "Import Substitution and Comparative Advantage: A Case Study of Turkey." (Ph.D. Thesis, Cornell University, U.S.A., 1968.)
- Al-Braikan, S.M., "OPEC Foreign Investment: The Case of Saudi Arabia", (Ph.D. Thesis, University of Colorado, U.S.A, 1980)
- Al-Farsy, F., "Saudi Arabia: A Case Study in Development", (London, Kegan Paul International, 1982)
- Al-Hamoudi, Khaled, "An Evaluation of the Current National Agricultural Data Base in Saudi Arabia: An Information System Approach", (Ph.D. Thesis, Michigan State University, 1984)
- Al-Hudaithy, Abdullah.S., "An Analysis of the Role of the Agricultural Bank and Extension Services on the Changing Pattern of Agriculture in Al-Qassim Region of Saudi Arabia." (Ph.D. Thesis, University of Northern Colorado, Greeley, U.S.A., 1983.)
- Al-Jazera Daily Newspaper, No.5131, 16 October, 1986.
- Al-Odaibi, Abdullah.I., "Analysis of Education Competency and Training Needs of Agricultural Extension Workers in the Eastern District of Saudi Arabia", (Ph.D. Thesis, The University of Wisconsin-Madison, U.S.A., 1983.)
- Al-Riyadh Newspaper, No.6212, 26 June, 1985.
- - - - - No. 6663, 20 September 1986.
- Al-Sadairy, Turkey, M., "Agricultural Development In Saudi Arabia With A Primary Focus On Wheat Production", (M.S. Thesis, Michigan State University, 1984)
- Al-Sheikh, Abdul-Rahman, A., "Agriculture and Economic Development With Spcial Emphasis on a Strategy for Saudi Arabian Economic Development." (Ph.D. Thesis, University of Edinburgh, U.K., 1970.)
- Al-Shiekh, Abdulmalek, I., "Evaluation of Arid Land Food Production Systems: Strategies for Saudi Arabian Agriculture", (Ph.D. Thesis, University of Arizona, 1983)

- Al-Takroni, Abdel Salam, B., "The Role of Planning in the Economic Development of the Kingdom of Saudi Arabia", (M.S. Thesis, Jackson State University, U.S.A., 1984)
- Al-Zokair, Abdulaziz, A., "A Study of Agricultural Development in Al-Kharj, Saudi Arabia.", (M.A. Thesis, Michigan State University, U.S.A., 1981.)
- Anderson, E., "Plants, Man and Life", Berkeley; University of California Press, 1967.
- Arndt, T.M.; Dalrymple, D.G. and Ruttan, V.W. (ed.), "Resource Allocation and Productivity in National and International Agricultural Research" (Minneapolis University of Minneapolis Press, 1977)
- Asfour, E.Y., "Saudi Arabia, Long-Term Projections of Supply of and Demand for Agricultural Products", Beirut, Economic Research Institute, American University of Beirut, 1965.
- Askari, H. and J.T. Gummings, "Agricultural Supply Response: A Survey of the Econometric Evidence", 1976.
- Baba, M. and M. Totemoto, Foreign Trade and Economic Growth in Japan 1858-1937, in L. Klein and K. Ohkawa (eds.) "Economic Growth, the Japanese Experience since the Meiji Era", (Richard D. Irwin Inc., Homewood, Illinois 1968) pp.173-74.
- Bacha, E.L., Industrialisation and Agricultural Development, in J. Cody et. al (eds.) "Policies for Industrial Progress in Developing Countries", (London, Oxford University Press, 1980)
- Bardhan, K. "Price and Output Response of Marketed Surplus of Foodgrains", American Journal of Agricultural Economics (February, 1970).
- Barker, R. and Y. Hayami "Price Support Versus Input Subsidy For Food Self-Sufficiency in Developing Countries" American Journal of Agricultural Economics (November, 1976) p. 617.
- Basabrain, Abdulla, A.A., "Modernisation of Agriculture: An Analysis of Incentives, Disincentives and the Economical, Educational Factors Influencing the Adoption of Agricultural Innovations in Saudi Arabia", (Ph.D. Thesis, University of Massachusetts, U.S.A., 1983.)
- Beaumont, P., "Water and Development in Saudi Arabia.", The Geographical Journal, 43(1), 1977, p.50.
- Brown, L.R., "Seeds of Change", (New York, Praeger, 1970).
- Carim, E.(ed.), "Middle East Review 1985", World of Information, 1985.

- Chamber of Commerce, Economic Research Dept., Saudi Arabia, "Present and Future Agricultural Situation in Saudi Arabia", Riyadh, 1985, (in Arabic)
- Chamber of Commerce, Economic Research Dept., Saudi Arabia, "Investment Guide in Agricultural Projects", Riyadh, 1985, (in Arabic).
- Chang, C.W., "Extension Education For Agricultural and Rural Development", (Bangkok: F.A.O., March 1963) p. 171.
- Chenery, H.B., "The Role of Industrialisation in Development Programmes" American Economic Review 42(2), (1955) pp.40-57.
- Clawson, M., and et. al, "The Agricultural Potential of the Middle East", (N.Y., American Elsevier publishing Copany Inc., 1971)
- Council of Chambers of Commerce, Economic Studies and Research Department, Saudi Arabia, "The Role of Agricultural Projects in Economic Development in Saudi Arabia", Riyadh, 1985, (in Arabic)
- Dickinson, H.D. "Von Thunen's Economics", Economic Journal, 79 (December 1969) pp. 894-902.
- El-Khatib, A., "Seven Green Spikes", F.A.O and MOAW in Saudi Arabia, Beirut; Dar Al-Qalam Press, 1974.
- El-Mallakh, R., "Saudi Arabia: Rush to Development", London, Croom Helm, 1982.
- Evenson, R.E. and Kislev, Y., "Agricultural Research and Productivity", (New Haven, Yale University Press, 1970.)
- Falcon, W., "Farmer's Response to Price in a Subsistence Economy", American Economic Review, papers and proceedings (May, 1964).
- Fei, C.H. and G. Ranis, "A Theory of Economic Development" American Economic Review, 51, no.3, 1961.
- Ghatak, S., and Ingersent, K., "Agriculture and Economic Development", Wheatsheaf Books Ltd., Brighton, Sussex, U.K., 1984.
- Griliches, Z., Research Costs and Social Returns: Hybrid Corn and Related Innovation, in C.K. Eicher and L.W. Witt, "Agriculture in Economic Development", (McGraw-Hill, 1964).
- Habakkuk, H.J., Historical Experience in Economic Development, in E.A.G. Robinson (ed.) "Problems of Economic Development", (London, Macmillan, 1965).

- - - - "Economic Functions of English Landowners in the Seventeenth and Eighteenth Centuries", Essay in Agrarian History, Vol. I., (ed.) W.E. Minchinton (New York, Augustus M. Kelly, 1968), p. 190.
- Harris, G.L., "Saudi Arabia its People its Society its Culture", (Newhaven, Harf Press, 1959)
- Hayami, Y. and Ruttan, V.W., "Agricultural Development: An International Perspective", The John Hopkins Press, Baltimore and London, 1971.
- Higgins, B. "Economic Development", (New York, W.W. Norton and Co., 1959) pp. 400-401.
- Ibrahim, M.H., "Problems of Nomad Settlement in the Middle East With Special Reference to Saudi Arabia and the Haradh Project", (Ph.D. Thesis, Cornell University, 1981)
- Italconsult, "Land and Water Studies on the Wadi Jizan" 1965.
- Johnston, B.F., and J.W. Mellor "The Role of Agriculture in Economic Development", American Economic Review, 51, no.4 (1961) pp.59-91.
- Jorgenson, D.W. "The Development of a Dual Economy" ,Economic Journal, 71, (June, 1961) pp. 309-334.
- Katanani, Ahmed, K., "Policies and Models for Planning the Economic Development of the Non-Oil Sector in Saudi Arabia", (Ph.D. Thesis, Iowa State University, U.S.A., 1971)
- Khaliffah, A.A., and Others, "The Marketing Margins and Marketing Efficiency of the Vegetable Products", King Saud University, College of Agriculture, Agriculture Research Centre, 1981.
- Krishna, R. ,Agricultural Price Policy and Economic Development, in H.M. Southworth and B.F. Johnston (eds)" Agricultural Development and Economic Growth" (Ithaca, Yale University Press, 1967).
- Kuznets, S., "Six Lectures on Economic Growth" (Glencoe, Illinois, 1959) pp. 59-60.
- - - - " Economic Growth and the Contribution of Agriculture", The International Journal of Agrarian Affaires, No.2, 1961.
- - - - ,Notes on the Take-off, in W.W. Rostow (ed.) "The Economics of Take-Off into Sustained Growth" (London: Macmillan, 1964) pp.22-43.
- - - - , "Economic Growth and Structure" (New York, 1965) pp.244-43.

- Kohls, R.L. and Downey, W.D., "Marketing of Agricultural Products", 4th edition, 1972, MacMillan Publishing Company Inc., N.Y.
- Lateef, N.A., "Report to the Government of Saudi Arabia on Agricultural Extension", F.A.O., Rome, Report No. 518 August 1956.
- Leibenstein, H. "Economic Development and Economic Growth", (New York, John Wiley, 1957) pp. 263-264.
- Lele, U.J. , The Role of Credit and Marketing in Agricultural Development, in Nurul Islam (ed) "Agricultural Policy in Developing Countries" (London: Macmillan, 1974).
- Lewis, W.A. "Economic Development with Unlimited Supplies of Labour", The Manchester School, Vol. 22, (May, 1954).
- - - - , "Theory of Economic Growth", London, 1955.
- - - - , "Unlimited Labour; Further Notes", Manchester School, Vol. 26 (1958).
- Lipton, M., "Agricultural Finance and Rural Credit in Poor Countries" , World Development, No.4 (July 1976) pp.543-53.
- List, F., "The National System of Political Economy" (London, 1885).
- Lloyd, G.R. ,Agriculture in Development Theory: An Overview, in G.R. Lloyd (ed) "Agriculture in Development Theory", (Yale University Press 1975) p.14.
- Luttrel, C.B. "Food and Population: A Long View", Federal Reserve Bank of St. Louis, 58 (May 1976) pp.2-10.
- Marx, K. (1889), "Capital: A Critical Analysis of Capitalist Production", (The Stereotyped edition) translated from the third German edition by S. Moore and Areling and edited by F. Engels, London.
- Mellor, J.W." The Economics of Agricultural Development", (Ithaca, Yale University Press, 1966).
- MERI Report (Middle East Research Institute, University of Pennsylvania), "Saudi Arabia", London, Croom Helm, 1985.
- Moliver, D. and Abbondante, P., "The Economy of Saudi Arabia" (N.Y.; Praeger, 1980)
- Mollett, J.A. "Planning For Agricultural Development", (London, Croom Helm 1984).
- Montgomery, G. ,Education and Training for Agricultural Development, in H.M. Southworth and B.F. Johnston (eds.) "Agricultural Development and Economic Growth", (Ithaca, Cornell University Press, 1967).

- Mosher, A.T." Getting Agriculture Moving: Essentials for Development and Modernisation", (New York, Praeger, 1966) p. 141.
- Morgan, W.B." Agriculture in the Third World: A Spatial Analysis", (London, Bell and Hyman, 1980) p.47.
- Myint, H., Agriculture and Economic Development in the Open Economy, in G.R. Lloyd (ed.), "Agriculture in Development Theory", (Yale University Press, 1975)
- Nicholls, W.H., "An 'Agricultural Surplus' As a Factor in Economic Development" Journal of Political Economics 71(1) (1963) pp.1-29.
- - - - " The Role of Agriculture in Economic Development, in C. Eicher and L. Witt (eds.) "Agriculture in Economic Development", (McGraw-Hill, 1964) p. 14.
- - - - , The Place of Agriculture in Economic Development, in K. Berill (ed.) "Economic Development With Special Reference to East Asia", (N.Y., St. Martin's Press, 1964)
- Nou, J." Studies in the Development of Agricultural Economics in Europe", (Uppsala: Almqvist and Wiksells, 1967) pp. 85-107.
- Nurkse, R., "Problems of Capital Formation in Underdeveloped Countries", (Oxford Basil Blackwell and Mott Ltd., 1953)
- - - - , "Patterns of Trade and Development" (Oxford, Basil Blackwell, 1962) pp. 41-42.
- Ohkawa, K., "Economic Growth and Agriculture", Annals Histotubashi Academy, October 1956.
- Ohkawa, K. and H. Rosovsky, "The Role of Agriculture in Modern Japanese Economic Development", Economic Development and Cultural Change, (October 1960) pp.43-67.
- Ojala, G., "Agriculture and Economic Progress" (Oxford, 1953)
- Ojala, E.M., The programming of Agricultural Development, in H.M. Southworth and B.F. Johnston (eds) "Agricultural Development and Economic Growth" (Ithaca, Cornell University Press, 1968).
- Oshima, H.T., "A Strategy for Asian Development", Economic Development and Cultural Change, Vol. 10, (April, 1962) pp.302-308.
- - - - , "The Ranis-Fei Model of Economic Development", American Economic Review, 53 (June 1963) p. 448.

- Paglin, M., "Surplus Agricultural Labour and Development: Facts and Theories", American Economic Review, (September, 1965), pp.815-834.
- Peterson, W. and Hayami, Y. "The Technical Change in Agriculture", A Survey of Agricultural Economics Literature, Vol.1, ed. Lee, R. Martin, (Minneapolis, University of Minnesota Press, 1977)
- Pinstrup-Andersen Per., "Agricultural Research and Technology in Economic Development", Longman, London & N.Y., 1982.
- Prebisch, R., "The Role of Commercial Policies in Underdeveloped Countries", American Review Papers and Proceedings (May 1959).
- Presley, J.R., "A Guide to the Saudi Arabian Economy", London, Macmillan, 1984.
- Population Reference Bureau Inc., U.N., "1984 World Population Data Sheet", Washington, D.C., 1984.
- Ritson, C., "Agricultural Economics; Theory and Policy", (Crosby Lockwood, London, 1977)
- Rosenstein-Rodan, P.N., "Problems of Industrialisation of Eastern and Southeastern Europe", Economic Journal, Vol.VIII, 1943.
- Rostow, W., "The Take-Off into Self-sustained Growth", Economic Journal, 66, (March 1956) pp. 25-48.
- - - - , "The Stages of Economic Growth - A Non-Communist Manifesto", (Cambridge, Cambridge University Press, 1960).
- - - - , "Agricultural Role in Economic Development", Foreign Agriculture, Vol. 1, No.35 (September 1963).
- Rustow, D., "U.S.-Saudi Relations and the Oil Crisis of the 1980'S", Foreign Affairs, Vol.55 No.3, April 1977.
- Ruttan, V.W., "The Impact of Urban-Industrial Development on Agriculture in the Tennessee Valley and the Southeast" Journal of Farm Economics, No.37, February, 1955, pp. 38-56.
- Sauer, C.O., "Agricultural Origins and Dispersals; The Domestication of Animals and Foodstuffs", Second Ed., Cambridge: Massachusetts Institute of Technology Press, 1969.
- Schichele, R., "Agrarian Revolution and Economic Progress", Fredrick, A. Praeger, N.Y., 1968.
- Schultz, T.W. , A Framework for Land Economics, in T.W. Schultz, "Economics Organisation of Agriculture" 1953, p.147.

- - - - , " Transforming Traditional Agriculture", (New Haven, Yale University Press, 1964).
- Sherif, M.M. " Production Economics Report to Wadi Jizan Agricultural Development Project", F.A.O., Rome, 1977.
- Sial, F.S., "Importance of Agriculture in the Oil-Rich Kingdom of Saudi Arabia", Agricultural Mechanisation in Asia, Africa and Latin America, Vol. 16(3), 1985, pp. 70-76.
- Stier, H. ,Extension Service, Education and Agricultural Development, in Nurul Islam (ed.) " Agricultural Policy in Developing Countries" (London, Macmillan, 1974) p. 453-55.
- Sutherland, J.A., " Agricultural Education in the South Pacific", 1968.
- Takroni, Mohamed, H. "Evaluating Loan Repayment in Saudi Arabian Agricultural Sector By Means of a Farm Credit Interdependent system", (Ph.D. Thesis, Oklahoma State University, U.S.A., 1980)
- The Economist, "Adjusting to a Better Diet", July 6, 1985.
- - - - - , "Chivvyng and Compromising", July 13, 1985.
- Timmer, C.P., "Food Prices and Food Policy Analysis in LDC's", Food Policy, Vol.5, No. 3, 1980, pp. 188-197.
- Todaro, M., " Economic Development in the Third World", Second Edition, 1981, (London, Longman)
- Tuncalp, S. and Yavas, U., "Agricultural Development in Saudi Arabia: Present Status and Prospects", Third World Planning Review, Vol. 5, Part 4, 1983, pp. 333-47.
- Unwin, T., The Economy Of Saudi Arabia, in " The Middle East and North Africa 1986", the 32 edition, London, Europa Publications Limited, 1986.
- Usher, A.P., "Soil Fertility, Soil Exhaustion, and Their Historical Significance", Quarterly Journal of Economics, 27 (May 1923) pp.385-411.
- Vavilov, N.I. "The Origin, Variation, Immunity and Breeding of Cultivated Plants", Trans. K. Starr Chester, Vol. 13, Nos. 1-6 of , Chronica Botanica, 1949-50.
- Veer, J.D., Extension and Administration Needs in Application, in E.O. Heady (ed) " Economic Models and Quantitative Methods for Decisions and Planning in Agriculture", Proceedings of an East-West Seminar (Ames, The Iowa State University Press 1971) pp. 489-490.

Viner, J. "International Trade and Economic Development", (Free Press 1952) p. 72.

Wahba, Hafiz, Reported in "World Petroleum", July 1938.

Warriner, D., Land Reform and Economic Development, in C. Eicher and L. Witt (eds.) "Agriculture in Economic Development", (New York, McGraw-Hill Book Company, 1964)

Welsch, F., "Education in Production", Journal of Political Economy 78, 1970.

Zuvekas, G. " Economic Development: An Introduction", (New York, St. Martin's Press, 1979).

Official Publications

ARAMCO (Arabian American Oil Company), "Aramco Handbook: Oil and the Middle East", Dhahran, Saudi Arabia, 1968.

F.A.O., Food and Agriculture Organisation of the U.N., "Increasing Food Production Through Education, Research and Extension", Freedom From Hunger Campaign, Basic Study No. 4 Rome 1962, p.8.

- - - - , "Programming for Agricultural Development", Agricultural Planning Studies, No.1, Rome, 1963.

- - - - , "Fertiliser Yearbook", Vols. 26 to 35, (1976-1985)

- - - - , "Production Yearbook", Vol.39, 1985.

- - - - , "Kingdom of Saudi Arabia", Report of FAO/Programming Mission, Rome, 1980.

F.A.O./F.I.A.C., "Fertiliser Subsidies; Alternative Policies" Rome, 1976, p.36.

I.M.F, (International Monetary Fund), "International Financial Statistics", Yearbook, 1986.

Ministry of Agriculture and Water, MOAW, Saudi Arabia, "The Third Five-Year Development Plan, 1980-85; The Operating Plan", (in Arabic)

- - - - "The Fourth Five-Year Development Plan, 1985-90; The Operating Plan", (in Arabic)

- - - - "The Agricultural Magazine", No.4, Jan., Feb. and March 1985.

- - - - "A Guide to Agricultural Investment in Saudi Arabia", Riyadh, 1984
- - - - "Results Of The Overall Agricultural Census For 1973/74", Riyadh, 1974, (in Arabic)
- - - - "Bulletin Of Agricultural Current Sample Survey", Different Issues, 1970 To 1985.

Ministry of Finance and National Economy , Saudi Arabia, Central Department of Statistics, "Statistical Yearbook", 1982.

- - - - "The Statistical Indicator", 1980.

Ministry of Planning, Saudi Arabia, "The First Five-Year Development Plan; 1970 - 1975"

- - - - "The Second Five-Year Development Plan; 1975 - 1980"
- - - - "The Third Five-Year Development Plan; 1980 - 1985"
- - - - "The Fourth Five-Year Development Plan; 1985 - 1990"
- - - - "The Achievements of the Development Plans 1970 - 1984: Facts and Figures", Riyadh, 1985.

Ministry of Higher Education, Saudi Arabia, Directorate General for the Development of Higher Education, "Progress of Higher Education in Saudi Arabia During the Years 1970 to 1980", Riyadh, 1980, Table No.2, p. 144.

- - - - "Statistics of Higher Education in the Kingdom of Saudi Arabia", 1983/84, Issue No.7

Ministry of Labour and Social Affairs, Saudi Arabia, "A Brief Report About Cooperative Activities in Saudi Arabia.", (Unpublished Report, 1985, in Arabic)

O.E.C.D. (The Organisation for Economic Cooperation and Development), "Intellectual Investment in Agriculture for Economic and Social Development", No.60, Paris 1962.

- - - - , "Agricultural and Economic Growth", a report by a group of experts, Paris 1965, p. 25.
- - - - , "Advisory Work in Farm Management", Documentation in Agriculture and Food, No. 77 (Paris, May 1966).

OPEC, Organisation of the Petroleum Exporting Countries, "OPEC Bulletin", June 1985, p. 49; July/August 1985, p. 21; March 1986, p. 49.

Saudi Arabian Monetary Agency (SAMA), Saudi Arabia, "Annual Report", Different Issues, 1970 to 1986.

- - - - - "The Statistical Summary", 1985.

Saudi Arabian Agricultural Bank (SAAB), Dept. of Research and Economic Studies, "A Study About Mechanisation and Agricultural Development in Saudi Arabia", 1981. (in Arabic)

- - - - - "Analytical Study About Technical, Economical and Financial Aspects of the Farms Financed Through Loans from SAAB." ,The First Prport 1982, Riyadh, (in Arabic)

- - - - - "An Analytical Study about the Situation of Co-operatives and their Role in the Process of Agricultural Development in Saudi Arabia", First Report, 1982/83, (in Arabic)

- - - - - "The Annual Report", different issues, 1978 to 1985.

- - - - - "The Saudi Arabian Agricultural Bank in Twenty Years", Riyadh, 1985.

The Grain Silos and Flour Mills Organisation, (GFSMO), Saudi Arabia, "The Annual Report", different issues, 1979 to 1985.

UNCTAD, United Nations Conference on Trade And Development, 1976.

- - - - - , "Monthly Commodity Price Bulletin: 1960-84", Geneva, July 1985, p. 5

UNESCO, U.N. " Agricultural Education in Asia", Paris 1971, p.35.

United Nations, Department of Economics and Social Affairs of the Secretariat, "Selected World Demographic Indicators By Countries; 1950 - 2000", ESA/P/W, 1970.

- - - - - , "Yearbook Of International Trade Statistics", Different Issues, 1963 To 1983.