304

ECONOMIC FACTORS THAT AFFECT WHEAT PRODUCTION IN IRAN

BY

MOHAMMAD RAD

B.S., Tehran University, 1971

A MASTER'S REPORT
submitted in partial fulfillment of the
requirement for the degree
of Master of Science

Department of Agricultural Economic

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1979

Approved By:

L. Orlo Sorenson
Major Advisor

Spec. Coll.
LD
2668
.R4
1979
R34
c. 2

TABLE OF CONTENTS

Page

ACKNOWLEDGMENTS..... viii

PART I

IRANIAN ECONOMIC BACKGROUND..... 3

PART II

FACTORS THAT AFFECT AGRICULTURAL PRODUCTION IN IRAN..... 15

WATER RESOURCES..... 16
LAND..... 28
TECHNOLOGY..... 28
POPULATION DISTRIBUTION AND LABOR FORCE..... 36
HISTORICAL STRUCTURE OF IRANIAN AGRICULTURE..... 44
PRESENT STRUCTURE OF IRANIAN AGRICULTURE..... 49

1. Small Farms..... 54
2. Commercial Farms..... 56
3. Agri-business..... 59

AGRICULTURAL CREDIT..... 63

1. Agricultural Cooperative Bank of Iran..... 65
2. Small Local Private Money Lenders..... 67
3. Pre-sale of the Crop..... 67
4. Processors of Agricultural Raw Materials..... 68
5. Special Government Programs..... 68
6. Commercial Banks..... 69
7. Agricultural Development Bank of Iran..... 69

TRANSPORTATION..... 75

PART III

INTEGRATED SUMMARY OF THE IRANIAN AGRICULTURE..... 76

PART IV

Page

WHEAT ECONOMICS AND POLICY IN IRAN..... 84

INTRODUCTION..... 85
DEMAND FOR WHEAT..... 86
DOMESTIC PRODUCTION OF WHEAT IN IRAN..... 98

Conditions Influencing Rate of Expansion in Domestic Production of Wheat..... 103

DISAPPEARANCE AND DOMESTIC SUPPLY GAP..... 121
WHEAT PRICE POLICY..... 123

CONCLUSIONS..... 132

REFERENCES..... 136

BIBLIOGRAPHY..... 141

APPENDIX..... 143

ILLEGIBLE DOCUMENT

THE FOLLOWING DOCUMENT(S) IS OF POOR LEGIBILITY IN THE ORIGINAL

THIS IS THE BEST COPY AVAILABLE

THIS BOOK CONTAINS NUMEROUS PAGES WITH THE ORIGINAL PRINTING BEING SKEWED DIFFERANTLY FROM THE TOP OF THE PAGE TO THE BOTTOM.

THIS IS AS RECEIVED FROM THE CUSTOMER.

LIST OF TABLES

Table		Page
1	COMPOSITION OF IMPORTED GOODS, 1959-68.....	9
2	FEASIBLE REVISED IRRIGATION PROGRAM, 1972-92.....	25
3	INCREASE IN FULLY IRRIGATED LAND, FIFTH AND SIXTH PLANS.....	26
4	PRESENT AND PROPOSED LAND USE.....	29
5	AGRICULTURAL MACHINERY IN USE (1973).....	32
6	POWER AVAILABILITY FOR AGRICULTURE, VARIOUS COUNTRIES ABOUT 1970.....	34
7	CHANGE IN NUMBER OF TRACTORS, VALUE OF MACHINERY AND COMMERCIAL FERTILIZER USED FOR THE UNITED STATES.....	35
8	INCREASE IN POPULATION BETWEEN 1966 and 1976.....	37
9	EMIGRATION AND IMMIGRATION IN IRAN 1974-75.....	38
10	CAUSES OF RURAL EMIGRATION TO URBAN CENTERS.....	39
11	LITERACY RATE.....	41
12	MANPOWER SUPPLY AND DEMAND.....	43
13	STRUCTURE OF IRANIAN AGRICULTURE, 1972.....	50
14	NATIONAL FARM SIZE DISTRIBUTION.....	51
15	APPROXIMATE SIZE OF FARMS REQUIRED TO MEET A TARGET INCOME OF U.S. $500 PER PERSON.....	53
16	VALUE OF MARKETED PRODUCTION BY SIZE OF HOLDING, 1972.....	58
17	CLASSIFICATION OF THE APPROVED PROJECTS ACCORDING TO THE AMOUNT OF LOAN.....	61
18	CLASSIFICATION OF THE APPROVED PROJECTS ACCORDING TO THE REPAYMENT PERIOD, 1977.....	62

Table		Page
19	DISTRIBUTION OF AMOUNT AND NUMBER OF LOANS EXTENDED BY ACBI	66
20	AGRICULTURAL CREDIT: ESTIMATED SUPPLY AND LIKELY FUTURE REQUIREMENT AT CONSTANT 1974 PRICES	70
21	RELATIVE IMPROVEMENT OF VARIOUS SOURCES OF AGRICULTURAL CREDIT, 1963-72	72
22	NATIONAL PRODUCTION IN 1977	73
23	DISTRIBUTION OF LOANS AND CREDITS OF THE BANKS TO THE PRIVATE SECTOR ACCORDING TO ECONOMIC ACTIVITY	74
24	POPULATION AND PER CAPITA DISAPPEARANCE OF WHEAT	89
25	PER CAPITA INCOME IN CURRENT AND CONSTANT PRICES	93
26	PRODUCTION AND YIELD OF WHEAT IN IRAN, 1961-76	99
27	AREA UNDER WHEAT WITH RESPECT TO TOTAL AVAILABLE LAND FOR IRRIGATED AND DRY-FARMING	109
28	ESTIMATED LAND USE, IRAN, 1971	110
29	ESTIMATED COSTS OF ONE HECTARE OF IRRIGATED WHEAT PRODUCTION IN IRAN, 1977, IN U.S. DOLLARS	112
30	ESTIMATED COSTS OF ONE HECTARE OF DRY-FARMING WHEAT PRODUCTION IN IRAN, 1977, IN U.S. DOLLARS	114
31	ESTIMATED COSTS OF WHEAT PRODUCTION PER HECTARE UNDER IRRIGATION CONDITION IN 1967 IN U.S. DOLLARS	115
32	AREAS UNDER WHEAT, COTTON, SUGAR BEETS, AND OIL SEEDS	119
33	PROJECTED VALUES OF POPULATION AND QUANTITY OF PRODUCTION AND DEMAND FOR WHEAT IN 1980, 1985 AND 1990	120

Table		Page
34	TOTAL WHEAT PRODUCTION AND ANNUAL PURCHASE BY CEREALS ORGANIZATION, 1958-75.....	124
35	IMPORTING PRICE OF WHEAT IN INDIA AND IRAN PRODUCERS SUPPORT PRICE OF WHEAT.....	127
A-1	IRANI GOVERNMENT AND PRIVATE AGRI-BUSINESSES.....	144
A-2	INVESTORS IN FOUR AGRI-BUSINESSES.....	146
A-3	IRANI BASIC FARM EQUIPMENT INVENTORY OF TWO AGRI-BUSINESSES IN KHUZISTAN.....	147

LIST OF FIGURES

Figures		Page
1	COMPOSITION OF IMPORTED GOODS.....	11
2	COMPOSITION OF CURRENT FOREIGN EXCHANGE PAYMENTS.....	11
3	COMPOSITION OF CURRENT FOREIGN EXCHANGE RECEIPTS.....	11
4	OIL'S IMPORTANCE.....	13
5	OIL REVENUE AND INFLATION.....	13
6	SECTOR SHARE OF GROSS DOMESTIC PRODUCT.....	13
7	ANNUAL PRECIPITATION IN IRAN.....	17
8	ANNUAL PRECIPITATION AND TEMPERATURE PATTERN IN IRAN.....	20
9	THE GENERAL MAP OF QANATS.....	22
10	ILLUSTRATION OF PER CAPITA DISAPPEARANCE OF WHEAT.....	90
11	ILLUSTRATION OF POPULATION GROWTH.....	92
12	CALORIE DEMAND AS A FUNCTION OF TOTAL EXPENDITURE IN TEHRAN, 1965.....	95
13	URBAN PRIVATE CONSUMPTION EXPENDITURE FREQUENCY DISTRIBUTION.....	96
14	ILLUSTRATION OF PER CAPITA DOMESTIC PRODUCTION IN IRAN.....	101
15	WHEAT YIELD AND YIELD TREND, IRAN, 1961-76.....	102
16	AREA IN WHEAT AND AREA TREND, IRAN, 1961-76.....	104
17	ILLUSTRATION OF THE GAP BETWEEN PER-CAPITA DISAPPEARANCE AND PER CAPITA DOMESTIC PRODUCTION.....	122

ACKNOWLEDGMENT

I would like to take this opportunity to thank the members of my committee: Dr. L. Orlo Sorenson, Dr. Edgar S. Bagley, Dr. Leonard W. Schruben and Dr. Michael W. Babcok for their suggestions, guidance, and encouragement through my graduate program at Kansas State University.

I am especially grateful to Dr. L. Orlo Sorenson, my major professor, for his advice, counseling, and patience in completing this report.

Appreciation is extended to Dr. Edgar S. Bagley for his constructive assistance and advice during my graduate program.

This manuscript is dedicated to my parents, without whose constant support and encouragement I would not have been able to complete this degree.

INTRODUCTION

Agriculture in Iran, has some similarities with other undeveloped nations and also has unique characteristics. Some characteristics influencing wheat production are generated from the economy as a whole, and some are from the agricultural sector.

Wheat is the most important crop in Iran. Over 50 percent of cultivated area is under wheat production. In 1965, per capita consumption of wheat as bread was about 464 grams per day (1.1lbs). At least 30 percent of each farm is under wheat. Wheat is the most important source of calories for income people, which are the majority of the population. Before 1963, Iran was a wheat exporting country, but since 1963 Iran has imported wheat. Size of imports has increased each year since 1963.

The goal of this report is to examine economic factors that affect wheat production in Iran. Meaningful discussion of wheat production requires background information on the national economy as a whole and especially the agricultural sector.

I have divided this report into four parts. In Part I, I discuss national economic issues in Iran. In

Part II, I discuss economic factors that are especially relevant for agricultural production. Part III, integrates economic factors into a summary of Iranian Agriculture. And, finally, in Part IV, I examine economic and public policy factors affecting wheat in Iran.

PART I

IRANIAN ECONOMIC BACKGROUND

An important task in examining national growth processes is to examine macroeconomic trends and growth rates in the key sectors. A more difficult task is to explain why certain events happened and how specific goals set for the economy by the authorities were or were not achieved. The process of development in Iran is complex and poorly understood. Growth in Iran is affected by a number of intangibles, including the nation's cultural patterns and social values. The country's development has political and human, as well as economic, dimensions. It depends both on external factors, which to a large extent are uncontrollable, and on internal forces, which are more susceptible to government control. Because of its multi-dimensional aspects any explanation of the "why" and the "how" of Iran's recent growth must involve some speculation.[1]

Dependent capitalism has been established in Iran in the past decade. This system determines the socio-economic infrastructure and political and cultural super-structure of the Iranian society.

The main features of dependent capitalism in Iran are as follows:

1. The growth of dependent entrepreneurs in the economy, especially in the industrial sector.
2. Capitalist relationships established in the villages and in the agricultural sector in general.

3. Unprecedented amounts of foreign capital investment in various sectors of the economy.
4. Formation of a minority consumer class, consisting of high and middle income people, as a complementary element of the new economic system.[2]

During the past decade, the industrial sector has developed faster than any other. The activities of this sector are dependent upon foreign technology, capital and management skills provided largely through multinational corporations. Major development is occurring in basic fields of mining and consumer goods industries, although at the present time the former activity (mining) lags far behind the latter (consumer goods industries). Heavy industry has advanced with the burden of capital investment carried by the government. The government also is in partnership with foreign capital in the production and export of industrial raw materials. The most important area of activity for the private industrial sector is in consumer industries such as food, clothing, medical supplies, toiletries, metal work, household goods, tractors, and transport. These industries have grown rapidly in the past ten years and capital investment in them has increased at an extraordinary rate in a very short time (30 or 40 times over in some cases).

The dependence of the industrial sector on multi-national corporation takes various forms. The most important of these are:

(a) Dependence through capital: The simplest form of capital dependency is the partnership between internal and foreign capital as in many important consumer goods industries. This is a formof direct capital dependency. However, if an industrial company is formed with borrowed capital from internal sources say from the Industrial Expansion Bank, then since the bulk of this bank's credits are provided by foreign banks, this would also constitute a form of indirect capital dependency.

(b) Dependence through machinery: Today, the whole of mechanized Iranian industry is dependent on foreign industry for its machinery and spare parts. An important part of the earnings of foreign capital employed in Iran is returned to the industrial countries for the import, maintenance and renovation of factories and machinery.

(c) Technological and technical dependence: The foreign advisors have a significant role in economic and industrial planning, in the assembly of machinery, and in supervising industrial production. Every year millions of dollars are paid out for foreign specialists. Thousands of foreign advisors and technicians accompany the dependent industries into Iran and are employed at substantial

expenditure of foreign currency to install and supervise industries. The cost of foreign technical supervision forms an important part of the total cost of industrial production.

(d) Dependence through intermediate goods and raw materials: Intermediate goods and raw material for which Iran is dependent upon international sources are of three types. First, are those items that have to be assembled in Iran, e.g., automobile parts; second, intermediary goods and raw materials that are directly imported from abroad such as chemical compounds, various metals, liquid rubber, industrial dyes, natural and synthetic fiber, and raw or semi-treated food materials; and, third, those products that are made in other dependent industrial establishments for further development or processing by Iranian industry. Thus, nearly all consumer materials and goods (except in food industries) are imported from abroad. Intermediate goods imports constituted 64.5 percent of Iranian imports in 1974 (Table 1 and Figure 1, 2, 3) much of which entered through multinational corporations.

(e) Dependence on foreign patents, trademarks, and systems of production: Payments for use of legally protected processes are sometimes as high as 15% of the total sale of a particular product.

The private industrial sector has important opportunity for development side by side with the state-run heavy industries. The government, by capital investment in steel, mining and petro-chemical industries, relieves the industrial sector of a heavy investment burden. However, the government intends subsequently to transfer these industries to the private sector. In the agricultural sector Government investment occurred in construction of the Des dam in Khozesian (a province in Iran). The fact that substantial government infrastructure and industrial investment has been undertaken in Iran has given the private industrial sector an extraordinary opportunity for growth.

With the growth of a dependent industrial sector, local producers or industries and traders, with systems of workshop production of consumer goods, came face to face with an industrial rival that began to flood the market with consumer goods. The rapid increase in imports during the previous two decades (1957-1977), coupled with the subsequent establishment of dependent industries and their rapid growth, forced small industries and artisans to retreat from their position and take up those trades that had not as yet been threatened. At every stage of retreat a considerable number of people lost their source of livelihood. Today, not only the urban markets but also markets in villages and even small hamlets are closed to the products of the artisan

Table 1

COMPOSITION OF IMPORTED GOODS, 1959-68

(millions of dollars)

	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
Intermediate goods	267.5	324.6	329.9	313.2	285.1	408.0	518.2	558.2	711.0	856.5
	(49.2)	(42.2)	(53.4)	(57.2)	(55.9)	(55.0)	(57.7)	(57.9)	(59.7)	(61.7)
Industries and mines	217.7	261.9	260.6	234.9	221.9	317.9	410.1	444.5	545.3	641.7
Construction	26.2	40.4	35.5	49.8	34.8	58.8	69.2	74.7	120.8	147.0
Services	22.1	19.9	29.1	23.5	22.1	24.7	30.7	31.3	30.9	52.1
Agriculture and livestock breeding	1.5	2.4	4.7	5.0	6.3	6.6	8.2	7.7	14.0	15.7
Capital goods	112.1	167.1	129.8	114.9	104.4	162.4	223.0	260.7	329.3	376.3
	(20.6)	(24.3)	(21.1)	(21.0)	(20.3)	(21.9)	(24.8)	(27.1)	(27.7)	(27.1)
Industries and mines	60.1	84.1	74.8	81.0	54.0	72.8	132.1	160.1	230.2	239.1
Services	33.1	69.1	29.4	20.6	26.7	47.7	55.8	63.9	71.5	103.8
Agriculture	19.0	13.9	25.6	13.3	23.7	41.9	35.1	36.7	27.6	33.4
Consumer goods	164.6	196.6	156.9	119.5	124.0	171.9	157.2	144.8	150.0	156.4
	(30.2)	(28.6)	(25.5)	(21.9)	(24.2)	(23.2)	(17.5)	(15.0)	(12.6)	(11.3)
Total	544.2	688.3	616.6	547.6	513.5	742.3	898.4	963.7	1190.3	1389.2

NOTE: ( ) indicates percent of total.

SOURCE: Compiled from Bank Markazi Iran, Annual Report and Balance Sheet, various issues.

Table 1 (Cont.)

	1969	1970	1971	1972	1973	1974	Average Annual Rate of Growth 1969-72	Average Annual Rate of Growth 1972-74
Intermediate goods	987.3	1068.5	1336.3	1596.2	2273.7	4266.4	17.37	36.78
	(64.0)	(63.7)	(64.8)	(62.1)	(60.8)	(64.5)		
Industries and mines	737.4	845.0	1110.9	1265.8	1912.0	3324.5	19.73	37.97
Construction	152.7	145.8	138.5	204.3	237.8	375.8	10.19	22.53
Services	64.8	52.7	57.8	97.4	76.3	444.1	14.55	65.82
Agriculture and livestock breeding	32.4	25.0	29.1	28.7	47.6	122.0	-3.96	61.99
Capital goods	387.2	391.0	482.9	642.6	906.0	1330.9	18.40	27.47
	(25.1)	(23.3)	(23.4)	(25.0)	(24.2)	(20.1)		
Industries and mines	316.2	263.7	316.6	411.9	560.3	770.4	9.21	23.21
Services	30.9	91.2	132.7	168.4	273.0	464.6	75.98	40.25
Agriculture	40.1	36.1	33.6	62.3	72.7	95.9	15.82	15.46
Consumer goods	168.2	217.1	241.7	331.6	557.4	1016.4	25.39	45.26
	(10.9)	(12.9)	(11.7)	(12.9)	(14.9)	(15.4)		
Total	1542.7	1676.6	2060.9	2570.4	3737.1	6613.7	18.55	37.03

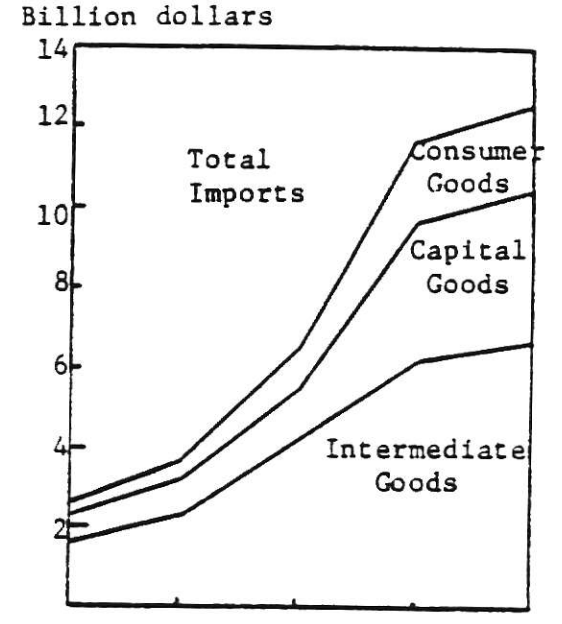
NOTE: ( ) indicates percent of total.

SOURCE: Compiled from Bank Markazi Iran, Annual Report and Balance Sheet, various issues.

As reported by Robert E. Looney, A Development Strategy for Iran through the 1980's.

Figure 1

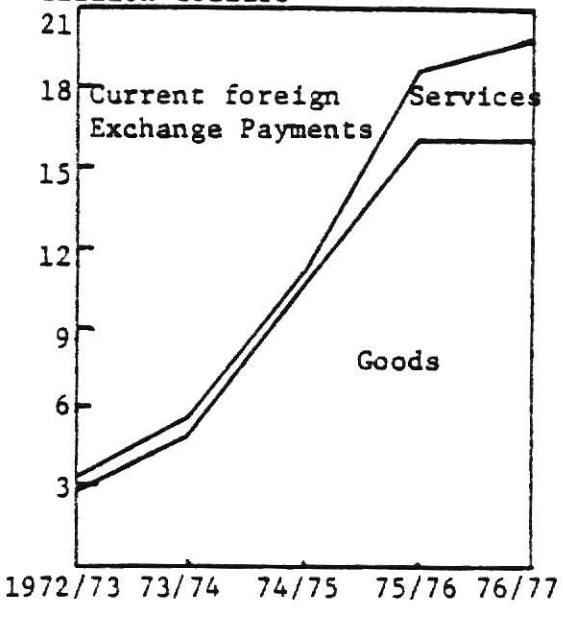
COMPOSITION OF IMPORTED GOODS



Source: Central Bank of Iran

Figure 2

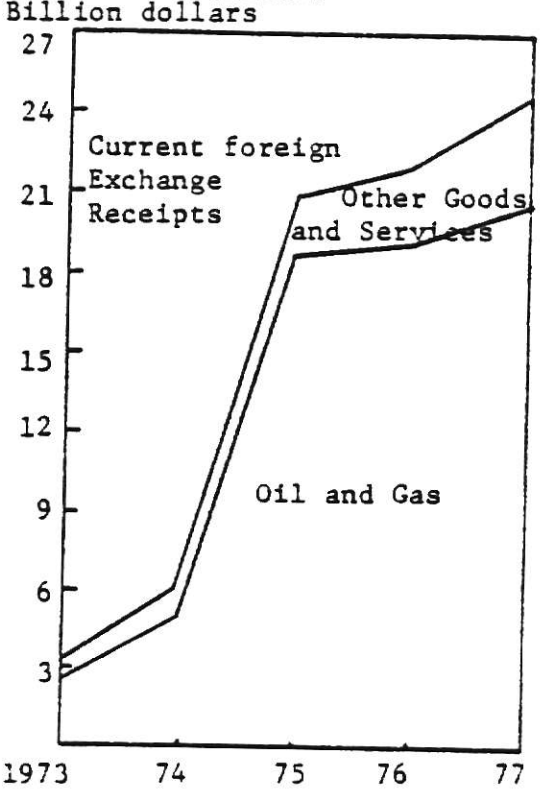
COMPOSITION OF CURRENT FOREIGN EXCHANGE PAYMENTS



Source: Central Bank of Iran

Figure 3

COMPOSITION OF CURRENT FOREIGN EXCHANGE RECEIPT



Source: Central Bank of Iran

system of production. This process will, in time, destroy traders, small businesses, and ultimately the small local producers and extend the dependent industrial and commercial sector throughout Iran.[3]

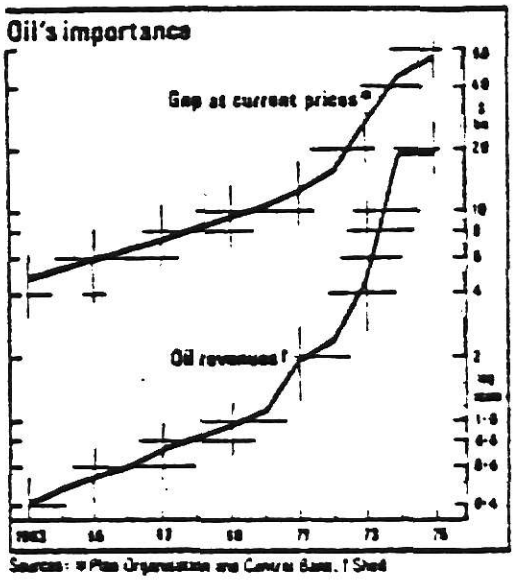
Another important factor of dependency is the role of oil in the economy. Figures 4, 5, and 6 show the important role of oil revenues.

The key issue arising from the Iranian economic performance during the last decade is how long economic growth can be sustained without a more concerted effort to solve a number of the country's underlying social and income distribution problems. Economic growth and socio-economic develcpment in Iran are not necessarily synonymous. Iran experience . . . offers a clear example of growth without development. And with the increase in oil revenues, the Iranian economy was able to achieve for a time a high rate of growth associated with little or no social development, intensified unemployment, widened disparities in income distribution, and the stagnation of educational opportunities.[4]

The following comment by Clower concerning growth and development in Liberia is applicable to Iran:

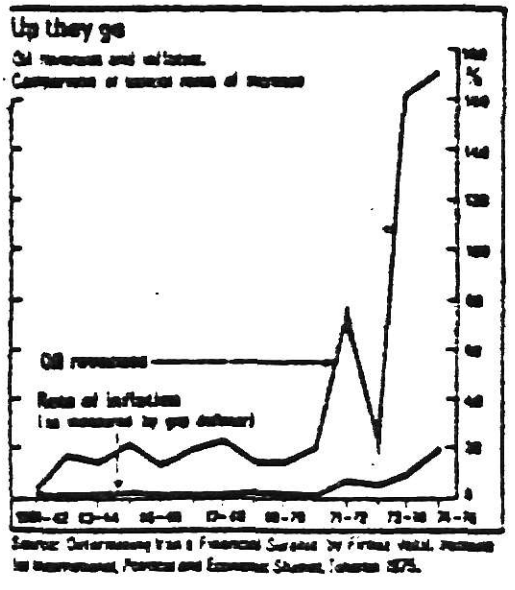
> "Development involves. . . structural change in lines of production undertaken by Liberians moving from subsistence production in the tribal sector to production for sale, the adoption of more efficient techniques; a continuous decline

Figure 4



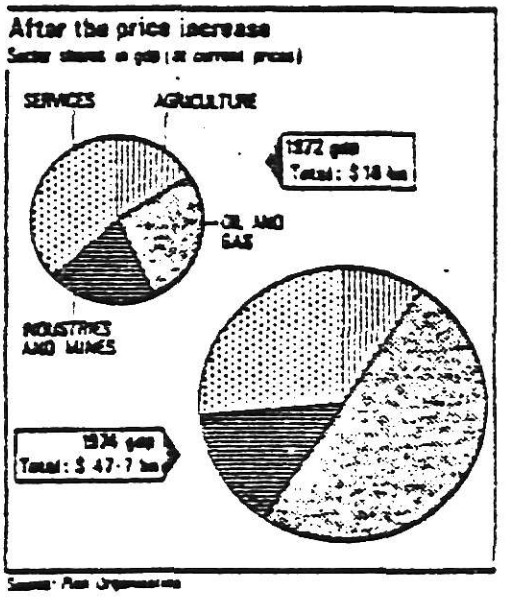
As reported by: Iran Almanac and Book of Facts

Figure 5



As reported by: Iran Almanac and Book of Facts

Figure 6



As reported by: Iran Almanac and Book of Facts

in the proportion of unskilled labor in the labor force; and new social achievement and aspirations. Specifically, it involves the acquisition of social overhead capital (such as roads, power facility, and schools) and institutional improvement (more and better government services, higher level of education, and skilled labor, . . .).[5]

PART II

FACTORS THAT AFFECT AGRICULTURAL PRODUCTION IN IRAN

WATER RESOURCES

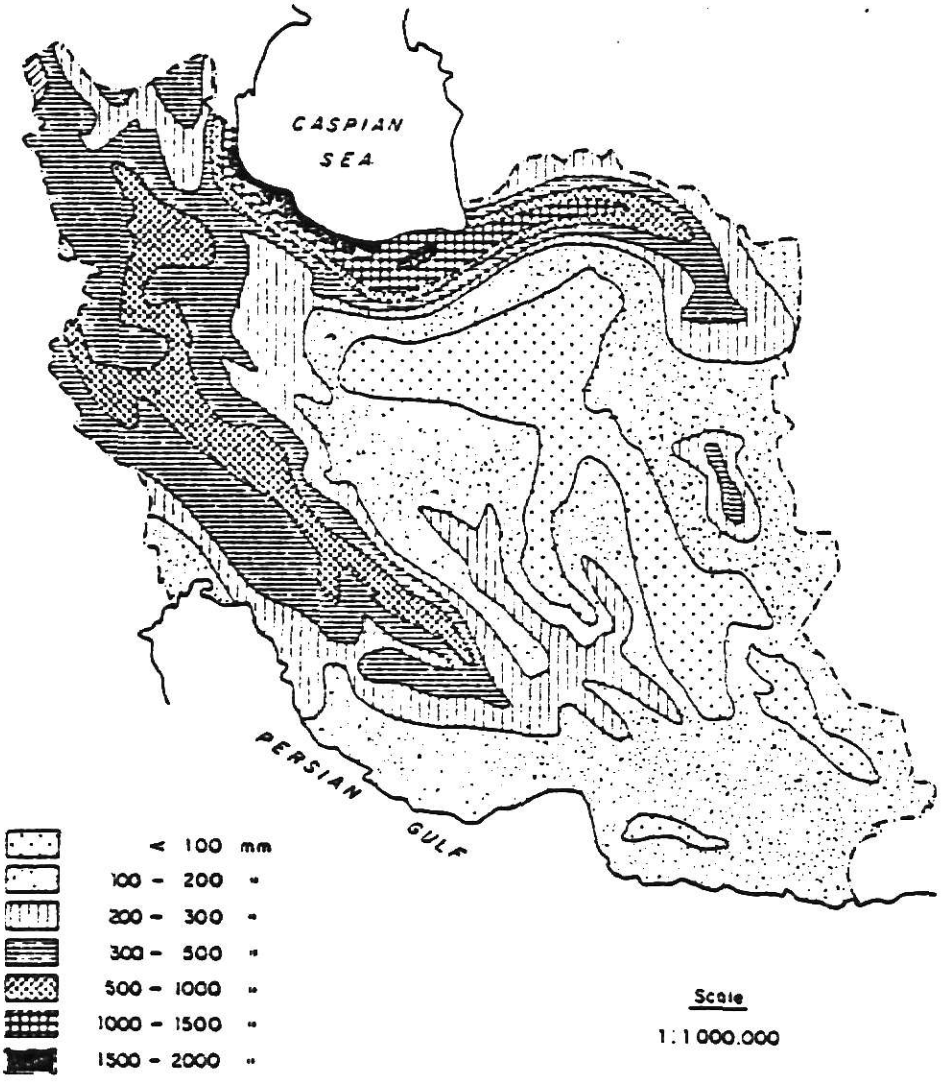
Iran is a predominantly arid country, and the availability of water defines the boundaries of present agriculture and the potential for change. About 74 percent of the land area receives less than 250 millimeters (mm) (10 inches) of precipitation. About half of the irrigable land is salt-affected or water-logged. Evaporation is usually high, and annual or seasonal deficits of water severely limit the area under rain-fed crops. In most parts of the country, rainfall is the limiting factor on agricultural development. The 250 mm precipitation line generally marks the boundary between areas where cereals can be cultivated without irrigation and areas dependent on irrigation.[6]

Figure 7 shows the annual precipitation in Iran. We can distinguish five important moisture-related problems of rain-fed agricultural production in Iran:

1. Geographic scatter of precipitation (i.e., excessive rainfall in some coastal regions).
2. Unequal geographic distribution of precipitation within regions.
3. Unequal temporal distribution of precipitation.
4. High degree of evapotranspiration.
5. High salt content of surface water in rivers.

Figure 7

Annual Precipitation in Iran



Source: FAO, Report to the Government of Iran. Assistance in the Planning and Design of Irrigation and Water Development Projects, based on the work of H. Hekket, United Nations Development Program, Report no. TA 2822 (Rome: FAO, 1970).

As Reported By: Oddvar Aresvik, The Agricultural Development of Iran

The above factors are expanded upon as follows:

1. It is estimated that one third of the total annual precipitation is on 10 percent of the land (Caspian Sea coast). One third of it falls on 50 percent of the land in the central part of Iran.
2. Precipitation is not homogenious within each region. Precipitation that falls heavily in the mountain areas will turn to small surface floods which are destructive in some seasons. Rainfall on deserts, because of high temperature and low and scattered precipitation, will evaporate before it can join surface or underground reservoirs.
3. Most of the crops will grow in the summer, but most of the precipitation is in fall or in the beginning of spring. In summer time when crops need more water, precipitation approaches minimum level, so that many of the rivers in summer are dry and soil moisture is effectively reduced.
4. High sunshine in many regions will cause a high rate of evapotranspiration, e.g., in Tehran with a precipitation of 220 mm per year (14.7 inches/year), evapotranspiration is about 3000 mm (200 inches), almost 13 times more. High evapotranspiration in the hot season will cause plant water requirement to increase. In Tehran case irrigation water must be provided to supply the difference

between 220 mm rainfall and 3000 mm evapotranspiration.

5. Finally, the water of a large number of rivers is salty, which will cause improper chemical balance in the soil if applied for irrigation purposes.

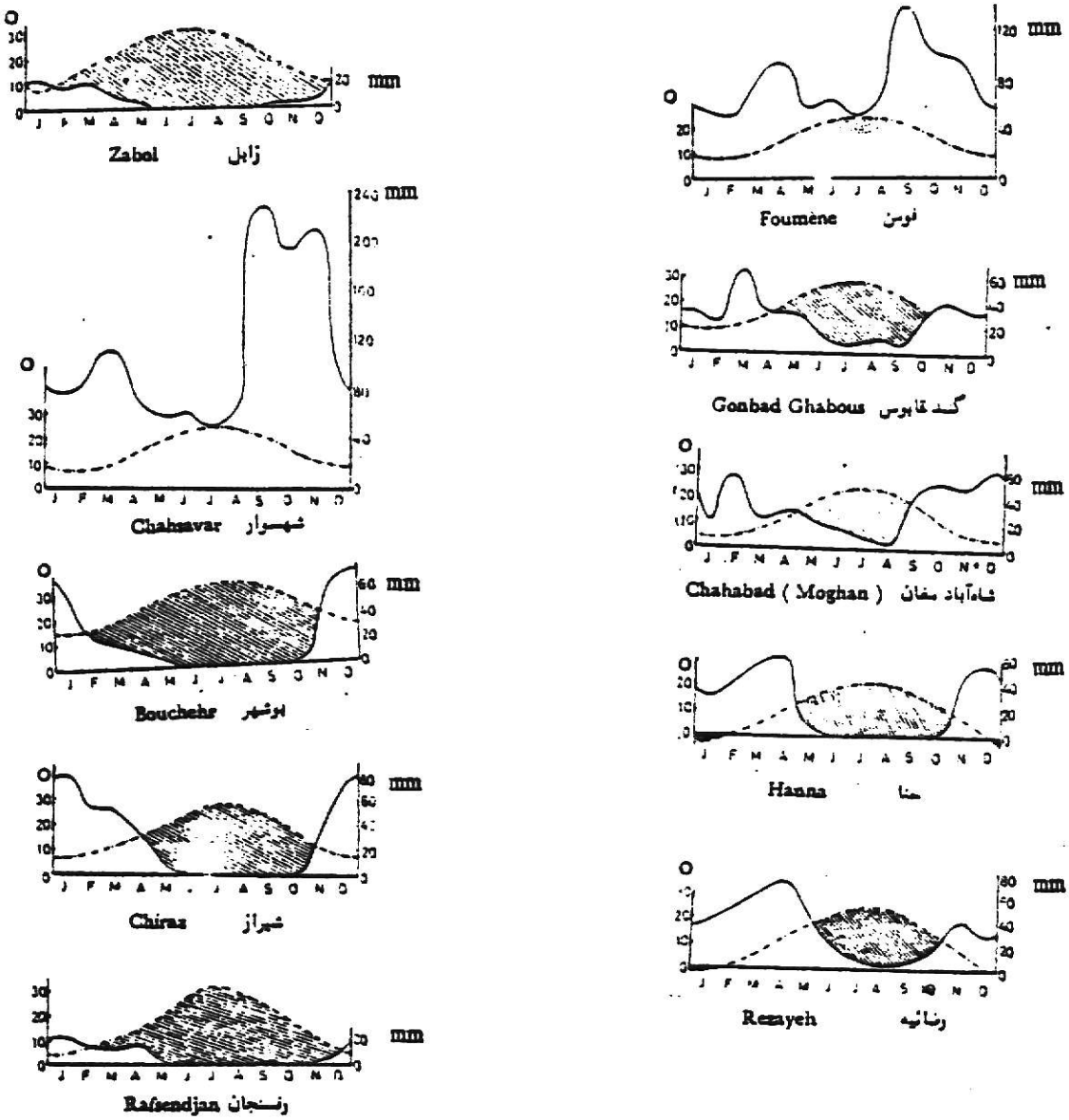
Because of very marginal moisture conditions, farming in many areas is limited to those crops that can be adapted to these climate conditions. Adapted wheat varieties have been developed. Most of the dry farming area is under wheat cultivation. The yield of wheat under dry-land farming condition in Iran is highly dependent upon spring precipitation.[7]

Studies in the United States have shown that wheat can be grown with a minimum annual precipitation of 200 mm (8 inches). Increase in timely rainfall of 12 mm (.48 inches) will increase yields an average of 56 kilograms (123 lbs.) per hectare. In western Australia, minimum water requirement for wheat is reported to be 150 mm (6 inches) with average yield of 500 kg (1100 lbs.) per hectare (7.3 bushels per acre).

Expected average yield of wheat in Iran with rainfed production and minimum annual rainfall of 250 mm (10 inches) is 500 Kg per hectare (7.3 bushels per hectare). Seasonal rainfall patterns are not optimum in Iran. Annual precipitation and temperature patterns in various parts of Iran are shown in Figure 8.

Figure 8

ANNUAL PRECIPITATION AND TEMPERATURE PATTERNS IN IRAN



mm: millimeters of precipitation
o: temperature in centigrade
-.-.-: temperature
———: precipitation

SOURCE: Habribolah Sabeti, The Study of Bioclimatology of Iran, (University of Tehran, 1970).

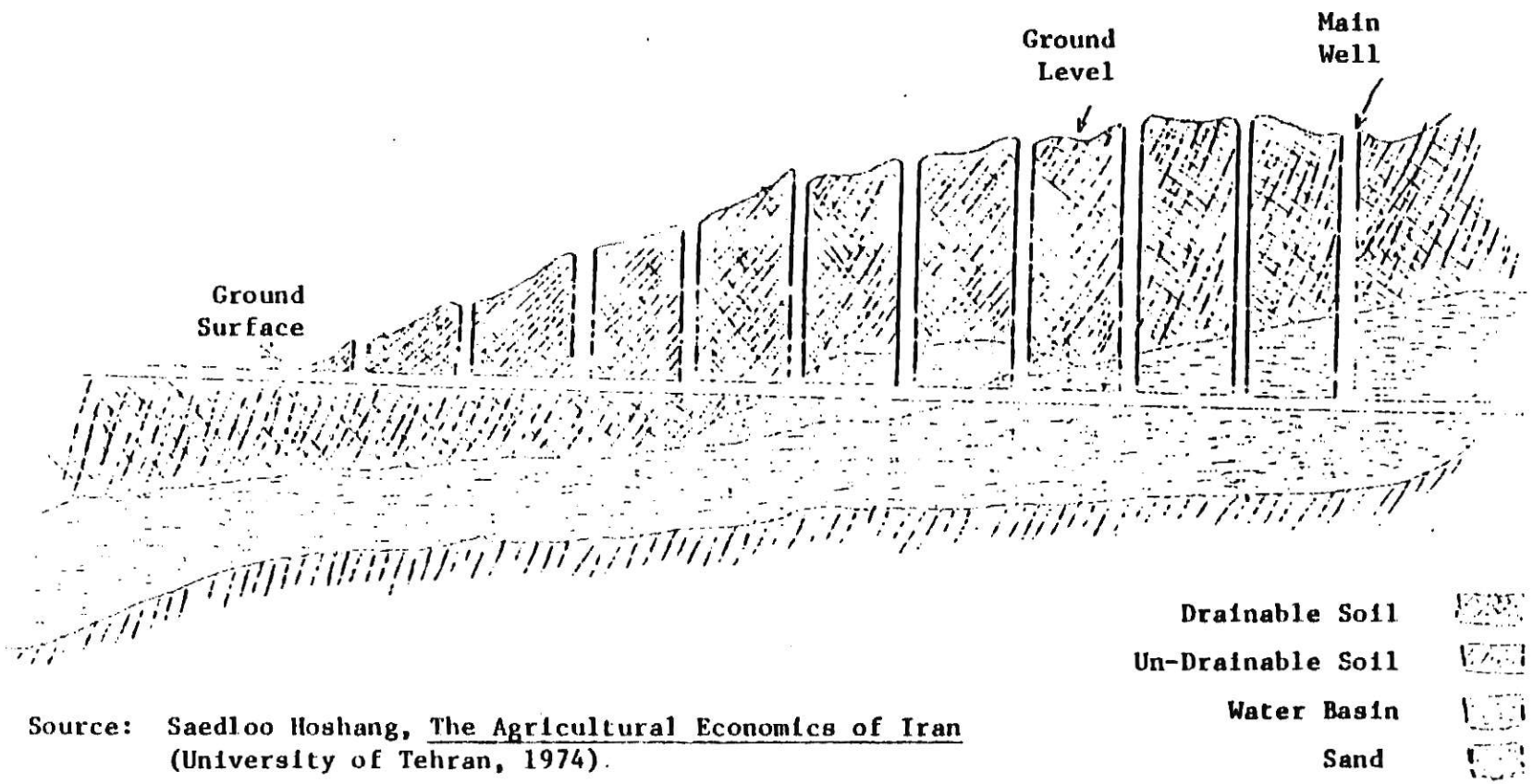
Because of marginal rainfall conditions irrigation of agricultural crops through management of surface water and pumping of underground water is important in Iran. Surface water irrigation potential is estimated at 77.5 billion cubic meters (BCM) per year. Of this amount, about 39.5 BCM are currently diverted for irrigation purposes, but only 16 BCM are estimated to be used effectively by the crops because of evapotranspiration.

Intensive studies and investigations are being carried out on the ground water potential. The amount of ground water potential, including the water made nonusable by excess salts, so far determined is 33.1 BCM per year. Of this amount, 19 BCM (58 percent) is already extracted by well, qanats and springs.[9]

The qanats, used for the last 2,500 years in Iran, tap a waterbearing stratum, usually in the mountains. Shafts of decreasing depth are sunk at intervals, and an underground conduit is excavated to connect the bottom of each shaft. The conduit is made so that its slope is less than that of the ground surface, and thus the tapped water is discharged above the ground where these two slopes meet. The great disadvantage is the waste involved. The flow is continuous, cannot be halted, and is practically never stored in reservoirs. (Figure 9)

Figure 9

The General Map of Qanats



Source: Saedloo Hoshang, The Agricultural Economics of Iran (University of Tehran, 1974).

Qanats are relatively expensive to construct, which is why capital investment for development of water supplies traditionally have come from land owners and hence water supplies are controlled by the land owners. The installation of tube wells has had the effect of hastening the obsolescence of qanats because the wells tend to lower the ground water table from which qanats draw their supply. The amount of ground water obtained by qanats in 1965-75 has been estimated at 9 BCM annually. It has been estimated that 8 BCM now are pumped by tube wells.[10]

The potential ground water htat is good enough for irrigation is not yet known, but it is perhaps not more than two-thirds of the total. 58.5 BCM are already diverted or extracted for irrigation and 1.6 BCM for individual and urban supplies.[11]

The irrigated area of Iran is about 3.6 million hectares (8.892 million acres). Of the current irrigation water exploitation, only about half is delivered to the fields. The balance is lost in conveyance and operation. Very few canals or channels are lined, structures are few, and the uncontrolled flow of qanats and springs produces water when irrigation is not required. Unleveled land has resulted in high field losses.

Much of the land nominally under irrigation receives only a supplementary water supply. On the basis of crop consumption requirements, average effective rainfall, and irrigation distribution and conveyance losses, it is estimated

that only one fifth of the irrigated land (750,000 hectares or 1,852,500 acres) receives, what Aresvik calls, an "optimal" water supply; that a similar area receives less-than-optimal but still moderate water supply; and that the remaining two million hectares receive only supplemental irrigation. Much of the area receiving optimal water supply is served by modern deep wells (450,000 hectares or 1,111,500 acres).[12]

Until the end of 1982, no new dams are likely to make significant quantities of additional water available; and consequently, even if it were possible to accelerate the development of tertiary and quaternary canals below the dams in order to extend distribution water on farms, the maximum expansion possible between 1972 and 1982 is about 800,000 hectares (1,976,000 acres) as can be seen from Table 2.

The figures in Table 2 illustrate very interesting differences between the short-term and long-term prospects. In the shorter term (up to 1982), the most feasible way of increasing the area of fully irrigated land is by more active exploitation of ground water, as shown in Table 3.

In the longer term (up to 1992), the greatest scope for expanding the area of fully irrigated land lies in the exploitation of surface water through the construction and completion of storage dams and related canals, as can be seen from Table 2.

Table 2

FEASIBLE REVISED IRRIGATION PROGRAM, 1972-92

Year	1972	1977		1982		1992
	Existing	Probable[a]	Feasible	Probable	Feasible	Feasible
Full irrigation						
Wells	0.82	0.94	1.18	1.09	1.68	1.80
New canals	0.13	0.28[c]	0.33[c]	0.58[c]	0.73[c]	1.60
Traditional Canals	0.55	0.60[c]	0.60[c]	0.60[c]	0.65[c]	0.70
Subtotal	1.50	1.82	2.11	2.27	3.06	4.10
Partial irrigation						
River diversions	1.30	1.25	1.25	1.15	1.10	0.95
Qanats	0.80	0.71	0.71	0.59	0.55	0.55
Subtotal	2.10	1.96	1.96	1.74	1.65	1.50
Total	3.60	3.78	4.07	4.01	4.71	5.60

[a]"Probably" is a fairly optimistic estimate of the rate of expansion of fully irrigated land, on the basis of performance over the decade 1964-74.

[b]"Feasible" refers to what could be achieved if a far more liberal and positive policy were adopted in licensing and the financial encouragement of groundwater development, and a crash program were adopted to develop tertiary and quaternary canals below existing dams.

[c]Mainly from existing dams not now fully utilized.

SOURCE: O.T.W. Price, Towards a Comprehensive Iranian Agricultural Policy (Tehran: IBRD, Agricultural and Rural Development Advisory Mission, 1975).

As reported by Oddvar Aresvik, The Agricultural Development of Iran.

Table 3

INCREASE IN FULLY IRRIGATED LAND, FIFTH AND SIXTH PLANS

(hectares)

	Fifth Plan (1972-77)			Sixth Plan (1977-82)		
	Probable	Feasible*	Difference	Probable	Feasible	Difference
Wells	120,000	360,000	+ 240,000	150,000	500,000	+ 350,000
Dams/canals	200,000	250,000	+ 50,000	300,000	450,000	+ 150,000

*Since only two years of the Fifth Plan remain, it is realistic to raise the Fifth Plan targets higher than shown.

SOURCE: O.T.W. Price, Towards a Comprehensive Iranian Agricultural Policy (Tehran: IBRD, Agricultural and Rural Development Advisory Mission, 1975).

As reported by Oddvar Aresvik, The Agricultural Development of Iran.

Accomplishing the feasible goals of ground water development will require a main adjustment in the government attitude toward ground water development. . . . the most rapid and sound development may take place through private wells, if their use is stimulated through long term credit.

Irrigation efficiency in Iran is generally very low, especially in the traditional diversion systems. Improvements in the use of scarce water resources could greatly contribute to more water being made available for irrigation. The present system, based mainly on wild flooding and basin and furrow irrigation, results in a low irrigation efficiency because most of the land is unlevelled. Thus, a major program required before more effective irrigation practices can be used is the levelling and grading of a large part of the irrigated lands. A major change in irrigation practices, mainly moving away from the small check-basin type of irrigation, is absolutely essential if the extensive hand labor, now used in irrigation, is to be replaced by mechanization, thus increasing yield to a satisfactory level.

The scarcity of fully irrigated lands is the most important factor that limits the agricultural development of Iran. Full development of the existing water resources and efficient land and water management, in combination with other factors for high yields, is the crux of increasing agricultural production.[13]

LAND

Approximately 40 million hectares of soil is suitable for cultivation. However, the major part of this area does not receive sufficient rainfall for production of crops or have water resources for irrigation. Accepting a 250-300 millimeter average annual rainfall as the lower limit for growing crops gives around 16 million hectares of total potential arable land. Of this area, nearly 9 million hectares are presently cultivated, as can be seen from Table 4. The present irrigation equipped area is around 5.3 million hectares; but the irrigated crop area is only 3.6 million hectares, giving a cropping intensity of 69 percent. It has been estimated that some 2.1 million hectares receives less than 4,500 cubic meters of water, or 18 inches of irrigation waters, annually per hectare.

The cropping intensity in rain-fed agriculture is estimated to be only 48 percent, with most of the cropped area under winter cereals. About 40 percent of the total arable rain-fed area receives rainfall greater than 500 mm, while 60 percent receives 250-500 mm.[14]

TECHNOLOGY

In order for the people to have more food, clothing, medicine, and other necessities, more has to be produced. To

Table 4

PRESENT AND PROPOSED LAND USE

(thousand hectares)

	Land Use 1970	1990 Land Use (high alternative)
Total area of Iran	165,000	165,000
Uncultivable land (deserts and wastelands)	86,000	86,000
Poor pasture, arid but cultivable lands	33,800	33,550
Forests with part of the area under permanent pastures	19,000	19,000
Permanent meadows and good pastures	10,000	13,000
Total arable land	16,200	13,450
Irrigation-equipped area	5,300	5,850
Cultivated	3,640	5,500
Rain-fed arable land	10,900	7,600
Cultivated	5,236	4,552

SOURCE: FAO, Perspective Study of Agricultural Development for Iran, ESP/PS/Iran?16 (Rome: FAO, 1974)

As reported by Oddvar Aresvik, The Agriculutral Development of Iran.

produce more, two things are necessary: One, more people have to be engaged in useful productive activity; or two, the labor of the workers and peasants has to yield a larger amount of goods than is now being obtained. For both of these purposes, but especially to increase individual productivity, more and better equipment is needed. To get more and better equpment, resources have to be mobilized from either internal or external sources. For agricultural purposes what is usually needed are water conservancy projects, irrigation systems, proper drainage, transportation roads and equipment and a variety of improved farm tools and simple machines.[15]

In 1960 (before land reform) mechanical power was used on less than 10 percent of land-holdings, with about 4 percent being fully mechanized. Before 1960, 75 percent of land cultivation employed animal power and the other 15 percent used only human power. Approximately 40 percent of all holdings had their own draught animals, 75 percent of these animals being used on holdings of under five hectares. About 85 percent of the total number of draught animals were oxen, the rest mainly asses. Animal drawn tools, as well as hand tools, were generally made and repaired by village blacksmiths. After the mid-1950's small workshops began to introduce improved types by adapting features of imported tools.

By 1966 there was about 16,000 tractors in operation in the country plus some 10,000 power tillers in the rice-growing areas. By 1971 there were some 23,000 tractors in operation, many of them run by private contractors.

The total number of four-wheel tractors sold to farmers annually in recent years as reported by the ministry of agriculture and natural resources increased from 2,772 tractors in 1971 to 5,787, 4,779 and 7,561 in 1972, 1973, and 1974 respectively. Table 5 indicates number of tractors, combines and tillers in use in Iran in 1973, as well as those in Iran but not being used (disuse) in the same year.[11] Total number of agricultural tractors on Iranian farms in 1975 is separately estimated at about 35,000.[17]

It is generally agreed that agricultural production in Iran could be increased considerably by proper application of reasonably complete farm mechanization. In some parts of the country only a limited number of operations have mechanized primary tillage and grain harvesting at the present time. This limited mechanization is not sufficient to achieve the potential increase in yields. The present average power availability, is also insufficient. A factor contributing to low yields is that present power availability per hectare of arable land, including farm worker, is low relative to the needs.[18]

Table 5

AGRICULTURAL MACHINERY IN USE (1973)

Machinery	In Use	Disused
Tractors	31,673	1,397
Combine Harvesters	1,987	253
Tillers	21,370	1,207
TOTAL	55,030	2,857

SOURCE: Iran Almanac.

Table 6 shows the availability of horsepower per hectare by source (line 5, 6, 7, and 8) in Iran in 1970, compared with four other selected countries. Total horsepower per hectare in Iran in 1978 was slightly more than 1/2 that of India, about 1/8 of the U.S. figure, 1/18 of Japan and 1/25 of West Germany. Change in number of tractors, investment in farm machinery and equipment and consumption of commercial fertilizer by agriculture in U.S. are reported in Table 7.

Important to agricultural production in Iran is the fact that lands are not levelled and cannot be levelled by primitive tools or by hand. Modern technology and machinery should be applied. Levelling the land requires high investment, but once it is done, increased production can be realized. Farmers typically are financially unable to buy land levelling equipment, hence these services must be provided by other private sectors or by the government.

Summarizing farm mechanization needs, Aresvik says:

> "In addition to the relatively low power availability per hectare and per worker in Iran, other energy-based inputs, such as fertilizers, irrigation, drainage, and pesticides, are relatively low. A crucial problem is that only with a harmonious combination of these inputs will maximum yields be attainable. To be effective, farm mechanization programs must be an integral part of a much wider development program that provides complementary services, inputs, and markets, and it must itself be complementary to rural development programs."[20]

Table 6

POWER AVAILABILITY FOR AGRICULTURE, VARIOUS COUNTRIES, ABOUT 1970

	India	Iran	United States	West Germany	Japan
Cropland (1,000 hectares)	162,434	8,876	176,400	8,185	5,753
Farm workers (1,000)	145,319	3,620	4,836	2,967	11,731
Four-wheel tractors (1,000)	63	27	4,820	1,257	64
Two-wheel tractors (1,000)	2	12	(700)	(100)	3,021
Human horsepower per hectare	0.09	0.031	n.a.	n.a.	0.216
Animal horsepower per hectare	0.204	0.036	n.a.	n.a.	0.120
Mechanical horsepower per hectare	0.008	0.104	1.4	4.7	2.664
Total horsepower per hectare	0.302	0.171	1.4	4.7	3.0
Farm workers per hectare	0.9	0.42	0.03	0.36	2.2
Horsepower per farm worker	0.28	0.40	47.00	13.00	1.23
Yield of Paddy (tons/hectare)	1.55	2.6	5.1	4.6 (wheat)	5.8

NOTE: n.a.: data not available.

SOURCE: FAO, "Agricultural Engineering," Joint Iran/FAO Workshop on Agricultural Sector Planning, Tehran, May 7-8, 1975.

As reported by Oddvar Aresvik, The Agricultural Development of Iran.

CHANGE IN NUMBER OF TRACTORS, VALUE OF MACHINERY AND COMMERCIAL FERTILIZER USED FOR THE UNITED STATES

Date	Number of Tractors (thousand)	Value of Machinery and Equipment[4] Total ($ Mil.)	Value of Machinery and Equipment[4] Per Farm $	Commercial Fertilizer Consumed[5] (thousand short tons)
1910	1[2]			5,547
1920	246			7,176
1930	920	3,302	597	8,171
1935	1,048[2]			6,275
1945	2,354	5,147	1,094	15,128
1954	4,345			22,773
1964	4,783			30,681
1969	4,619[3]	25,343	9,770	38,948
1974	4,390[3]			
Percentage Change:				
1935-1969	+341	+667	+1536	+521

SOURCE: Historical Statistics of the United States (1975), p. 469--see notes p. 455; 1945 Census of Agriculture, Volume II, Chapter 6, Table 3, p. 311; and 1969 Census of Agriculture, Volume II, Chapter 4, Table 14, p. 19.

[1]Census of Agriculture data. Excludes Hawaii and Alaska. Excludes steam and garden type tractors.

[2]Estimates only.

[3]Includes Hawaii and Alaska.

[4]No data was collected between 1945 and 1969.

[5]U.S. Department of Agriculture survey data. Includes Hawaii, Alaska and Puerto Rico for all years except 1920-1944. Prior to 1944, the data were for calendar years, and after 1944 for years ending June 30.

Technology does not mean machines alone. There is an art in the use of machines. In order to bring science to agriculture for the solution of food and raw materials problems, you need a farmer who understands new technology, the benefits to be gained from better technology, and has sufficient confidence in himself to use it. Ultimately, successful development rests on a transformation of the people themselves.[21]

POPULATION DISTRIBUTION AND LABOR FORCE

Population distribution and migration in Iran are important factors affecting the agricultural sector. The population distribution among urban and rural areas is shown in Table 8. According to Table 8, total population in Iran increased from 1966 to 1976 by 30.25 percent with urban population increasing 60.45 percent and rural population 11.76 percent. The portion of total population listed as rural dropped from 62 percent to 53.2 percent in the same period.

The five official figures in Table 9 concerning domestic emigration and immigration show that 284,000 people emigrated from the rural area to the cities during 1974-75.

The causes of emigration of rural inhabitants, mostly literate young men to urban areas are shown in Table 10.

Table 8

INCREASES IN POPULATION BETWEEN 1966 AND 1976

Population	1966 Census	1976 Census	Increase
Country Total	25,788,722	33,591,875	7,803,153
-Urban Areas	9,794,246	15,715,338	5,921,092
-Rural Areas	15,994,476	17,876,537	1,882,061

SOURCE: Iran Statistics Centre

As reported by Iran Almanac and the book of facts.

Table 9

EMIGRATION AND IMMIGRATION IN IRAN, 1974-75

Region	Emigration	Immigration	Net Change
Domestic			
Tehran	109,000	193,000	+ 84,000
Other Cities	497,000	697,000	+200,000
All Cities	606,000	890,000	+284,000
Rural Areas	1,015,000	731,000	-284,000
Total Domestic	1,621,000	1,621,000	+ 000

SOURCE: Iranian Population Growth Measurement, Publication No. 628, Statistical Centre of Iran.

As reported by Iran Almanac and the book of facts.

Table 10

CAUSES OF RURAL EMIGRATION TO URBAN CENTERS

Cause	1964 Sample Census	1972 Agricultural Census
In search of employment	11.2%	4.3%
In search of better jobs	49.2%	16.2%
Transfer of job	7.7%	4.8%
Marriage	10.9%	7.6%
Join family	8.8%	62.3%
Study	1.3%	0.6%
Other Causes	10.9%	4.2%

(Sample Demographic Census, 1964 and 1972, Iran Statistics Centre).

As reported by Iran Almanac and the book of facts.

According to Table 11 in 1964 49.2 percent of rural emigrations was reported to be "in search of better jobs." Job related reasons for emigration were reported by 68.1 percent of emigrants reported in 1964. In 1972, 62.3% of the population are said to have emigrated to "join family." "Family" in Iranian terminology includes relatives as well. Emigration to "join family" likely means to seek employment in locations near to relatives. Taking that into account, probably 85 percent of the emigrated rural population in 1972 sought employment upon arrival in urban places.

The main reasons for this migration have been "pull" factors represented by concentration of large-scale manufacturing industry in urban areas, the rapid expansion of urban construction activity, and the widening gap in income and social facilities between urban and rural areas. Since the early 1960's movement to cities has also been influenced by a limited increase in agricultural mechanization, relative stagnation of agricultural production and displacement affects of land reform.

Another reason for emigration is that a number of rural people have only seasonal employment in a rural community, hence, are unemployed for major portions of the year. Seasonal unemployment causes them to seek year around jobs in urban areas.[22]

Table 11

LITERACY RATE

	1956	1966	1972
Literacy Rate (Percent of Population 7 years and over)			
Total	15.4	29.4	36.9
Male	22.4	40.1	47.7
Female	8.0	17.9	25.5

SOURCE: Iran Almanac and book of facts, 1977.

With industrial development and agricultural mechanization, the country's educational and training facilities have been unable to provide sufficient skilled manpower to meet the demand. As shown in Table 11, in 1972 more than 60 percent of the population was illiterate, most of them in the rural areas. A high demand for skilled and semi-skilled labor in Iran is indicated in Table 12. In rural areas those who learn industrial skills often immigrate to urban points because of very high demand for skilled labor.

Most machinery repair shops are located at urban areas. It is also difficult to find reliable tractor drivers (again because good drivers are absorbed by the non-agricultural sector). This important factor will bring about competition among farmers to get better drivers and better repairmen, thus increasing the cost of mechanization.

High operation costs and at the same time insecurity, especially for mechanized operation influences crop selection by farmers. Farmers will choose the crop that will ensure returns sufficient to cover his costs. Farmers are accustomed to the traditional system and can, at least, cover their costs of production. New technology and machinery, where the economy does not facilitate its usage, can be used with risk. This point will be discussed further, later in the report.

Table 12

MANPOWER SUPPLY AND DEMAND
('000)

Category	Demand	Supply
Engineers	36.4	20.3
Medical Personnel	44.1	21.5
Educational Personnel	287.4	230.0
Other Personnel	279.5	266.0
Technicians	116.6	75.0
Skilled and Semi-skilled Workers	810.0	250.0
Unskilled Workers	538.0	528.0
TOTAL	2,112.0	1,390.8

SOURCE: Iran Almanac and book of facts, 1977.

HISTORICAL STRUCTURE OF IRANIAN AGRICULTURE (1960)

The pattern of land ownership in Iran before the land reform was, in general, as follows:

1. Big landlords, i.e., those with more than five villages each, owned a total of 19,000 villages in Iran (38% of the total). In this category, land ownership was concentrated in 37 families. (Village in Iran is a plot of land, which is owned by one or more persons, and cultivated by the peasants that are living on these lands. Number of owners and number of peasants and also acreages of land in villages vary).
2. Medium size landlords, i.e., those with one to five villages, owned a total of 7,000 villages (14% of the total).
3. Religious institutions, holy shrines and their administrators owned a total of 6,000 endowed villages (12%).
4. The state itself owned over 3,000 villages (6%).
5. Petty landlords (small farmer--landlords and absentee landlord) owned about 15,000 villages (30% of the total). Only 7% of the farmers (130,000 families) in Iran owned over three hectares of land each.

Nearly all the villages had a backward system of production, that is to say, each farmer worked a piece of land, which was managed by himself. He would keep a share of harvest for himself and give the rest to the landlord. The most prevalent system of sharing the crops was based on the five factors of cultivating the land, namely, water, land, seeds, oxen and labor. Every one of these factors would receive an equal share of the crop. Hence, those farmers who contributed labor only would receive 1/5 of the crop, those who also contributed oxen would receive 2/5, and so on. Before land reform there was 1.9 million families working under this condition.

On a whole, a system of barter existed in the rural areas, and the use of money was extremely limited. The peasants had neither the money to purchase industrial goods nor knew how to use such goods. Theonly goods that had a market in the villages were items such as sugar, a limited amount of cloth, and some elementary household goods. The backward system of production imposed a static type of relationship in rural areas, and this was diametrically opposed to the interests and modern designs of multi-national corporations which wanted to expand production. The multinational corporations badly needed the rural market for the sale of their goods and, at the same time, wanted to prepare the peasants for the production of raw materials.

The eradication of large scale ownership of land was the main objective of land reform (1963). According to the land reform law, every landlord was entitled to keep one village, but had to sell the remainder of his land to the government and receive payment by installments paid over 15 years. Orchards were one of the exceptions in the land reform laws. Mechanized farming was the other exception from the laws.

Landlords avoided some of the distribution effects of land reform by giving title to their relatives, switching their farms to orchards, and buying tractors as an evidence of mechanization.

The Result of Land Reform were:

1. Expansion of mechanization and of investment in agriculture. The land reform law defined a mechanized farm as "land which is at least cultivated by a tractor and worked by farm laborers." "worked by farm laborers" implies hired farm labor and hence replacment of peasant-type leasor-operators on the larger units as well as those acreages that were distributed in small tracts to owner-operators.

The absence of peasants and the use of causual farm labor denotes a capitalist form of production. In this case, the landlord will undertake to manage the farm, invest in

land, and use machinery and labor in reasonably appropriate economic proportions, at least within the framework of required mechanization. Hence, where large land holdings remain, traditional systems of production are being replaced and those large holdings operated as an integrated unit rather than a cluster of minimum-size units (3 hectares of less).

The mechanization of agriculture has, on the one hand, opened a whole new market for industrial products (such as tractors, fertilizers, . . .) and, on the other hand, released the disguised unemployed in the rural areas.

2. Increase in the number of small owner-operators.

   The number of owner-operators with small farm units has greatly increased since land reform. After land reform the number of small owner-operators has increased from 130,000 families to 800,000. Small amounts of lands (less than 3 hectares) were distributed to 1.1 million peasants in land reform.

Out of these 1.9 million about 130,000 owned land before the land reform and did not owe any installments on their farms. The rest are required to pay installments which far exceed the amount they would otherwise have had to pay the landlords in the form of crops. It will take these small landlords between 12 and 15 years to pay off the installments, during which time their living conditions remain more like those of the old-time peasants than owners of land.

3. Expansion of a money relationship and the growth of financial agencies (especially government owned) in rural area.

Prior to the land reform, the rural economy was primarily based on self-sufficiency, that is, the money relationship played a very small role in the day-to-day lives of the villagers. They would buy such items as sugar, tea and some household goods from the local shopkeeper, but would otherwise rely on their own production for their needs. This pattern changed after the land reform. The need to pay installments on land, the transformation of some peasants into laborers, the growth in the consumption of capital goods (farm machinery, chemical fertilizers, and the seeds) as well as consumer goods, all contributed to a tremendous growth of money relationship in rural areas. Shopkeepers and money lenders began to do increasingly profitable business. The government, too, started investing in rural areas and set up cooperative societies. The main task of these societies is to lend money to the villagers, but they also sell various goods in competition with the shopkeepers. It is important to note that land reform would have been impossible without these cooperative societies, because the poor peasants who received lands would not have been able to survive without some financial backing from the societies.[23]

PRESENT STRUCTURE OF IRANIAN AGRICULTURE

Largely as a result of reform in land ownership and industrial development policy, the organizational structure of farming in Iran has changed. Presently, farm production is organized around:

1. Small owner-operators, basically subsistence farms.
2. Larger, mechanized commercial farms.
3. Integrated production, processing or marketing firms referred to in Iranian literature as agri-business.

According to Table 13, Iran has a high proportion of small farms: 84 percent below eleven hectares, 67 percent below six hectares, 45 percent below two hectares, and 32 percent below one hectare. While farms under eleven hectares occupy about 40 percent of the land and produce a similar proportion of the agricultural gross output, they provide less than 20 percent of the marketed agricultural produce. This is a consequence of the fact that small farms have low cash sales and many are purely subsistence operations, with no surplus for sale. Farms over eleven hectares provide more than three-quarters of the marketed supplies.[24]

Table 14 also shows national farm size distribution in Iran. According to Table 14, only 11 percent of the present surplus comes from purely rain fed crops. In wheat, however, which is a strategically important corp, about half of the production is accounted for by the rain-fed areas.[25]

Table 13

STRUCTURE OF IRANIAN AGRICULTURE, 1972

Farm Size	Families or Farms (1000)	Families or Farms (percent)	Rural Population (1000)	Rural Population (percent)	Farm Area (1000 hectares)	Farm Area (percent)	Share of Gross Output (percent)	Share of Marketed Output (percent)
Large								
>100 hectares	7	--	36	--	1810	12	6	
Medium								77
51-100 hectares	10	--	52	--	700	4		
11-50	394	16	2048	12	7030	46		
Small								
6-10 hectares	434	17	2257	13	3180	21		
3-5	545	22	2834	16	1810	12		
1-2	342	13	1778	10	490	3	41	19
<1	801	32	4165	23	300	2		
Subtotal	2533	100	13170	74	15330	100	83	
Pastoralists	100		600	3	--	--		
Other rural people not owning land*	790		4119	23	--	--	17	4
Total	3423		17889	100	15330	100	100	100

*About 3.5 million of these people depend primarily upon earnings from agricultural labor and livestock herding for their livelihood.

SOURCE: O.T.W. Price, Toward a Comprehensive Iranian Agricultural Policy, Report No. 1, (Tehran: IBRD, Agricultural and Rural Development Advisory Mission, 1975).

As reported by: Oddvar Aresvik, The Agricultural Development of Iran.

Table 14

NATIONAL FARM SIZE DISTRIBUTION

Size (hectares)	Total Area (hectares)	Percentage Total Area	Percentage of Area Irrigated	Percentage of Area Rain-fed	Average Size (hectares)
Over 100	1,811,000	11.8	18.9	7.6	258.7
50-100	703,000	4.6	5.4	4.2	70.3
10-50	7,031,800	45.9	33.2	53.4	17.9
5-10	3,178,900	20.7	18.2	22.2	7.3
2-5	1,812,500	11.8	14.4	10.2	3.3
1-2	486,200	3.2	5.6	1.8	1.4
Under 1	299,600	2.0	4.3	0.5	0.4
TOTAL	15,327,500	100.0	100.0	100.0	6.1

SOURCE: Bookers Agricultural and Technical Services, Ltd., and Hunting Technical Services Ltd., National Cropping Plan, Interim Report, Vol. I. (Tehran: 1975).

As reported by: Oddvar Aresvik, The Agricultural Development of Iran.

The size and structures of individual farms has an important bearing on income in agriculture. The IBRD Agricultural and Rural Development mission, Iran, has estimated the approximate size of farms (Table 15) required to meet a 1980 target income of U.S. $500 per person at 1975 price levels. Although farm incomes could be raised by improving the supply of irrigation water, and/or better farming practices, many farm unit in Iran would still be too small to achieve the minimum levels of income within the next decade.[26]

The size of farm may also affect the efficiency of production on both rain-fed and irrigated farms. Especially in the low-potential rain-fed areas (250-450 millimeters per annum), the formation of large, mechanized farm units may be the most effective way of increasing crop productivity through the adoption of new techniques of soil and water conservation. In irrigated areas the number of small farms and the fragmentation of holdings among all types of farms makes it difficult to develop an efficient irrigation network and interferes with cropping patterns and the efficient use of machinery. Fifteen to twenty hectares is probably the smallest land unit required for an efficient irrigation unit for most field crops.[27] Here we say farms under ten hectares are small size farms, farm between 10 and 200 hectares are commercial farms; and farms greater than 200 hectares are agri-business.

Table 15

APPROXIMATE SIZE OF FARMS REQUIRED TO MEET A TARGET INCOME OF U.S. $500 PER PERSON

Type of Farm	Present Practices (hectares)	Improved Practices (hectares)
Dryland cereal farm	70	40
Partly irrigated field-crop farm[a]	9	5
Intensively irrigated field-crop farm[a]	5	3.3
Rice farm	2.5	1.5
Orchard	0.6	0.35
Poultry farm	11,000[b]	9,000[b]

NOTE: Table assumes an average family of 5.2 persons and forecast world prices (CIF, Iran) for 1980 expressed in 1975 constant dollars.

[a]Partly irrigated field-crop farm: 60 percent wheat, 30 percent sugar beets or similar crops, and 10 percent fallow. Intensively irrigated field-crop farm: 90 percent sugar beets, vegetables, and similar crops, and 10 percent fallow.

[b]Annual number of broilers sold, equal to shed capacity of 2,000-3,000.

SOURCE: O.T.W. Price, Towards a Comprehensive Iranian Agricultural Policy, ARDAM Report No. 1 (Tehran: ARDAM, 1975).

As reported by: Oddvar Aresvik, The Agricultural Development of Iran.

1. Small Farms:

It has been estimated that around 80 percent of the nation's farm families are engaged in traditional agriculture at a subsistence or semi-subsistence level. Although these families may possess, on the average, as much as four hectares of land each, probably no more than 25 percent is irrigated, and even this in many cases is limited to no more than two or three irrigations a year (partial irrigation). The majority of farmers in this category were traditionally service tenants or share croppers who obtained possession of their land through the land reform.

On peasant holdings with irrigation, most water is provided by qanats or small scale diversion works on seasonal streams. The water supply thus obtained is uncontrolled, erratic, and subject to seasonal and cyclical fluctuations in flow. Productivity under such a system is low, and cultivation is concentrated on staple crops for family consumption. Yields of the major crops generally are well below potential, even taking into account the limited water supply. This is due to inefficient water use, relatively low levels of inputs, ignorance of modern technology, lack of credit and effective extension service, and fragmentation of holdings. Some crops, usually the most profitable ones such as melons, cucumber, sugar beets, and cotton, receive preferential irrigation treatment and yields are reasonable, though still capable of considerable improvement.

Wheat and barley are by far the most important crops grown by this category of farmers on both irrigated and rain-fed land, with barley most widely grown in the more marginal areas. In addition to being staple foods, these crops have the advantage of being relatively drought-tolerant. Other crops are grown only to a limited extent, with pulses, fruits and industrial crops such as sugar beets and cotton, being the most widely cultivated.

Surplus on the larger or better irrigated units are marketed through local traders. Cooperatives and other institutions have been only partially effective as channels for the supply of credit and other inputs or as marketing outlets. The quantity of agricultural products marketed through the cooperatives is negligible (less than one percent of the national production), as is, apparently, the proportion of agricultural inputs they provide to their members. Except for lending, their services represent a negligible fraction of the overall rural activities and needs. Rural cooperatives have not been able to provide the farmers with sufficient credit, farm inputs, or technical assistance to help them increase their productivity or to market their produce.

The lack of finance for production credit has meant that the members have had to rely on private source of credit, and often have been obliged to market their crops through lenders as part of the original loan agreement. This meant a serious erosion of income because of high interest rates

and low prices paid for the produce by the private lenders. Regarding supply of inputs and marketing, a major constraint has been the lack of finance for infrastructure investment, warehouses, stores, and transport.

2. Commercial Farms:

This very important subsector of Iranian agriculture consists of regular farms that produce a significant surplus above the family's subsistance needs. Commercial farms include traditional family farms existing before the land reform, farms exempted from the land reform, and the larger farm enterprises resulting from the land reform. The size may vary from one hectare or less, in case of very intensive vegetables or orchards or poultry production, to more than 2,000 hectares. As an average, it is reasonable to assume that most farms of ten hectares or more with some irrigated land fall into this category.

This subsector produces nearly 50 percent of value added in settled agriculture and 60 percent of the market surplus.[29] Value of marketed production by size of holding can be seen from Table 16.

The commercial sector of the agricultural industry probably represents around 20 percent of the farmers and some 50 percent of the land. Most likely the importance will be still higher in the future, since it is the intention

of government to bring a higher proportion of farmers into this sector through various means.

All commercial farms produce primarily for the market, and therefore are responsive to such normal market forces as prices of products and inputs, availability of inputs, and market outlets. They are also affected by the overall investment climate. Development of this sector therefore will be closely related to national and sectoral policies as they affect the private sector. The rapid evolution of government policies and expansion of public sector activities in agriculture have not, until recently, been conducive to the development of private activities. The government has previously not given significant attention to the large production potential of this sector. It has mainly concentrated on the provision of infrastructure, credit, and incentive to agri-business.

For various reasons the commercial farmers have felt somewhat insecure about the future. As a consequence, investment in the commercial sector has been low, and it is probable that the low growth rate of agricultural production during the last two decades has been due in large part ot the failure of the commercial sector to expand output at a satisfactory rate.[30]

Table 16

VALUE OF MARKETED PRODUCTION BY SIZE OF HOLDING, 1972

	Billion Dollars	Percent
Large Farms (above 200 hectares)	.07	3.5
Medium Farms (between 11 and 200 hectares)	1.5	73.4
Small Farms (10 hectares or less)	.39	18.9
Pastoralists and other landless producers	.09	4.2
TOTAL	2.04	100.0

SOURCE: Estimates by Plan Organization.

As reported by: Oddvar Aresvik, The Agricultural Development of Iran.

Despite the importance of commercial farmers to Iran's agriculture, the government's policies have generally neglected them. The interests and needs of these farmers have gone unnoticed to some degree because of the government's emphasis on small farmers on one hand and the support of agri-businesses on the other. Several studies have indicated that the critical barrier to the rapid improvement of medium sized farm operations is the shortage of capital to finance purchases of equipment for modern farming.[31]

3. Agri-business:

Since the late 1960's, government policy has emphasized the establishment of large scale modern farm enterprises with joint Iranian and foreign investment. Government planners believe that operations which combine a variety of farming or livestock operations, called "agri-business" in Iran, will most efficiently use the land and water resources of the irrigation areas below new dams constructed during the period 1967-68 to 1977-78. During the early 1970's, the Ministry of Agriculture expanded the concept of agri-business to include food processing operations, meat complexes to fatten sheep and cattle, and large scale dairies.

In accordance with the Ministry's original concept, the minimum size of an agribusiness is 5,000 hectares. The agribusinesses lease undeveloped or semi-developed land, receiving 30 year leases on land and water at subsidized rates in return for investment in land development and

irrigation networks. The government also offers the agri-businesses low-interest, long-term loans and equite funds through the Agricultural Development Bank of Iran (ADBI).[33] Long term loans that are granted by ADBI are shown in Tables 17 and 18. Government also provides canals for units over 100 hectares, and roads for units over 1,000 hectares. The rest, including minor canalization and the employment of laborers, is left to the agribusiness companies.[34]

The initial geographic focus for the development of agribusiness projects was the 100,000 hectare, Dez Irrigation Project (DIP) in the province of Khuzistan. Between 1968 and 1973, the government attracted the participation of Iranian investors and several foreign companies for establishment of four agribusiness companies in DIP project. The four companies are listed in Table A-1.

The companies developed large tracts of land, purchased substantial amounts of agricultural equipment (see Table A-3), hired dozens of foreign technicians and by 1976 were farming 20,000 hectares. The basic cropping program of the agribusiness companies is a rotation of wheat, sugar beets, and alfalfa.[35]

Despite their ambitious start, the agribusiness companies have not been successfully operated. The crop yields achieved by the agribusinesses are significantly lower than the yields originally projected for the projects. They

Table 17

CLASSIFICATION OF THE APPROVED PROJECTS
ACCORDING TO THE AMOUNT OF LOAN

Size of Loan Thousands Dollars	No.	Percent	Amount of Loan in Million Dollars	Percent
7.14-14.28	48	8	.41	-
14.28-35.71	105	19	2.58	1
35.71-71.42	94	17	4.94	1
71.42-285.71	140	24	20.48	6
285.71-	182	32	341.64	92
TOTAL	569*	100	370.05**	100

*11 revised projects are excluded.

**Includes 104 million rials in guarantees issued.

SOURCE: Agricultural Development Bank of Iran.

Table 18

CLASSIFICATION OF THE APPROVED PROJECTS ACCORDING TO THE REPAYMENT PERIOD, 1977

Repayment Period	Number	Percent	Amount Thousands U.S. $	Percent
1-5 years	50	9	7,942.90	2
5-8 years	188	35	67,385.70	22
8-12 years	279	51	224,714.30	72
12- years	27	5	119,985.70	4
	544*	100	21,841*	100

*Excluding 20 projects for equity participation, three projects receiving grants, two letters of guarantee, and 11 revised.

SOURCE: Agricultural Development Bank of Iran.

do not compare favorably with crop yields achieved by the better commercial farmers in the same province of Khuzistan. The combination of low yields, high equipment costs, and excessive overhead costs have led to chronic financial losses, cash flow squeezes and crisis management.[36]

In my interview with a manager of one of these companies, he complained most of lack of skilled labor. He thought most of the losses are due to the fact that workers don't know how to work with the advanced equipment. Skilled laborers that are able to work with the equipment are scarce, their salaries are very high, and their employment tenure undependable because of high demand for their skills.

The deficit operations of the agribusinesses have been underwritten by a series of sizeable "rescue" loans and equity contribution by ADBI. In the face of growing losses, the private foreign and Iranian investors have been unwilling to increase their equity investment and ADBI has become a major shareholder in several of the agribusinesses.[37]

AGRICULTURAL CREDIT

As a result of the land reform, commercialization and modernization of agriculture took place more rapidly than would otherwise have occurred, and there was an increased demand for credit. The supply of agricultural credit in Iran has been inadequate and has acted as a constraint on agricultural development.

Past government policies have not been conducive to private investment in agriculture. The lack of well-defined agricultural strategy has created a weak investment climate and, to a large extent has been responsible for the low-level of private investment in agriculture. Two factors have been particularly important: (1) the failure to define a pricing policy for agriculture that offers the producer good, long-term price prospects for his products; and (2) the lack of long-term security of land tenure, mainly because of the failure to define the roles to be played in agricultural development respectively by the public and private sectors. The substantial amount of enabling legislation to give government the powers of compulsory acquisition has created considerable insecurity among private farmers. The alternative investment opportunities in other sectors have been made more attractive by their very high profit margins.[38]

The drastic changes in agricultural practices have increased the financial needs of farmers, but agricultural credit institutions have not been able to meet all their financial needs. On an average for the decade 1963-1972, agricultural credit institutions (Agricultural Cooperative of Iran and Agricultural Development Bank of Iran are extending loans to agriculture only) were responsible for 31 percent of the total amount of the loans obtained by farmers. About 20 percent was supplied by commercial banks;

and the remaining credit was obtained from private money lenders, middlemen traders, and relatives.[39]

In order to study the agricultural credit more carefully, money lenders are divided into different categories.

1. Agricultural Cooperative Bank of Iran (ACBI):

After land reform, the number of rural cooperatives increased. To receive land, farmers were required to be members of local cooperatives. The main function of the rural cooperatives is borrowing money from Agricultural Cocperatives Bank of Iran (ACBI) and subsequently, lending those funds in medium- and short-term loans to farmers.

With the wide coverage of the rural cooperatives, are in the best position to assist subsistence farmers by providing credit, production inputs, and marketing outlets, thus reducing the dependence of cultivators on private money lenders. The major remaining problems with the credit function of the rural cooperatives are shortage of funds and difficulty in matching size of loan with the individual farmer's need for credit. According to Aresvik, the supervision of the loans is generally inadequate. Because of its limited supply, cooperative credit has not contributed significantly to the financing of on farm investments.[40]

According to Table 19, there is a high demand for small ($150 or less) loans. This is an indication of the level of poverty of the farmer and the need for more loans

Table 19

DISTRIBUTION OF AMOUNT AND NUMBER OF LOANS EXTENDED BY ACBI

Year	Number of Loans in Thousands	Less Than $142.86	Between $142.86-$714.28	Between $714.28-$1,428.57	More Than $1,428.57
1967	250	188	50	9	2
Percent	100	75.2	20.2	3.7	.9
1968	327	234	78	12	3
Percent	100	71.5	23.7	3.7	1.1
1969	352	249	91	8	3
Percent	100	70.8	25.9	2.3	1.0
1970	350	233	107	7	3
Percent	100	66.5	30.7	1.9	.9
1971	212	139	60	3	9
Percent	100	65.9	28.4	1.5	4.2
1972	233	135	83	6	9
Percent	100	58	35.6	2.5	3.9
1973	263	110	132	8	12
Percent	100	41.9	50.5	3	4.6
1974	346	100	225	12	10
Percent	100	28.8	64.9	3.4	2.9
1975	441	68	328	32	13
Percent	100	15.4	74.4	7.3	2.9
1976	306				
1977	327				

SOURCE: Statistical Center of Iran, Plan Organization.

to enable him to produce. Small farmers are relying on other source of money supply.

2. Small local private money lenders:

Small farmers borrow some of their money from small, local, private lenders. These private money lenders usually have credit at a commercial bank and, in turn, lend money to local farmers. The loans from private sources generally carry a very high interest rate (estimated to range between 24 and 48 percent). Loans are not production oriented. The terms are usually six to twelve months. The only advantage, and the reason for the success, of this type of credit is the shortage of institutional credit and ready availability and freedom from red tape of private credit.[41] Small private lenders know their clients well and hence can lend judiciously with minimum documentation and formal procedure.

3. Pre-sale of the crop:

At the time of need a farmer may pre-sell his crops to a local trader. The local trader will pay the farmer in cash and, at harvest time, will collect from the horrowers crop. According to some studies, the cost of pre-selling is extremely high. Usually traders pre-buy the crop at half of its expected harvest price, and, because the farmer needs money, he will accept a high cost for advanced payment. It usually takes three months before the trader collects the crops. If the trader can sell at the harvest price and make

twice as much as when he pre-purchased three months earlier, the annual earnings (interest) rate is very high.[42]

4. Processors of agricultural raw materials:

Another source of credit for agriculture is the processors of agricultural raw materials, such as oil seeds, fruits, and vegetables. The processing companies generally provide advances to cultivators in kind, to be accounted for when farm produce is sold to the factories. The advantage of this type of credit is its production orientation, the provision of some extension service, and the marketing guarantee is provided. It is generally short-term with higher effective interest rates than those of commercial banks. The specific use of this type of credit limits its effectiveness for general farming.[43]

5. Special government program:

Credit is also provided to farmers under certain special government programs and through such channels as regional development authorities and special autonomous organizations concerned with individual crops (such as the Tea Board, Cotton Board, Sugar Board, the Tobacco Company, the government agencies in charge of the distribution of farm machinery and fertilizer, including the Agricultural Machinery Organization and the Fertilizer Distribution Company). The program for which credit is provided generally aims at improved production practices for special crops, encouragement of the use of modern inputs, and enhancement of general development of agriculture in particular areas.

The most important positive aspects of this type of credit is the production orientation and the concessionary rates.[44] Table 20 indicates that specialized agricultural credit institutions now provide about a quarter of the short-term credit and the bulk of the development credit for agriculture.

6. Commercial Banks:

Agricultural credit activity of commercial banks is a minor part of their total lending operation. During 1971-72 it accounted for only 6.3 percent. Table 20 indicates that specialized agricultural credit institutions now provide about a quarter of the short-term credit and the bulk of the development credit for agriculture. Table 20 also shows that while development credit is increasing rapidly, a further substantial expansion will be required to facilitate an acceleration in the growth of agricultural output. This highlights the need to expand on-farm investment programs.

In the absence of a production credit system for agriculture, most of the lending by commercial banks to agriculture is in the form of credit to big agriculturalists, processors, merchants, and exporters, some of which is re-loaned to the farmers at higher rate.[45]

7. Agricultural Development Bank of Iran (ADBI):

The other important institutional source of credit is the ADBI. This credit institution was created to provide long-term financing for commercial agricultural projects with a minimum limit on loans of one million Rials ($14,000).

Table 20

AGRICULTURAL CREDIT: ESTIMATED SUPPLY AND LIKELY FUTURE REQUIREMENT AT CONSTANT 1974 PRICES

Million Dollar

	1972[a]	1974[a]	1982[b] Assuming Real Growth in Output is 5%/yr.	1982[b] Assuming Real Growth in Output is 7%/yr.
Short-term Credit				
Agricultural Cooperative Bank	$244.29	$330.00		
Commercial Banks	198.57	285.71		
Non-institutional Sources	628.57	800.00		
Total	1,071.43	1,415.70	2,042.86	2,371.42
Medium and long-term credit				
Agricultural Cooperative Bank	22.86	112.86		
Agricultural Development Bank	17.14	65.71		
Machinery companies	18.57	24.28		
Farm Corporations	8.57	14.28		
Other	7.14	10.00		
Total	74.28	227.14	1,200.00	1,957.42

[a]These estimates are in current prices.

[b]Short-term credit needs are estimated at 34 percent of current agricultural value added, and long-term credit needs are based on a capital value-added ratio of 4:1 and a real growth rate of 5 percent or 7 percent per year.

SOURCE: Estimated by IBRD, Agricultural and Rural Development Advisory Mission, Iran, listed in O. T. W. Price, Towards a Comprehensive Iranian Agricultural Policy (Tehran: ARDAM, 1975).

As reported by: Oddvar AResvik, The Agricultural Development of Iran.

Although its share in the total volume of agricultural credit in the country is small (Table 21), it handles the major portion of the institutional long-term credit for agriculture. The average size of loan has been about 15 million rials ($20,000). The borrowers are commercial farmers, and agri-businesses.[50]

Table 22 shows the GNP in Iran and the sector percentages or shares of economic activities. According to Table 22 the value added in "agricultural group" in 1977 is 430.1 billion rials ($6,143 millions). Total loans extended by ACBI in 1977 was 37,760 million rials ($539.4 millions).[47] Total loan funds extended by ADBI to agriculture in 1977 is 21,841 million rials ($312 million).[48] These are the two specialized banks for agricultural credit. In 1977 they loaned a total of $851.4 million to the agricultural sector which is 13.9 percent of total production in the agricultural sector. The commercial banks also paid 23.6 billion rials ($337 millions) to the agricultural sector.[49] All new loans received by agriculture in 1977 totaled $1188.4 million, which is inadequate outside financing. The distribution of these loans among farm is unequal. In some areas credit is only 5 percent of the value of output.[50]

Table 23 shows the distribution of loans and credits of the banks to private sectors. The agricultural credit of commercial banks is a minor part of their total lending operation. During 1971 and 1972, it accounted for only 6.3 percent.[51] In 1977 it was 8.9 percent (Table 23).

Table 21

RELATIVE IMPORTANCE OF VARIOUS SOURCES OF AGRICULTURAL CREDIT, 1963-72

(Estimated Average)

Institution	Amount in Million Dollars	Percent
Agricultural cooperatives	$128.57	13.6
Rural cooperative societies	85.71	9.0
Agricultural Development Fund	5.71	0.6
Tea Board	1.42	0.2
Other Institutions	71.42	7.6
Total agricultural credit institutions	292.86	31.0
Commercial banks	188.57	20.0
	481.42	51.0
Noninstitutional credit	461.42	49.2
	942.52	100.0

SOURCE: FAO, Perspective Study of Agricultural Development for Iran, ESP/PS/IRA/74/10 (Rome: FAO, 1975).

As reported by: Oddvar Aresvik, The Agricultural Development of Iran.

Table 22

NATIONAL PRODUCTION IN 1977

(Billion Dollars)

National Product	Value Added		Percent Change		Share (Percent)
	Current Prices	Constant Prices	Current Prices	Constant Prices	
Agricultural Group	6.14	4.92	28.8	6.4	9.6
Industrial Group	13.42	9.34	51.3	22.0	18.2
Services Group	20.98	16.55	28.1	13.0	32.2
Gross Domestic Product (without oil)	40.54	30.82	35.1	14.4	
Oil Group	24.88	20.58	26.6	13.9	40.0
Gross Domestic Product (at factor cost)	65.42	51.39	31.7	14.2	100.0
Net factors income from abroad	-5.2	-3.7	-66.0	-73.9	
Net indirect taxes	1.57	1.18	- 1.8	-14.6	
Gross National Product	66.91	52.52	31.1	13.8	
Terms of trade adjustment			.65		
Gross National Income	66.91	53.17	31.1	15.9	

SOURCE: Central Bank of Iran.

Table 23

DISTRIBUTION OF LOANS AND CREDITS OF THE BANKS TO THE PRIVATE SECTOR ACCORDING TO ECONOMIC ACTIVITY

(Percent)

	End year		
	1975	1976	1977
Domestic Trade	25.1	25.4	24.7
Industries and Mines	20.8	23.0	25.2
Construction	12.3	13.8	16.2
Imports	16.2	12.8	11.4
Agriculture	9.1	8.8	8.9
Exports	3.2	3.6	1.5
Others	13.3	12.6	12.1
Total	100.0	100.0	100.0

SOURCE: Central Bank of Iran

Transportation:

There are 84,440 villages in Iran. Seventy six villages are served by water ways, 201 villages by railroad, 65,043 by road, (2,683 having paved road, 7,050 dirt road, and to 55,310 of the villages only jeeps can go when climate allows and constraints such as rain and flood or snow do not prevent travel). Finally 19,120 villages can be reached only with animal drawn loads or animal carriage. Only 11.5 percent of the villages can be served by trucks and only 3.2 percent of the villages have paved road.

PART III

INTEGRATED SUMMARY OF THE IRANIAN AGRICULTURE

At the turn of the century, Iran's economy was essentially agricultural. Agriculture and related activities provided jobs for 90 percent of the working population. The majority of non-agricultural occupations were in distributive trades or public and private services. Agriculture and related activities contributed 80-90 percent of GNP. The remaining 10-20 percent was provided by a few small-scale industrial and mining enterprises and tertiary activities. The major agricultural crops for domestic consumption and export were wheat, barley, and rice. All implements were made by village workers, and cultivation processes were extremely primitive. A serious lack of communication facilities, coupled with periodic failure of crops due to unfavorable weather, led to frequent local famines. Communications were such that each community was physically isolated from its neighbors.

Villages were scattered due to scattered distribution of surface water. Production provided self-sufficiency in each closed village with returns distributed on the basis of share-cropping. Total domestic market external to the village for agricultural products was from the food and fiber demands of 10 percent of the Iranian population living in urban areas. Urban markets were usually served by the landlord's share of the crop and the rest of the landlord's

marketable share was exported. Peasants, in good years had bread to eat and in bad years suffered from lack of food. While the peasants had to adjust their consumption to their share of the crop, supply and demand was brought into balance each year. Landlords who received their share of the crop (usually three fifths of the crop) were able to provide enough supply for urban demands plus a surplus for export. Because of these factors, Iran was a net exporter of agricultural commodities, basically wheat.

Because of the primitive tools and primitive cultivation processes, the best crops for most parts of the country were wheat and barley. The most important variable affecting crop yields was the supply of water, and again because tools were primitive, underground water was generally inaccessible except where qanats could be used, however, they were very expensive to build and maintain.

The basic structure of Iranian agriculture did not change between 1900 and 1963. Between 1900 and 1963, there was a small migration to urban areas. By 1963, about 25 percent of the working population was living in urban areas. Growth of the urban population was due mainly to extraction of raw material, especially oil, and mineral and to activities related to these extractions. GNP increased due to extraction, but the industrial sector changed little in the pre-1963 period. Increase in urban population expanded the market demand for agricultural goods. This increase in

demand was matched by a decrease in export and the country still remained self-sufficient in agricultural goods.

Several factors have propelled industrial expansion since 1963. Change to a broadly distributed land ownership pattern in agriculture with greater reliance on money and industrial inputs has broadened the market for industrial and consumer goods. Increased national income from sale of oil has provided money for government promotion of Iranian industries. The entry of multinational corporations with large investments in Iran has been perhaps the greatest spur to industrial expansion.

Industrial expansion has affected agriculture in several ways. It has absorbed agricultural labor resulting in sizeable migration of unskilled labor to urban areas. Industrial growth has created strong competition with agriculture for financial credit and for skilled labor. Growth of urban populations have increased the commercial market demand for food, especially wheat. A large portion of the urban population is unskilled labor with low income. To provide food for the low-income urban sectors, government policy has attempted to stabilize agricultural product prices at a low level, i.e., essentially a cheap food policy.

The most important structural changes in the agricultural sector since 1963 have been (1) expansion of mechanization and private investment in agriculture on the larger commercial farms, (2) increaes in the number of small

owner-operators of farms, and (3) expansion of the money relationship and growth of financial institutions in rural areas.

Within the context of change to a slightly less agrarian economy and the restructuring of agriculture, problems have been identified that appear to discourage agricultural expansion. These problems include the following:

(a) There exists an insecure atmosphere for investment in agriculture. Titles to land were disturbed in the land reform in 1963. Owners were forced to sell at government-determined prices. Since 1963 additional forced land transfers have occurred. For example, land lying below newly constructed irrigation dams has been bought by the government for consolidation into "commercial" and large corpo rate farm holdings.

Also, when the government passed a law which established farm corporation in selected areas, farmers were forced to relinquish their land to these corporations in return for shares of stock in the farming corporation.

There are other cases also when the government has taken the land away from owners through regulation. This factor creates an insecure atmosphere for the agricultural sector to plan for long term investment on the farm.

(b) An objective of government policy has been to keep food prices low. Growth in the industrial sector has brought about growth in urban populations. In 1978, 47 percent of the population of Iran was urban, increasing from 25 percent in 1963. A large majority of this population is unskilled workers with low levels of income. Keeping the cost of living down has encouraged further migration and is designed to promote industrial activity. This policy has had important impacts on the agricultural sector.

(c) Low current returns in agriculture discourages agricultural expansion. The low food price policy has tended to keep returns to farmers low. As a result of land reform, peasants with share-cropping systems changed to small landlords and were forced to manage their farms and make profit. But, in fact, many peasants received so little land that cultivation was unprofitable. This has forced many of them to leave the land and migrate to growing urban areas to find jobs. Some farmers have seasonal industry employment and continue to operate small acreage. Others have found year around jobs and have left the land idle or have sold it and migrated to urban areas to be absorbed by a growing industrial sector.

Growing industries in urban areas demand skilled and semi-skilled labor and by paying better wages, will absorb almost all of skilled and semi-skilled labor as well as efficient unskilled labor. The remaining population in rural areas is mainly an inefficient labor force. Comparison of the level of income from the cities and from the farm indicates financial incentive for the efficient labor force to leave the farm. Hence, migration has occurred and market demand for food has expanded faster than the ability of domestic agriculture to supply food.

(d) There has been limited application of new production capital to agriculture. Use of traditional ways of production results in continued low yields. Increased production at stable yields can occur only if the area of land under cultivation is increased. The extension of land is related to availability of water.

Packages of technology have been promoted especially for large commercial farms for increase of yields. Packages of technology include the following:

-extracting water from underground sources for irrigation by sprinkler systems

-replacing man and animal power by machine

-applying better seeds

-using fertilizer on time

-applying plant protection chemicals

-doing studies of climate and soil

-levelling the land.

Packages of technology have two effects on agriculture:

1. Some of the land that could not be used previously because of lack of water and primitive tools, now may be irrigated from tube wells.
2. Through use of improved cultural practices yield per hectare will increase.

(e) Agricultural credit, especially bank credit is scarce in Iran. In order to use technological package, capital is required. Capital in the form of money seeks maximum return where the investment is secure. In Iran, investments in new technology in agriculture must compete with high rates of return in non-agricultural sectors through government regulations.

(f) Only low levels of infrastructure or social services are provided for agriculture. Only 3.5 percent of the villages have paved roads and 11.5 percent of the villages can be served by trucks. Almost no other communication system exists in villages except post. Services such as hospitals, doctors and schools, are generally not available at the village level.

In Chapter 4, I will focus on wheat production as a case study and examine government policy concerning wheat.

PART IV

WHEAT ECONOMIC AND POLICY IN IRAN

Introduction:

Wheat production in Iran is deeply rooted in Iranian history. There are indications that wheat has been produced in Iran for 2,000 years. Because of the importance of food and self-sufficiency of the villages, wheat is produced in almost every part of the country. Most peasant farmers have produced wheat and they know well the traditional way of production with primitive tools.[60]

Food accounts for about 43 percent of the average Iranian's cost of living and an even higher proportion for those in lower income groups.[53] Wheat is the main food staple, providing an estimated half of the caloric intake of Iranians.[54]

Bread is the most important and most common food for the vast majority of the Iranian people. According to some studies, 12.2 percent of total expenditure of urban families and about 23 percent of the total expenditure of rural families is for bread.[55] On the average, per capita food consumption in Iran just meets estimated energy requirements. However, unequal distribution places close to 30 percent of the population in danger of calorie deficiency, this problem is most pronounced in the poor urban population. Wheat in the form of bread, is usually the cheapest form of calories and of protein.[56] Bread

consumption in 1966 in Tehran was estimated at 464 grams (1.021 bs) per person per day in Tehran.[57]

Demand for Wheat:

McCoy and Hoover reporting on the long-run trend in demand for wheat indicate that, "In the United States per capita consumption of wheat flour dropped from 212 pounds in 1912 to about 132 pounds in 1953. At the same time production was on an upward trend. History reveals that as societies rise from low levels of living, wheat is initially considered a superior type of food. Under these circumstances with each one percent increase in family income, money spent for wheat for food increases more than one percent. As living standards rise over time an apparent change takes place in the relationship between income level and demand for wheat . . . . In addition to the income effect on per capita consumption, the decrease in the percent of the population doing hard physical labor and increasing average age of the population decrease the need for energy-giving foods like wheat."[58]

A more generalized explanation, in which the level of wheat consumption is related to the standard of living, is set forth by Bennett as reported by Meinken. Bennett states: "If at the outset a country used little wheat per capita, has a low standard of living, and strongly prefers wheat as the cereal food, growth of per capita food use of

wheat is likely with a continuously rising standard of living, up to a level ranging around 6 to 8 bushels. At some point in time, per capita use of cereals will represent use of wheat almost exclusively; but the dietary maximum intake of roughly 12 bushels is unlikely to be reached because so high an intake itself reflects not prosperity but lack of it. After the point when wheat has become practically the exclusive source of cereal foods, with continuing advance of living standards a decline in per capita food use of wheat will set in . . . decline of per capita wheat use among the whole range of foods, by expansion of per capita use of preferred non-cereal feeds whatever they may be, wheat must yield place to other foods, ... The 'normal' curve of per capita food use of wheat, in countries where living standards rise continuously, where wheat is the strongly preferred cereal, and where the level of food use of wheat and of living standard was initially low, is an advance followed by a decline. . . ."[59]

Schnittker reported on and Jureen reiterated Bennett's point with respect to cereal consumption. "Here consumption shows . . . three phases: (a) rising demand in countries with very low levels of living; (b) constant demand in countries with still rather low levels; and (c) falling demand in countries with medium or high levels. . . . Thus, assuming constant real food prices the peak in cereal consumption is reached at a rather low income level."[60]

Per capita demand for wheat in Iran has increased steadily during the last 15 years. On Bennett's curve Iran is on the "advance" part of the curve and in Jureen's categories Iran is in category "(a)" which is "rising demand in countries with very low levels of living."

Total disappearance of wheat in Iran, Table 24, is calculated as follows: Total domestic production plus total imports minus total export is equal to total disappearance. This calculation assumes no change in stocks between annual periods. Data on year-end stocks are not available.

Per capita annual disappearance of wheat is calculated in Table 24 and is shown in Figure 10. A regression line is computed to show estimated average per capita disappearance for the period 1961 through 1976. The equation for the regression line is $Y = 119.97 + 5.1 X$; where X is the year (X = 0, 1, 2, . . . corresponding to 1960, 61, 62, . . .) and Y is per capita disappearance of wheat in kilogram. Estimated average growth in per capita disappearance of wheat is 5.1 kg/year.

An FAO study estimates that between 83 and 86 percent of total disappearance is used for food and the rest used for other "domestic utilization" such as processing for non-food uses, feed, seed, and waste.[61] Accepting 83 percent ratio for food consumption of wheat, then the estimated regression line for food consumption would be $Y = 99.57 + 4.24 X$ where X and Y are defined as before.

Table 24

POPULATION AND PER CAPITA DISAPPEARANCE OF WHEAT

Year	Domestic Production of Wheat 1000 MT	Import of Wheat 1000 MT	Export of Wheat 1000 MT	Annual Disappearance of Wheat Supply 1000 MT	Total Population 1000 persons	Population Change	Calculated Per Capita Disappearance of Wheat Kg/yr	Per Capita Food Disappearance of Wheat*** Kg/yr
1960					21,500			
1961	2,869	192		3,061	22,069	2.65	138.70	115.12
1962	2,755	160		2,915	22,655	2.65	128.67	106.80
1963	2,468	184		2,652	23,261	2.67	114.01	94.63
1964	2,623	173		2,796	23,891	2.70	117.03	97.13
1965	3,648	530		4,178	24,549	2.75	170.19	141.26
1966	4,381	168		4,549	25,238	2.81	180.24	149.60
1967	4,618	66	76	4,608	25,960	2.86	177.50	147.33
1968	3,816	535	213	4,138	26,720	2.93	156.55	129.94
1969	4,200	1	2	4,199	27,519	2.99	152.59	126.65
1970	4,262	24	3	4,283	28,358	3.05	151.03	125.35
1971	3,612	999	3	4,608	29,238	3.10	157.60	130.81
1972	4,500	775	4	5,271	30,158	3.15	174.78	145.07
1973	4,600	785	3	5,382	31,119	3.19	172.95	143.55
1974	4,700	1,4 6	4	6,152	32,117	3.21	191.55	158.99
1975	5,483	1,473	1	6,955	32,923	2.51	211.25	175.34
1976	6,000	1,440*	-	7,440	33,957	3.14	219.10	181.85

SOURCE: Based on FAO Production Yearbook and FAO Trade Yearbook.

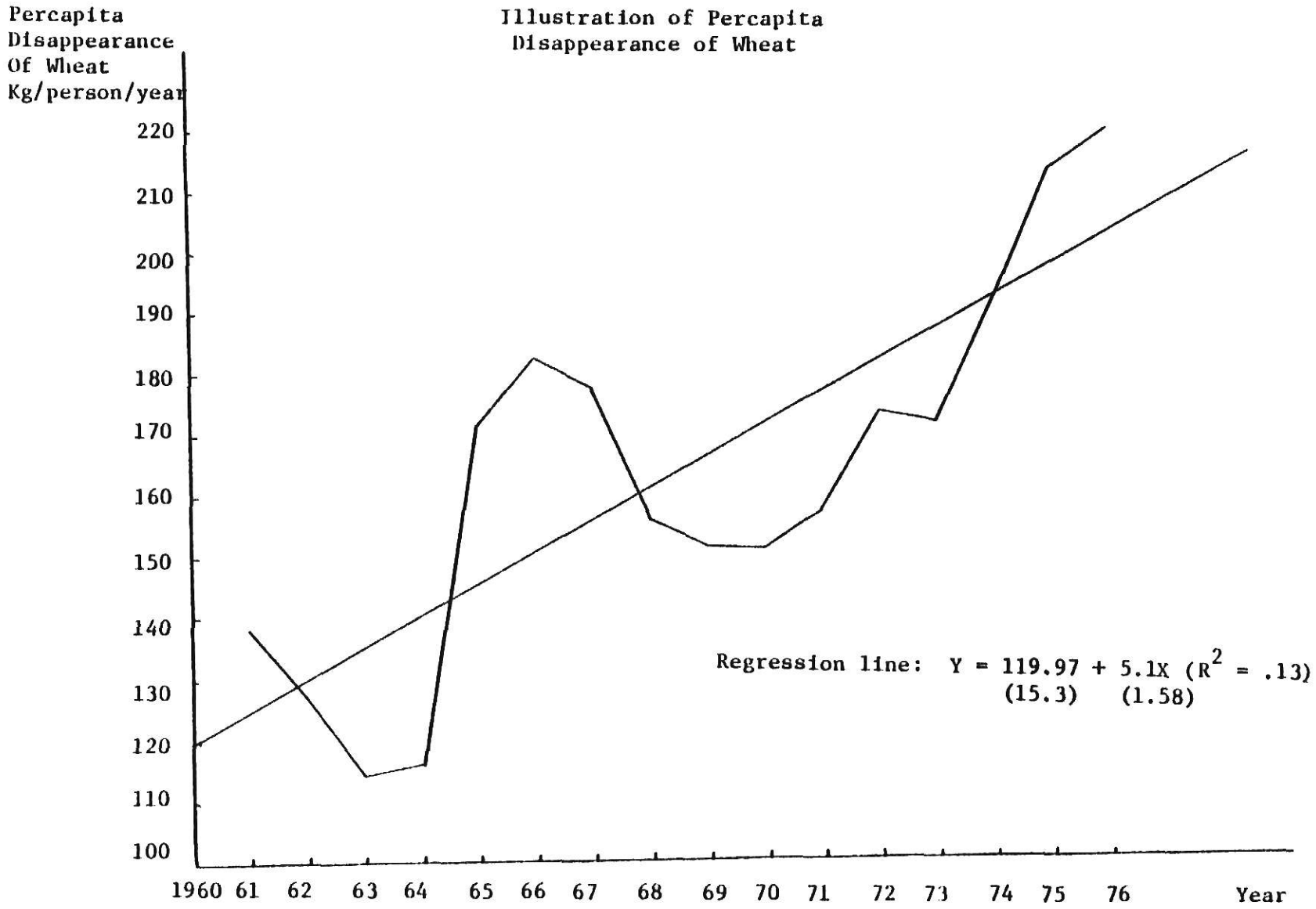
*Import data for 1976 is from Iran Almanac.

**Annual supply divided by population.

***83% of annual per capita disappearance.

Figure 10

Illustration of Percapita Disappearance of Wheat



Source: Based on FAO Production Yearbook and FAO Trade Yearbook Data

According to an FAO study on Iran: "In both urban and rural areas, the main demand determinants are population and income parameters."[62]

1. Population Parameters:

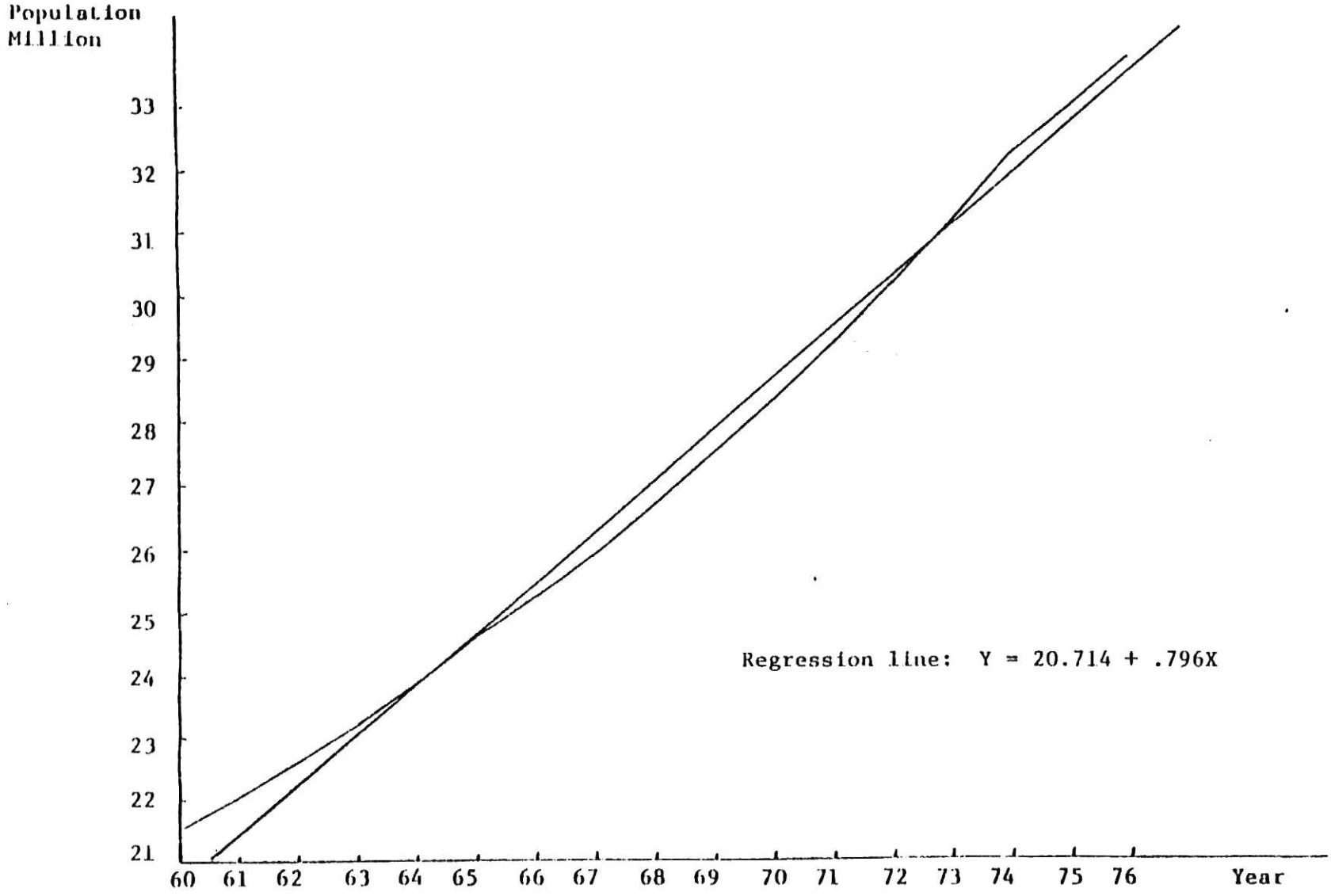
Table 24 shows the population in Iran from 1960 through 1976. As the population increases total quantity of wheat demanded will also increase. Population increased 58 percent between 1960 and 1976, from 21,500,000 to 33,957,000. This is an average annual rate of increase of 2.9 percent per year with a marked tendency for rate of population increases to accelerate over the period. In the five year period 1971 to 1976 annual average rate of population increase was 3.05 percent. Figure 11 illustrates population growth in the country with the estimated regression line $Y = 20,714.15 + 796.36\ X$, where X is the year (X = 0,1,2,... corresponding to 1960, 61, 62, ...) and Y is population in thousands.

2. Income parameter:

Table 25 shows per capita income at current prices, an index of per capita product at constant prices, (1970 = 100), and calculated per capita income at constant 1970 prices. Per capita income in 1973 in current prices was 2.34, 3.75 and 4.67 times more than per capita income in 1970, 65 and 60 respectively.

Figure 11

Illustration of Population Growth



Source: Based on FAO Production Yearbook

Table 25

PER CAPITA INCOME IN CURRENT AND CONSTANT PRICES

Year	Annual Per Capita Income in Current U.S. $	Calculated Percent Increase	Index of Per Capita Product at Constant Prices 1970 = 100	Calculated Per Capita in Constant (1970) U.S. $
1960	176		55	194
1963	192	9.09	59	208
1965	219	14.10	68	239
1966	226	3.20	73	257
1967	243	7.50	79	278
1968	286	17.70	86	303
1969	317	10.84	92	324
1970	352	11.04	100	352
1971	420	19.32	105	370
1972	494	17.62	115	405
1973	822	66.40	158	556

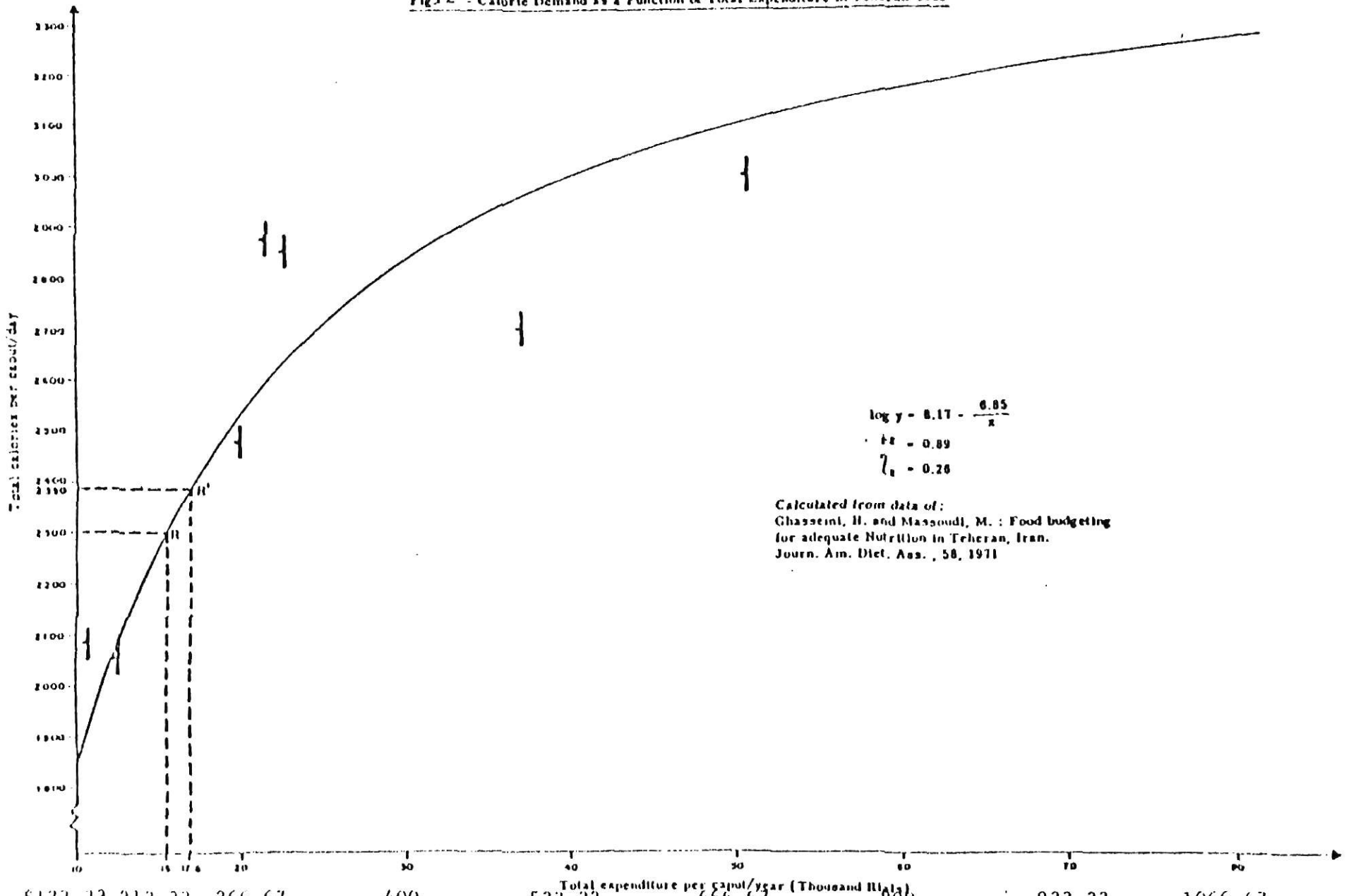
SOURCE: United Nation statistical yearbook.

Per capita income at 1970 constant prices increased from $194 in 1960 to $556 in 1973, (187 percent).

Distribution of income in Iran also has important effect on wheat consumption. A study of consumer expenditures per capita in 1965 with 84 respect to total calorie intake per capita per day was done for Tehran. The study was used by the FAO to estimate expenditure/calorie intake relationship for all urban areas in Iran. Hence, conclusion about the urban sector are tentative.

The results of the expenditure-calories study are given in Figure 12. According to Figure 12, people who had less than $226 per capita expenditure in 1965, had very high need for food to satisfy calorie needs. According to the FAO, 2,280 calories per person per day is "the estimated average energy requirement."[63] Schnittker calls 2,200 calories per person per day a minimum calorie requirement.[64] According to Figure 12, Iranian people with per capita expenditure of $213.33 in 1965 had caloric intake of 2,300 calories per person per day, and people with expenditures of less than $213 per capita suffered from calorie deficiency. For the group, a high proportion of any increase in expenditures was likely to go for food purchases. According to Figure 13, more than 60 percent of the urban population in Iran had less than 2,300 calories per person per day in 1971.

Fig 12 - Calorie Demand as a Function of Total Expenditure in Teheran 1965



Source: As reported by FAO, Report of the Workshop on Agricultural Sector Planning

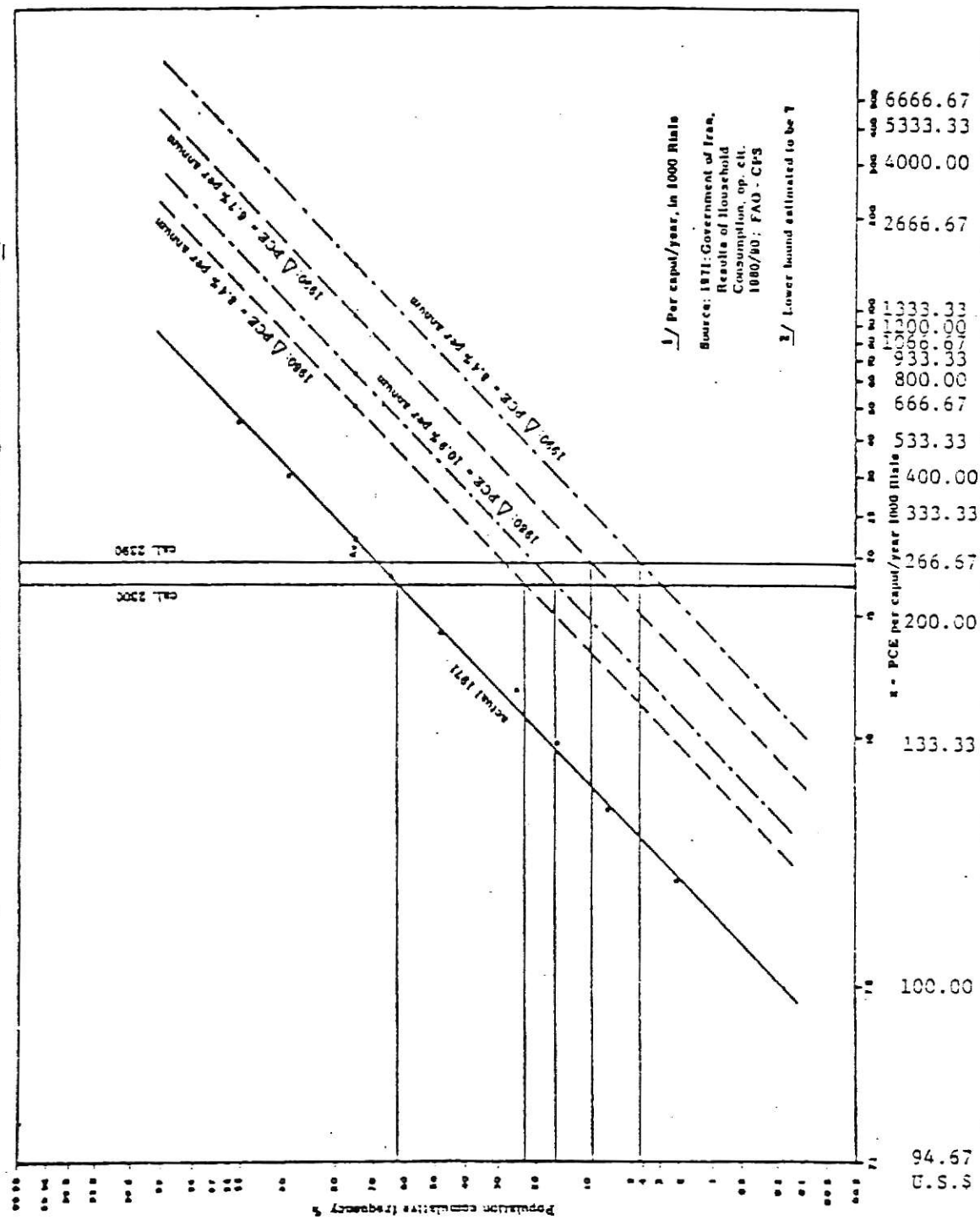


Fig. 13 - Urban Private Consumption Expenditure Frequency Distribution, 1/ Actual 1971 and Projected 1980-1990, Fitted to a Gauss-Logarithmic Model 2/

Source: As reported by FAO, Report of the Workshop on Agricultural Sector Planning

For this low income group of people no food can compete with wheat in form of bread because it is a good energy-giving food and it is a relatively inexpensive source of food energy. In this context the government's cheap bread price policy is meaningful.

A study by Allen Lebaron computed the income elasticity of demand for urban families, based on cross-sectional data in 1965. He found that income elasticity of demand for bread and bakery products in urban areas in 1965 was .365.[65] For the people in the middle income group, rice may be substituted for bread due to taste preference. In upper income groups per capita consumption of bread will likely reach a minimum level.

Per capita income of the agricultural population (per capita GDP) in -970 was $170, which was 48 percent of average per capita income for the whole country.[66] In the absence of more data, Figure 12 is used for a rough estimate of per capita calorie intake for the agricultural population. The conclusion is that, on an average basis, calorie intake per person per day for the agricultural population is far below the 2,300 level (taking into account the consumer price index between 1970 and 1965). The interpretation would be the same as for the low income group in urban areas, i.e., strong demand for wheat, and potential for increased demand as incomes increase. In 1977, 47 percent of the total

population in Iran lived in urban areas. It is likely that 60 percent of the urban population had apparent high income elasticity of demand for wheat even in 1977. Fifty three percent of the population lived in rural areas in 1977. A vast majority of rural people have very low incomes, also with apparent high income elasticity of demand for wheat.

According to the FAO, as levels of income have increased in Iran within the past decade, "income distribution has become increasingly unequal."[67] Hence, it is likely true that per capita consumption of wheat is lower than it would be with more equal distribution of income and income elasticity higher than with more equal distribution. Per capita consumption is likely to continue to increase until the calorie requirements of large numbers of low income people are better satisfied either through higher levels of income or through more even distribution of income.

Domestic Production of Wheat in Iran:

Domestic production of wheat in Iran between 1961 and 1976 is shown in Table 26. Production increased from 2,689,000 MT in 1961 to 6,000,000 MT in 1976, an increase of 123 percent in fifteen years. Population (also reported in Table 26) increased from 22,069,000 to 33,957,000 people, or an increase of 54 percent during the same period.

Table 26

PRODUCTION AND YIELD OF WHEAT IN IRAN, 1961-1976

Year	Total Population 1000 people	Total Domestic Wheat Production 1000 MT	Domestic Wheat Production kg/person	Area Under Wheat 1000 Hectare	Yield Per Hectares of Wheat Kilograms
1960	21,500				
1961	22,069	2,689	121.85	3,400	844
1962	22,655	2,755	121.61	3,400	810
1963	23,261	2,468	106.10	3,400	726
1964	23,891	2,623	109.79	3,700	709
1965	24,549	3,648	148.60	4,000	912
1966	25,238	4,381	173.59	4,400	996
1967	25,960	4,618	177.89	4,400	1,050
1968	26,720	3,816	142.81	4,804	804
1969	27,519	4,200	152.62	5,100	824
1970	28,538	4,262	150.29	5,100	836
1971	29,238	3,612	123.54	5,097	709
1972	30,158	4,500	149.21	5,000	900
1973	31,119	4,600	147.82	5,100	920
1974	32,117	4,700	146.34	5,200	904
1975	32,923	5,483	166.54	5,605	978
1976	33,957	6,000	176.69		

SOURCE: FAO Production Yearbook.

Column 4 in Table 26 shows that domestic per capita production of wheat in Iran increased from 121.85 kilograms in 1961 to 176.69 kilograms in 1976, an increase of 45 percent.

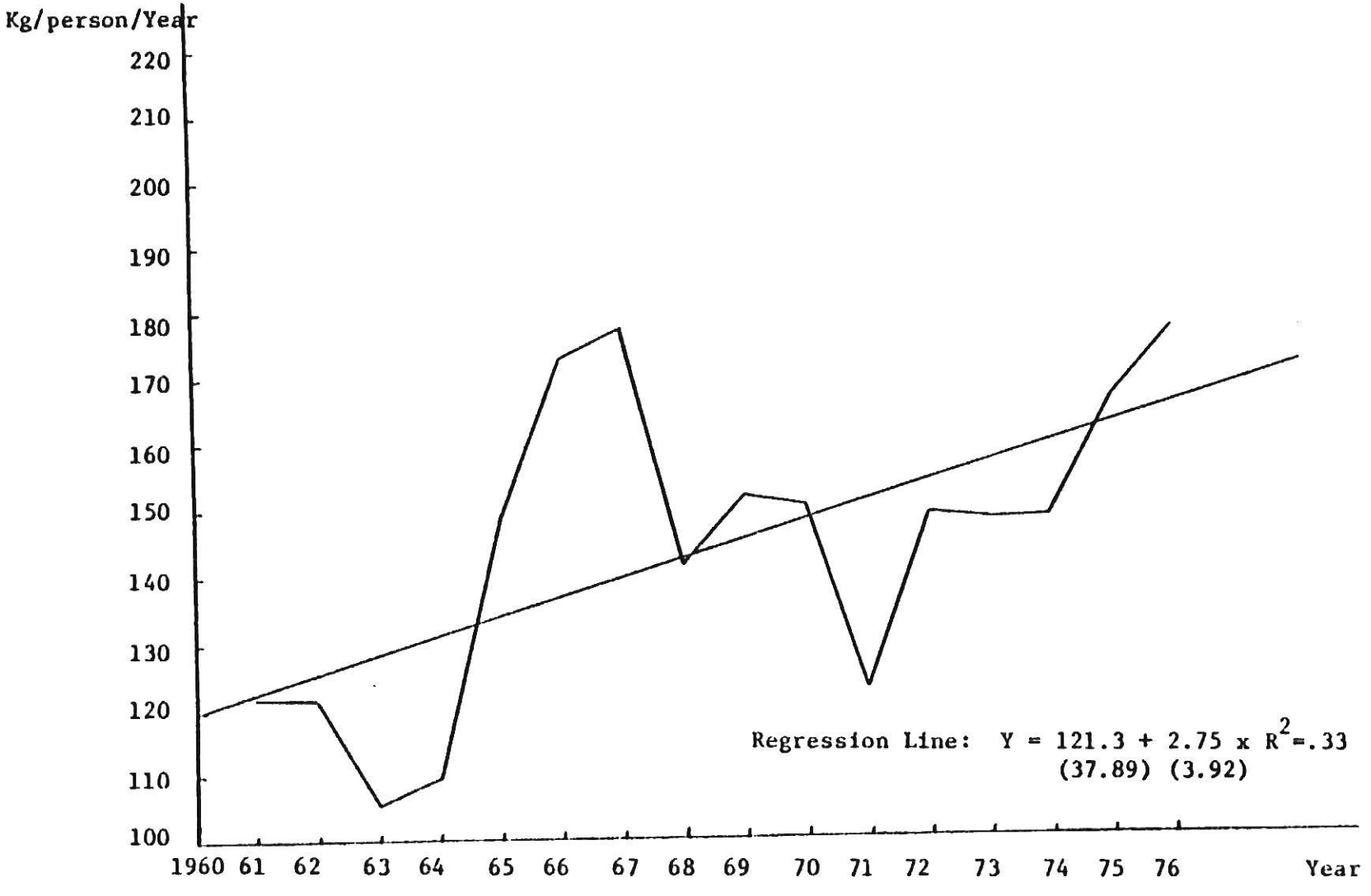
Figure 14, which is based on data in Column 3 in Table 26, graphically illustrates the trend in domestic production per capita. A regression line is drawn to give an average estimate of per capita domestic production. The equation of the regression line is $Y = 121.3 + 2.75 X$, where X is years (X = 0, 1, 2, . . . corresponding to 1960, 61, 62, . . .) and Y is per capita domestic production of wheat in dilograms. The slope coefficient of the regression line is 2.75, which means that estimated domestic production of wheat increased 2.75 kg/person/year.

Increase in wheat production is due either to increase in yield per hectare or to increase in area under wheat. Data on areas under wheat and yield per hectare are in Table 26.

A regression line is computed for the yield based on FAO Production Yearbook data, the equation for the estimated regression line is $Y = 802.01 + 7.43 X$ where X is the year (X = 0, 1, 2 . . . corresponding to 1960, 61, 62 . . .) and Y is yield per hectare in kilograms. The slope of the line is 7.43 which means it is estimated that yield per hectare of wheat is increasing 7.43 kilogram/year on an average basis, Figure 15.

Figure 14

ILLUSTRATION OF PER CAPITA DOMESTIC PRODUCTION OF WHEAT IN IRAN

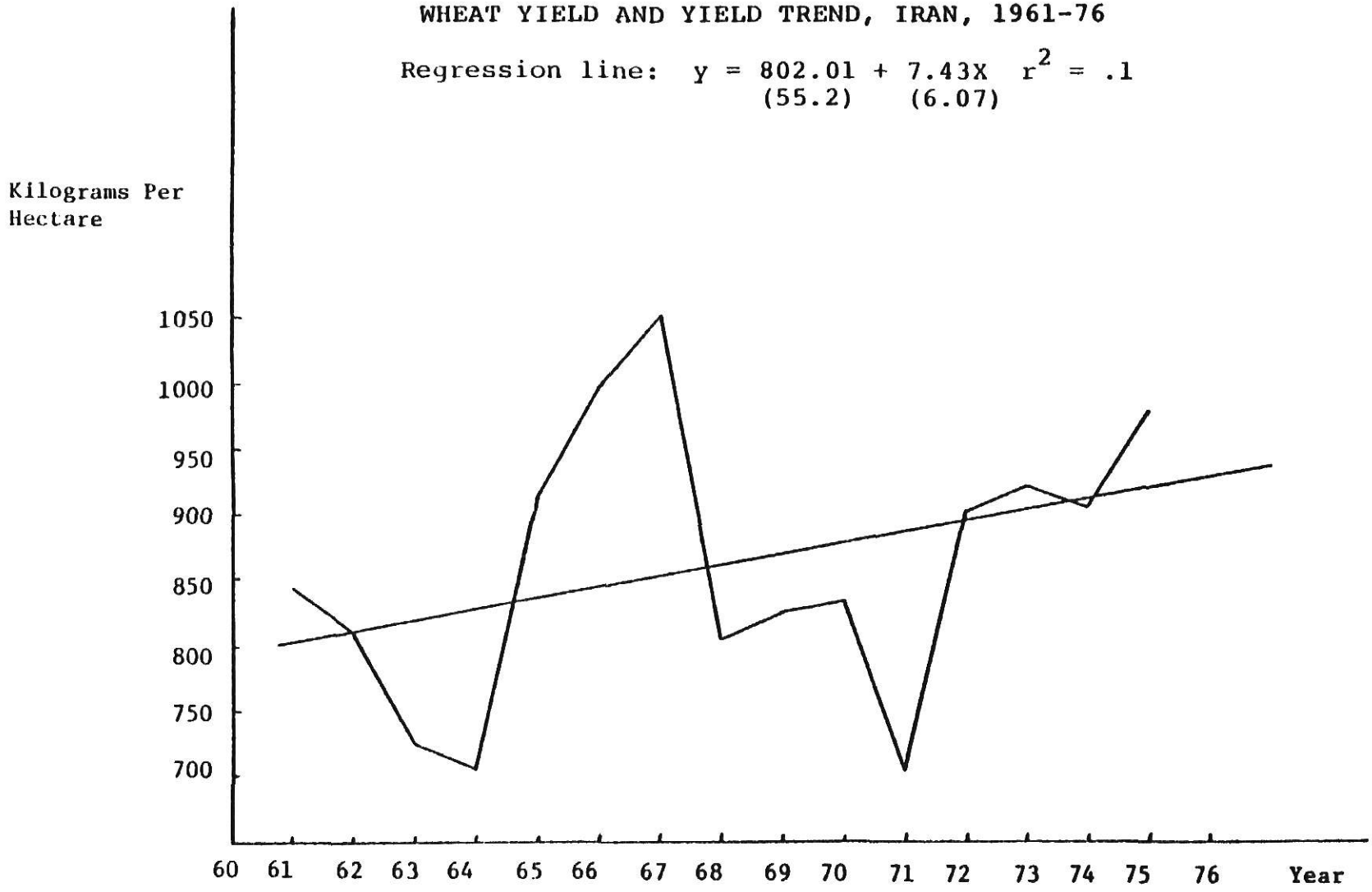


SOURCE: Based on FAO Production Yearbook Data.

Figure 15

WHEAT YIELD AND YIELD TREND, IRAN, 1961-76

Regression line: $y = 802.01 + 7.43X$ $r^2 = .1$
(55.2) (6.07)



SOURCE: Based on FAO Production Yearbook.

Another regression line has been computed for the area under wheat, based on FAO Production Yearbook data. The equation for the estimated regression line is Y = 3218.7 + 161.88 X where X is the year (X = 0,1,2. . . corresponding to 1960, 61, 62. . .) and Y is areas under wheat in 1000 hectares. The slope of the line is 161.88, which means that average estimated increase in area under wheat is about 161,880 hectares each year, Figure 16. Area devoted to wheat expanded more rapidly than average yield in the period 1960 through 1976.

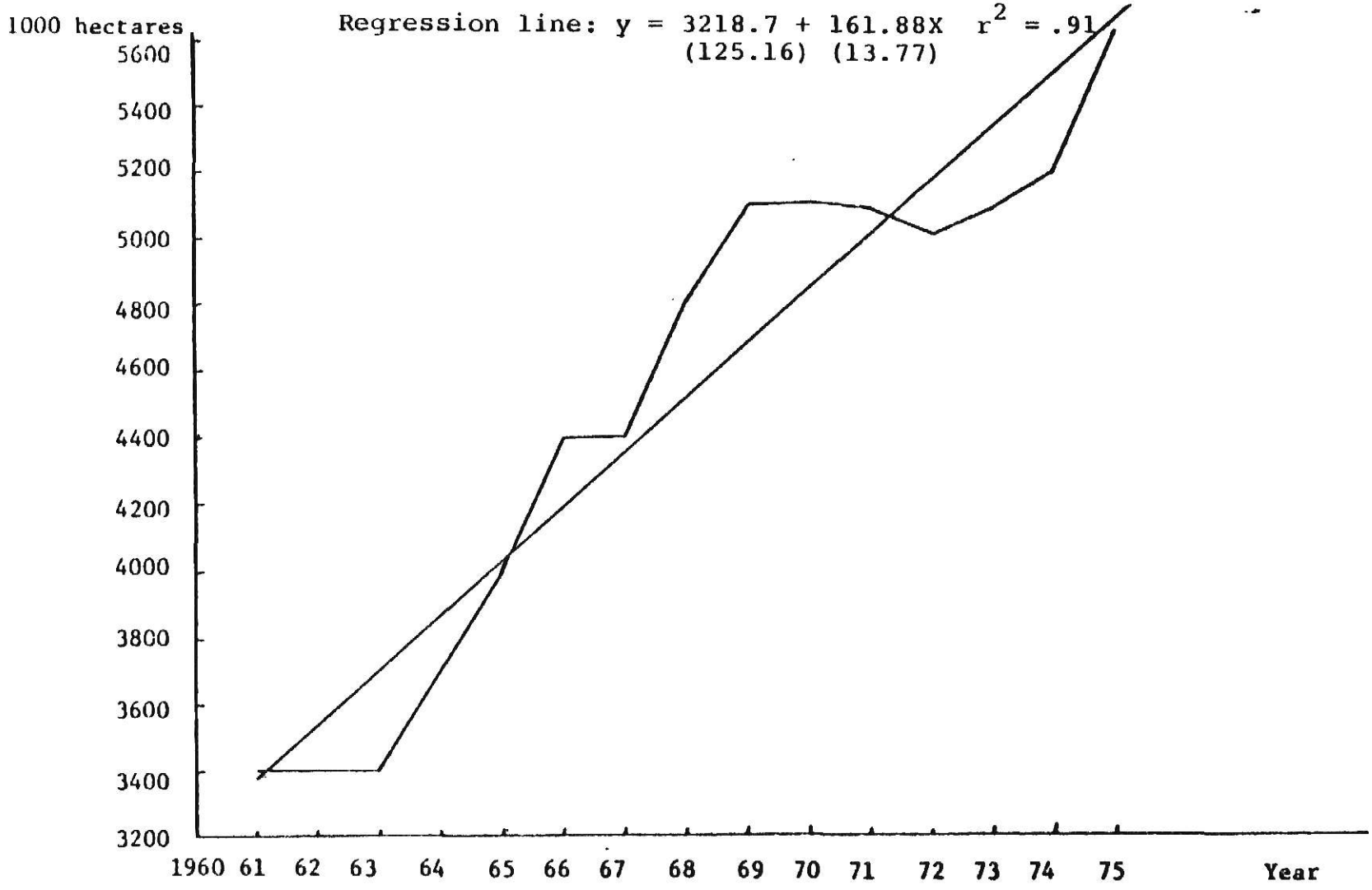
Conditions Influencing Rate of Expansion in Domestic Production of Wheat

After land reform in 1963, with structural changes in agriculture, management of individual farms needed to adjust to the new situation. Some farmers were able to adapt to the new system and became good managers of their farms; some of them became bankrupt; but, the vast majority of them remained in intermediate situations. In the historic system landlords didn't go bankrupt because their annual outlays were negligible and they received their shares of the crop each year. In the new management system the land owner must plan production, buy inputs from the market, hire labor, and market his crop. The role of management exercised by farmer-owners who are now owner-operators has increased. At the end of each year the operator should be able to pay the cost of inputs from the money he receives from selling his crops and have an additional return to

Figure 16

AREA IN WHEAT AND AREA TREND, IRAN, 1961-76

Regression line: $y = 3218.7 + 161.88X$ $r^2 = .91$
(125.16) (13.77)



SOURCE: Based on FAO Production Yearbook.

capital and management. The amount of profit is affected by the quality of management inputs.

The new management responsibility and the danger of bankruptcy cause farmers to choose crops with familiar cultural practices, that are best adapted to the climate, and from which they can derive at least a small margin. Because most of the lands are arid, most of the farmers choose drought tolerant wheat and barley.

A study by Schnittker about wheat problems and programs in the United States makes the following points concerning wheat producers response to prices in the semi-arid U.S. Great Plains. He stated:

> "Two aspects of the relationships among farm prices and farm output are fundamental. The first is the ratio of product prices to the prices of materials used in production. The second is the relationships among the prcies of farm products.
>
> Farm production, barring disturbances such as unusual weather, tends to increase when farm product prices rise relative to the costs of resources used in their production, it tends to decline when product prices decline relative to costs.
>
> This follows from an elementary principle of economics: That production is a process by which resources are changed into products, that production is motivated by the prospect of gain, and that gain accrues fromthe margin between cost of production and selling price. Perception producers will note that when product prices rise, the value of output attributable to any operation performed in production (including the least productive or most dispensable operation), is increased. By increasing inputs on given land, thus increasing output per acre when product prices rise, producers can increase net returns.

> This is so conventional it scarecely needs to be stated. Yet a major qualification is required to make it relevant to the sub-humid and semi-arid plains, where few opportunities exist to increase the intensity of resource use on a given land area in dryland production of small grains. There certain cultivations must be performed in a rather uniform sequence to produce a grain crop, any major lapse seriously jeopardizes crop prospects. . . .
>
> . . . Since the yield of grain is severely jeopardized by any major decrease in cultivation producers will tend to cultivate rather uniformly within a wide range of product prices. Output can be reduced appreciably only by retiring land from wheat production. The nature of the climate and of wheat production preclude reducing cultivations fractionally.
>
> This should not be taken to mean that low product prices relative to costs cannot reduce farm output in these areas. Rather, output reductions will not come from successive small reductions in inputs as product prices become unfavorable relative to costs. Production will persist thorough a long unfavorable period, and will decline sharply or stop when producers either can no longer produce, or when they find income earning opportunities more favorable than those in agriculture."[68]

The result of field study in different states reported by Schnittker suggests that: "Decline in the wheat price of roughly 25 to 50 percent from 1954-60 levels (other prices constant) might start a small shift from wheat to alternative crops over a wide area of the plains and Cornbelt. However, in choosing to specialize in one crop or another, producers weigh not only yields and prices of alternative crops, but the certainty with which they are expected. Producers intuitively consider yield certainty as a partial substitute for yield level. Yield expectations of less certain crops are discounted, therefore."[69]

McCoy and Hoover make a similar point:

> "Several factors have been responsible for the great expansion in wheat relative to corn. Perhaps the most important is that wheat production was mechanized earlier and more rapidly. Other influences were government price-support programs and an increased realization by farmers that corn is less well adapted than wheat and grain sorghums to the climatic conditions of central and western Kansas. . . . Once farmers have made the investments necessary for the adoption of new tehnologies which result in greater production, there is a strong incentive to continue to use them. Lower prices, or even controls based on acreage allotments, may be ineffective in reducing wheat production unless more profitable alternatives are available to use the resources formerly employed in growing wheat. . . .
>
> Flexibility may also help to meet the problems that arise from uncertainty as to future yields, prices, and incomes. . . . Buying machinery and buildings that can be adapted to more than one use, making it possible to change the size and type of farm enterprise as weather conditions or prices change, is another way to obtain flexibility . . . .
>
> Although flexibility reduces the danger of losses when production conditions are highly uncertain, production costs are likely to be higher on a farm with a flexible organization than on one with less flexibility, provided the less flexible farm could always operate under the conditions for which it was designed."[70]

Important factors affecting wheat supply in Iran can be summarized as follows:

1. Climate and resource restrictions,
2. Uncertainty and its relation to flexibility in crop selection,
3. The ratio of product prices to production costs, and
4. Knowledge and adaptability of farmers to new methods of cultivation and new crops.

In four years 1972-75, 8,054,000 mt of wheat were produced on irrigated land (49.5% of total) and 8,217,000 on dry land (50.5% of total). According to Iranian agricultural census data, 38, 37, 39 and 43 percent of total irrigated areas was under wheat in 1972, 1973, 1974 and 1975 respectively. (Table 27) In most dry farming, precipitation is not enough for good yields. On the average, yield per hectare of dry-farming is about 500 kilogram, (8.33 bushels per hectare or 3.37 bushels per acre).

Table 28 shows that Iran has 16.6 million hectares of arable lands, out of these lands only 3.6 million hectares are irrigated. Much of the land under irrigation receives only a supplementary water supply. It is estimated that only one fifth of the irrigated land (750,000 hectares) receives "optimal" water supply, that a similar area receives less than "optimal" but still moderate water supply, and that the remaining two million hectares receive only supplemental irrigation.[71] Wheat adapts well to supplemental irrigation.

Options available to farmers in selection of crops are largely determined by amount of water available. In the 750,000 hectares with "optimal" irrigation, farmers have viable options in selecting their crop. The situation is almost the same for another 750,000 hectares of less than "optimal" irrigation. But in supplemental irrigation of about 2 million hectares farmers have fewer options, among

Table 27

AREAS UNDER WHEAT WITH RESPECT TO TOTAL AVAILABLE LAND
FOR IRRIGATED AND DRY FARMING

	Cultivation area in the country (Hectares)						Area under Wheat (Hectares)		Wheat Production (Tons)	
Year	Available Land	Irrigated Acres		Dry Farming		Total Fallow	Irrigated areas	Dry Farming	Irrigated Areas	Dry Farming
		Cultivated	Fallow	Cultivated	Fallow					
1972	15,330,000	3,940,000	1,900,000	5,680,000	3,810,000	5,710,000	1,429,000	4,136,000	1,855,000	1,758,000
1973	17,293,638	4,038,698	2,060,733	7,062,154	4,132,052	6,192,785	1,501,000	3,968,000	2,116,000	2,282,000
1974	16,417,530	4,095,325	1,990,424	6,366,716	3,964,977	5,955,401	1,572,000	4,753,000	2,289,000	2,257,000
1975	15,399,521	3,617,589	1,999,430	5,572,504	4,209,998	6,209,428	1,565,000	4,408,000	1,794,000	1,920,000

SOURCES: Statistical Year Book of Iran.
The result of the Agricultural Census.

Table 28

ESTIMATED LAND USE, IRAN, 1971

	Area (million hectares)	Percent
Total land area	164.8	100.0
Arable land	16.6	10.0
Under cultivation	8.8	5.3
Irrigated	(3.6)	(2.2)
Rain-fed	(5.2)	(3.1)
Fallow	7.8	4.7
Forests	18.0	10.9
Scrub land	1.0	0.6
Permanent pasture	10.0	6.1
Other land	119.2	72.4
Cultivable	33.0	20.0
Noncultivable	86.2	52.4

SOURCE: Ministry of Agriculture, Plan Organization

As reported by Aresvik, The Agricultural Development of Iran.

which wheat is often the best choice. For this important reason, many farmers put some of their lands under intensive irrigation to enable choice of crop with expected maximum return based on marketing information on inputs and outputs. Farmers do not try to specialize in producing one crop on their intensively irrigated land, because of variation of input-output prices of different crops in different years. Farmers have a similar situation with their less than "optimal" irrigated lands.

Also of importance to wheat production in irrigated areas is the fact that wheat is produced in winter and harvested in spring, leaving the land available for production of other crops such as melons, beans, and hay, in the summer time. Wherever the supply of water allows, farmers will raise two crops each year on the same land. The most important factors determining the areas under dual crops is the amount of water available to farmers. Normally, only a small proportion of total land under wheat goes under dual crops due to water limitation.

Available cost and income data suggest that input-output price relationships have discouraged wheat production in Iran in the past decade. Sarkisian estimates the average costs of wheat production in Iran on irrigated soil in 1977 as indicated in Table 29.[72]

Table 29

ESTIMATED COSTS OF ONE HECTARE OF IRRIGATED WHEAT PRODUCTION IN IRAN, 1977, IN U.S. DOLLARS

	Dollars	Total
Rent including water	$133.33	
Disk-cultivation-plow	13.33	
Seeds	24.00	
Fertilizer	36.00	
Labor costs for distributing fertilizer	6.67	
Herbicide	24.00	
Water pump costs and labor costs for irrigation	53.33	
Guard	2.67	
Harvesting	60.00	
Cost of sacks	16.00	
Overhead	26.67	396.00
Interest	27.72	423.72
Profit and Management (20% of Operating Costs)	84.74	
TOTAL		$508.46

SOURCE: Tehran Economists, No. 1203, July 16, 1977.

Yield of wheat per hectare of land under full irrigation is 3.5 mt (128 bushels/hectare or 51.8 bushels/acre) in good years and 1.5 mt (55 bushels/hectare or 22.2 bushels/acre) in bad years, or, on the average, 2.5 mt per hectare (91.6 bushels/hectare or 37.1 bushels/acre). Assuming average yield, the estimated average cost of production of one metric ton of wheat under intensive irrigation, reported by Sarkisian, is $203.38 ($5.50 per bushel).

Sarkisian also estimated costs of wheat production in Iran under dry farming conditions. In good years, yield per hectare may reach 1.35 mt (20 bushel/acre) in dry farming and in bad year it is estimated at about .15 mt (2.23 bushels/acre). Sarkisian assumes two bad years and one good year as a normal rotation in Iran. Average yield per hectare with these assumptions is .55 mt (8.16 bushel/acre). Average cost of producing wheat under dry farming condition in 1977 was $195.13 per metric ton.

An earlier study by Gorgani, in 1967 found the cost of production of one hectare of wheat under irrigation in Northeast Iran as reported in Table 31.[73] Yield per hectare to which Gorgani's cost related is 1.638 metric ton (24.32 bushel/acre). The cost of production per ton reported by Gorgani was $43.30 in 1967, however, these costs do not include profit or costs of management, interest on investment, rent, storage costs, or transportation from storage to market.

Table 30

ESTIMATED COSTS OF ONE HECTARE OF DRY-FARMING OF WHEAT PRODUCTION IN IRAN, 1977, IN U.S. DOLLARS

	Dollars	Total
Rent	$ 13.33	
Disk-cultivation-plow	13.33	
Seeds	9.60	
Fertilizer	13.33	
Labor cost for distributing fertilizer	3.33	
Guard	1.33	
Harvesting	20.00	
Cost of sacks	2.67	
Overhead	6.67	83.59
Interest	5.84	89.43
Profit and Management (20% of Operating Costs)	17.89	
TOTAL		$107.32

SOURCE: Tehran Economist, No. 1203, July 16, 1977.

Table 31

ESTIMATED COSTS OF WHEAT PRODUCTION PER HECTARE
UNDER IRRIGATION CONDITION IN 1967
IN U.S. DOLLARS

	Dollars	Total
Disk and plow	$ 8.53	
Seeds	21.33	
Cost of removing weeds from land	6.67	
Guard	2.40	
Cost of water and irrigation	16.00	
Sack and transport to on-farm storage	4.00	
Harvesting	10.67	
TOTAL COSTS		$70.93

SOURCE: Mansour Gorgani, Economic of Gorgan.

Data were not available to compare costs by year to show the trend in cost of wheat production. Data in Iran Almanac indicate trend in the cost of agricultural labor which is a major input in wheat production. According to the Iran Almanac, the daily wage of a farm worker in 1957 was $0.40 per day, and in 1977 it was $4.67 per day. Price of one ton of wheat in 1957 was $60/mt and in 1977 $160/mt. Wages increased more than 11.6 times between 1957 and 1977, but wheat price in 1977 was only 2.67 times greater than the 1957 price.[74]

The government support price in 1967 was $80/mt. According to Gorgani, estimated cost of production was $43.3/mt. Hence, $36.7 is left for profit, management, interest and rent, assuming the farmer sells his crops at the farm gate at the support price at harvest time. The government support price in 1977 was $160/mt and cost of production (including profit, management, interest and rent) of one ton of wheat raised under dry farming condition (Table 31) was $195.13/mt. With 1977 price/cost relationships, as reported, farmers would lose $35.13 per mt from wheat production in dry farming.

It is estimated that cost of production of one ton of wheat on irrigated land was $203.38/mt in 1977 with a support price of $160/mt, the margin would be $43.38/mt. Farmers are losing $43.38/mt from producing wheat on irrigated land. The crucial question is, "Why don't they quit farming?" Schnittker's discussion is relevant. Few alternatives to

wheat or barley exist for producers, especially wheat producers, "few opportunities exist to increase the intensity of resource use on a given land area in dry land production. . . ."

When few or no alternatives exist, farmers will continue to produce as long as short-run cost outlays are recovered. For many producers, land, management inputs and owner-operator family labor are fixed costs within a broad range. Production will continue therefore over a broad range of prices below estimated costs when costs of relatively immovable assets are charged at competitive (market) rates.

Areas under irrigation are more sensitive to the input-output price ratios, because these lands have cropping alternatives. Alternative crops may be selected and limited water supplies applied to crops where marginal return for water application is the greatest.

Detailed production cost data for alternative crops such as oil seeds, sugar beets, or cotton are not accessible however, it is not unlikely that wheat has yielded to other crops under the present input-output price ratio of wheat.

Higher overall yields per hectare of land under wheat can only be obtained under intensive farming, which the present input-output price ratio of wheat discourages.

But, in spite of apparently discouraging price relationships, wheat producers have an offsetting tendency to stay with traditional low risk crops. Crops such as sugar beets, cotton, and oil seeds are almost new crops in Iran, at least for most of the farmers. These crops need good management in order to have good crops. For example, in sugar beet production, the plants have to be irrigated at specific times and the weeds have to be removed periodically. If the farmer fails to remove weeds and irrigate on a basis technical requirements, the amount of sugar in sugar beets will decrease, and they would not have enough sugar to be bought by sugar factories. The alternative use for sugar beets is for feeding animals where return for the crop is very low.

The important aspect of new management, gives relative advantage to wheat production over other crops. If the rate of return on wheat can also compete with other crops, then production of wheat would likely increase. Table 32 compares the area under wheat, cotton, sugar beets and oil seed cultivation each year, 1972 through 1975.

Area under wheat cultivation far exceeds area under any other crops, however, increases have occured in areas devoted to each of the other crops over the four-year period. According to Table 32, areas under cotton was 5.5 percent of the area under wheat in 1975. Area under sugar beets and

Table 32

AREAS UNDER WHEAT, COTTON,
SUGARBEET, AND OIL SEEDS

Year	Area under wheat (hectares)	Area under cotton (hectares)	Area under sugar beets (hectares)	Area under oil seeds (hectares)
1972	5,565,162	307,500	149,700	76,119
1973	5,469,000	308,600	146,100	84,770
1974	6,325,033	330,300	165,000	120,660
1975	5,973,272	380,300	158,800	115,427

SOURCE: Statistical Year Book of Iran.

Table 33

PROJECTED VALUES OF POPULATION AND QUANTITY OF PRODUCTION AND DEMAND FOR WHEAT IN 1980, 85, AND 90

Year	Population 1000	Production 1000 MT	Dis-appearance 1000 MT	Total Deficit 1000 MT	Per Capita Deficit Kg/person
1980	36,641	6,460	8,133	1,673	45.67
1985	40,623	7,720	10,053	2,333	57.42
1990	44,605	9,090	12,176	3,085	69.17

oil seeds with respect to areas under wheat in 1975 are 2.7 percent and 7.4 percent, respectively. Total area for the three competing crops is equal to about one-third of the area under "optimum" irrigation water.

Wheat in Iran is called the golden crop. The ERS study mentioned wheat ". . . is grown on virtually every farm. . . wheat usually provides about one-third of total farm income."[75]

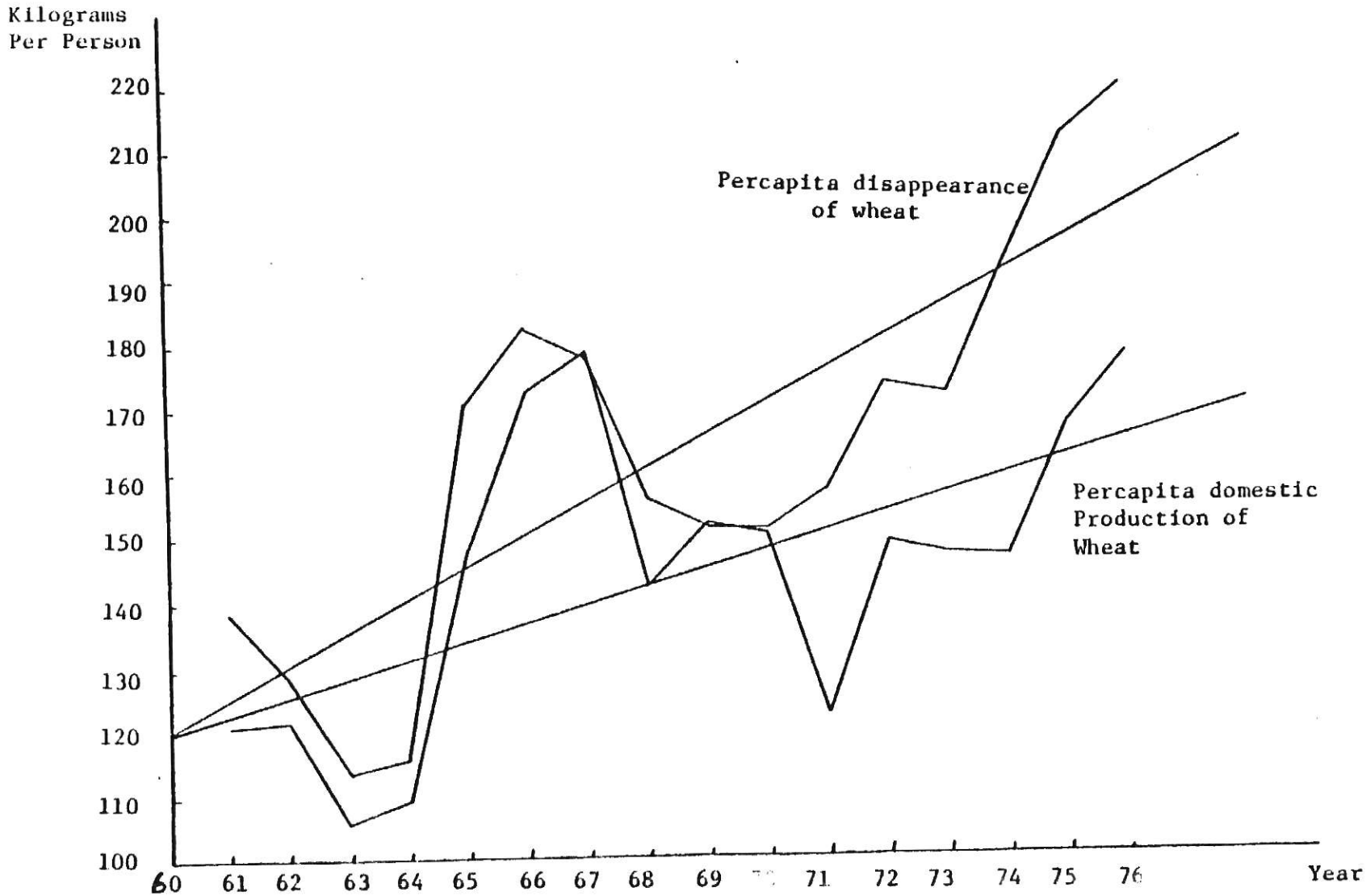
Disappearance and domestic supply gap:

Regression lines in Figure 17 represent estimated average per capita disappearance and estimated domestic production of wheat, 1960-1976, illustrating a growing gap between per capita disappearance and domestic production of wheat. The gap between per capita disappearance and per capita domestic supply increasing rapidly in the period 1970 through 1976, was .74, 34.06, 25.57, 25.13, 45.21, 44.71, 44.18 kg/person in successive years. Deficit in total quantity for the same years was 21, 996, 771, 782, 1452, 1472, 1440 thousand metric tons respectively.

The regression line illustrates that disappearance of wheat is increasing at a rate of 5.1 kg/person/year whereas domestic production is increasing by 2.75 kg/person/year or an average increase in production shortfall of 2.35 kg/person/year.

Figure 17

ILLUSTRATION OF THE GAP BETWEEN ANNUAL PER CAPITA DISAPPEARANCE AND DOMESTIC PRODUCTION



Regression equations were used to compute the projected values reported in Table 34. Projected values reflect linear functions based on data from 1961 through 1976, with the assumption of no drastic change in the system. The gap between total quantity disappearance and total quantity produced locally in 1980, 1985, and 1990 is estimated at 1,673, 2,333, and 3,085 thousands metric ton respectively.

WHEAT PRICE POLICY

Bread is the strategic food in Iran. The goals of the government are (1) to fix bread prices at low level and (2) to guarantee an adequate supply.

Aresvik describes the design of a program to carry out wheat price stability as follows:

> "Since the early 1960's, an intervention program for wheat in Iran has been carried out through the Cereals, Sugar and Tea Organization (below called Cereals Organization), a government organization under the Ministry of Cooperative and Rural Affairs, with the following program regarding wheat: To buy surplus wheat from producers; to satisfy consumer demand for wheat, if necessary by importing to supplement domestic supplies; to export wheat when domestic production is in excess of demand; to collaborate with the responsible ministries and authorities; to establish storage capacity as needed . . . .
>
> The wheat produced locally or imported by the government is generally distributed under a government plan for subsidizing and stabilizing the price of bread. The government is very much interested in stabilizing bread prices for the urban masses in order to stabilize the cost of living. Wheat purchased by the Cereals Organization is moved to areas where prices show an upward tendency, in order to maintain an adequate local supply. Wheat and wheat flour are distributed at a subsidized rate to bakers, so as to facilitate sale of bread at the prices fixed by the municipalities."[76]

Table 34

TOTAL WHEAT PRODUCTION AND ANNUAL PURCHASE BY CEREALS ORGANIZATION, 1958-75

(Tons)

Year	Total Wheat Production	Wholesale Price of Wheat (rials per kg.)	Annual Purchase as Percent of Total Production	Annual Purchase By Cereals Organization	Import[a]	Stock at End of Year
1958	3,040,000	n.a.	3.3	101,119	62,300	134,363
1959	2,840,000	n.a.	1.3	36,462	13,300	20,538
1960	2,923,657	6.50	0.4	12,952	479,000	37,473
1961	2,869,119	6.65	4.4	127,353	159,000	48,304
1962	2,754,740	7.86	2.0	56,007	133,000	58,440
1963	2,468,140	7.41	5.4	133,876	130,000	110,065
1964	2,622,578	7.95	0.3	7,061	554,400	26,461
1965	3,647,713	8.33	0.4	15,504	239,900	89,004
1966	4,380,982	7.38	4.5	196,770	228,600	232,461
1967	4,618,368	5.98	5.3	246,270	86,000	364,637
1968	4,672,000	5.52	5.2	244,713	500	302,367
1969	4,200,000	6.14	0.2	9,331	23,000	209,638
1970	3,800,000	7.68	0.1	3,984	650,000	19,720
1971	3,500,000	8.40	0.1	5,000	414,500	n.a.
1972	4,545,700	7.11	0.1	3,000	156,000	n.a.
1973	4,600,000	7.92	0.0	106	800,000	n.a.
1974	4,700,000	12.58	0.0	85	1,350,000	n.a.
1975	5,500,000	n.a.	8.2	450,000	n.a.	n.a.

n.a.: data not available.

[a]Flour import converted to wheat equivalent.

[b]Tentative figure, January 10, 1976.

SOURCES: FAO Agriculture Production Yearbook; Iran Statistical Yearbook (Room: FAO, Annuals); G. Allen LeBaron, Long Term Projections of Supply and Demand for Selective Agricultural Products in Iran (Utah Agricultural Experiment Station, 1970); Ministry of Agriculture and Natural Resources, Department of Economics and Statistics.

SOURCE: As reported by Oddvar Aresvik, The Agricultural Development of Iran.

Aresvik comments further concerning program operation:

> "The indicated farm-level floor prices have not been properly enforced, and the wholesale prices have not been stabilized. The government has had limited funds and storage space, and has no obligation to buy all the wheat offered at the announced floor price. As a consequence, the wholesale prices for wheat in Iran have fluctuated quite widely between seasons and between years. Thus, the government intervention policy for wheat has neither been efficient in providing a floor price for farm prices nor in pegging the wholesale prices of wheat to the millers."[77]

Aresvik said:

> "Stabilization of the wholesale wheat price to the mills could have been ensured in principle by holding sufficient stocks of wheat to meet any demand at a stablized price level. The necessary stocks could have been obtained by buying from the farmers in good crop years or by importing in less good years."[78]

He continued:

> "In spite of some influence through announced prices in some years and for some areas, the price risk has not generally been reduced to a satisfactory level for the Iranian farmers. The main reasons that the Cereals Organization has not been able to provide more stabilization and price leadership that will bring about a close correlation between the floor prices and the free market prices are mainly the following: the Cereal Organization has not been ready to purchase all the wheat offered at the announced floor price; the number of procurement points has been insufficient; and, the Cereals Organization has not been able to supply the commercial market with enough of its needs at a fixed, reasonable margin to stabilize the wholesale prices.
>
> There is little storage at the village level for the small farmers. Consequently, heavy losses may occur, and there is not opportunity for villagers to plan their marketing effectively over the season.

> The number, and location of silos, often only one in each provincial capital, and their handling arrangements do not permit large numbers of farmers to take advantage of the minimum prices.
>
> The farmer has no real bargaining power in the marketing of his output, often having but one alternative for selling his products--a situation often linked to credit advance. Apparently, in good crop years wheat often sells for up to 40 percent less than the announced floor prices. The situation is not conducive to a strong increase in wheat production."[79]

Intervention floor price in Iran was held at $80 per metric ton from 1960 until 1974. Intervention floor price in 1974-75 and 1976-76 was raised to $133.33 per ton and in 1976-77 and 1977-78 to $160.00 per ton.

Aresvik suggests rather wide fluctuations in prices to producers on an annual basis and seasonally. A stable intervention price from 1960 to 1974, in the face of inflated farm input prices also indicates a progressively ineffective intervention price over that period.

Aresvik suggests wide seasonal variations in wholesale price of wheat to millers, although imports have been used by the government to stabilize wholesale prices. Imported grain has been routed to those areas in which wholesale prices are increasing. Table 34 indicates some fluctuation in wholesale prices of wheat over the period 1960 to 1974 but fluctuations have not been severe. Prices

reported in Table 34 in Rials convert to a high of $112 per metric ton in 1971 and a low of $73.60 per ton in 1968, with an annual average wholesale price over the 16-year period of $94 per metric ton.

Government stock have been sold to millers at less than acquisition prices, especially since 1974 in an effort to maintain stable wholesale prices for wheat. Reported delivered price to licensed bakers in January 1976 was $100.13 per metric ton which was about 75 percent of the governments' announced floor price to producers of $133.33 per ton. Estimated import cost of wheat in 1975-76 was $198 per metric ton (Table 35).

Import prices of wheat in India are estimated in Table 35 using United States Gulf export price plus ocean freight charges from Houston to India. India was estimated because it was the destination nearest to Iran for which ocean freight rates were available. Landed cost of wheat in Iran is likely to be similar to that of India.

Table 35 indicates that an intervention price, if enforced, of $80 per metric ton was realistic relative to world prices through 1971-72, but not thereafter. In a volatile world wheat price environment, efforts to stabilize wholesale wheat prices in Iran have been more difficult and more expensive.

Table 35

IMPORTING PRICE OF WHEAT IN INDIA AND IRAN
PRODUCERS SUPPORT PRICE OF WHEAT

Year	F.O.B. Price of wheat at the Gulf of Mexico	Freight rate for wheat from the Gulf to India (East)	Importing Price of Wheat in India	Flour Price of Wheat in Iran
	$/MT	$/long ton	$/MT	$/MT
1966-67	68	13.65	81.65	80
1967-68	66	17.48	83.48	80
1968-69	67	14.89	81.89	80
1969-70	62	15.87	77.87	80
1970-71	67	16.07	83.07	80
1971-72	66	10.66	76.66	80
1972-73	91	17.54	108.54	80
1973-74	184	47.54	231.54	80
1974-75	192	39.87	231.87	133.33
1975-76	176	22.10	198.10	133.33
1976-77	133	22.09	155.09	160.00
1977-78	111	21.50	132.50	160.00

SOURCES: World Wheat Statistics, International Wheat Council, and Oddvar Aresvik, The Agricultural Development of Iran.

Concern is also expressed in various source documents over the inability of the government of Iran to enforce floor prices to producers.

Aresvik suggests that:

> "It would be advisable for the government to consider taking measures to make the floor price really functional. Such steps could include the following:
>
> 1. Announcement of the floor price long enough before the planting of wheat to influence the farmers' ordering of fertilizer and other inputs.
>
> 2. The Cereals Organization should be provided with adequate storage capacity and funds to buy all the wheat offered at the announced floor price, and should be obliged to do so.
>
> 3. Around 10 percent of the total production may have to be bought each year, which may be approximately one-third of the marketed quantity of wheat. At present this would average around 0.5 million tons annually.
>
> 4. Enough collecting points should be established to provide opportunities for easy delivery by the farmers.
>
> 5. A stream-lining of the procurement standards of the Cereals Organization should be considered, aiming at improving the cleanliness of the wheat and stimulating use of combines.
>
> 6. Payment to the farmers should be in cash at time of delivery, without delays and red tape.
>
> 7. Compartmented storage, keeping separate wheats of different qualities, would help to improve the average quality of domestic wheats for millers and bakers.
>
> The active buying policy launched in 1975 was aimed at stabilizing farm wheat prices at the floor price level, at building up reserves, and at ensuring that good-quality grain reached the consumer.[13] It is

> hoped that this will mean a rapid improvement of the situation discussed above. In 1975 imported American wheat was selling at around $180 per ton at port of delivery, which is around 2,500 rials more per ton than the floor price."[80]

An FAO study also has a section on "Price Policies for Agriculture" in Iran, in which policy is characterized as follows:

> "In general, the main objectives of a pricing policy for agriculture include some or all of the following: (a) To reduce the risk to producers arising from severe fluctuations in prices (b) to ensure a steady supply of agricultural products to consumers, (c) to promote agricultural production along the lines of a specified strategy, (d) to stabilize and/or reduce the price to consumers of agricultural products, and (e) to raise agricultural incomes."[81]

The FAO study continues:

> "A crucial problem of any price support policy is that it should grant sufficiently attractive prices to producers to stimulate production and at the same time ensure a steady supply of produce to consumers at relatively low prices. Logically, if the two objectives are to be achieved simultaneously, either the margin of the marketing and distribution sectors has to be reduced or government subsidies have to be granted to producers and/or consumers. The government has taken measures to stabilize both categories of prices for a number of agricultural commodities. However, it appears that these measures have not always been successful since the support prices to producers have given limited results and consumer prices have been rising.
>
> It would seem that the less than full effectiveness of the present price support programmes is due to a number of factors such as administrative and management difficulties, insufficient size of stocks, insufficient transport facilities, insufficient information on producer prices to farmers, insufficient credit to small farmers, and insufficient number and inadequate regional distribution of assembly points.

Since a price support program can be fully effective only in the context of an adequate infrastructure and institutional set up, the following considerations should be underlined in the present Iranian situation.

(a) The wide seasonal fluctuations in product prices are due to a large extent to the financial weakness of farmers who sell their products immediately after the harvest and often before the harvest to the middleman at a very low price to get the needed cash or to pay debts. Credit alone could mitigate substantially these seasonal fluctuations.

(b) The farmers have to be sure that the assembly points will buy their products at a guaranteed price. This would provide farmers with a better bargaining position vis-a-vis private traders.

(c) The storage capacity must be sufficient to accommodate the output in a bumper crop year, especially when support prices are attractive."[82]

Then the FAO study adds:

". . .agricultural price policy is always faced with the dilemma of how to grant attractive and incentive prices to producers, and at the same time keep consumer prices at a low level. This difficult and sometimes impossible task is approached in four main ways: (a) increasing the efficiency of the marketing sector by reducing waste and by improving storage and transportation, (b) eliminating monopolistic practices of middlemen and reducing their margins if they are unreasonably high, (c) subsidizing consumer prices of basic food products, (d) subsidizing inputs and investments."[83]

Finally,

"A revaluation of agricultural production can be effected by means of one or more of the following measures: (a) stabilizing producer prices at a higher level, (b) subsidizing the production inputs, particularly fertilizers, pesticides, agricultural implements and credit, (c) undertaking public investments in agriculture, especially in land and water development and subsidizing the costs of use, and (d) restructuring the pattern of farms."[84]

CONCLUSIONS

Key conclusions that emerge from this study are as follows:

1. The quantity of wheat demanded by Iranian consumers is increasing and expected to continue to increase because of (a) rising personal incomes and positive income elasticity of demand for wheat for large segment of the population and (b) increasing population.

2. Domestic production is unable to meet the growing demand for wheat. Imports have increased, especially in the last decade and are projected to increase into the future.

3. Government programs have been ineffective in providing rural infrastructure, marketing outlets and facilities and floor price stabilization for encouragement of expanded wheat production in Iran. Cost studies cited in this report suggest that full cost of producing wheat is greater by a significant amount than prices received for wheat.

4. Increased oil revenues make it feasible in Iran to undertake major programs of rural development to improve economic condition in rural areas and to encourage greater production and market sale of basic food grains.

Three types of farms were discussed in Part III of this report. Specific policies for expansion of wheat production should consider each farm type separately because each is a different economic unit with different characteristics and limitation. One policy for wheat in the whole country may not fit adequately the needs in each type of farming structure. Some suggestion for policy for each farm type toward increasing wheat production are as follows:

Farmer-owners: Immediate policy to increase the actual income of small farmer-owner wheat producers is through opening credit to them. As was discussed in Part II, most of these farmers pre-sell their crop or borrow money with very high interest rates. Also they sell their crops at harvest time frequently at low prices to acquire cash, pay their debts and to pay installments on land. The "middle man" performs many functions for this group including pre-buying the crops, lending money, and finally when farmers are forced to sell crops, buying at low prices in the absence of any other market alternative for farmers. The main objectives of policy for this group of farmers would be to improve credit and marketing functions to provide higher net returns to producers. A practical policy could be, as Aresvik said:

> ". . . purchasing all produce offered . . . at the guaranteed price, and cooperatives. . . authorized to act as buyers where relevant. Although cooperatives have marketed less than one percent of agricultural output in recent years, it is considered that the higher prices and the introduction of marketing contracts will expand the marketing operations of cooperatives. Under those contracts, the farmer receives a cash advance against his crop and in turn signs a contract to market his crop through the cooperative."[85]

Commercial farms: Income of the commercial type farm that produce most of the wheat for market, could be increased by increasing the efficiency of the marketing sector, by reducing waste and improving storage and transportation.

Realized costs of commercial wheat production for producers could be reduced by subsidizing production inputs, particularly fertilizers, pesticides, agricultural implements and credit, also by undertaking public investments in agriculture, especially in land and water development and by subsidizing the costs of use.

Agri-business: Agri-businesses were established with access to credit, current technology and a more adequate infrastructure than for the two other farm types. Enforcement of price policies that adequately cover production costs would likely shift production to wheat and away from other crops.

Iran is a rich country. The announced amount of oil income was $24.88 billion in 1977 (Table 26). The government is financially capable of financing projects to decrease production costs of wheat and increase net incomes of wheat producers. If wheat production were at least as profitable as other crops, then local wheat production would

be expanded and Iran may approach self-sufficiency of this strategic food crop.

Government policy is unlikely to increase the price of bread. The alternative policy is to encourage wheat production through a broader application and enforcement of minimum prices to producers and assisting producers in reducing their production costs.

REFERENCES

1. Robert, E. Looney. A development strategy for Iran through the 1980s, (Preager Publishers, 1977), p. 14.

2. B. Jazani. The Socio-Economic Analysis of a dependence capitalist state, (Iran Committee, 1975), p. 17.

3. Ibid., p. 22.

4. Robert, E. Looney. Iran at the end of the century, (Preager Publishers, 1976), p. 123.

5. Robert, W. Clower. Growth without development, (Northwestern University Press, 1966), p. 31.

6. Oddvar Aresvik. The Agricultural Development of Iran. (Preager Publishers, 1976), p. 65.

7. Mahmoud Havirian. The Economic Geography of Iran. (Tehran Teachers College, 1971), p. 20.

8. Habibolah Sabeti. The Study of Bioclimatalogy of Iran. (University of Tehran, 1970), p. 27.

9. Oddvar Aresvik, op. cit., p. 65.

10. Ibid., p. 66.

11. Ibid., p. 66.

12. Ibid., p. 66.

13. Ibid., p. 69.

14. Ibid., p. 69.

15. Harry Magdoff. Capital, Technology and Development. (Middle East Research and Information Project Number 42, November, 1975), p. 15.

16. Oddvar Aresvik, op. cit., p. 162.

17. Ibid., p. 162.

18. Ibid., p. 163.

19. Plan Organization, Statistical Center of Iran, The Result of 1975 Agricultural Census, p. 2.

20. Oddvar Aresvik, op. cit., p. 164.

21. Harry Magdoff, op. cit., p. 17.

22. Oddvar Aresvik, op. cit., p. 167.

23. OIPFG, Land Reform in Iran, (Iran Committee, 1971).

24. Oddvar Aresvik, op. cit., p. 100.

25. Ibid., p. 102.

26. Ibid., p. 102.

27. Ibid., p. 105.

28. Ibid., p. 109.

29. Ibid., p. 115.

30. Ibid., p. 116.

31. International Marketing Information Series (IMIS), a Survey of U.S. Business Opportunities, Iran Country Market Sectoral Survey, (U.S. Department of Commerce, Domestic and International Business Administration, Bureau of International Commerce, October 1977), p. 22.

32. Ibid., p. 18.

33. Ibid., p. 19.

34. Helmut Richards. Land Reform and Agri-business in Iran. (Middle East Research and Information Project Number 43, December 1975), p. 14.

35. IMIS, op. cit., p. 19.

36. Ibid., p. 19.

37. Ibid., p. 19.

38. Oddvar Aresvik, op. cit., p. 174.

39. Ibid., p. 169.

40. Ibid., p. 171.

41. Ibid., p. 169.

42. Mansour Gorgani. Economic of Gorgan, (University of Tehran, 1972), p. 383.

43. Oddvar Aresvik, op. cit., p. 173.

44. Ibid., p. 172.

45. Ibid., p. 171.

46. Ibid., p. 172.

47. Agricultural Cooperative Bank of Iran (ACBI), Annual Report of ACBI, 1977, p. 9.

48. Agricultural Development Bank of Iran (ADBI), Annual Report, 1977, p. 13.

49. Bank Markazi, Iran (BMI), (or Central Bank of Iran), Annual Report, 1977, p. 50.

50. Mansour Gorgani, op. cit., p. 380.

51. Oddvar Areskin, op. cit., p. 170.

52. Statistical Center of Iran, 1975, op. cit., p. 2.

53. Oddvar Aresvik, op. cit., p. 189.

54. USDA, Economic Research Service, Iran, Agricultural Production and Trade, ERS - Foreign 357, (Washington D.C., April 1974), p. 12.

55. Mansour Gorgani, op. cit., p. 250.

56. Oddvar Aresvik, op. cit., p. 206.

57. Allen LeBaron, Long-term projection of supply and demand for selected agricultural products in Iran, (Utah Agricultural Experiment Station, Utah State University, Logan, Utah, 1970), p. 93.

58. Leo M. Hoover and John H. McCoy, Economic Factors that Effect Wheat in Kansas, Kansas Agricultural Experiment Station, Bulletin 369, January 1955.

59. Kenneth W. Meinken, The Demand and Price Structure for Wheat, (USDA, Technical Bulletin No. 1136, November 1955), p. 17.

60. John A. Schnittker, Wheat Problems and Programs in the United States, (Research Bulletin 753, North Central Regional Publication 118, Sept. 1960, University of Missouri, Columbia, Missouri), p. 41.

61. FAO, Report of the Workshop on Agricultural Sector Planning, (AGD/ESP/IRA/73/016, May 1975), p. 84.

62. Ibid., p. 75.

63. Ibid., p. 88.

64. John A. Schnittker, op. cit., p. 49.

65. Allen Lebaron, op. cit., p. 45.

66. FAO, op. cit., p. 80.

67. Ibid., p. 73.

68. John A. Schnittker, op. cit., p. 34.

69. Ibid., p. 38.

70. McCoy, op. cit.

71. Oddvar Aresvik, op. cit., p. 66.

72. George Sarkisian, Tehran Economists, (No. 1203, July 16, 1977).

73. Mansour Gorgani, op. cit., p. 244.

74. Iran Almanac, op. cit., p. 206.

75. USDA, ERS, op. cit., p. 12.

76. Oddvar Aresvik, op. cit., p. 143.

77. Ibid., p. 146.

78. Ibid., p. 143.

79. Ibid., p. 146.

80. Ibid., p. 148.

81. FAO, op. cit., p. 205.

82. Ibid., p. 205.

83. Ibid., p. 207.

84. Ibid., p. 208.

85. Oddvar Aresvik, op. cit., p. 145.

BIBLIOGRAPHY

Agricultural Cooperative Bank of Iran, Annual Report of 1977

Agricultural Development Bank of Iran, Annual Report of 1977

Aresvik, Oddvar, The Agricultural Development of Iran, (Preager Publishers, 1976)

Bank Markazi Iran, Annual Report of 1977

Clower, Robert W., Growth Without Development (Northwestern University Press, 1966)

FAO, Report of the Workshop on Agricultural Sector Planning, (AGD/ESP/IRA/73/016, May, 1975)

Gorgani, Mansour, Economic of Gorgan (University of Tehran)

Harririan Mahmoud, The Economic Geography of Iran (Tehran Teachers College, 1971)

Hoover, Leo M. and McCoy John H. Economic Factor that Effect Wheat in Kansas, Kansas Agricultural Experiment Station, Bulletin 369, January 1955.

International Marketing Information Series, a Survey of U.S. Business Opportunities, Iran Country Market Sectoral Survey (U.S. Department of Commerce, Domestic and International Business Administration, Bureau of International Commerce, October 1977).

Jazani, B. The Socio-Economic Analysis of a Dependence Capitalist State, (Iran Committee, 1975).

LeBaron, Allen, Long-term Projection of Supply and Demand for Selected Agricultural Products in Iran, (Utah Agricultural Experiment Station, Utah State University, Logan, Utah, 1970).

Looney, Robert E., A Development Strategy for Iran through the 1980s, (Preager Publishers, 1977).

Looney, Robert E. Iran at the End of the Century, (Preager Publishers, 1976).

Magdoff, Harry. Capital, Technology and Development, (Middle East Research and Information Project Number 42, November, 1975.

Meinken, Kenneth W. The Demand and Price Structure for Wheat, (USDA, Technical Bulletin No. 1136, November 1955).

OIPFG, Land Reform in Iran, (Iran Committee, 1971).

Plan Organization, Statistical Center of Iran, The Result of 1975 Agricultural Census.

Richards, Helmut, Land Reform and Agri-business in Iran, (Middle East Research and Information Project Number 43, December 1975).

Sabeti, Habibolah. The Study of Bioclimatology of Iran, (University of Tehran, 1970).

Sarkisian, Tehran Economists, (No. 1203, July 16, 1977).

Schnittker, John A. Wheat Problems and Programs in the United States (Research Bulletin 753, North Central Regional Publication 118, September, 1960, University of Missouri, Columbia, Missouri).

USDA, Economic Research Service, Iran, Agricultural Production and Trade, ERS, Foreign 357, (Washington, D.C., April 1974).

APPENDIX

Table A-1

IRAN: GOVERNMENT AND PRIVATE AGRIBUSINESSES[1]

Government	Hectarage[2]	Major Crops
Moghan Agro-Industry Company	35,000	Field crops, orchards, livestock
Karoun Agro-Industry Company	25,000	Sugar
Haft-Tappeh Sugar Can Company	10,000	Sugar
Sefid Rud Agro-Industry	10,000	Crops, livestock
Sharoor Agro-Industry	8,000	Field crops, folder, livestock
Jiroft Agro-Industry Company	3,000	Field crops, livestock
Fars Industrial Meat Complex	1,000	Red meat, alfalfa
Silk Industrial Complex	600	Silk
Kashan Perfume Company	500	Perfume
Iran Milk Industries	N.A.	Milk
Lorestan Industrial Meat Company	N.A.	Red Meat
Ziaran Turkey Industrial Complex	N.A.	Turkey Meat
Private		
Iran America Agro-Industrial Company	20,263	Field crops, livestock
Gol Nahal Company	21	Orchards
Nousari Company	20	Cotton
Poyam Company	18	Orchards
Afshin Company	8	Orchards
Ziaran Meat Complex	N.A.	Red Meat

Table A-1 (Cont.)

Government	Hectarage[2]	Major Crops
International Agro-Business Corporation	16,690	Field crops, livestock
Iran Shellcott	15,796	Field crops
Iran California Company	10,500	Field crops
Galeh Agro-Industrial Company	4,010	Field crops, milk
Eghted Sugar Company	1,800	Sugar
Koorosh Agro-Industry	1,600	Livestock, folder
Neka-Bazr Company	1,300	Seeds
Dashte Morghab Company	600	Canned food
Magsal	400	Folder, livestock
Chin-Chin Agro-Industrial Company	300	Canned food, orchards
Pak-Teen Company	300	Canned food
Shalikar Company	191	Silk
Broan Company	100	Almonds
Gulsara Company	100	Pistachio
Maher Company	100	Pistachio, Folder
Manuchehr Kalo Company	23	Orchards

[1]Projects which had commenced farming operations by 1975.

[2]Hectarage to be developed upon completion of project.

SOURCE: Ministry of Agriculture.

As reported by: Iran: A Survey of U.S. Business Opportunities.

Table A-2

INVESTORS OF FOUR AGRIBUSINESSES

Name of Agri-business	Date Established	Hectares	Investors
Iran-America Agro-Industrial Company	1970	20,263	N.H. Agro-Industrial Company, Private Iranian Investors, ADBI
Iran California Company	1970	10,500	Transworld Agricultural Development Corporation, Bank of America, ADBI, John Deere and Co., Private Iranian Investors, Khuzistan Water and Power
Iran Shellcott	1971	15,796	Shell International, Mitchell Cotts Development Finance Co., Limited, ADBI, Bank Omran
Internation	1973	16,690	ADBI, Ahwaz Sugar Beet and Refinery Co., Khuzistan Water and Power Authority, Chase International Invstment Corp., Mitsui and Co., Limited, Hawaiian Agronomics Co., International, Diamond A Cattle Company

SOURCE: U.S. Department of Commerce, Iran, A Survey of U.S. Business Opportunities.

Table A-3

IRAN: BASIC FARM EQUIPMENT INVENTORY OF TWO AGRIBUSINESSES IN KHUZISTAN

Shellcott (1975)		Iran California (1976)	
Tractors	Units	Tractors	Units
John Deere 3120 (81 HP)	11	John Deere 5020	8
Massey-Ferguson 178 (27 HP)	5	John Deere 4020	7
Massey-Ferguson 1080 (88 HP)	15	John Deere 3020	4
Massey-Ferguson 1150 (150 HP)	3	John Deere 3120	1
Muir Hill 111 (110 HP)	3	John Deere 2120	2
Muir Hill 161 (160 HP)	2	Romanian Universal	7
Other Equipment		International Harvester 10-66	4
John Deere 950 Combines	2	Muir Hill 161	3
Massey-Ferguson 65 Combines	2	Other Equipment	
International Cotton Harvesters	5	John Deere 860 Scrapers	5
Disc Harrows	12	Hancock Scrapers	4
Heavy Offset Disc Harrows	2	John Deere 950 Combines	2
Land plows	4	John Deere 630 Combines	4
Two-way plows (4-5 Bottom)	2	John Deere Sugar Beet Harvesters	5
Rolling Cultivators	11	Alfalfa Cuber	1
6-Row Planters	3	Miller stubble discs	2
Bedders	3	John Deere Offset Discs	12
Field cultivator	1	8-Row Planting Sleds	3
		Plows	2
		Road graders	2
		International Harvester balers	2

Table A-3 (Cont.)

Shellcott (1975)		Iran California (1976)	
Tractors	Units	Tractors	Units
Flail choppers	5	John Deere balers	2
Chisel plow	1	John Deere self-propelled spreaders	2
Heavy duty sub-soiler	1	John Deere field choppers	2
Bed shapers	3		

SOURCE: U.S. Department of Commerce, Iran, A Survey of U.S. Business Opportunities.

ECONOMIC FACTORS THAT AFFECT WHEAT PRODUCTION IN IRAN

BY

MOHAMMAD RAD

B.S., Tehran University, 1971

THESIS

AN ABSTRACT OF A MASTER'S REPORT
submitted in partial fulfillment of the
requirement for the degree
MASTER OF SCIENCE

Department of Agricultural Economics

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1979

ABSTRACT

Agriculture in Iran is faced with two sets of restrictions, i.e., natural and socio-economic restrictions.

Water is the most scarce natural input of agriculture. There are low amounts and scattered precipitation, which mostly are insufficient for dry farming. Availability of water is the most determinant factor in agriculture in Iran. Arable lands are available but lack of water restricts their use.

Water restrictions can be removed by adapting technology to divert underground water for irrigation purposes and by using water-saving systems of irrigation, such as sprinkler systems.

High rate of illiteracy in rural areas, lack of skilled and semi-skilled labor, credit shortage, peasant habits of traditional cultivation system, farm organization, and lack of road and infrastructure facilities are among the problems that are restricting use of technology. To overcome natural restriction, to increase the productivity of labor, and to increase yields per hectare, newer technology must be applied. To apply technology adequately, socio-economic restriction must be removed, which requires adequate government policy.

Bread is the most important and the most common food for the vast majority of the Iranian people. In lower level income groups, the main part of the family budget is spent on buying bread. Because of unequal income distribution in Iran, more than 60 percent of the population has calorie intake of less than a recognized minimum requirement, due to very low incomes. Income elasticity of demand for bread and bakery products in urban areas was .365 in 1965. In the last decade, as the national income increased rapidly, income of low income groups increased slightly, which increased demand for wheat.

Domestic production of wheat did not keep pace with the increase in demand for wheat in the period 1960 through 1976 due to the general agricultural restrictions and restrictions that are especially relevant to wheat production. A major limiting condition appears to be a government policy of keeping consumer prices for bread low and stable through a controlled low price for wheat. The support price of the government is well below production costs and importing prices for wheat. The result is that wheat will likely yield land to other crops, where alternatives are available. Irrigated lands have alternatives; however, dry farming, without alternatives, will remain under wheat until prices no longer cover direct variable costs. If present trends continue, Iran will rely increasingly on international markets to supply its strategic food.

Iran is a rich country. Oil income in 1977 was $24.88 billion. Iran is financially capable of carrying out improved development programs for agriculture.