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THE EFFECTS OF FARM SIZE AND MANAGEMENT SYSTEM ON AGRICULTURAL PRODUCTION IN IRAN

by

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ABBREVIATIONS

1) **DAY** — Total labour input of a production unit adjusted for the equivalent adult male labour days (labour days)

2) **DEPM** — Depreciation of machinery (Rls.)

3) **EA** = $\frac{\text{Net, value-added of output produced in a production unit in one agricultural year (Rls.)}}{\text{Total rental values of all measured factors employed in one year except for depreciation of machinery and the value of seeds, fertilizers and pesticides (Rls.)}}$

4) **EG** = $\frac{\text{Value of total gross agricultural production of a unit produced in one agricultural year (Rls.)}}{\text{Total rental values of all measured factors employed in one year (Rls.)}}$

5) **EN** = $\frac{\text{Net value of output (gross value less depreciation) produced in one agricultural year in a production unit (Rls.)}}{\text{Total rental values of all measured factors employed in one year except for depreciation of machinery (Rls.)}}$

6) **LA** — Total land under cultivation of a single production unit (hectares).

7) **MAN** — Total adult male labour days employed in a farm (labour days).

8) **OA** — Net value added of output produced in a production unit in one agricultural year $[OG-(DEPM + VCUR)]$ (Rls.)

9) **OG** — Gross value of output produced in a production unit during one agricultural year (Rls.)

10) **ON** — Net value of output produced in a production unit during one agricultural year (OG- DEPM) (Rls.)

11) **QW** — Quantity of water used in a production unit during one agricultural year (cubic meters).

12) **VCUR** — Value of current inputs (except for labour and capital) used in a production unit during one agricultural year (Rls.)

N o t e s

1. Most of the Iranian statistics are published on the basis of the Iranian solar year which starts on March 21, the beginning of Spring. For simplicity, the closest Gregorian year to the Iranian year is used here. Thus, 1960 is 21 March 1960 - 20 March 1961 and 1970 is 21 March 1970 to 20 March 1971.

2. Iranian currency is the rial. For much of the period under consideration in this dissertation, its rate was fixed at 76.50 rials to the dollar. In February 1973, the rial was revalued by about 11.1% to be fixed at 68.5 rials. Another small revaluation of 1.3% occurred a few months later. In March 1974, the link to the dollar was abolished, and the rial was fixed in terms of SDR's (IMF's special drawing rights). Since then, the value of the rial has fluctuated between 66.5 and 71 rials to the dollar.

GLOSSARY

arbāb landlord

arbābi belonging to landlord

bahre bardarye keshāvarzi agricultural production unit

Bānke Markazie Iran The Central Bank of Iran

Banke Ta^e-āvone Keshavarzi The Agricultural Cooperative Bank

Bānke Tose^e Keshavarzi The Agricultural Development Bank

bigāri unpaid work (usually for labour services provided by peasants for landlords)

boneh a traditional system of collective village production activities based on the division of the village lands into several parts (boneh) on which individual small-holders carry out their own production activities, while being subject to a number of collective responsibilities and constraints.

dar-kār similar to boneh but often less developed than boneh.

ejāre-kar a peasant producer who rents land in an area, usually not in his own province, and cultivates summer crops for sale. Often the production activities are carried out collectively with some other ejāre-kars.

farmān a decree issued by the Shah

harāse similar to boneh, often less sophisticated than boneh.

haqqe nasaq the right to hold and use for cultivation a portion of the village land and water (before the Land Reform).

iqtā^e land assignment

kad-khodā village headman

khowshneshin landless agricultural labourer

khish similar to boneh, often less sophisticated.

mafrūz delimited (of property of which the shares of the joint holders are delimited).

mālik landlord, owner of property.

Markaze Āmāre Iran Iran Statistical Centre.

mobāshir bailiff, man who collects the landowner's share of the harvest.

musha-e jointly owned in undivided shares (of land).

nasaq the total amount of land and water available to a village.

nime-kar similar to ejare-kar.

Ostān Province

qanāt underground water channel.

ra-eiyat a peasant with haqqe nasaq on a share-cropping basis.

ra-eiyati belonging to ra-eiyat, related to ra-eiyat.

sahrā similar to boneh.

sazemān a special type of capitalist farm which is found in the province of Gorgān and specializes in cotton and wheat production.

Sāzemāne Barnāme va Budje Plan and Budget Organization

shahrak quasi-town

tolombe-kār a small peasant cash-crop producer who migrates into another locality and in collaboration with other migrant peasants sets up a well and carries out production activities collectively.

tuyūl land assignment.

vaqf religious endowments.

Vezārate Keshāvarzi Ministry of Agriculture

Vezārate Keshvar Ministry of Interior

Vezārate Omoore Eqtessadi va Darayi Ministry of Finance and Economic Affairs.

Vezārate Ta-āvon va Omoore Roostāhā Ministry of Cooperatives and Rural Affairs.

I N T R O D U C T I O N

During the last two decades two major government policies aimed at bringing structural changes in the system of land tenure in Iran have been implemented. The first was the Land Reform of 1962-66, which transferred the ownership of the land from the large landlords to the peasant and tribal producers. But during the late-sixties and the seventies a second major structural change in the system of land tenure was proposed by the government, this time aimed at the destruction of the already existing peasant, tribal and capitalist producers and the creation of very large-scale agricultural corporations. As the main objective of this policy was to bring about substantial increases in agricultural production and productivities, it is the purpose of this dissertation to examine whether these very large-scale corporations are more productive systems than the already existing autonomous producers. As the proponents of the very large-scale farms argue in terms of gains from economies of scale in very large units and of the superiority of the trained and skilled corporate managers to the family managed peasant farmers, in this dissertation an attempt has been made to examine the effect on productivity of (a) farm size and (b) management system. The following procedure has been adopted to examine the subject.

In Chapter One, I have tried to present a background to the existing institutions of agricultural production in Iran. I have, therefore, provided a short historical survey of the system of land tenure in Iran and the role played by the Land Reform (1962-66) on these institutions. Some of the opponents if the large-scale corporations have argued that agricultural production in many Iranian villages is based on a traditional collective institution, boneh, which is composed of small peasant holdings but where many production activities are carried out on a collective basis. Thus, they argue that the boneh system allows for economies of scale. I have,

therefore, tried to explain the system of boneh and to study the contemporary conditions of this organization. In the second part of the Chapter I have tried to define the existing systems of agricultural production and have categorized them as 1) peasant, 2) tribal, 3) capitalist, 4) semi-government corporations, and 5) state farms. In order to narrow the subject, I have not made a specific study of the tribal systems. Also, because state farms are few, and exist mostly for experimental and demonstrative purposes, these are not studied.

A major piece of evidence used by the proponents of large-scale farms to demonstrate the existence of inherent inefficiencies in the autonomous production systems, has been the slow growth rates of agriculture relative to the rest of the economy.

In order to examine the validity of this argument, in the first section of Chapter Two I have tried to investigate, given the overall macro economic variables acting on agriculture, whether the evidence points toward inefficient production performance in the autonomous units. In the second part of the Chapter, I have tried, on the basis of the existing documented evidence, to study whether there is any indication by the data of increasing productivity with size increases. I have also tried to examine whether the existing corporate systems are more productive than the autonomous producers.

Since the existing documented evidence is limited and insufficient to allow for a rigorous analysis of the subject, in Part II of the dissertation I have presented an intensive micro study of five villages and four semi-government corporations (agro-business farms).

In Chapter Three the logic for the specific approach adopted for the case-studies, the characteristics of the case-studies, the type of variables collected from the field, the survey methods and an evaluation of the data are presented.

Chapter Four explains the statistical models used for the analysis of data, the approach adopted for the division of the sample farms into the different categories, and the measurement problems.

Chapter Five presents the results of the statistical analysis of the data concerning the five surveyed villages. The Chapter is broken into three sections. In the first, the empirical results concerning the comparisons of the different farm-management categories within each single village are presented. In the second section an attempt is made to compare the productivities of the five villages. In the final section of the Chapter, the farmers' response to innovation and adaptation of new technology is discussed.

In the Sixth Chapter, an evaluation of the productive performance of the four agro-businesses included in the survey is presented. The evaluation is carried out in two stages: First, the production objectives and the actual performance of the units are evaluated. Second, a comparative study of the productivities of the agro-business farms and the five villages is made.

CHAPTER I

HISTORICAL BACKGROUND AND THE CONTEMPORARY PRODUCTION SYSTEMS

The climatical conditions and the historical development of the land-tenure system in Iran have influenced the evolution of certain techniques and social organizations of production which still play an important role in the contemporary systems and techniques of agricultural production. Therefore, a brief examination of these historical developments will be useful for a better understanding of the contemporary systems.

In the twentieth century, the most dramatic change in the system of land tenure in the country has been introduced by the Land Reform (1962-66). Through elimination of the landlords, the Reform affected about one-third of the rural households, thus creating major changes in the social relations of production.(1) Since the contemporary systems are an outcome of the Land Reform and have evolved in relation to the interaction of the historical factors with the effects of the Reform, a study of the characteristics of the Land Reform, as formulated and implemented in Iran, will further clarify the structure of the contemporary systems of production.

A number of writers have argued that the traditional collective social organizations of production are useful in providing a near to optimal use of the most scarce resource : water. Also, they state that it offered a workable division of responsibilities between landlords and peasants. It has been argued that the Land Reform has considerably undermined these optimizing social organizations.(2) Without attempting

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(1) Ashraf (1973), p.2.

(2) Malek (1959), Safi-Nejād (1975).

to test the validity of the assumption of the economic efficiency of the pre-Land Reform social organizations of production, this chapter focuses upon a study of the relationship of the various social and economic changes, inclusive of the Reform, upon the traditional collective organizations. The purpose of this study is to examine whether the post-Reform institutions of production had the potential ability to allow for the existence of the traditional organizations.

In addition to the Land Reform, during the late sixties and early seventies, other policies aiming at structural changes in the countryside have been introduced. In order to complete the historical background to the contemporary systems of production, a brief examination of these policies and the logic behind such policy measures, as stated by the proponents of the approach, is presented in this chapter. Also, a brief study of the ideas of those who opposed these policies is made in order to show the controversy which existed in relation to this policy.

Having presented the background material, in Section Two of this chapter an attempt will be made to categorize and define the contemporary systems of agricultural production in Iran.

SECTION I : THE HISTORICAL BACKGROUND

The Land Tenure System

The structural characteristics of the system of land tenure in Iran have had major impacts upon the development of the institutions of agricultural production.[1] These characteristics, with only minor

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(1) The historical development of the system of land tenure in Iran has been subject to considerable controversy. Some scholars have defined it as feudal while others consider it 'Asiatic'. It is beyond the scope of this paper to evaluate the controversy. Examples of such attempts can be found in Abrahamian (1975), pp. 3-31, Ashraf (1969) pp. 54-79, Nomani (1976), pp. 121-142 or Vielle (1970).

exceptions and certain modifications have remained strikingly unchanged throughout the history of this country. The basic theory behind the system of land tenure is that the ruler (the Shah) is regarded as the sole owner of all land. He is allowed to assign at his will the use and the revenue of land to individuals and potentially could revoke the assignment, and often has.(1) Although this theory was modified in many instances, and in fact private property was to some extent practiced, the fact remains that the power of the Iranian Kings to confiscate landed property was strong and even the weaker central governments enjoyed this power.(2)

As a result of this basic theory, systems of land revenue assignments known as iqtā' and tūyūl developed.(3) Although both iqtā' and tūyūl were granted by the grace of the ruler and theoretically revokable, these institutions nevertheless became complex. There was a tendency for these lands to become the private property of the assignees. Nonetheless, instances of revokation of such 'property' rights are numerous. Thus although larger estates existed and large landlordism was practised, the right to such estates was not permanent and assignees were often changed.(4)

In the second half of the nineteenth century there is evidence of the strengthening of the institution of private property. Along with the commercialization of agriculture land also became commercialized. Land transactions were to a marginal extent practiced.(5) The constitutional revolution (1906), which was basically led by the merchants and the landlords, recognized private property and thus during the interim between the revolution and the rise of Reza-Shah (1925), there were

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(1) Lambton (1954), pp. III, 6 and 106.

(2) Vielle (1970), p.25. Also see Lambton (1971), pp.52-54.

(3) Both terminologies mean land assignment.

(4) Lambton (1954), Chapters III to VI.

(5) Nowshirvani (1975), pp. 21-22.

attempts to strengthen the institution of private property.(1) However, the rise of a new strong central government changed the scene and once again there was a reshuffling in the composition of the land-owning classes.(2)

Thus, the Land Reform, in its limited sense, meaning the redistribution of land ownership, was very much in line with the basic philosophy of land tenure in the country and was just another, though a major, redistribution of the ownership of the land.(3) However, the basic difference must be found in the fact that for the first time in the history of this country the masses of peasants were on the receiving side.

Another important feature of the large landlordism in Iran was the absentee nature of the owners: "... *Land ownership in Persia for a variety of reasons has been largely an urban rather than a rural phenomenon.*"(4) Under these conditions, there is evidence that the village communities enjoyed substantial local autonomy and responsibilities. In many instances the state authorities directly dealt with the local inhabitants. Also, there is some evidence indicating that the bulk of cultivation responsibilities and expenses were borne by the peasants. On the whole, it appears that the communal village settlement, and not the landlord settlements, was the original type of settlement; in spite of the long and persistent history of landlordism due to its absentee nature, many of the original autonomous and communal characteristics of the village survived.(5)

An important factor to note in the system of land tenure is the so-called nasaq right. The total amount of land and water available to a

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(1) Katouzian (1974), pp. 221-223.

(2) Lambton (1954), pp.242 and 256.

(3) Vielle (1970), p.4.

(4) Lambton (1971), p. 53.

(5) Lambton (1954), pp. 5-6, 122, 127, 172-173.

village is called its nasaq. The right to hold and use for cultivation a portion of the village land and water is called haqqe nasaq. This right could be obtained by fulfilling the following conditions: 1) residence in the village, 2) working on the land for at least one agricultural year, and 3) the recognition by the landlord and the village community that the tenant has obtained nasaq rights. Obviously not all those residing in the village and involved in agricultural activities had this right. The major distinction between ra'iyat (a peasant with nasaq rights on a share-cropping basis) and the khowshneshin (agricultural labourer) was in this specific right. Nasaq rights were usually inherited by children of the holders. Although there were no legal sanctions specifying these rights, by convention, nasaq provided a permanent right of holding.(1)

The nasaq right was often mushā' (jointly owned in undivided shares of land). This meant that the total shares of the peasant in the village land and water were fixed, but the location of his holding could change from year to year. This was more common for villages where collective farming was practiced.(2) There were also many instances where the right of nasaq was mafrūz (the shares of the joint holders were delimited). This was more often the case in the Caspian villages and other areas where the water shortage was not acute. However, even in the villages in the more arid areas where group farming was practiced, there were many instances of the nasaq rights being mafrūz.(3) As will be seen in the following pages, the question of mushāe and mafrūz became an important

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(1) Khosravi (1976), p. 128. Also see Lambton, pp. 295-305.

(2) Malek (1959), pp. 1-36.

(3) Personal field observations in villages in Yazd and around Tehran. Aside from the case study presented in this dissertation (see pp.109-111) I also observed several other villages which had collective organizations of production, but prior to the Reform, their nasaq had been mafrūz.

issue during and after the Land Reform.

According to the agricultural survey of 1960, about 43% of the production units, 55% of the area of holdings, operated under share-cropping agreements: ra'īyati. Owner-operated farmers constituted about 33% of the units, 26% of the holding areas. Land-leasing agreements were also practised, in about 12% of the production units and 7% of the holding areas. The rest were held by combinations of the above-mentioned arrangements.(1)

Estimates of the ownership of large estates before the implementation of the Reform are available only on a village basis, not in terms of holding areas. On the basis of data from the Ministry of Agriculture, the number of villages belonging to land-owners, owning at least one-sixth of a village, has been estimated to be about 35%. Estimates of Crown(2) and vaqf (religious endowments) villages are approximately 6 and 2 per cent, respectively. Thus, on the whole about 43% of the villages were being operated under the alternative systems of large landlordism.(3)

There is evidence that by 1960 a significant number of capitalist farms (see p.15 & p.41)existed in the country. As will be discussed(p.15) the Land Reform Law allowed a special clause for these units. Unfortunately no estimates concerning the percentage of these farms relative to the total are available. A very rough and arbitrary estimate may be to assume that all holding sizes larger than 50 hectares that used tractors for ploughing were capitalist operations. Under this assumption about 0.3% of the production units, 7% of the total area of holdings, may be considered capitalist in 1960.(4)

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(1) Vezārate Keshvar (1960) Vol. 15, p. 14.

(2) The distribution of Crown lands began in 1958.

(3) Khosravi (1976), pp. 27-29.

(4) Vezārate Keshvar Op. cit., pp. 33 and 55.

Organization and Techniques of Production:

The mean annual precipitation in Iran is only about one-third of the world mean.(1) The scarcity of water has played a major role in both the development of techniques and organizations of agricultural production in Iran. In order to circumvent the problem of water shortages, a useful irrigation technique called qanāt was developed in the country. As will be seen, this technique together with collective organizations of production, was used in order to overcome the problems of water shortages.

Goblot provides an interesting description of the technique of qanāt:

"... The qanāts are mining installations, using galleries called cross-cuts (travers-bancs) to extract a useful and expensive mineral hidden in the depths of the earth, namely, water in the underground pool, just as seams of coal are exploited by means of cross-cuts or shafts.

Not only does the digging of the shafts and cross-cuts pertain to mining techniques: the search for the qanat and the determination of its site - especially the mother-well - are carried out by excellent hydrological methods, obviously more or less unformulated but not in the least using the dubious methods of the water-diviners. Careful observation of the conditions that have led to success and the logical deductions which have been drawn from them for search truly witness to what one may call a scientific spirit". (2)

In many parts of the country, the use of qanāt water was accompanied by technical divisions of land and irrigation system aimed at making the best use of the scarce resource : water. These irrigation divisions were accompanied with collective organizations of production. It appears that the existence of these group activities is closely connected with the amount of rainfall. As the central and eastern provinces are more arid, these collective organizations are more common in these areas.(3)

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(1) The mean annual precipitation of Iran is about 25-30 centimetres, the mean world figure being 86. /Vahidi (1968) p.1/.

(2) Goblot (1971), p. 217.

(3) Safi-Nejād (1975), pp. 47-62.

The collective farming systems existed at various levels of social and technical sophistication in the different parts of the country, and in the different villages within the same locality. In the various geographical locations they were referred to by different names such as boneh, sahrā, khish, dar-kār, etc. Even in the villages around the Caspian littoral, where water shortage is not a problem, certain informal collective operations existed in the villages. It seems that the two systems of boneh and sahrā were technically and organizationally more sophisticated, as they are found in the areas which are more advanced agriculturally, e.g. Tehran, Yazd, etc.(1)

In collective village farming, the total agricultural lands in a village are divided into several units: boneh.(2) This division is based mainly upon attempts at minimizing wastage of water. Thus computations, varying from fairly simplistic to highly sophisticated, are made in relation to building irrigation canals, the corresponding size of each boneh, and the total number of the bonehs in each village. Since the major limiting factor is water, usually the total number of the bonehs exceeds the total number of the cultivated bonehs. Each year, depending on the amount of water available, a number of bonehs are brought under cultivation, the remaining bonehs being left fallow. Basically, the type of crops cultivated in each boneh are decided on collectively. This means that on each boneh similar crops, needing the same amount of irrigation water, are cultivated, e.g. wheat and barley, or alternative types of summer crops, etc. As a result regular collective divisions of the available water between the various bonehs are made on the basis of crop needs. This

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(1) Khosravi (1976), p.84.

(2) For an excellent and detailed description of the boneh see Safi-Nejad (1974), specially pp. 3-7. On the basis of the village Tāleb-ābad, he provides a complete picture of all economic, social and technical relations in the boneh.

prevents the wastage of water that would otherwise have resulted from dissimilar crops being sown on the neighbouring small farms, thus requiring different frequencies of irrigation, and therefore causing wastage of water by extra passages through canals before reaching the farms.(1)

The boneh also affects land fertility through crop rotation. Land and crop rotation patterns are established in such a way that allows benefits from rotating between the various crops and leaving the land fallow. Since the limiting factor is water, therefore, allowance is made for each boneh to be left fallow for the maximum number of years imposed by water limitations. Also, rotations between the crops are based on using land which has been left fallow for the crops that require greater land fertility, e.g. summer crops. For these crops substantial amounts of fertilization are also used. Therefore, at the end of the agricultural year land becomes even more fertile. In the following year, the boneh is used for a crop which can benefit from the existing land fertility without requiring substantial amounts of additional fertilizers. After these two crop rotations land is left fallow to become fertile again.(2)

Within each boneh land was divided into small allotments. Every holder of land had a share proportionate to his farm size on every boneh. Each peasant cultivated his own land and could choose, within the set collective limitations, the type of seeds, amount of fertilizers, etc. The peasants share of the crop depended upon the amount of output produced on these allotments.(3) Thus the boneh system was based upon small-holdings and maintained individual incentives.

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(1) Ibid, pp. 3-7.

(2) Ibid, pp. 41-42.

(3) Ibid, pp. 3-10.

A social hierarchy also existed within the collective systems which defined various roles and responsibilities. At the top of this hierarchy was the landlord. At least in theory, the landlord was responsible for investing in the qanāt, bringing water to the surface and providing short term credit for seeds and cash needs of the peasants in winter. In addition he was responsible for providing marketing facilities.(1) The extent to which the landlords fulfilled their responsibilities is debatable. According to Lambton for the majority of cases these obligations were not met.(2) Safi-Nejād's observations indicate that in the village Tāleb-ābād the landlord fulfilled his responsibilities.(3) But generalizations cannot be drawn from a single observation. Ajami is of the opinion that the collective system developed under conditions of absentee landlordism. Therefore, it required only minimal supervisory intervention by the landlord.(4) It appears that as it was easier for the absentee landlords to deal collectively with a village community, instead of individual farmers, they may have had an interest in maintaining the system. But, on the basis of the extensive observations of Lambton, it may be concluded that, with certain exceptions, the landlords did not fulfill their obligations. Thus, while the boneh system could potentially provide for investment, credit and marketing operations, in actual practice, for the most part, it did not.

Within the village, the Kad-khodā (village head-man) was at the top of the social hierarchy. He organized village production activities. Each boneh had a leader who was in charge of irrigation, often with one or two assistants. Finally, there were the peasants working on their own

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(1) Safi-Nejād (1974), pp. 37-42.

(2) Lambton (1969), p. 291.

(3) Safi-Nejad (1974), pp. 37-42.

(4) Ajami (1960), p. 140. This view is also implicit in Lambton op.cit.

allotments, and agricultural labourers helping the peasants with larger allotments. In addition, all the peasants in the village were responsible for such group activities as building or repairing the irrigation canals, village roads (if they existed), etc. In addition to the division of the crops between the landlord and the peasants who held nasaq rights, all those who either played more important roles in the boneh, e.g. irrigation leaders, or those who gave services to the members of the boneh, e.g. village barber, bathkeeper, etc. received a share of the total production at the harvest time.(1)

The Land Reform

In 1962, the Land Reform Law was passed and became effective. Its idea, however, was not new nor was it the first time that the government had attempted such a reform. There had been abortive or partial attempts prior to this date. However, the 1962 Law had two major differences from the previous ones: first, it used a very practical formula; and second, it received full governmental support. In the following years additional Laws were passed and the Reform was carried out in several stages.(2)

The Law was formulated in such a way that its application was very practical, with the formula for implementation being based on nasaq. Thus each crop-sharer became the proprietor of land equal to his nasaq rights. In the majority of cases he received the allotments he was working on when the land reform agents visited the village. As a result, even in the absence of any cadastral surveys of the country, the law was rapidly implementable.(3) Warriner refers to this formula as : "Persia's

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(1) Safi-Nejād (1974), pp. 3-10.

(2) Lambton (1969), pp. 31-65. The agricultural Bank was responsible to compensate the landlords the money due for their properties, irrespective of the Bank's ability to collect funds from the peasants. Ibid, p. 77.

(3) Lambton (1969), p.68.

Original Strategy".[1]

The Land Reform was aimed at the expansion of peasant proprietorship in Iran. Due to the insufficiency of the data, it is difficult to estimate the exact proportion of the land and the population that has been affected by the law. According to rough estimates, as a result of the implementation of the Land Reform Law, more than one-third of the rural households became proprietors. This together with those who owned allotments before the Reform, amounts to nearly 60 per cent of the rural households.[2] According to the Land Reform Law the capitalist farms, referred to by the Law as 'merchandized' units and defined as those operating with mechanical machinery and wage labourers, were exempted from the Law and remained in the hands of the original holders.[3] Unfortunately, there are no estimates of the number of farms that were thus exempted from redistribution.

The Land Reform Law of 1962 included the condition that all persons who received land should become members of cooperative societies. In theory, these societies were responsible for providing credit, general supervision and direction pertaining to agricultural affairs; also, the cooperative societies were legally responsible for the commonly shared agricultural obligations such as the upkeep of qanats and irrigation channels. In practice, however, the activities of these societies were reduced to the provision of short-term credit, a limited amount of biological inputs and sales of some basic consumer goods to farmers.[4]

The various stages of the Land Reform Law have been appraised by many writers. Also, the Reform has been evaluated in relation to its political, social and economic objectives. Special emphasis has been made

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(1) Warriner (1969), pp. 51-65.

(2) Ashraf (1973), p.2.

(3) Lambton (1969), p. 68.

(4) Ashraf and Safai (1971), pp. 27-32. Also see Chapter III, pp.

in relation to the income distributional and social stratification aspects of it.[1] However, the majority of these discussions are outside the scope of this study. This dissertation is concerned with the productive behaviour of the systems of agricultural production. Therefore, only a brief evaluation of the Land Reform in terms of its impacts upon production systems will be made.

As stated previously, due to the changing nature of landlordism and as a consequence of its being mainly absentee in nature, village production activities were carried out very much independently of the landlords. In fact the role of the landowners appears to have been minimal. These factors imply that perhaps the removal of the landlords should not have created very major disruptions. To these must be added the use of the nasaq formula for the implementation of the Reform. This formula made possible the rapid implementation of the Reform, thus avoiding years of uncertainty in the countryside. More importantly, the use of nasaq rights for land allocation kept intact the already existing structure of the holdings. As a result, in spite of creating a major structural change throughout the countryside during the years immediately following the Reform, there was no shock effect upon production and, in fact, output grew slowly.[2]

Collective Production Organizations: Post Reform Period

In the period after the Reform, there has been a tendency for the collective village production activities to disintegrate. Some writers have blamed the Land Reform.[3] Two arguments are proposed in this direction. First, in the context of mafrūz land proprietorship, where

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(1) For example see Lambton (1969), Ajami (1975), and Katouzian (1974).

(2) See Chapter II, Section One, pp.

(3) Safi-Nejād (1974), pp. 261-264, and 186-189.

the location of the individual holdings are well defined, collective village activities are not possible, as the peasant proprietors become concerned only about their own allotments, losing interest in the other activities of the village. Second, the removal of the landlord, along with the inability of the government to provide a substitute, have shattered the structure of the collective units.(1)

It must be noted that in the sixties and the seventies, the Iranian economy has undergone rapid growth.(2) With this growth many social and economic transformations have taken place; therefore it is difficult to assess the effects of a single variable, the Land Reform, upon these institutions. However, since still many of these organizations have survived, (3) it is difficult to accept the hypothesis that the Land Reform may have had a major undermining impact upon these organizations. The argument of mafruz ownership does not appear to have strong validity, as in some villages where collective farming has been practised, even before the Land Reform nasaq was mafruz.(4) Also, the importance of the role of the landlord in maintaining boneh appears to have been exaggerated. As stated earlier, most landlords did not fulfill their obligations. Also, there is evidence of the formation of boneh in the complete absence of landlords.(5) Nonetheless, it is fair to conclude that as the landlords were likely to have been more interested in dealing with a whole community,

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(1) Malek (1959), pp. 24-27; also Safi-Nejad (1974), pp. 186-189.

(2) See Chapter II, Section One, pp. 49-50.

(3) Khosravi (1976), pp. 81-92.

(4) Field observations in villages in Yazd. See specially (Chapter III, pp. 109-111) on Ahmad-abad. Also a number of villages in Karaj and Shahryar in Tehran.

(5) The ejareh-kars have formed group farming under conditions where landowners have no role in production. (See pp.

instead of individual farmers, they may have been a strengthening factor in maintaining the structure of collective farming.

Another line of argument is to study boneh in the context of the rapid growth and expansion of the economy, where various social and economic transformations have taken place, with possible weakening effects upon collective organizations. For example, it has been disputed that the breakdown of the boneh in Tāleb-ābād, which is located in Varāmin near Tehran,(1) should be attributed to the destructive effects of the city of Tehran upon its surrounding villages.(2) Rural-urban seasonal migrations, specially since a substantial amount appear to coincide with peak agricultural seasons,(3) are also likely to have created disorder and disturbance in the countryside, with possible weakening effects upon production organizations. Rapid monetization of rural economies during the more recent years may also be considered as a factor that may have affected collective activities.(4) One of the roles played by collective farming was to allocate shares of crops for the various labour services provided for boneh. Of course this procedure has been limited, since monetization of rural economies and the practice of cash payments for wage-labourers have been practiced as early as the nineteenth century.(5)

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(1) Safi-Nejād (1974), pp. 186-189 and 261-264.

(2) Saedloo (1975), pp. 64-72.

(3) Chapter II, Section One, pp. 63-66.

(4) Monetization of rural economies is not confined to villages with substantial surplus production for sales. The phenomenon is widespread. In the very poor areas where hardly any agricultural surplus exists for sales, seasonal migration of labour to urban areas has caused a substantial inflow of cash to these villages. /Field observations in areas in south of Khorāsān, (Torbate Heydarrye and Ferdows) east of Azarbayjan, (Ahar) Lurestān (Alashtar). /

(5) Nowshirvani (1975), pp. 21-22.

However, it may be argued that perhaps the rapid spread of monetization of the rural economies in more recent years may have had some weakening effects upon collective organizations of production.

Another important factor to note is the possible effects of the development of capitalist farming[1] upon collective social organizations. As stated earlier, the basis of boneh is smallholdings. Therefore the development of large farms in villages with a tradition of collective farming will be in opposition to these organizations. Unfortunately, due to data deficiencies, it is not possible to assess the extent to which the development of capitalist farming may have caused the disintegration of bonehs.[2]

In brief, it can be stated that various factors appear to have weakened the structure of collective organizations. However, with the exception of capitalist farms which are in complete opposition to these organizations, no other single factor seems to have exerted major influences upon these systems. Since at least in modified versions, many collective organizations appear to have survived,[3] it can be hypothesized that perhaps the existing land tenure systems and the overall social and economic conditions, though perhaps not conducive to the survival of these systems, are not dramatically opposed to it either.

An interesting factor to note is in relation to the structure and the working of the post-Reform cooperatives. These societies have provided only short term loans, a number of biological inputs and some consumer goods to the farmers.[4] All these were extended to the individual farmers and no attempt has been made to operate through traditional

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(1) For a definition of these farms, see Section Two, pp. 36-37.

(2) See Section Two, pp. 41-42.

(3) Khosravi (1976), pp. 81-92.

(4) Plan and Budget Organization (1975), pp. 27-37.

informal collective channels. Furthermore, in the working of the cooperatives, their supervisory role in collective village activities such as irrigation canals, roads, etc. has been completely neglected. In summary, the institution of cooperatives did not take account of the already existing informal cooperations in the villages and did not try to adjust to it. Therefore, it has not been instrumental in maintaining the collective system.

Government Policies Concerning Establishment of Large-Scale Agricultural Production Units

During the period immediately following the Land Reform agricultural growth was slow.[1] Attempts by the government to modernize agriculture through cooperatives and other organizations set up by the government proved to be inadequate and unsuccessful.[2] Among the various problems in this context, the bureaucracy found it difficult to deal with the numerous villages scattered all over the country and enfolding small peasant producers. As a result during the late sixties and the seventies a very controversial agricultural policy, aimed at creating very large farms was declared by the government.

The policy as formulated in a controversial 1967 article by Rohani,[3] the Minister of Agriculture at the time, was based on three major criticisms of structural inefficiencies of the existing villages and peasant production systems. These can be summarized as follows:

1) The villages in Iran are numerous and scattered all over the country, about 68,000 villages and independent farms. Some are at least several kilometres from the nearest village. On the average each village contains

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(1) See Chapter Two, Section One, pp. 49-55.

(2) Ashraf and Safai (1977), pp. 60-77.

(3) Rohani (1967), pp. 78-88.

about 38 hectares of irrigated and 51 hectares of unirrigated land only. In order to develop these units it is necessary to provide infrastructure e.g., roads, schools, electricity, telephone etc.; extension services, e.g., agricultural experts, machinery etc. Considering the total number of these units and the distance between them, it is highly uneconomical to provide the above-mentioned services and means of production to so many localities.

2) The majority of the peasant holdings in Iran are too small, (less than three hectares), to allow for the efficient use of farm machinery. Furthermore, there is the problem of fragmentation of land in these already small holdings. In addition, these farms are not being managed by trained agricultural experts. Therefore, the management suffers from the illiteracy and backwardness of the population and is unable to adjust to the new techniques of production.(1)

3) The qanāt irrigation system in Iran is inefficient in three ways: First, many qanāts provide only a small amount of water for irrigation. Therefore, they cannot irrigate large areas of land, and in turn are responsible for the existence of small and scattered villages in the country. Second, the water of qanāts runs throughout the year and even in seasons in which irrigation is not needed. Therefore, there is wastage of water. Third, the cost of the building and repair of qanāts is higher than those for deep wells.

The solution to the agricultural problems, he stated, could be found

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(1) Note that as the article was written in the period shortly following the implementation of the Land Reform (1962-66), there is no direct mention of the inability of the small size farmers to develop because of their illiteracy and backwardness. But the writer talks about the need for that segment of the population which has been freed from serfdom and feudalism to be led and directed by trained managers and be freed from the present vicious circle of poverty and illiteracy.... etc. (Rohāni, Ibid.) However, it is implicitly obvious that the writer does not believe the peasants to be able to take management of their own farms.

in a systematic destruction of the villages and the qanāts and the creation of large-scale agricultural poles that would be irrigated either by large dams or deep-wells. Rohāni argued that there are six factors which are used in the process of agricultural production: water, soil, climatic conditions, human labour, energy and capital.(1) The last three, namely, labour, energy and capital are perfectly mobile. Thus where water can be found in large quantities, i.e. through creation of dams or deep wells, there should be a concentration of agricultural activities and all other factors of production should be moved to these areas, making these areas the centres of production.

Rohani then stated that all agricultural producing areas in Iran could be clustered in about 1800 areas with holding areas of about 500 to 10,000 hectares. He argued that in these farms the provision of infrastructure and extension services would be feasible and economical. In these farms trained managers would supervise collective production activities carried out by the peasant share-holders.(2)

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(1) Note that the awkward division of the factors of production is only quoted here.

(2) Rohāni (1967) pp. 78-88, Note that in the subsequent development of the events in the agro-business operations set up by the government (see pp. 37-40) there was no question of collective production activities. The farmers became only wage-earners. But the above-mentioned type of management was applied in the case of the farm-corporation (see pp. 37-40).

Also note that in a similar fashion Valian, the Minister of Cooperatives and Rural Affairs, followed a land consolidating and large-scale production approach. In a press conference in 1973 he declared that 66,000 villages in Iran will be integrated into 5000 centres (Shahrak) of agricultural production /Ettela-e-at Tir 28, 1352 (1973) p.17./

As another example of a government attempt to collectivize, and in spite of many differences in both ideology and actual conditions between the two countries, Soviet Russia can be cited here. Indeed this example was referred to by the opponents of these policies in Iran. (Plan and Budget Organization, Internal Report 1967). On the eve of the Russian revolution there was a heated debate in Russia concerning the development of large-scale socialist farms. Lenin favoured the idea of collectivization of agriculture as a means of eliminating what he referred to as the anarchy and contraditions

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As stated earlier, the above-mentioned policies became subject to major controversies and the approach proposed by the two ministers was criticized on the following grounds:

1) It was stated that the proposed policies of the ministers were based on a complete lack of understanding of the climatical and natural conditions in Iran which have led to the subsequent developments of the scattered villages around the country. It was argued that the existing villages in Iran are in fact modal agricultural points which, as a result of the availability of water in an area, have attracted the other means of production, including human labour. Thus the size of the villages or "modal" agricultural points, as well as the clustering or dispersal of several villages in one area, to a great extent depends upon the amount of the limiting factor: "water". In reference to the small and scattered villages, which are practically in all cases located in the rim of the deserts, it was stated that not only do these small villages have a role in agricultural production, but they are also important in preventing the further expansion of the deserts and the sand winds into the surrounding areas. As a result, it was argued that it was to the country's national interest to protect these units and provide extension and public services for them.(1)

2) In general it was argued that in the proposed cost calculations prepared by Rohāni, no allowance was made for the value of the already existing means and social organizations of production whose destruction

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created through the forces of the market [Lenin (1956) pp.334-340]. On the other hand a group of Russian scholars debated that the small-scale cultivator in spite of commercialization and use of machinery for production is basically a family enterprise and cannot be treated as a capitalist enterprise. Thus the whole problem should be viewed differently [Lenin (1956) pp.345-355 or Chayanov (1966)]. Subsequent to these debates there were attempts by Stalin to collectivize agriculture. There was a rash undertaking in 1929-30 to collectivize. These attempts, at least from a productivity point of view, proved to be unsuccessful in Soviet Russia [Lewin (1968) pp. 515-517].

(1) Saedloo (1967), pp. 66-78.

have been suggested by the Minister. For example, it was stated that just before the implementation of the Land Reform Law, the number of qanāts in Iran was estimated to be over twenty thousand. The total amount of water provided by these qanāts was, on the average, about five hundred and sixty cubic metres per second. This is about four times the average amount of water provided by the Kāroon River (Khuzestan), or three quarters of the average amount of water provided by the Nile River. The opponents of the above-mentioned policies were struck by the fact that the Minister had not included the opportunity cost of the destruction of so many water resources in an arid country like Iran.(1)

3) It has been argued that the smallness of the size of peasant holdings and the fragmentation of lands in most areas cannot be considered a major obstacle to the use of machinery, as in many villages the system of boneh existed, and that instead of destroying the peasant holdings, the government could try to strengthen the collective system.(2)

4) It was argued that there is no empirical evidence proving that the very large collective farms necessarily bring about increases in productivities. In this respect, repeated reference was made to the failures of Stalinist Russia in increasing agricultural productivities through collectivization.(3)

5) It was argued that there is no reason to assume that modernization and development of farming should be considered synonymous with the use

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(1) Bastani Parizi (1976) and Saedloo Ibid. The latter also shows that there are mistakes in a number of cost calculations by Rohani.

(2) Saedloo Ibid.

(3) Plan and Budget Organization, several internal reports (1967).

of machinery specially designed for large farms. In this respect repeated reference was made to the development of the Japanese agriculture that took place within predominantly small-scale producers.(1)

6) It was argued that the proposed policies by the government were based on the complete importation of technology from abroad. Some writers stated that there is no reason to assume that certain traditional production technologies could not be improved. This point was specially stressed in regard to the techniques of digging qanāts. It was argued that the cost of digging qanāts was high relative to that of deep wells mainly because in the case of the former the only means of digging was still human labour and no improvements in the techniques of qanāt digging had been introduced. Also in terms of the wastage of qanāt water by its running throughout the year, it was argued that instead of destroying the qanats, the government could try to set up water reservoirs, thus saving water in winter for the following irrigation season.(2)

In the course of the development of events, it proved to be impossible to implement the proposed policies of large-scale farms on a national scale (see Section Two, pp. 40-42). In a government seminar held in June 1976, Rohāni was strongly criticized. The Minister who succeeded Rohāni openly declared that national policy is based upon supporting all agricultural producers without any emphasis upon a specific system of production.(3) But as a result of the large-scale production policies implemented during the late sixties and seventies two types of farms came into existence: 1) the so-called agro-businesses and 2) farm corporations. These are defined in the following section.

(1) Plan and Budget Organization, Internal Reports (1967), also Saedloo Ibid.
For an interesting description of the development of Japanese agriculture see Hayami, et. al. (1975).

(2) Bostani Parizi Ibid.

(3) Keyhan, 16 April 1978, p. 1.

SECTION II : CONTEMPORARY SYSTEMS OF AGRICULTURAL PRODUCTION

The contemporary picture of the organization of agricultural production is composed of various types of systems of production. Insofar as techniques of production are concerned, the variation ranges from traditional to highly mechanized farms. Even the traditional technology may vary from simple to fairly sophisticated. Furthermore, the scale of operation may vary from very small to very large units. Also, the labour or management contents of a farm may differ from family to corporation types. In addition, the role that the government plays in these units varies considerably.

The oldest systems of agricultural production in Iran are peasant and tribal systems. These two systems have persisted to date. Although throughout the centuries they have been influenced by the larger social systems surrounding them, the family farm and the tribal clan systems have retained some of their basic characteristics which distinguish them from other systems. In modern times, however, industrialization and growth of markets have modified some of the basic characteristics of these systems of production. Furthermore, the increasing role of the government in the countryside, the Land Reform and creation of cooperatives and other rural organizations, have also generated change. Also, with the abolition of share-cropping, infiltration of markets and employment of mechanized means and wage-labourers, there has been a development of capitalist farming in Iran. Furthermore, as previously stated, the government has endeavoured to establish large-scale farms with corporate management. Finally and in addition to these systems of production, there are also state-owned farms.

In this section an attempt will be made to categorize the various systems of agricultural production in Iran according to the following criteria:

1. **Scale of operation** : defined as the aggregate value of factors of production, i.e. land, water, capital and labour.
2. **The components** of labour and management : i.e. family labour versus hired wage labourer, or share-cropper; and family management versus clan management or corporate management.
3. **Relationship** to the market : i.e. production being market oriented versus self-consumption.
4. **The role** of the government in ownership, creation of the farm or provision of capital for it.

It should be noted that in many instances a clear division of the different categories of production systems will not be possible. In many areas there are marginal units which are difficult to include or exclude from a specific category. In these cases an attempt will be made to identify the dominant characteristics and accordingly to place the farm in the most appropriate group.

Also, note that due to data deficiencies, a quantitative measurement of the scale of operation, as defined above, was not possible. Therefore, in many instances the arbitrary measure of hectarage has been adopted.

1) The Peasant System of Production

In general, there is a lack of consensus among the scholars concerning a definition of peasantry. The problem is related to the fact that peasantry has survived throughout history within different and changing social systems. While having kept some of its basic characteristics, peasantry has also been affected by the surrounding social systems. Furthermore, as a marked feature of our time, within contemporary industrial society the characteristics which distinguish peasant farming from other kinds of occupations and the peasant family from other types of families

are declining in strength.[1] As pointed out by Shanin and reinforced by Mintz, peasantry should best be regarded as a process.[2] In terms of this approach to the problem, while it will be accepted that certain distinguishing characteristics are basic to peasantry. it will be differentiated in accordance with the physical, cultural, social and economic forces which have acted upon it.

The approach best known through the works of Chayanov, i.e. treating the family farm as the core of the peasant system of production, still remains valid. However, Chayanov's peculiar use of the term family labour, i.e. exclusive reliance on the labour of the family,[3] needs modification. In this respect, Galeski provides a more general explanation. He states that family labour is the chief feature of the peasant farm. Furthermore, the basic characteristic of this farm is the fusion of the enterprise, i.e. the commodity - producing establishment, with the domestic economy of the family household. Therefore, the economic rational of the peasant farm is based on two different, and sometimes contradictory principles: 1) producing for use value, i.e. self-consumption, and 2) production for exchange value. Thus, the peasant's motivation for production is not only determined by considerations of profit but also by the needs of the family.

"This fusion has major consequences for the whole of village life. It gives the farmer's occupation its own characetristic quality, for this occupation is less bound up with the social division of labour then are other occupations, and is much more closely bound up with the family, whose production activity is particularly central to the peasant farm. It is this fusion, above all, which determined the special characteristics of the peasant farm as a production unit. For the functioning principles of the 'enterprise' differ from those pf the domestic economy. The 'enterprise' produces exchange values, which necessarily involve the evaluation of all operations

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(1) Galeski (1972), p.6.

(2) Shanin (1973), pp. 63-80; Mintz (1973), p.91.

(3) Chayanov (1966), pp. 5-12. Chayanov's generalizations are based upon the 19th century Russian peasants. In many contemporary peasant production systems, in addition to the family labour, hired wage labourers are also used in the process of production.

from the point of view of the relation of output to input, as well as of profitability, whereas the 'domestic economy' has to do primarily with use values which are measured according to the needs they satisfy and the extent to which they do so". (1)

In discussing Iranian peasantry it should be noted that in relation to types of tenure, two major groups exist: owner operated family farms and family operated rented farms.[2] Share-cropping is also to a marginal extent practiced.[3] It should further be noted that due to climatical and cultural variations the farms produce different types of crops and are at different levels of technology, traditional or modern. Also in regard to surplus production for sales, there may be wide differences ranging from almost no sales to nearly total sales of output. A similar situation exists in regard to hired wage labourers. As a result there may be many marginal areas where it is difficult to decide whether a farm should be categorized as peasant or small capitalist. This is especially true after the Land Reform when a number of peasant farmers expanded their scale of operations, qualifying them as capitalist operators, while simultaneously retaining resemblances to peasant farming.[4]

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(1) Galeski (1972), pp. 9-11.

(2) Recent surveys do not include types of tenure. Therefore, it is difficult to estimate the relative importance of each tenure type. However, since immediately after the Reform about 60% of the rural households were estimated to have become owner-operated, (p. 15) the rest being employed not only in rented farms, but also as agricultural labourers, or in off-farm jobs, it is fair to conclude that the majority of peasants are holders of own-land.

(3) For example, research teams have observed a few cases in Baluchestan and in North of Iran. Unfortunately, the information has not been documented.

(4) See Chapter III, Section Two pp. 112-14 on Gorgan.

It appears that certain characteristics are essential parts of peasant operations. Due to the fact that exceptions and marginal cases exist in many instances, two characteristics, namely, scale of operation and major dependence upon family labour, have been assumed to be fundamental. The other characteristics in some marginal cases may be overlooked. The main characteristics of Iranian peasantry are listed below:

1) Smallness of scale of operation:[1] The scale of operation in a peasant farm should be relatively small. If this scale exceeds a certain level generally there is, relative to family labour, a greater reliance on hired wage labourers. This then would contradict the basic assumptions of peasant farming. Of course, the scale of operation may expand through the substitution of machinery for hired wage labourers. In this case, however, the second assumption will be violated: the extent of production for market, relative to self-consumption.

2) Dependence on family labour for production: A peasant farm is mainly dependent upon the labour of the household for agricultural production, even though during the peak agricultural seasons the farmer may hire wage labourers. If the bulk of labour does not come from the family, the operation is no longer considered peasant. During the more recent years, due to abundant availability of off-farm jobs, the family farmer often sells his own labour outside the farm. In this case, if the sales reach a point where the family is unable to provide the bulk of required labour for the farm, then the operation again is no longer considered peasant.

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(1) Unfortunately, it is not possible to provide a quantitative measurement of what is here referred to as 'small'. An inadequate measure e.g. hectarage, has been used in relation to the case studies. However, even those divisions are far from being adequate for a generalized quantification of scale of operation.

3) Production having the dual aims of self-consumption and market orientation Usually peasant farmers produce both for self-consumption and sales. Even in cases where the peasant farmer does not sufficiently produce for subsistence, observations indicate that the farmer sells part of his produce at harvest, and later on purchases similar items. There are also cases where production for self-consumption becomes minimal. But in the majority of cases farmers tend to produce at least wheat for self-consumption.(1)

The exception to this rule comes from the migrant peasant who goes to another area to produce cash crops. The orientation of this group is completely market- and profit-based. However, in the majority of cases these peasants also own a piece of land in the village of origin on which they usually produce wheat and other items mainly for self-consumption. For example, various groups of ejāre-kārs migrate seasonally to different areas of the country and rent on a small scale, both land and water. The operation of their farms is almost entirely dependent upon family labour, yet they produce cash crops exclusively for marketing.(2)

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(1) Field observations by Kazerooni R, who has been involved in years of field work with the Institute of Social Studies. My own personal field observations also confirm this point. The poor peasants usually substitute off farm jobs for the insufficiency of their own produce for self-consumption. Also, even in the highly commercialized region of Gorgān, where cotton is produced for sale, I observed production of wheat for self-consumption.

(2) See Chapter III, Section Two p. 115. This type of activity is common around Tehran and in the southern regions where summer-crops can be produced during winter. They are referred to by various names in different parts of the country, according to the types of agreement they have concluded with the owners. For example, Ashaf (1973, pp. 31-36) refers to this type of activity as nime-kāri. This means that the shares of the owner and the cultivator in both the value of factor input and output is half and half. It is true that the term nime-kāri, without strict application of its meaning, has wide usage. However, it appears that ejāre-kāri will have a more universal application, as many of these agreements have no share-cropping implications.

4) A degree of dependence upon village for production:[1] Traditionally Iranian villages have always played a role in production, and they still do. Of course in the more arid areas this dependency is much greater. However, even in the Caspian villages the division of water is village based. Also, many of the recent small-scale cash crop producers who operate on rental bases often depend on a village for irrigation.[2] Exceptions to this rule are observed in villages in Gorgān.[3] Here each individual farmer owns his own well and is not dependent on the village community for irrigation. As explained in Chapter III pp. 112-113 first the development of farming in the area has been capitalistic, and the peasant farming is marginal, and second, there is tendency for small scale farmers to disappear and become integrated into large capitalist farms. Another exception to this rule is observed for the so-called tolombe-kārs, a type of migrant cash-crop producing peasants who operate on rental basis and are found mostly in the southern regions. These farmers operate on the basis of group farming, but for irrigation depend on semi-deep wells outside the village boundaries.

5) Residence in a village community: Peasant farmers reside in a village community. This is also true of those peasants who migrate seasonally and produce their agricultural outputs in areas outside their own villages, as they nevertheless have a place of residence in their village of origin.

6) Productive occupation of a peasant includes a wide range of tasks which are interrelated and are at a relatively low level of specialization. The training for these tasks is carried out through family labour

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(1) Shanin (1973), p. 63.

(2) See Chapter III, Section Two p.115.

(3) See Chapter III, Section Two, pp.112-114.

participation from childhood and is a result of experience in the field. In this kind of occupation there is strict division of labour between sex and age groups.(1)

Tribal System of Production

The second category of agricultural production systems in Iran is the tribal system. This system is based on kinship. Thus some authors tend to treat it as some sort of marginal peasant mode of production.(2) However, there are reasons to reject this hypothesis. First, although both types of systems depend heavily on family labour, the tribal network is dependent on a clan system, while peasant production can be reduced to the household unit. An important aspect of tribal production is the existence of a tribal hierarchy. Thus the tribe is divided into sub-sections, the smallest of which is based on several lineages. Furthermore, the tribesmen do recognize their belonging to a tribal organization and there is common tribal territory. A second distinction, though a more arbitrary one, is based upon the fact that peasants concentrate on crop production, animal husbandry being a secondary occupation, while tribesmen mainly raise flocks of sheep and goats, crop production being secondary.(3) A third distinction should be made with regard to the historical development of the tribal units and the effects of the Land Reform upon this system of production. According to Afshare Naderi, the Land Reform

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(1) Shanin (1973), pp. 67-70.

(2) See for example Shanin (1973), pp. 63-799.

(3) Afshare Naderi (1971), pp. 4-5. Note that although it is true that a percentage of tribal population migrates each year for production purposes, this may not be a characteristic distinguishing it from the peasants, as a percentage of the latter also migrate each year for production purposes, i.e. <u>chare-kars</u>.

through elimination of the tribal khāns, has in effect destroyed tribal hierarchies and inflicted a strong destructive blow upon this social institution.(1)

As stated in the Introduction, this dissertation focuses upon production systems with emphasis on crop production, rather than animal husbandry. Furthermore, there are different sets of methodological problems in studying the tribal production systems. As a result, this organization of production will receive only a marginal evaluation. Thus they will be evaluated only where the aggregate national macro data includes tribal figures, otherwise no direct attempt will be made to study tribal production.

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(1) "According to tribal tradition, the chief "khan" of a tribe was considered by the state, as well as his subjects, to be the traditional owner of the tribal territory, including the tribesmen, their animals and whatever was cultivated. The tribe was viewed as a political unit under the control of the Chief in that the government agents and even the armed forces considered the Chief to be responsible for maintaining peace and order within the tribe.

Through the implementation of Land Reform, the tribal Chief, like his subjects, received a piece of land. His legal ownership of his new parcel of land relinquished his claim on tribal territories. Thus, the whole tribal structure, which existed since the beginning of Iranian society, collapsed once and for all."

Afshar Naderi "Society" in Elements of Destiny Tehran forthcoming.

I believe that the word ownership has been arbitrarily used here. The Khans did not own tribesmen, while they may have experienced substantial power over the latter.

3) Capitalist System of Production

The earliest evidence of the development of capitalist farming on a significant scale is found in Gorgān where it began during the late 1940's.[1] Subsequently, it expanded to other regions, notably Tehran, West Azarbāyjān, North of Khorāsan, etc. By 1962, when the Land Reform Law was being implemented, the number of such farms in the country was sufficiently large to allow the government to make special provisions for these units. These units were exempted from redistribution and remained in the hands of original holders. Though the existing data is not adequate to show the extent of expansion of these units in the period after the Reform,[2] considering the rapid growth of the economy[3] and the subsequent expansion of markets it is likely that the number of capitalist farms has also expanded considerably.

Currently the capitalist system of production, in various forms, exists throughout the country. In some instances the scale of operation may differ only marginally from peasant operations, while in other examples very large-scale farms with substantial capital are operating. Also, the social relations of production may vary from arrangements close to share-cropping to totally cash wage-earning. Furthermore, in regard to application of modern technology the farms may vary from very limited access to machinery to complete integration of agriculture and industry to the extent that the output is completely processed. In spite of the differences, the following characteristics may be observed in all capitalist farms:

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(1) Okazaki (1968), pp. 7-21.

(2) See pp. 40-42.

(3) See Chapter II, Section One, pp. 42-50.

a) Private ownership of the means of production, as well as private initiative in the establishment of the farms. The latter point is an important factor distinguishing these farms from the category of 'semi-government corporations'.

b) Employment of wage labourers in production. In this respect, even if payments to labour are made as a percentage of the crop, the agreement is distinguishable from the traditional landlord peasant systems, in the sense that there is no nasaq right attached to the present day agreements.

c) Production is aimed for markets and sales.

d) There is a tendency for accumulation and expansion.

The smallest in scale of these types of farms may, in general, be those peasant farms which have expanded and thus acquired the characteristics of an enterprise. These are usually located within village boundaries. There are also instances of capitalist farms within the boundaries of village lands which belong to the original landlords.(1) In addition there are many capitalist farms which exist outside the village boundaries. Ashraf recognizes two major categories: first, those which are basically labour intensive, for which he uses the term 'plantation'. These are located mostly in Gorgān and are used for cotton cultivation. The second category consists of those which are basically capital intensive

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(1) A marginal number of such landlord farms possess the dominant characteristics of the traditional landlord units. In as much as they are larger in scale than peasant farms, they cannot be included in that particular category. However, in terms of applying low levels of technology and, therefore, no accumulation of capital, neither can they be considered capitalist. As a rule however, these are either developing into capitalist farms, or disintegrating. It should be noted that to begin with the number of such farms was small, as the Land Reform Law exempted only mechanized farms from redistribution among the peasants. Personally, I have not observed examples of this type in the field. According to numerous other field observers, these examples are very rare. Thus, in the farm categories presented in this dissertation, they will be omitted.

and are found throughout the country.[1]

A number of these capitalist farms have set up food processing industries and thus prepare products for the final markets. In this sense they are true agro-business operations. However, as this term is often applied to a category of government created farms, I will refrain, in this dissertation, from applying it for the real agro-businesses.[2]

4) Semi-Government Corporations

As previously stated, during the period after the Land Reform, an attempt has been made by the government to establish large-scale farms with the following characteristics:

a) They are managed through corporate management systems.

b) They have been created by the state.

c) The state does not own these farms, though in some instances is a major shareholder,[3] but has made substantial contribution to the capital assets as well as farm technologies.

The contributions of the state to these farms may be classified as follows:

1) Long, medium and short term loans with low interest.

2) In the case of farm corporations, various types of aid in terms of use of current inputs, machinery, management, etc.

3) In the case of agro-business farms, land and water is provided at very low cost.

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(1) Ashraf (1973), pp. 4-10.

(2) A well-known example of this type of farm is the Yek-o-Yek company which cultivates about 2.5 thousand hectares and produces canned foods for the market.

(3) See Chapter III, Section p.119.

4) The government, or rather the government owned Agricultural Development Bank, is a major shareholder in agro-business farms.

5) The government provides these farms, without charge, the results of specially conducted technical research.

The best known examples of these types of farms are the "farm corporations" and the so-called "agro-businesses".(1)

An agro-business farm is a private business corporation which is owned by Iranian and foreign companies, and by the government owned Agricultural Development Bank. The land located under the dam irrigation systems is leased out by the Iranian Government to these companies on the basis of a thirty year contract. These firms are expected to bring the land under cultivation. It is also assumed that complementary food processing and other agriculture based industries will be set up by these farms. Workers, including the professional and the managerial staff,are wage earners in these farms. The size of these farms is generally very large, between 5 to 20 thousand hectares.(2)

A farm corporation is defined as an agricultural producing coporation which has come into existence as a result of combining a few villages and independent farms in one locality into one unit. All persons who were land owners before the establishment of the farm corporation become share-holders in this new unit. The shareholders transfer all their rights of land use and other factors of production to the corporation and in return receive regular payments in accordance with the value of the

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(1) In this category there are also large-scale cattle and sheep raising units. However, as this dissertation mainly focuses upon crop-production, these will be omitted.

(2) Vezārate Keshāvarzi (1970), pp. 1-10.

transferred factors and the corporate profit. Legally, this transfer should take place with the agreement of at least 51 per cent of the farmers. However, in practice this point has often been overlooked. In these farms the workers are wage earners, regardless of whether or not they hold corporate shares.(1) The size of these farms varies between 2 to 10 thousand hectares.(2)

As the definition indicates agro-business farms may have many of the characteristics of a capitalist farm. However, as the government is also a major shareholder in these units, and since the farms are heavily subsidized by the government, (see Chapter III, Section Two p.119 & Chapter VI pp 283-284) it would not be appropriate to call them capitalist, as in essence they are not completely private enterprises.

Since the shareholders in a farm corporation are the original peasants, this system has many of the characteristics of peasant production. However, insofar as it has a corporate management system, and the peasants become shareholders, the system differs from peasant production.

Insofar as the shareholders in farm corporation are the original peasant cultivators, while in agro-business farms shares are owned by large companies, the two systems, while both being government supported corporations, differ drastically. Farm corporations are based upon the original peasant holders in a locality. But the agro-business system is completely superimposed on an area and the original landholders are forced

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(1) Note that in recent years, sometimes wages are paid as a percentage value of output, in order to allow incentives for farmers. See Chapter Two Section Two pp. 75-86.

(2) Vezarate Ta'āvon va Omoore Roostaha, Qānoone Tashkile Sherkathaye Sahamye Zera'i (unpublished).

to sell and leave, or become wage-earners.[1]

5) State Farms

These farms are created and owned by the state: they are often aimed at the development and spread of farm technology in various parts of the country. They either test and improve various crops (agricultural stations all over the country) or attempt to venture into new productions (e.g. Haft-Tappe sugar-cane producing unit). Since the share of these units in the total national output is presently negligible, they will not be evaluated in this dissertation.

Relative Significance of Each System

Unfortunately, according to the existing data only very limited evaluations of the relative proportion of each system may be possible. The problem mainly arises because the only available post-reform agricultural census (1973)[2] does not list data according to holding size. Agricultural sample surveys provide data according to farm sizes, but their sampling procedures make it impossible to make estimations of the relative shares of the various categories in the total. Relative to other categories, the samples include more large size farms, in the extreme cases one hundred per cent.[3] Furthermore, on the basis of the national agricultural surveys,

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(1) Note that the two systems also differ in their relevance to the historical conditions of land tenure in Iran. In farm corporations, the original landholders in an area become shareholders in the new system, and irrespective of their being shareholders or not, agricultural labourers are wage earners. In the sense that in both owner-operated and share-cropping systems, the output gained by the peasant depended on what he produced on his own allotment, and not on an abstract proportion of the total output of an institution, labour shares in a farm corporation differ from the historical pattern. In the second type, agro-businesses, the original peasant holders are forced to sell their lands and either leave the area or become wage-labourers in the new system. Since in general, throughout the history of the country, peasants have been fairly secure in their holding conditions, forcing peasants out of their holdings does not appear to fall into the historical pattern of tenure conditions.

(2) Markaze Āmāre Iran (1975).

(3) Markaze Āmāre Iran (1976), pp. N-V.

it is not possible to distinguish between peasant and tribal systems, as the two are grouped and averaged together.

According to the agricultural survey of 1974, the majority of farm size categories, that held less than 50 hectares of land, were reported to have mainly depended on family labour, only 2% mostly relied on outside labour. For the farm size categories, of 50 hectares and more, 45% were reported to have mainly relied on outside labour.(1) Thus if we accept the approximate criterion of 50 hectares as the dividing line between the capitalist and the peasant plus tribal producers, then 21% of the area of holdings of sample farms fall into the category of capitalist farms.(2) However, as stated earlier the sample is biased towards larger farms. Therefore, the relative share of these farms is bound to be less than this figure. Thus, more than eighty per cent of the area of holdings is being cultivated by peasant and tribal producers. According to 1976 figures, only about 30% of total rural population falls into the tribal category.(3) Since in tribal production, animal husbandry dominates crop production, it is likely that the share of tribes in the total area of holdings will be even less than their share in the total rural population. Thus it can be concluded that, among the autonomous units, peasant production is the dominant system in regard to area of holdings.

Due to data deficiencies, it is not possible to quantify the exact expansion of capitalist farming in the period after the Reform. However,

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(1) Markaze Āmāre Iran (1976), p.7. Note that for the size category 10 to less than 50 hectares, only 7% reported to have mainly relied on outside labour.

(2) Ibid, p.15. Note that the surveys do not include agro-businesses and farm corporations.

(3) The figure is inclusive of settled and nomadic tribes. The following procedure has been used for the estimation: Total rural population amounted to about 18 million according to 1976 population census (Markaze Āmāre Iran (Dec. 1976), pp. 1-5). Estimates of the tribal population, for the same year, amounted to about 5 million. (Keshavarz (1976), pp. 19-20).

it seems likely that this system may have expanded in this period. Between 1960 and 1973, the total area of holdings increased by 56%.(1) It seems likely, though again I cannot present evidence, that a substantial expansion of capitalist farms may be related to the cultivation of new lands. Thus if we accept the relative share of capitalist producers in total holdings to be somewhat smaller than the exaggerated figure of 21% in 1973, and compare it with the 7% figure for 1960,(2) and account for cultivation of new lands, it may be concluded that perhaps the expansion of capitalist farms in the post-Reform period was not so much by means of the destruction of peasant producers.

The total area of land held by the semi-government corporations is only about 2.25% of the total, that of farm corporations being 1.5% and of agro-businesses 0.75%.(3) Thus the share of these systems in total area of holdings, relative to others, is not significant.

S U M M A R Y

1) The historical characteristics of the systems of land tenure in Iran appear to make the following generalizations possible:

a) While prior to the Land Reform of 1962 large landlordism was persistently practised, the landlords were subject to considerable instability and

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(1) Markaze Amare Iran (1975), p.X and Vezarate Keshvar (1960) p.11.

(2) See p.9.

(3) According to the agricultural census of 1973 the total area of holdings amounted to 17,750,000 hectares (Markaze Amare Iran (1975), p. X). In 1976 the total area of farm corporations amounted to 259,000 hectares (Vezarate Ta'avon va Omoore Roostaha, (1976), p.44). The total area of holdings allocated to agro-business farms amounts to 148,000 (Ministry of Agriculture, a report produced for agricultural seminar of 1976, unpublished. (Note that according to the report this area is estimated to be 200,000 hectares. However, a number of farms included in this list, according to the definitions presented in this dissertation, do not fall into the category of agro-business farms).

changes, as the basic philosophy behind the system of land tenure was that the ruler is the sole owner of land and may, at his will, either assign the use of land and its revenue to individuals, or confiscate landed property. Although in practice this theory was modified and in fact private property was to some extent practiced, it appears that the power of Iranian kings to confiscate landed property was strong.

b) Another characteristic of large landlordism in Iran appears to be its absentee nature, as for the most part the landlords did not reside on their estates.

c) Under these conditions, it seems that the village community enjoyed a substantial degree of autonomy, and most production responsibilities seem to have been carried out by the peasants. Through the convention of nasaq, the peasants appear to have had some guarantee of security of tenure.

2) Most parts of Iran are very arid. In order to circumvent problems of water shortage, a technique of using underground water channels, qanāt has been used. In many areas, especially central and eastern parts, the use of qanat was accompanied by collective farming. These collective farming systems existed at various levels of sophistication in the different parts of the country, varying from very simplistic techniques and social organizations, to fairly sophisticated. While the basis of these organizations was small-holdings, their aim was to allow for certain advantages of large-scale operations by carrying on some activities collectively. Thus total village land was divided into several large units: boneh.. Every peasant holder had a piece of land on each boneh. Every year, depending on the amount of available water, a number of bonehs were cultivated. On each boneh similar crops were sown in order to allow irrigation systems to benefit from economies of scale. An informal social hierarchy existed defining roles and responsibilities. While it appears that in general the role of landlords in boneh was minimal, and that the nature of this role was absentee, nonetheless, as it was easier for the landlords to deal with a village collectively

they may have been a strengthening factor in collective organizations.

3) The Land Reform in Iran was carried out in the period 1962-66. It aimed at the expansion of peasant proprietorship and affected about 30% of the rural population. It based land distribution upon nasaq formula. Thus, farmers received allotments which they were working on. Considering the changing, unstable and absentee conditions of landlordism, plus the use of nasaq formula, it appears that the Land Reform did not produce major shock effects upon the institutions of production.

4) Large mechanized farms, i.e. those using machinery and wage labourers, were exempted from the Land Reform Law and remained in the hands of original proprietors.

5) During the period after the Land Reform, there seems to have been a tendency for a number of collective organizations of production to disintegrate, though still many have survived. A combination of factors related to the social and economic changes in the country, i.e., the overall rapid growth of the economy, rural-urban migration, rapid expansion of large cities, monetization of rural economies, elimination of landlords, mafrūz land proprietorship and development of large capitalist farming in villages seem to have played undermining roles upon these organizations.

6) With the Land Reform, rural cooperatives were also established in villages. While these cooperatives could have benefitted from the existence of informal cooperations in the villages, and in turn be a strengthening factor keeping collective activities, their structure and formulation was not adjusted to act through the informal channels. These cooperatives merely became credit institutions, providing short-term low-interest loans to farmers, without playing any direct role in production.

7) In the period after the Land Reform, there have been other government policies aimed at creating structural changes in the countryside and creating very large-scale farms. The proponents of these policies argued that since the Iranian villages are numerous and scattered all over the country, and as many of them are very small, it would be uneconomical to invest in infrastructure and extension services for these villages. It was also argued that the majority of the peasant holdings in Iran are too small and too fragmented to allow for efficient use of machinery. Also, the qanāt irrigation system was criticized for providing only a small amount of water in a number of cases, running throughout the year including the seasons when irrigation is not needed, and being more expensive than deep-wells to build and repair.

The solution was proposed to be the destruction of the villages and the qanāts and the creation of large agricultural poles in their places that could be irrigated either by large dams or deep-wells. It was argued that in the case of the latter it would be economical to invest in infrastructure and machinery.

8) This government policy was criticized by a number of experts who argued that:

a) The size of the Iranian villages and their dispersion in the country are related to the natural and climatical conditions and the availability of water. Criticism of this dispersion and suggestion of the removal of the villages reflects a lack of understanding of the conditions of the country.

b) In the proposed policies the opportunity cost of destroying the already existing means of agricultural production in the country, especially the scarce resource water provided by qanāts, has not been accounted for.

c) The already existing boneh system in the villages could help the small

size farms to benefit from scale-economics and there appears to be no necessity for structural changes in the farm sizes.

d) There is no empirical evidence providing that the very large size farms are necessarily more productive than the smaller units.

e) There is no reason to assume that modernization of farming methods should be synonymous with the use of machinery especially designed for large farms, as there exist also biological inputs and farm machinery and implements designed for smaller farms.

f) Instead of total dependence on the importation of technology from abroad, there could be attempts to improve the traditional technologies in Iran.

9) In the years subsequent to the proposed policies, it became evident that large-scale farms could not be set up at a national level, and in the late seventies the idea was almost abandoned. However, as a result of the above-mentioned policies two types of farms: a) agro-businesses and b) farm corporations came into existence in the country.

10) The contemporary systems of agricultural production in Iran have been categorized according to the following criteria:

a) scale of operation defined as the aggregate value of factors of production.

b) components of labour and management divided into categories of family versus non-family labour, and family versus clan or corporate management.

c) relations to market: i.e. production being market-oriented versus self-consumption, and

d) the role of government in ownership, creation and provision of capital for the farm.

Using this criteria, five systems have been distinguished:

a) peasant b) tribal c) capitalist d) semi-government corporation and e) state farms.

Of course, there are many marginal areas which are difficult to include or exclude from a certain category. In these cases an attempt has been made to categorize according to dominant characteristics.

Since the focus of the study is on crop-production, and the tribal system is dominated by animal husbandry, this system is not included in the study. Also, due to the lack of importance of state farms in total production, this group is also excluded from further investigations.

11) The peasant system of production in Iran has been identified as having the following characteristics: a) smallness of scale of operation, though as a result of insufficiency of information this criterion is not empirically defined, b) major dependence on family labour for production, c) production having the dual aim of both self-consumption and market, d) a degree of reliance on village community for production, e) residence in a village community, f) involvement of a peasant in a wide range of interrelated tasks at a low level of specialization.

12) The following characteristics of a capitalist system of production have been identified: a) private ownership of means of production, as well as private initiative in the establishment of farms, b) employment of wage-labourers for production, c) market orientation of production, and d) accumulation and expansion.

13) The characteristics of semi-government corporations have been identified as: a) having a corporate management system, b) being created by the state, and c) while being basically owned by the private sector, receiving from the state substantial contributions to capital assets as well as farm technologies. Two categories of these farms exist in Iran:

a) Agro-business farms which have large foreign and Iranian companies, and government, as their shareholders.

b) farm corporations, where the original peasant holders in the locality are the new corporate-shareholders.

CHAPTER II

A PRELIMINARY EVALUATION OF PRODUCTIVE PERFORMANCE OF THE AUTONOMOUS SYSTEMS

In this Chapter a first attempt is made to determine whether the existing empirical evidence supports the argument proposed by the proponents of large-scale semi-government corporate systems. Unfortunately, as a result of data limitations, a systematic and rigorous analysis of the problem was not possible. I have only tried to see if the existing evidence favours the large-scale policy.

One of the major attacks upon the autonomous agricultural producing units (peasant producers, tribal systems and capitalist farms) has been based on the slow growth rate of this sector. The lower growth rates of agriculture, relative to the rest of economy have then been used as a major support for the argument that there are inherent inefficiencies in the autonomous systems, especially peasant producers. Therefore, the suggested alternative has been to make structural changes and create new systems.(1)

In the first section of this Chapter an attempt has been made to study productive performance of the agricultural sector within the overall economic context of the country, and to evaluate, given the various macro-economic variables acting upon this sector, whether the autonomous units have been inefficient in production and whether their organisational and size structures should be considered as the main cause of the slow growth rates if output in this sector.

In the second section of the Chapter, I have tried to make a

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(1) In a 1976 article entitled "Social Problems are an Obstacle to the Development of Agriculture", Rohani argued that the slow growth rate of agriculture, relative to other sectors, is due to inherent institutional inefficiencies existing in the systems of peasant and small capitalist production (Ettelaeat June 1976).

comparative study of the productive performance of different size and organizational systems.

SECTION 1:

AN EVALUATION OF PRODUCTIVE PERFORMANCE OF THE AUTONOMOUS SYSTEMS

In this Section an attempt is made to study the effects of various variables such as government policy, agricultural terms of trade, rural-urban migration and rural credit systems upon the existing autonomous production units, i.e. capitalist farms, peasant and tribal producers. The purpose of the study is to provide a general frame of the conditions in which agricultural production is taking place, and to evaluate, given the overall context, whether the existing autonomous systems have been inefficient production units.

Production Performance of Agriculture:

During the sixties and the seventies, as a result of the inflow of oil revenue, the Iranian economy has experienced high growth rates. Thus during the last three development plan periods the GNP has risen on the average by 15.1 per cent per annum, and the non-oil GDP by 11.4. In contrast agriculture has shown a much slower growth rate, 4.8 per cent (Table 1). As a result of this relatively slow growth rate, the share of agriculture in the total non-oil GDP has substantially declined (Table 2).

Even though the official growth rates for agriculture relative to the rest of the economy are low, nonetheless, it is generally believed that the recorded figures give grounds for optimism. For example, according

Table 1 : Average Growth Rates (Constant 1974 Prices)

	Third Plan 1963-1967	Fourth Plan 1968-1972	Fifth Plan First four Years 1973-1976	Average Three Plan Periods 1963-1976
Agriculture	5.1	2.4	6.4	4.8
Non-Oil GDP	9.5	10.4	14.8	11.4
GNP	9.6	13.4	17.9	14.1

Table 2 : Average Share of Value-Added in Agriculture to Non-Oil GDP[1] (Rls. Billion Constant 1974)

	(1) Average Annual Non-Oil GDP	(2) Average Annual Value-Added in Agriculture	(3) Ratio of Agriculture to Non-Oil GDP (Per Cent) 2/1
Third Plan 1963-67	627.9	204.7	32.6
Fourth Plan 1968-72	1005.7	258.4	25.7
First Four Years of Fifth Plan	1773.5	314.6	17.7

Source: Bank Markazi Iran, Revised Estimates of National Income 1977, Unpublished.

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(1) Due to the special role of the oil revenue in the Iranian economy, and because it is not comparable with the rest of the economic sectors, the non-oil GDP, instead of the GNP, has been used for comparisons.

to the combined Bank Markazi and Ministry of Agriculture estimates, during the first four years of the Fifth Plan, agriculture grew on the average by 4.8 per cent (Table 1). However, according to Plan and Budget estimates, this figure does not exceed 3.9. (1) Estimates by IBRD for the mid-sixties to the mid-seventies indicate that the growth rate for these years has fluctuated between 2.5 to 4 per cent per annum, (2) while the official estimates are over 4 per cent (Table 1).

On the whole agricultural production figures are precarious. The various reporting agencies provide substantially different estimations of production. For example, estimates of the value-added by the two major reporting agencies, namely, the Central Bank and Iran Statistical Centre, are significantly different. (3) In no way may the discrepancy be explained in terms of acceptable statistical errors.

A study by Brown of production figures of wheat, the most important crop output accounting for about 57 per cent of the total cropped area, (4) throws doubts on the reliability of these figures. It is argued that the rise in per capita consumption of wheat, as estimated by production figures and imports, which amounts to an average of 8 per cent per annum over a period of 16 years (1959-1975), appears too high to be realistic. (5) Also

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(1) Plan and Budget Organization (1977), Unpublished, p.3.

(2) Price (1975), p.1. These estimates are made on the basis of consumption and imports.

(3) See Iran Statistical Centre, Baravarde Arzeshe Afzoode Bakhshe Keshavarzi for 1350 (1971), 1351 (1972) and 1352 (1973). Also see Bank Markazi Iran Annual Reports for the same years.

(4) Markaze Āmāre Iran (1975), pp. XI-XII.

(5) According to estimates made by Iran Statistical Centre income elasticity of demand for bread is estimated to be less than 0.1. (Markaze Āmāre Iran (1972) p.10). Though the realiability of this figure, too, may be questioned, the fact is that the gap between this and the production figures are substantive.

these per capita consumption figures show wide fluctuations from year to year,[1] which again, Brown argues, makes it difficult to accept the reliability of the data. Furthermore, on the basis of the official data, the increase in output of wheat and the increase in the area under cultivation of this crop do not follow a similar pattern.[2] On the whole, it may be argued that the income elasticity of demand for wheat is normally not very high. Thus it can be hypothesized that production figures have been overstated for this output.

Another fact which seems to support the hypothesis of overstatement of agricultural growth rates, is the rapid rise of imports compared with a much slower increase of exports. (Table 3). As a result, in spite of the very rapid increase of the non-oil GDP the share of agricultural imports to non-oil GDP increases, while that of exports declines. Furthermore, whilst during the Third Development Plan the ratio of imports to domestic production of agriculture was less than one-tenth, it reached a figure of nearly one-quarter of the agricultural value-added during the Fifth Plan.

Obviously two factors, i.e. population [3] and income growth are responsible for this rapid increase in imports. Food consumption is likely to have risen sharply both because of population growth and as a result of the upward movements of subsistence sectors. However, on the basis of recorded average annual growth rates of nearly 5 per cent, such sharp

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(1) Per capita consumption of wheat between 1960-1963 declined by about 18%. Then between 1963-1966 increased by about 74%. Then in 1967 it declined by 19% and rose again by 78% between 1967-1974. (Plan & Budget Organization (1977) pp. 10-15).

(2) Brown J.A.C. "Notes on Wheat, & Red Meat Reports Prepared by Plan and Budget Organization" a preliminary report produced for The Iran Planning Institute 1977.

(3) The average annual growth rate of population is estimated to be 2.7 per cent per annum (Markaze Amare Iran (1977) p. 34).

Table 3 : Comparison of Imports of Agriculture with Domestic Production and Non-Oil GDP for Three Plan Periods (Rls. Billion Current Prices)

	(1) Average Annual Non-Oil GDP	(2) Average Annual Import of Agri-culture (1)	(3) Average Annual Export of Agri-culture (2)	(4) Net Imports (2-3)	(5) Ratio of Agricultur-al Imports to Non-Oil GDP (Per Cent) (2/1)	(6) Ratio of Agricultur-al Exports to Non-Oil GDP (Per Cent) (3/1)	(7) Ratio of Agricultur-al Imports to Agri-cultural Value-Added (Per Cent) (3/2)
Third Plan 1963-67	377.5	9.3	6.8	2.5	2.5	1.8	8.0
Fourth Plan 1968-72	678.1	15.7	11.6	4.1	2.3	1.7	9.5
First Four Years of Fifth Plan 1973-76	1941.3	75.6	22.6	53.0	3.9	1.16	23.2

(1) Import figures include Wheat, barley, rice, corn, red meat, poultry, dairy products, eggs, sugar, tea, vegetables and fruits.

(2) Exports include Cotton, fresh and dried fruit, skins and leathers, caviar, casings, cumin-seed, others.

(3) Note that up until 1961 the value of agricultural exports exceeded imports. In 1961 they became almost equal. After this year imports began exceeding exports.

Source: Bank Markazi (1970), p. 135; (1974) p.23; (1976) p.56; and Ibid. Revised estimates 1977, Unpublished.

increases in import bills seem to have been rather unlikely. On the contrary, the sharp rise in imports may partly be considered as an outcome of a rather inelastic domestic supply.

From the above statements it may be concluded that on the whole official production figures do not appear to be realistic and the data presents problems. Furthermore, the case of imports and the study of wheat production tend to imply lower growth rates than the recorded official figures. Unpublished studies by the Plan Organization [1] and IBRD, [2] also support the hypothesis of overstatements of official growth rates. Unfortunately, data concerning the exact growth rates of this sector are not available. The lowest recorded estimates will be those provided by the IBRD at 2.5 per cent [3] annual rates from the mid-sixties to the mid-seventies. [4]

It should be noted that according to estimates provided by IBRD, at the end of 1973 all farms larger than 300 hectares, inclusive of farm corporations, agro-businesses and large capitalist farms, together produced less than 2 per cent of the total output. [5] Unfortunately, no estimation of the relative output share of all the semi-government corporations in any approximate form is available for the years following 1973. However, since these corporate units have been established after 1968, it is likely that their share prior to 1973 must have been less than 2 per cent. Furthermore, as the three development plan periods cover the years 1963-1976, only for the last two years there may be the possibility that the corporate units

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(1) Plan and Budget Organization, op. cit.

(2) Price, op. cit.

(3) Ibid.

(4) In spite of the problems of the official data, since no other source is available, these figures are used in this dissertation.

(5) Crawford (1973), p. 3.

may have contributed more than 2 per cent to the output. Thus it is fair to conclude that for the period under study, the bulk of output came from the autonomous units, and that the growth of output for this period may be considered as nearly synonymous with the increase of output of the autonomous units. Therefore, in order to evaluate the production performance of the autonomous units, the aggregate performance of the agricultural sector may be taken as a very close approximation.

Development Budget Allocation to Autonomous Units

Before attempting to analyse the government budget allocations, it should be emphasized that Iran is a major oil producing country, and therefore a capital surplus economy. In this context, the view expressed by many writers that in the process of economic development surplus should be extracted from agriculture to form capital for industrial development[1] loses its meaning, since a substantial portion of the national income is already in the form of investible foreign currency. For example, average gross value-added by the oil sector as a percentage of the GDP for the last three development plan periods comprises nearly 50 percent of the GDP at market value (Table 4). Thus the problem in Iran should be viewed as that

Table 4 : Average Annual Share of Oil Sector in Total GDP at Market Value During Each Development Plan Period (Per Cent) Constant Price [2] (1974).

Third Plan 1963-1967	Fourth Plan 1968-1972	First Four Years of Fifth Plan 1973-1976
47	54	43

Source: Bank Markazi Iran: Mid-1977 revised estimates of national income, unpublished.

(1) See for example: Mellor (1966), pp. 339-341, Kuznets (1957), or Ohkawa (1960), pp. 43-61.

(2) Note: For oil, production figures are used; this is not equivalent to the oil revenue.

of allocation of capital in such a way that no major imbalances, preventive to a healthy development, are created. As the government is the sole receiver of the oil revenue, it has very powerful investment abilities. Thus government economic policies become very important variables in directing the economy.

A study of the development budgets during the Third, Fourth and Fifth development plans indicate that the budgets allocated to the agricultural sector for the period amounted to about 10 per cent of the total development budget (Table 5), while, on the average, for the same period, the share of this sector in the total non-oil GDP amounted to about one quarter (Table 2).

Table 5 : Disbursements of Development Budgets (Rls. Billion Current Prices).

	Third Plan*		Fourth Plan*		Fifth Plan** (First 4 years)	
	Disburse-ments	Per Cent	Disburse-ments	Per Cent	Disburse-ments	Per Cent
1. Total Disburse-ments	204.6	100	506.8	100	1019	100
2. Agricult-ural Sector	25.6	12.5	41.2	8.1	109.1	10.7
3. Disburse-ments to Non-Corpor-ation Agricult-ural Sector	13.7	6.7	18.7	3.7	50.2	4.9

Source: Plan and Budget Disbursements.

* Total development disbursements

** Development disbursements to economic sectors

As stated in the previous section, approximately 98 per cent of the total output came from the autonomous units. The allocated development budget for the three development plans for these producers amounted to about 5 per cent of the total only (Table 5). Thus the ratio of the share of development budget for the autonomous units to the share of these producers in the non-oil GDP was approximately one to five.

During the Third Development Plan agriculture contributed on the average about one-third of the non-oil GDP. All this value-added was produced in the autonomous production units. The total development budget for these units amounted to 7 per cent of the total, or nearly one-fifth of their share in output. During the Fourth Plan, the share of agriculture in the non-oil GDP was about one-quarter. Agricultural output was almost completely produced in the autonomous units. However, the share of these units in the total budget was less than 4 per cent. During the Fifth Development Plan, the share of agriculture in the non-oil GDP was reduced to about 18 per cent, mostly produced in the autonomous units. However, the share of these units in the total development budget was only 5 per cent (Tables 2 and 5).

Comparisons of direct government capital investments in industry and agriculture for the period 1971-1976, show that these figures are almost double for industry (Table 6). Considering the fact that the bulk of investments in agriculture were allocated to building large dams, used for agro-business and to a lesser extent farm corporations, the discrepancy in investments between autonomous agricultural producers and industry is much greater than the figures indicate.

The issue of the relative share of agriculture in development budgets has been subject to considerable controversy among development economists. While a number of writers have considered development as nearly synonymous with industrial expansion,[1] others have been concerned about the large

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(1) See, for example, Chenery (1958).

Table 6 : Comparison of Direct Government Capital Investments in Agriculture with Industry and Mining.

Rls. billion current prices.

Year	Agriculture			Industry and Mining		
	Construct-ion	Machinery	Total	Construct-ion	Machinery	Total
1971	10.2	0.7	10.9	11.5	8.8	20.3
1972	12.4	0.6	13.0	10.3	8.2	18.5
1973	17.0	6.6	23.6	17.8	8.5	26.3
1974	24.0	10.7	34.7	22.9	29.0	51.9
1975	39.3	5.1	44.4	37.3	36.8	74.1
1976	32.9	7.5	40.4	47.8	46.7	94.5

Source: Bank Markazi Iran 1977 Estimates of Capital Formation (Unpublished).

base of agriculture in developing economies and consider its growth and expansion as an important key to material and social progress in many countries.(1) It has been argued that the inelastic land and labour supplies may be eased through a continuous series of technological changes and investments in biological and mechanical inputs.(2) Some writers have argued that gigantic productivity differentials between agriculture and other sectors are in fact the outcome of a sectoral bias in investment in developing countries.(3) A survey and evaluation of the different views expressed in relation to appropriate public sector budget allocation is beyond the scope of this dissertation. Furthermore, in the case of Iran, for the specific policies pursued in resource allocation, planners

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(1) Enos-Griffin (1970), pp. 123-124.

(2) Hayamie and Ruthan (1971), pp. 1-2.

(3) Lipton (1971), p.18.

may have had reasons,such as supply inelasticities in agriculture or the lower income elasticity of demand for agriculture relative to other sectors, etc. Again these subjects are beyond the scope of this dissertation and there is no intention to try to evaluate the overall logic of the plans. However, the point to note is that the government of Iran has strong spending powers. Such major imbalances in government resource allocation create conditions in the country that are likely to have unfavourable effects upon agriculture. Therefore, in an attempt to evaluate the productive behaviour of the agricultural sector, government investment policies should be regarded as an important variable.

A second point to note is in relation to the government preferential policies vis-a-vis corporate units. The figures indicate tremendous differences in government resource allocation between the autonomous systems and the semi-government corporations. Unless substantive differences in marginal returns covering for resource allocation differentials may be observed between the two systems, it will be difficult to justify such discriminating policies. A comparative evaluation of the productive behaviour of the two systems should allow for the government investment policy variable.

Credit System

The most important government credit institutions in rural areas are the cooperative societies which operate in nearly all villages and provide low interest - 6 per cent - short-term loans to the farmers.(1) As indicated by (Table 7) the volume of loans provided by these institutions, both per hectare and in terms of relative share in gross value of output, has increased substantially during the period 1968-1976. However if it is assumed that these short-term loans should cover the running costs

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(1) Ashraf and Safai (1971), p. 35.

Table 7 : Credit Extended by Cooperatives and Gross Value-added by Agriculture per Hectare of Total Area of Holdings.

Rls.current prices.

Year	(1) Agricultural Cooperative Bank	(2) Gross Value-Added in Agriculture	(3) Share of Loans in Gross Value-Added (1/2) Per cent
1968	305	7755	4
1969	310	8211	4
1970	515	8922	6
1971	555	9594	6
1972	830	11211	7
1973	1155	13022	9
1974	1800	16850	11
1975	2040	18550	11
1976	2450	23894	10

Sources:Bank Taā'vane Keshāvarzi (1976)

Bank Tosee' Keshāvarzi (1976)

Bank Markazi Iran, (1977), revised estimates of National Income, Unpublished.

The area under cultivation is assumed to be fixed at about 17.7

billion (Iran Statistical Centre, 1973, p. x.)

of operation, and if we make an approximate assumption that these running costs may account for about 40 to 50 per cent of the gross value of output,[1] as shown by (Table 7) the amount of loans provided by cooperatives, though improved during the period, has been far from adequate to cover running costs.

The government-owned Agricultural Development Bank is the provider of low interest[2] medium and long-term loans to agricultural producers. Originally, it was intended that the bank would provide loans to farms with an area of holdings of at least 500 hectares. In practice, this rule has been modified and the bank extends loans to capitalist farms which are smaller than the said limits, too. Nonetheless it continues to be a banker for the larger farms, especially the agro-business units.[3] According to IBRD estimates, in 1972 only about 12% of the total farm area was being held by those farms with a holding size of 100 hectares or more.[4] If we make a rough assumption that the customers of this bank fall into that category, then it may be concluded that 88% of holding areas are unable to receive long and medium low interest loans from the government institutions.

As indicated by Table (8), the agricultural credit extended by commercial banks has expanded during the seventies. However, it appears that the major beneficiaries are again capitalist farmers, as the banks do not seem to be willing to extend loans to the smaller producers who are unable to provide the required guarantees on loans.[5] Thus,

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(1) This assumption is often made by the Ministry of Agriculture. Unpublished sources.

(2) The rate of interest varies between 4 and 8 per cent.

(3) See Chapter VI, pp.

(4) Price (1975), p. 14.

(5) Field observations in Gorgān, Karaj (Tehran) and Shahryār (Tehran). In these areas many branches of commercial banks are operating But according to the bank managers, they only extend agricultural loans to larger farms who can provide guarantees for the loans.

Table 8 : Outstanding Agricultural Credits of Banks to the Private Sector

billion rials

	1971		1972		1973		1974		1975		1976	
	amount	% share	amount	% share	amount	% share	amount	% share	amount	% share	amount	% share
Agricultural Cooperative Bank of Iran	13.0	77.0	24.8	85.8	29.8	79.9	44.9	71.7	52.4	55.7	65.2	49.7
Agricultural Development Bank of Iran[1]	-	-	-	-	2.8	7.2	8.3	13.2	23.4	24.9	42.3	32.3
Commercial Banks	4.0	23.0	4.1	14.2	4.7	12.9	9.4	15.6	18.2	19.4	23.6	18.0
Total	17.4	100.0	28.9	100.0	37.3	100.0	62.6	100.0	94.0	100.0	131.1	100.0

(1) Note that the Bank started operations in 1973

Bank Markazi Iran Annual Reports and Balance Sheets for 1976, p. 11, p. 50 and 1975 p. 82.

the bulk of the producers[1] are unable to obtain commercial bank loans.

Thus the majority of agricultural producers are faced with the inadequacy of borrowed capital from government sources and commercial banking systems. As a result, they are forced to turn to private sources for credit. Unfortunately, estimates of the volume of these loans are not available. Interest charged by these sources was estimated to be about 50 per cent up until the early seventies. Due to the expansion of cooperative credit in rural areas this dependency has decreased and the interest charged by private sources has fallen to about 25 per cent.[2] However, even the latter figure indicates that the majority of farmers are still faced with high costs of borrowed money.

Terms of Trade, Wages and Migration

Not only has the government been more generous in its investment and credit policies to other sectors relative to agriculture, but also its import and price policies have created conditions under which terms of trade have become more favourable to industry and urban services. The government, following a protective policy of industrialization, not only has not set any price ceiling for industrial products produced in the country, but has also imposed high tariffs upon many industrial imports. In contrast, to protect urban consumers a number of major agricultural products have price ceilings.[3] Also subsidies are used for the imports

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(1) See Chapter I, Section Two, pp. 40-42.

(2) Ashraf and Safai (1977), pp. 35-36.

(3) Unfortunately, price indices comparing farm-gate prices with industrial output are not available. However various official and non-official sources have referred to the discrepancies between the two. [For example, see: Vezarate Taa'von va Omoore Roostaha, Daftare Vazir (Agricultural Seminar 1976), pp. 11, 18 or Plan and Budget Organization "Syasate Qeymat-Gozarie Mahsoolate Keshavarzi va Dami" Agricultural Seminar 1976, unpublished.] There are also various recent (1978) reports produced by the Ministry of Agriculture or the Ministry of Trade making various estimates and suggestions for a competitive pricing of agricultural output. (Combined internal reports of Ministry of Agriculture and Ministry of Trade on prices of: Wheat, poultry, eggs and red meat).

of agricultural products. Thus, while agricultural producers pay tariffs for purchase of many industrial items, their own produce in the market is faced with competition from subsidized import prices. According to Plan and Budget estimates, during the first three years of the Fifth Development Plan, the government paid Rls. 126 billion, or about 75 per cent of its current agricultural budget, to cover losses incurred through imports of agricultural products.(1)

In contrast to government policies concerning stabilization of agricultural prices, other productive sectors have enjoyed rising prices and high profits. In particular, the urban housing industry has made substantial profits. As a result during the last few years this sector has rapidly expanded,(2) and the share of construction in the non-oil GDP rose from an average of nearly 6 per cent during the Third and Fourth Development Plans to an average of 10 per cent during the Fifth Plan. (Table 9). This has had two major effects upon agriculture: Firstly, agricultural wages have gone up rapidly, and secondly, labour has migrated during peak agricultural seasons to urban areas.

Macro data concerning rural-urban wage differentials are not available. However, a micro study of a selected sample of 40 villages and a sample of migrant unskilled urban workers show that in spite of the fact that agricultural wages have gone up by about 240 per cent during 1973-76, they are still 40 per cent lower than wages received by those workers who

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(1) Plan and Budget Organization (1977), p. 3.

(2) It is true that the rapid expansion of the housing industry is very much due to rising demand. However, in this context the same argument can be applied to agriculture. There has been a rising demand for it. Nonethless, government policies in terms of pricing has not allowed these prices to rise at a comparable rate to those of other sectors.

Table 9 : Average Share of Construction and Agriculture in in Non-Oil GDP For The Three Plan Periods

Rls. billion current prices

	1 Value-added in Agriculture	2 Value-added in Construction	3 Non-Oil GDP	4 Ratio of Agriculture to GDP (1/3)	5 Ratio of Construction to GDP (2/3)
Third Plan 1963/67	579.1	108.1	1888.7	30.7	5.7
Fourth Plan 1968/72	822.5	216.2	3390.3	24.3	6.4
First Four Years of Fifth Plan 1973/75	1328.7	800.4	7765.1	17.1	10.3

Source: Bank Markazi Iran, 1977 revised estimates of national income, unpublished.

migrated from their villages.(1) Thus, in spite of rapid increases in agricultural wages, due to profitability and demand in housing construction in urban areas, agriculture has been incapable of competing in labour absorption during peak seasons. Furthermore, agricultural wages in comparison to agricultural prices are so high that in many areas farmers have declined to harvest their crops. For example, reports from East and West Azarbayjan in 1976 indicate that in many areas because of high wages some farmers left their crops unharvested.(2)

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(1) Hob-khoo (1977). Average daily wages (unskilled) for agricultural workers in 1976 was about Rls 450 (p. 54). In contrast, average daily wages for those workers (unskilled) who migrated from rural to urban areas was about Rls 630 (p. 62).

(2) Plan and Budget Organization "Barresye Mokhtasare Vaze'h Bardasht dar Āzarbayzan" Agricultural Seminar 1976. unpublished.

The total number of adult male labourers employed in agriculture between 1960 and 1972 has remained nearly constant.(1) However, the area under cultivation between these two years has increased by 56 per cent.(2) Thus the land-labour ratio has declined substantively. It is possible to argue that the decline in the land-labour ratio for the period may have been compensated for by the use of machinery. However, after 1973, major labour shortages have been observed in the countryside. Unfortunately macro data is not available for the period. But a micro study indicates that in the period after 1973, while mechanization has solved labour shortage problems for planting seasons, machinery has not yet sufficiently replaced labour for harvesting.(3)

The thesis of the zero marginal productivity of labour in agriculture is now by general consensus refuted.(4) However, in a period of industrialisation it is no doubt expected that a substantial number of labourers would migrate to cities. Nonetheless, should a healthy and balanced development take place, this process would be accompanied with mechanization and substitution of machinery for labour. In such a process not only would agriculture not suffer, but also overall productivities in this sector would go up. However, this has not been the case in Iran. Firstly, while the government through its budget allocation has caused booms in other

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(1) Vezārate Keshvar op. cit. p.10, and Markaze Āmāre Iran (1977), p.5.

(2) Vezārate Keshvar Ibid p. 11, and Markaze Āmāre Īran (1975), p.x.

(3) Hob-khoo op. cit. p.59.

(4) See for example, Mellor (1966), Schultz (1964).

sectors of the economy, notably construction, it has not provided sufficient low-interest funds for investments in machinery in agriculture. As a result agricultural mechanization has lagged behind rural-urban migration. Second, in spite of a rapidly rising wage rate, farm-gate prices for the major agricultural outputs, either through direct government purchase or through subsidized import prices, have been prevented from rising as rapidly as costs. Therefore, farmers are not in a position to offer competitive wage rates, in comparison to industry and construction. In brief, through tremendously unbalanced allocation of resources, the government has created a situation which has led to misallocation of labour. The process of transfer could have been more smooth had different resource allocation and subsidy policies been followed.

CONCLUSIONS

In the period after the Land Reform, relative to other sectors the growth of agriculture has been slower. The existing evidence tends to show that the actual growth rates may have been lower than the recorded official figures. The proponents of large-scale semi-government corporations have argued that the inherent inefficiencies existing in the institution of autonomous agricultural producing units, especially peasant producers, are the factors responsible for the relatively slow growth rates of this sector.

In this section, I have tried to show that several macro-economic variable related to the government resource allocation policies appear to have acted unfavourably on the agricultural sector. These can be summarized as government-development budget allocation, agricultural credit and agricultural pricing and import policies. These in turn have created unfavourable rural-urban terms of trade imbalances and have caused rural-urban migration of labour at peak agricultural seasons, without sufficient mechanization of agriculture to substitute for labour shortages.

In view of the above-mentioned unfavourable factors acting on

agriculture, even if we accept the lower 2.5% average annual growth rate of agriculture for the period as estimated by the IBRD[1], it is difficult to accept the hypothesis of institutional inefficiencies of this sector. On the contrary, the growth figure, given the overall macro-economic conditions, tends to point favourably to the rather productive performance of this sector.

SECTION II:

COMPARATIVE STUDIES

As seen in Chapter One (Section One, pp.20-23) the proponents of large-scale corporate farms base their arguments on two assumptions:

1) There are purely technical advantages in large-scale production in agriculture, and

2) In a corporate management system, where trained managers run the operations and labourers are wage-earners, organization of production is more efficient than in the family farms and the village organizations.

In this section I have made a first attempt to study whether the existing empirical evidence supports the above-mentioned hypothesis. Thus I have tried to study:

1) If there is evidence that larger farm sizes show higher productivities, and

2) if the existing semi-government corporations appear to be more efficient in resource allocation than the comparable autonomous units.

The limitations on the available data have posed two major constraints on the analysis presented in this section:

1) Due to data limitations, it was not possible to use total productivity indices (output divided by all factor inputs) in the comparative analysis. Only proxies such as yields, gross value of output per hectare etc. have been used. Therefore, because productivity ratios with respect to a single

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(1) Price (1975), p.1.

input are not a sufficient means of evaluation of resource allocative efficiency, it was not possible to provide conclusive results for the relative economic efficiency of the different sizes or systems under study. 2) The information used here comes from disparate sources: some pertaining to the entire country, some to a micro number of observations. Consequently it was not possible to provide a comprehensive study of the subject.

The analysis has been carried out in three stages: First, I have tried to see if the existing macro data suggests economies of scale in production. Second, an attempt is made to evaluate the efficiencies of factor combination in the autonomous units, especially peasant producers. Third, an attempt has been made to make a comparative study of the productive efficiencies of semi-government corporations and the autonomous units.

National Surveys

In this section an attempt is made to compare average yields of the major crops in the different farm size categories. The reason for choosing yields, averaged over total area of holdings and grouped into size categories, is that these are the only available partial productivity ratios on a macro-scale. The data concern four national surveys carried out by the Iran Statistical Centre for the agricultural years 1960, 1971, 1972 and 1974.[1] Unfortunately, the classification of crops and farm

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(1) Iran Statistical Centre (1961), (1972), (1973) and (1975).

size categories is not consistent for these four years. Nonetheless, the results indicate somewhat consistent yield patterns.

Yields of irrigated wheat and barley are recorded together for 1960 and 1971. For the other two years, irrigated and unirrigated wheat are recorded together. The same classification has been adopted for barley. In all cases the smallest size farms show the highest yields. Similarly, for rice the highest yields are observed in the smallest size categories. A similar pattern is also observed for sugarbeet, the data for which was available only for 1974 (Tables 10 to 13).

The case of cotton is somewhat different (Tables 10 to 12). The data seems variable and it is difficult to draw reliable inferences from it. But unlike the other four crops, cotton seems to show higher productivities in the relatively larger sizes. But in the case of farms larger than 500 hectares, yields are considerably lower (Table 10). Also in Tables 11 and 12 yields show a declining trend for farms larger than 100 hectares. Thus, it may be stated that even if there are scale economies for cotton, beyond a certain expansion of farm size, yields suggest a declining trend.

Obviously productivity ratios with respect to a single input cannot provide conclusive results in relation to economies of scale, as the differences may be due to other inputs.(1) In addition, hectarage as a proxy for land use is misleading as land qualities may vary considerably.(2) Furthermore, the data presented in the Tables show yields over average size of holdings, and do not provide information on the area under cultivation. Often smaller farms cultivate a larger percentage of their holdings.(3)

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(1) A number of Indian writers have attributed higher yields per unit of land input in India to the intensity of cultivation, i.e.greater use of other inputs. Among others see: Sen (1962), Bharadwraj (1974), Saini (1968).

(2) Again a number of Indian writers have attributed higher returns per unit of land input in the smaller size categories in India to the better quality of land in the smaller holdings. Among others see Khusro (1964).

(3) My field observations in Yazd, East and West Azarbaygan and North of Khorasan indicate that ingeneral the smaller size farms cultivate a larger percentage of their holdings.

Table 10 : Yields Per Hectare and Per Size of Farm Categories of Major Crops 1960.

Tons per hectare

Farm Size Categories (hectares)	Irrigated Crops		
	Wheat & Barley	Rice (Paddy)	Cotton
Average Yields	1.18	2.16	1.13
Less than 0.5	2.21	2.61	1.80
0.5 - Less than 1	1.72	2.11	1.36
1 to less than 2	1.40	2.31	1.01
2 to less than 3	1.26	2.27	1.11
3 to less than 4	1.25	2.22	1.07
4 to less than 5	1.20	2.09	0.90
5 to less than 10	1.15	2.03	1.07
10 to less than 20	1.12	1.97	1.29
20 to less than 50	1.14	1.56	1.10
50 to less than 100	0.93	1.45	0.69
100 to less than 500	0.99	2.58	1.89
500 and more	1.22	2.43	0.65

Table 11 : Yields Per Hectare and Per Size of Farm Categories of Major Crops 1971

Tons per hectare

Farm Size Categories (hectares)	Irrigated Wheat and Barley	Unirrigated Wheat and Barley	Rice	Cotton
Average Yields	1.287	0.422	2.549	1.518
Less than 1	1.937	0.611	3.000	1.300
1 less than 2	1.789	0.600	3.174	1.235
2 to less than 5	1.484	0.549	2.888	1.322
5 to less than 10	1.305	0.431	2.125	1.434
10 to less than 50	1.183	0.366	1.461	1.613
50 to less than 100	1.125	0.498	2.333	1.955
100 and more	1.051	0.463	2.143	1.582

Source: Iran Statistical Centre (1960) and (1973)

Table 12 : Yields Per Hectare and Per Size of Farm Categories of Major Crops 1972

Tons per hectare

Farm Size Categories (hectares)	Irrigated and Unirrigated Wheat	Irrigated and Unirrigated Barley	Rice	Cotton
Average Yields	0.80	0.81	2.67	1.42
Less than 1	1.85	1.75	3.06	1.20
1 to less than 2	1.26	1.18	2.98	1.31
2 to less than 5	0.93	0.90	2.83	1.31
5 to less than 10	0.78	0.76	2.00	1.40
10 to less than 50	0.67	0.70	1.87	1.51
50 to less than 100	0.86	0.84	2.67	1.65
100 or more	1.07	1.13	2.00	1.36

Table 13 : Yields Per Hectare and Per Size of Farm Categories of Major Crops 1974

Tons per hectare

Farm Size Categories (hectares)	Irrigated and Unirrigated Wheat	Irrigated and Unirrigated Barley	Rice	Sugarbeet
Average Yield	0.483	0.535	2,337	23.597
Less than 1	1.594	1.434	2.719	31.372
1 to less than 2	0.973	0.995	2.466	19.103
2 to less than 5	0.659	0.611	2.391	22.530
5 to less than 10	0.480	0.460	2.301	22.242
10 to less than 50	0.346	0.385	1.909	21.470
50 to less than 100	0.530	0.574	2.703	24.884
100 and more	0.690	1.072	1.746	26.704

Source: Iran Statistical Centre (1974) and (1977).

Therefore, the data presented here cannot lead to any conclusive results. Nonetheless, it may be stated that the data does not appear to favour higher returns from larger farm sizes.

On the basis of the national agricultural survey for 1972, IBRD provides interesting estimates of the gross value of output per farm size categories. According to these estimates production units ranging between 1 to 10 hectares held only 38 per cent of the total farm area in the country, while they produced about 50 per cent of the gross value of output. In contrast, farms that were larger than 100 hectares held 12 per cent of the farm area, producing only 7 per cent of the output (Table 14). These estimates, while a superior proxy to the yields discussed previously, are still non-conclusive and suffer from the same shortcomings discussed earlier. However, again they tend to throw doubt on the possibility of the existence of scale economies.

Table 14 : Share of Gross Output in Total and Share of Area of Holding in Total According to Farm Size Categories

(Per cent) 1972

Farm Size (Hectares)	Farm Area	Share of Gross Output
100 or more	12	7
11 - 100	50	43
Less than 1 to 10	38	50
Total Land Holding Units	100	100

Source: Price (1975) p. 14.

Peasant Production

As shown in Chapter I (Section One pp. 23 - 25), in general a number of experts in the field of agricultural economics and rural sociology hold the view that peasant production units are economically efficient entities

in Iran.[1] They also support the doctrine of economies of scale in agriculture. But they state that scale economies can be gained in conditions where individual incentives of the family are restored, i.e. boneh. Thus, they argue that this curious combination of allowing the peasant holders to use the labour of the family on the owned (or rented) allotment together with the economic gains of large-scale production in land rotation and division of water, even in the use of machinery, provides the best production system for Iran. Unfortunately, with the exception of one technical input-output study, no other technical study is available on the productive efficiency of peasant farmers in Iran.

An interesting study of the allocative efficiency of the peasant farmers in the area near the city of "Nishāboor" (Khorāsan) is carried out by Noori. He has applied a linear programming model to a sample of 300 villages and 100 households for agricultural year 1969. He concludes that within the existing constraints, the farmers were already utilizing their resources in a near optimum manner, thus there would seem to be little advantage from any reallocation. The tests indicated that water was the most limiting factor in the area and that further development of agriculture depended on the expansion of the irrigation system. However, financial limitations were preventing the farmers from expanding the water supply.[2] Note that the study examines the allocative efficiencies of the individual farmers. It does not allow for the village organizational factors.

Again as the available studies supporting production efficiencies of peasant farmers are mostly descriptive, and since the only technical input-output study is related to a small area only, no major conclusions can be drawn about these units.

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(1) Among others, see Ajami (1976), Saedloo (1967), Malek (1960 and 1978), Safi-Nejad (1974).

(2) Noori (1976), pp. 2-3.

Farm Corporations

Official data on farm corporations in general indicate a rise in yields (Table 15), income of shareholders and net profits.(1) Although these figures may be somewhat exaggerated, there is sufficient evidence to believe that in general production has increased in these units.(2) However, in view of substantial investments made by government for land improvements and increase in supply of water, use of machinery, fertilizers, improved seeds, employment of agricultural experts by the government for these units, etc.(3) it is difficult to attribute the increase in output either to scale or the management systems.

Table 15 : Comparison of Average Yields Per Unit of Land Input Before and After the Establishment of Farm Corporations

Kilograms per hectare

Crops	Before Establishment of Farm Corporations	Agricultural Years 1974-1975	Index of Comparison
Irrigated Wheat	1,270	2,102	165.5
Unirrigated Wheat	883	673	76
Irrigated Barley	1,170	2,258	193
Unirrigated Barley	867	998	115
Cotton (Processed)	1,043	1,653	158
Rice	2,400	2,250	94
Onions and Potatoes	10,250	9,278	91
Corn	742	3,259	439

Source: Vezarate Ta'āvon Va Omoore Roostāhā (1976), p. 40.

(1) Vezarate Ta'āvon (1976), pp. 40-87.

(2) Azkya (Unpublished), p. 99.

(3) Vezarate Ta'āvon, Ibid.

An examination of the extension of aid and long and medium-term low interest loans to these units, shows that on the average the government has extended an annual credit of more than Rls. 15,000 per hectare of area under cultivation. (Table 16). No comparable extension of aid and medium and long-term low interest credit has been available for the peasant and small capitalist producers. The only source of government credit to the latter has been the cooperatives, mainly short-term seasonal credit. Flat comparisons of annual extension of government aid and medium and long-term credit with short-term seasonal loans are not appropriate, as the actual aggregate aid and outstanding loans by far exceed the annual credit extension. Nonetheless, even these flat figures are about fourteen times the per hectare credit extended by cooperatives (Tables 7 and 16).

As a result of the availability of capital, substantive investments have been made in land improvement and expansion of the area under cultivation : 25% increase in cultivated area in comparison with the area under cultivation before the establishment of corporations.(1) The supply of water has increased by 90% and improvements have been made in the irrigation canals.(2) An examination of the use of machinery for the different tasks of production before and after the establishment of farm corporations, indicates a rapid increase in the use of these inputs.(3)

Due to capital shortage, none of these possibilities was open to the peasant producers in the areas presently used by farm corporations, before they became members of the new system. In particular, in view of the fact that water shortages in Iran are a major drawback on output, and that the supply of water in these units has increased by 90%, while land

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(1) Ibid p. 43.

(2) Ibid p. 44.

(3) Ibid pp. 71-76.

Table 16 : Loans and Aid Provided by Government to Farm Corporations

	Loans[1] Rls. 1000	Aid Rls. 1000	Total Rls. 1000	Area Under Cultivation/ ha	Loan Per ha. Rls./ ha.	Aid Per ha. Rls./ ha.	Loan and Aid Per ha. Rls./ha.
1975	313,530	1,531,200	1,844,730	130,000	2,412	11,701	14,113
1974	323,700	2,005,064	2,328,764	110,000*	2,943	18,228	21,171
1973	313,850	1,234,217	1,548,067	89,000*	3,526	13,980	17,506
1972	248,650	592,040	840,690	68,000**	3.671	8,853	12,524
1971	101,298	342,545	443,843	37,801**	2,666	9,020	11,686
1970	79,941	173,069	253,010	24,861**	3,200	6,960	10,160
1969	69,473	229,631	299,104	20,261**	3.475	11,490	14,965
1968	69,305	214,377	282,682	14,000*	4,946	15,312	20,258

Source: Unless otherwise stated, figures are taken from Vezarate Ta'āvon va Omoore Rostaha (1976) pp. 159-162.

* As access to exact figures was not possible these are obtained from a chart from Ibid (1975), p. 27.

** Ibid (1971).

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(1) Annual loans extended each year by the Government to the farm corporations. These are low interest (2 to 8 per cent) loans with durations of 5, 10 and 15 years. Note that the data concerns annual extension of new loans. The actual amount of the loans outstanding by far exceeds these figures. Unfortunately, due to data limitations, it was not possible to estimate the amount of loans outstanding each year.

Also note that the nominal rate of interest for the loans vary. However, the effective interest rate is 1%, as the remaining interest rates are ploughed back to the farms in the form of aid.

under cultivation has gone up by 25% only, the increase in the supply of water per hectare of land under cultivation is likely to have positive effects on yields.

Note that the existing evidence, though not related to the exactly comparable time periods, tends to suggest that the hypothesis that the corporation units have been bringing new land under cultivation and therefore need relatively more capital investment, while peasant producers are employing land already prepared for cultivation and therefore are not so much in need of capital investments, does not appear to have validity. As shown in Chapter One (section Two, pp. 40 - 42), according to the two available agricultural censuses, 1960 and 1973, the area under cultivation of the autonomous units has increased by 56%. It is possible to argue that relative to total holdings, capitalist farms may have brought a larger proportion of new land under cultivation. However, the relative share of land held by capitalist farms in the total area of holdings rose from 7% in 1960 to a possible maximum of 21% in total area of holdings in 1973. Therefore, it is possible to hypothesize that the peasant producers may be responsible for a substantial proportion of the increase in cultivated area. Obviously comparisons of two sets of data related to two periods, 1960 to 1973, versus data from 1968 to 1976 and showing a 25% increase in area under cultivation, is not conclusive. Also, the data for the autonomous units is rather ambiguous as it is inclusive of capitalist producers. But the data suggests that the farm corporations do not appear to be more land augmenting than the peasant producers.

Case studies concerning farm corporations are few. A number of such studies were carried out by the Faculty of Social Research and Cooperatives of the University of Tehran. In general, the studies pointed at the lack of success of these units. However, as these case

studies belong to the earlier years of the establishment of these units, and since that time production has gone up substantially, these evaluations cannot be meaningfully cited here. However, these case studies, as well as some later works, point to the management problems of these units, the superimposition of a bureaucratic system of management and taking away individual incentives.(1) This view is also expressed in some official papers.(2) Furthermore, the experience of using wage labourers in the various production tasks has proved unsuccessful. Therefore, whenever possible, the management has tried to use various crop-sharing agreements with the cultivators and the results have been more successful.(3)

By general consensus, the most successful farm corporation is the Garmsār unit. It is also among the earliest established corporations (1968) and it may be fair to expect that the unit may have passed through earlier stages of 'infancy' and entered full capacity operation. During eight years of production the gross value of output (current prices) has become twelve times that of the first year of production.(4) Furthermore, practically in all years of operation, it has shown the highest official profits. For example, in 1975 the recorded official net profit for the unit was about Rls. 83 million, the average for all other farm corporations being Rls. 15 million.(5)

An input-output study of this unit throws doubt on the economic efficiency of the corporation. Using an approach for computation of total productivity ratios similar to the one for the case-studies in this dissertation (Chapter Four, page 148), a total productivity index

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(1) Azkya (unpublished), p.99, or Keshavarz et. al. (1971) pp.90-94.

(2) Vezārate Ta'āvon, (Agricultural Seminar 1976), p.8.

(3) Azkya Ibid p. 103.

(4) Noroozi (1978), p.7.

(5) Vezārate Ta'āvon (1976), pp. 85-87.

has been constructed for this unit. The resulting index shows a figure of 1.07, i.e. it is at almost break-even point.[1] But an examination of the methods of computation indicates that the value of the government personnel which amounts to about 1.7%[2] of total costs has not been imputed in the above-mentioned index. Should this figure be imputed the ratio would amount to 1.05. Furthermore, the interest rates imputed in the above-mentioned index are the preferential bank rates of 7 to 9 per cent. Should a shadow price of 12% (the rate normally charged by commercial banks) be imputed for the index, i.e. assuming no preferential interest rates by the government, then the index would be less than one, i.e. the farm corporation will show losses.[3]

Another interesting result obtained from this study is the comparison of Garmsār unit with the neighbouring village of Ricān. In general, gross output per hectare is higher in the corporation unit. However, total productivity ratios i.e., gross value of output divided by the total rental value of all factor inputs used in its production, (see Chapter Four, p. 148) for Rican, 1.2, are higher than the farm corporation.[4]

The results of the Garmsar unit are especially interesting for the following reasons:

(1) the unit is considered to show the highest net profit among the corporations. Since according to the above-mentioned case study, this farm corporation should be regarded as either being at break-even point or incurring losses, it is safe to conclude that most farm corporations

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(1) Noroozi (1978), pp. 29-35.

(2) Ibid.

(3) In view of the fact that the small producers do not even have access to the commercial bank loans and have to pay higher interest rates than 12% on loans, in order to make a social cost-benefit analysis of farm corporations, it appears justifiable to impute at least 12% commercial bank rates.

(4) Noroozi (1971) pp. 29-35.

are making real losses. Thus they cannot be considered as independent economic units, and should the government withdraw its aid the units would face economic problems; and

2) the most successful farm corporation is less efficient in resource allocation than a comparable village unit.

A study of the Shams-Ābād farm corporation in Kuzestān, located under the Dez Dam irrigation system, indicates the failure of this unit. Comparisons of total agricultural production in the area presently operated under the corporation system with its 1960 output show the decline of the aggregate output in the corporation. Furthermore, comparisons of the output produced by the surrounding villages with the corporation unit, again indicate the inferior performance of the latter.(1) It must be noted, however, that the Shams-Ābād unit is considered as one of the least successful farm corporations and major generalizations cannot be made from this example.

On the whole, it can be hypothesized that the farm corporations have succeeded in increasing output relative to the amounts produced in these areas before the new systems were established. Given substantial government investment and technical aid, it appears unrealistic to accept the hypothesis that increase in output has been due to either scale or system of management. On the contrary, the evidence tends to suggest that the farms appear to make losses and cannot be considered as economically efficient entities. Also the case studies on these units have tended to be critical of the bureaucratic management systems of these farms.

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(1) Malek and Alimorad (1978), pp. 115-123.

Agro-business Farms:

Official published data concerning agro-business units is almost non-existent. The number of research studies on these units are also very limited.[1] An interesting comparative study on the four agro-businesses under the Dez irrigation system has been carried out by the IBRD office in Tehran. This study is summarized below:

The IBRD report [2] makes comparisons of productivities per unit of land input between the four agro-business units in Khuzestan, one large capitalist farm, 2,500 ha., in the same area, and 52 other farms in Khuzestan and Kermanshah ranging between 4 to 800 hectares. The latter farms are grouped in two categories, those having less than Rls. 3 million capital assets, and the rest. The Kermanshah sample showed in general higher returns per hectare and per factor input for the farms with less than Rls. 3 million capital assets. The Khuzestan sample did not show any difference between the two samples. The one large capitalist farm in Khuzestan showed higher returns per hectare than all the other 51 farms. As the IBRD study only shows gross returns per hectare, and since the large capitalist unit is likely to have employed more mechanical and biological inputs per hectare, its higher returns may be more attributable to its technological co-efficient than its efficiency. Thus with this information available from the IBRD report no conclusions concerning the relative efficiency of these farms may be drawn.

The agro-business farms have not yet prepared for cultivation all the land allocated to the units. Comparisons in gross value of output

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(1) There are two studies on these units prepared by the Agricultural Development Bank. I will discuss these results in relation to my case studies.

(2) IBRD (1976).

per hectare between the agro-business units and the large-capitalist farms in Khuzestan show higher returns for the agro-business farms if their total holding is assumed to be equal to the levelled farm area, and for the capitalist farm the total size of holding is used. However, if averages over farm areas are considered, then the large capitalist enterprise shows higher returns per hectare. Comparisons of sugarbeet production between the agro-business units and the Kermanshah sample (the Khuzestan sample did not produce sugarbeet) show higher returns from the Kermanshah farms. Furthermore, the study concludes that all capitalist farms in the sample, both Kermanshah and Khuzestan, showed profits. However, the four agro-business units showed substantial losses. The IBRD study attributes the apparently more efficient performance of the sample farms compared with the agro-business units to the existence of family labour and family management in these farms.[1]

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(1) IBRD (1976) pp. i-iii. Note that no statistical tests of significance have been applied.

SUMMARY

1) The proponents of the semi-government corporation systems have argued that the reason for the relatively slower growth rates of agriculture, in comparison with other sectors, is the inherent institutional inefficiencies existing in the autonomous systems, especially peasant, tribal and small capitalist producers. In this Chapter I have tried to determine whether the existing evidence tends to suggest inherent inefficiencies in the production system of the autonomous units. I have tried to do this evaluation at two levels:

a) To evaluate the productive performance of the agricultural sector accounting for the effects of the overall macro economic variables, especially the government policy variable, acting upon the sector; and

b) On the basis of the existing evidence, to make a comparative study of productivities in relation to farm size and in relation to the systems of production.

As a result of data limitations, both stages of the study are exploratory and non-conclusive. But the evidence tends to suggest certain hypotheses in relation to productive performance of these systems.

2) During the sixties and seventies, as a result of the inflow of the oil revenue, the Iranian economy has experienced high growth rates, 15.1 per cent average annual growth rate of the GNP at constant prices for 1963-1976. In comparison to the rest of the economy, agriculture has shown a much slower growth rate, 4.8 per cent at constant prices for the same period according to the official sources. On the basis of evidence provided by other sources, i.e. Plan and Budget Organization internal reports, and the IBRD Office in Tehran, it seems possible that the actual growth rates may have been lower, 2.5 to 4 per cent per annum. Also, a study of wheat production figures indicate that the figures may have been

over estimated. The rapid increase in imports also tends to suggest a rather inelastic domestic supply. Thus, it is fair to assume that the actual growth rates may have been below the recorded official rates.

3) Data concerning the relative production shares of the autonomous and the semi-government systems are not available. But estimates by the IBRD indicate that by the end of 1973 all farms larger than 300 hectares, inclusive of large capitalist farms and the semi-government corporations, produced only about 2% of output. Thus, it is fair to assume that for the period covering the sixties to the mid-seventies, the bulk of agricultural production has been produced in the boundaries of the autonomous units and the growth figures for this sector may be considered to be almost synonymous with the growth figures for the autonomous systems.

4) In the case of Iran, because the oil revenue is received by the government sector, resource allocation policies of the government have a strong influence upon the economy. A study of the government development budget allocation for the period 1963-1976 indicates that the budget allocations to the autonomous units amounts to about 5% of the total development budget, while the contribution of the autonomous units to the non-oil GDP for the same period on the average amounts to 25%. Furthermore, a comparison of the development budget allocation to the autonomous and the semi-government corporations, indicates that the latter has received an amount nearly equivalent to 6% of the total budget allocation, while its area of holdings has been less than 2% of the total in the country. Thus there seems to be a tremendous imbalance in the government resource allocation between the autonomous units in comparison with the semi-government corporations and the rest of the economy. While there may be other justifications for the specific resource allocation policies, these imbalances are likely to have had unfavourable effects upon the autonomous units.

5) A study of the government credit allocation to the autonomous units indicates that while the volume of short-term low-interest credit has expanded to this sector, it is still below the short term seasonal cash needs of the sector. Also, the evidence indicates that the peasant producers have virtually no access to intermediate and long-term bank loans. As a result, they seem to be dependent on the local private sources that charge high interest rates.

6) The government pricing policy has been directed to support urban consumer and industrial production. Unfortunately, comparative indices for farm-gate and industrial prices are not available. But it appears that as a result of two government pricing policies: a) price ceilings on a number of major crops and b) subsidizing agricultural import prices, the prices of agricultural products have been prevented from going up in response to internal demand. On the contrary, domestically produced industrial items have been protected through tariff policies. As a result, it seems that while agricultural producers are faced with price ceilings and competition with subsidized import prices, they have to pay tariff protected prices for the industrial items which they purchase.

7) While it seems that agricultural prices have been prevented from going up in proportion to market demands, agricultural wages appear to have gone up considerably. Unfortunately, macro data is not available on the subject. But a number of micro studies indicate that, especially in the period after 1973, agricultural wages have gone up to the extent that in certain instances the farmers have declined to harvest their output as it did not seem to be profitable. Also, as a major competitor with agriculture in labour absorption is the construction industry, and as the activities of this sector coincide with peak agricultural seasons, because of the relatively higher wages offered by construction sector labour shortages have been observed in many areas at peak agricultural seasons.

It should be added that perhaps as a result of the unprofitability of agriculture and unavailability of sufficient credit for investments in this sector, mechanization appears to be lagging behind labour migration. Therefore it has not yet fully compensated for the labour shortages.

8) In view of the various apparent unfavourable macro-economic variables acting upon agriculture, even if the lower average annual growth rates of this sector - 2.5 per cent - as estimated by the IBRD, are accepted for the mid-sixties to the mid-seventies, it is difficult to accept the hypothesis of the institutional inefficiency of the autonomous units. In fact, given the overall macro-economic conditions of the country, and especially in relation to the government policy variables, the evidence tends to suggest that institutionally the autonomous agricultural producers may have been rather productive entities to be able to show a sustained average growth rate of 2.5 per cent per annum over a period of nearly fifteen years.

9) Macro data comparing the efficiency in resource allocation by the different farm size categories are not available. But yields of the five major crops per hectare of the area of holdings and according to farm size categories are available. With the exception of cotton, all other major crops, namely, wheat, barley, rice and sugarbeet showed highest yields for the smallest farm sizes. Cotton did not show a very consistent pattern but appeared to have higher yields for relatively larger categories. But in the largest size categories it showed a declining trend. Also a study by the IBRD of the value of gross ouput divided by the area of holdings for the different farm size categories, has shown that the productivities are substantially higher for the smaller farms.

Yields per hectare, or gross value of output per hectare, cannot be considered as an indication for efficiency, as the differences in these ratios may be due to some other factors. Therefore, these results cannot be conclusive, but they tend to throw doubt on the possibility of economies of scale in agricultural production.

10) A number of micro studies in Iran have supported the hypothesis of the economic efficiency of peasant production and the positive role of village collective activities on output. But with the exception of one technical input-output study the rest are descriptive. In the technical input-output study, applying a linear programming model, the author has shown that the sample farmers, given their constraints, appear to allocate their resources almost optimumly.

11) A study of farm corporations shows that yields have in general gone up. But in view of substantive government investments and technical aid in these units, it is difficult to attribute the productivity increases either to scale or management factors. It should be noted that the evidence suggests that relative to the autonomous units, farm corporations do not appear to have been more land augmenting. Therefore, major differences in the government resource allocation to these units cannot be justified in terms of the relative increases in the supply of land under cultivation.

12) A number of case-studies on farm corporations have been critical of the bureaucratic system of management in these units. They have also pointed out that the use of hired wage labourers for all production tasks in these units has at times proved unsuccessful. As a result the managers have tried to use various arrangements which are similar to the traditional share-cropping agreements. These arrangements seem to have been more successful.

13) An input-output case-study of 'Garmsār' farm corporation, shows that the farm is either at a break-even point, or is making losses. Since according to the official accounting methods, 'Garmsār' is by far the most profit-making farm corporation, and the profit of this unit for 1975 was about 5.5 times the average profit for all other units, it is safe to conclude that most farm corporations are making losses. Furthermore, comparisons of 'Garmsār' corporation with a nearby village show that while yields are higher for 'Garmsār', output divided by all factor inputs are higher for the village. These results throw doubt on the efficiency of the system of farm corporations in resource allocation.

14) A comparative study carried out by the IBRD of the four agro-business units under the Dez irrigation system, one large capitalist farm, 2,500 hectares, and a sample of 51 other farms in Khuzestan and Kermanshah, has shown the following results:

a) The average gross value of output per size of farm is higher for the capitalist farm as compared with the agro-business unit.

b) All sugarbeet producing farms in the sample has shown higher yields than the agro-business units.

c) In general, all the farms in the sample having capital assets of more than Rls 3 million, showed profits on their accounts, while the agro-business units showed losses.

INTRODUCTION TO PART II

In the first part of this dissertation, an attempt was made to evaluate the productive performance of the different production systems in Iran on the basis of the existing information. However, the insufficiency of the available data imposed limitations on the analysis. In order to provide a more rigorous study of the input-output relations within different production systems, an in-depth study of five villages and four agro-businesses has been carried out to supplement the first part. Some of the hypotheses set up in the first part of the study are tested here. It is hoped that the combination of the macro and the micro parts of the dissertation may lead to more general and conclusive results.

The five villages are studied through intensive field survey methods, mainly based on interviews. The four agro-business units are studied through documents available on the subject. For the latter, whenever access to actual figures was possible, they have been used. However, for the most part dependence had to be made upon projected figures presented in the original proposals of these units. Very recently (January 1978) an unpublished report of the Agricultural Development Bank, based on actual figures, became accessible. Extracts from this report are used to supplement the study of the agro-business units.

The field survey was carried out with the help of three research assistants. Between eight to ten weeks were spent in each village. Mainly, the method of interviewing was used. However, in certain instances direct measurements were used. Methodological problems, at the level both of data collection and of analysis, have been substantial. These were partly a result of the rudimentary state of the development of methods in this field, and partly a consequence of the limitations of this research. Perhaps the most noticeable methodological problem of this approach results from

the limitations of using micro data in cases where I wanted to make generalizations. But other methodological difficulties e.g., collection of accurate data from the field, use of monetary values for measurements, assessment of the effects of unmeasured social and economic variables etc., have also been considerable. Some of the problems have been overcome, but many remain for future researchers to solve.

An attempt has been made to carry out the analysis and the interpretation of the data at three levels:

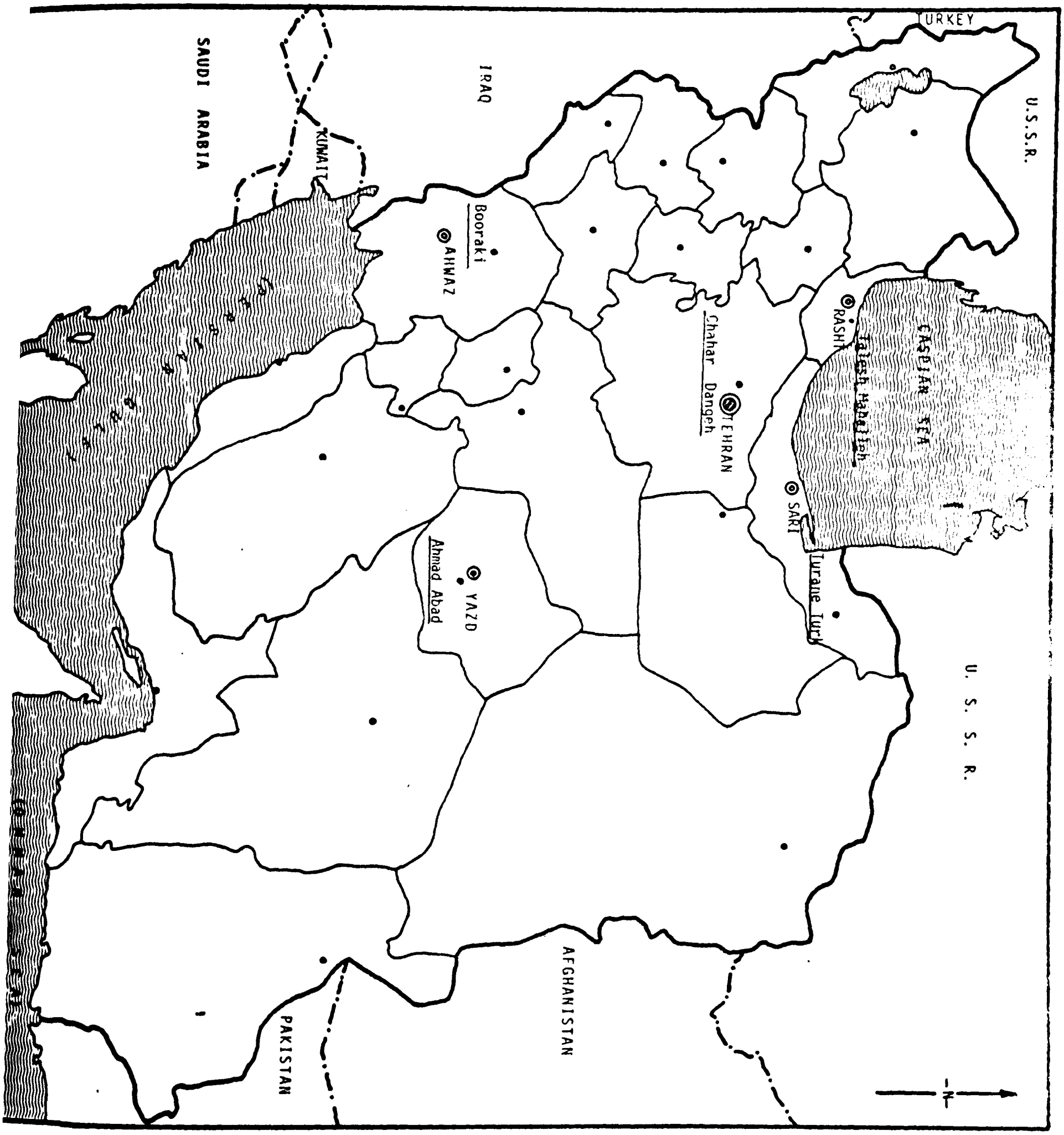
a) Within the autonomous production units included in the case-studies I have tried to evaluate the production performance of the different farm size and management systems.

b) An exploratory attempt has been made to evaluate the impact of village social and organizational conditions upon output.

c) The production behaviour of the autonomous units included in the five village case-studies have been compared with the four agro-businesses.

Admittedly, every stage of the analysis has many shortcomings. These problems are especially acute in relation to evaluations of the organizational role of the village in production.

The proponents of the large-scale corporate systems assume that the autonomous units, specially peasant farmers, are unable to adapt to new production technologies, therefore, unable to increase their productivities. In this research a supplementary study of innovation and adaptation has been carried out in order to evaluate the extent to which the autonomous units are trying to improve their production techniques. Due to time limitations, this part of the study is rather sketchy. Nonetheless, it provides a number of interesting hypotheses.


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SARI
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TEHRAN
Chahar Dangeh
KUWAIT
SAUDI ARABIA
Ahmad Abad
YAZD
AFGHANISTAN
PAKISTAN

CHAPTER III

SURVEY METHODOLOGY

In this Chapter, the methodology applied in order to carry out a micro-study of five villages and four agro-businesses is presented. The Chapter discusses the general approach adopted for this study and presents an introductory description of each case-study. As the five villages have been studied through intensive fieldwork, while the available sources have been used for the agro-businesses, the Chapter will concentrate mostly on the methodology aspects of the survey of the five villages.

Before presenting the survey methodology applied in this research, a short survey of the existing literature on rural studies in Iran will be made, in order to provide a picture of the existing methodological problems.

SECTION I : PREVIOUS RURAL STUDIES

In general, studies concerning peasants and other agricultural producers in the context of contemporary social sciences are very recent in Iran. This type of interest, in fact, developed after the Second World War.(1) Historically, the village in Iran was always regarded as a source for the provision of revenue and soldiers for the rest of the country, and where surveys were carried out they were made in order to fulfill these goals.(2) So it is not surprising to find that, in comparison

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(1) One of the earliest studies of Iranian villages is Professor Lambton's Landlord and Peasant in Persia, first published in 1953. This book provides a comprehensive insight into the life of Iranian villages. It is a product of the author's years of experience in this field, as well as her extensive knowledge of Persian history. The book is a classic of its type and has been used as a source of reference in most studies concerning rural Iran. However, the approach adopted by the writer is that of an Oriental historian. The accounts that she gives are purely descriptive. The book does not present quantitative data nor does it attempt to provide a systematic qualitative analysis of the economic life of these rural settlements.

(2) Saedloo, 1975, p. 61.

with countries which have a longer history of village studies, e.g., India, Russia, etc. the amount of available information about rural Iran is limited. Many aspects of rural life seem to be unknown, particularly those on which a progressive agricultural policy might be based.

The existing rural studies in Iran may be classified in four categories.

1) Village monographs which are based on the study of a single village. The authors of these case-studies have tried to look into the village systems of production and the local culture and folklore.(1)

2) More general micro studies on a specific subject, e.g., Land Reform migration, rural cooperatives, farm-corporations etc.(2)

3) Macro data based on the national sample surveys.(3)

4) A limited number of studies of specific topics in relation to rural areas at a more general and macro-scale.(4)

The first two types of studies, that is the micro approach, because they were carried out at grass-roots level, are useful in illustrating certain aspects of rural problems. Also, as a result of these studies, there have been some developments in field survey methods. However, these works have a number of shortcomings:

a) Each study has been carried out independently of the rest, and often within the different disciplines of social sciences and arts. Also, each researcher, according to his taste and his level of technical sophistication,

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(1) Among the best examples of this type of approach see: Āle-Ahmad (1970) and (1973), Ajami (1971) and Safi-Nejād (1966) and (1974).

(2) Among others see: Ajami (1975), Ashraf and Safai (1977), Hob-Khoo (1977), Keshavarz et. al. (1971), Malek et. al. (1978), Noroozi (1978).

(3) See: Markaze Amāre Iran agricultural surveys, Bank Markazi Iran Annual Reports and Vezārate Keshāvarzi and Vezārate Ta'āvon various publications.

(4) See Lambton (1959) and (1969), Khosravi (1976) and Nowshirvani (1977).

has used a specific approach, so that the studies remain unco-ordinated. It is difficult, therefore, to draw generalizations from these works.

b) The tradition of this type of research is not a long one in Iran, compared to that in many other countries. As a result many methodological problems that have been overcome elsewhere are still present in these micro studies.

Comprehensive sampling surveys in Iran date from 1960, when the first national survey on agriculture was carried out.(1) While these surveys have provided macro illustration of many aspects of agricultural production and a number of other social and economic factors related to rural areas, they nevertheless have many short-comings:

a) Because of the wide coverage, only a limited number of basic variables is covered. Therefore detailed and qualitative information is not included in these surveys.

b) Basic methodological problems exist in these works which at times make the reliability of the data questionable.(2)

c) A number of basic social and economic variables are still not included in these surveys.(3)

The number of general studies in relation to a specific topic at a national level is still very limited in Iran. Due to the pioneering nature of these studies, and as a result of the inadequacy of information both at macro and micro levels, the majority of these studies are descriptive.

In summary, the existing rural studies in Iran are generally inadequate in terms of providing both information for analytical studies and sophisticated methodological tools for the collection of such information.

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(1) Vezārate Keshvar (1960). Note that prior to this date a number of sample surveys were carried out, but they were not comprehensive.

(2) See Chapter Two, Section One. pp. 51-55.

(3) For example, see Chapter Two, Section One, pp. 63-67.

So in order to carry out analytical studies concerning rural economies, and in particular in relation to input-output data and the relevant social and organizational variables, it is necessary to carry out complementary studies. However, such field studies would be in turn affected by the general state of backwardness of the survey methodology in the country, in addition to other possible short-comings.

SECTION II : THE GENERAL SURVEY DESIGN

In order to study the factors affecting farm agricultural productivity in Iran, an accurate macro sample survey of the country allowing for a detailed inclusion of the farm input-output data, as well as of institutional factors, would ideally have been desirable. However, this approach does not in general appear to be within the realm of possibility,[1] and in the specific case of Iran, due to the existence of major methodological problems, this approach seems to be too ambitious.

Considering the general state of backwardness of survey methodology in Iran, and the existence of many unknown factors for the setting up of a comprehensive macro survey design for the country, perhaps it would be appropriate to try to make a systematic stratification of the country, according to a number of key variables, into fairly homogeneous agricultural producing areas, and then try to make coordinated in-depth micro studies in each area. This approach could have allowed for the collection of detailed data from each area through intensive field survey methods. The data, being coordinated, could then be used to make general macro conclusions.[2] Using this approach, sampling precision would be traded off for the

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(1) For example some writers have been critical of the Indian macro-data on farm input-output relations (see Sernivas (1975)). In this respect the Russians appeared to be advanced up until the mid-twenties when this type of work came to a halt. (See Shanin (1978)).

(2) Epstein proposed this method as a bridge between the economist's macro and the social anthropologist's micro approach for rural studies (Epstein (1975) pp. 1-15).

reduction of observation errors and the inclusion of more detailed variables. But through application of intensive field survey methods one would expect further developments in relation to survey methodologies, as well as additional knowledge about the important social or economic variables to be included in a more general macro survey. This approach could then lead to potential feasibility of an accurate and detailed macro survey for future studies.

Unfortunately, practical limitations did not allow a systematic and comprehensive study of this type. I had to rely on a much smaller survey which covers five villages and four agro-businesses only. In the case of the villages the focus of the study has been on the collection of detailed data concerning input-output variables and the social and institutional factors which appeared to be acting upon them. But I have also tried to select the micro data so that they are representative of a larger area. Due to government restrictions, a similar kind of data collection was not possible for the agro-business farms. Therefore in several instances I relied on the projected estimates provided by the original proposals of the companies. In the following pages I have tried to illustrate the general design of the survey.

a: Application of Case Method

In order to evaluate and compare the production behaviour of a micro segment of autonomous agricultural producers, (mainly peasants,) and a number of corporate units, (agro-businesses,) I have employed the method of case-study. Provided that each case-study is a nearly self-sufficient organic whole, so that a segment of rural society is studied almost in its totality, the method appears to be appropriate for the purpose of this research, which is not only to find technical input-output relations between a sample of variables, but also to observe the relations between economic

and non-economic variables.

For the purpose of studying the production behaviour of the peasant, and to a marginal extent of capitalist producers, I argue that the 'village' should be selected as the unit of case study. The ultimate aim is to observe and evaluate the economic activities of the individual farmers. Nonetheless, it will not be possible to reach meaningful conclusions without trying to observe and evaluate these activities in their total social setting. Many writers have demonstrated that peasant farming and its system of production is functionally related to its local community: 'the village'. Galeski has stated that the elements of rural life constitute a coherent whole. *"None of the elements of this system - the farm, the family or the village - exists in isolation"*. Lipton points out that in a village the majority of economic and political activities are integrated.(2) Shanin states that *"In the setting of the village community, the peasant reaches a level of nearly total social self-sufficiency"*.(3)

An Iranian village community is no exception to this rule. It is an organic whole in which individual holders of land participate in production activities.

"The village in Persia has thus been from early times the unit which formed the basis of social life and the group into which the population organized themselves for economic and political cooperation. This importance of the village as the unit in rural life has persisted through medieval times down to the present day. The isolated settlement is still the exception and not the rule. Where small farms or hamlets (known as mazra'eh) are found, they are in almost all cases attached to a parent village.

The basis of the village is the peasant holding. This is reckoned in two main ways, by ploughland or by a share of water. It is a noteworthy

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(1) Galeski (1972), p.6.

(2) Lipton, Connel (1973).

(3) Shanin (1972), p. 207.

fact that this division of the village land into ploughlands is widely found in villages both in the landlord areas and the peasant proprietors..."(1)

The structure of the post Land-Reform villages in Iran may be somewhat different from the above description, particularly in relation to the possible existence of capitalist farms in a village (Chapter One, Section One pp. 17-19). But it still appears to be valid to state that due to the social, economic and historic role of the village communities in Iran, a study of farm economic activities may be unsatisfactory if it does not look at these farms in their village ensemble. It can also be argued that where capitalist farms exist within a village community, though they may create distortions in the conventional set-up of a village community, since there is likely to be interaction between the capitalist and the peasant holdings in a village, the selection of the village as a case for study is justified.

Sometimes around the village boundaries there are a number of so-called 'mechanized farms'. Mechanized farms are those capitalist production units which have been exempted from the Land Reform Law and have remained in the hands of their original holders. (Chapter One, Section One, pp 114-116). These units may be found next to the village ploughlands, but they are administratively independent of the village. For the following reasons, where these units were found around a village case-study, they were also included in the survey.

1) Although the emphasis in the field survey has been given to peasant and corporate systems, inclusion of the capitalist farms gives the study another interesting dimension.

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(1) Lambton (1969), p. 4.

2) Comparison of the activities of these farms with the nearby village holdings may be simpler than trying to select a sample of capitalist farms in the country as a whole and then making an attempt to compare it with village holdings in general. Where these farms are included in the case studies we can rely to some extent on the area homogeneity to make the comparisons simpler.

3) In some instances these farms have historically been parts of the parent village; though administratively independent from the village, in fact they may still be geographically part of the village.

4) By including these farms in the case studies it may be possible to observe the interaction, if any, between these farms and the village holdings.

In order to study agro-business farms, each corporation has been selected as a case-study, since each unit is independent of others and has its own social organization of production.

Representativeness of the Data

As stated earlier, in my attempt to collect detailed micro information that embodies not only input-output data, but also the social and institutional conditions of production, sampling precision has been traded off for the reduction of observation errors and inclusion of detailed variables. But insofar as the purpose of the study is to reach some generalizations, it seems hardly worth to have selected untypical case-studies, where the results could only be applicable to the specific villages under study. Therefore, I have tried to select case-studies that appear to be typical of a larger segment of the rural population in the country. But as a result of the inadequacy of the knowledge about the population from which the cases have been selected, and as the approach adopted in this research has been case-study, rather than random sampling, it is not possible to demonstrate the

percentage of the rural population which is represented in these case-studies.

The relative shares of the regions from which the cases have been selected, in both the total rural population and the total area under cultivation in the country, are presented in Table 1. However, in each of the regions there may exist a number of types of villages. Therefore, it can only be concluded here that, through application of the following procedure, the case-studies may represent a significant proportion of the population of these regions.

In order to select village case-studies that appear to represent a significant proportion of the above-mentioned rural areas, I have tried to choose villages that fulfill the following criteria:[1]

a) Each village case study is mainly producing the major agricultural products of its region.

b) Yields of the major crops in the village case-studies are about the median yields of the similar crops in the area.

c) The existing systems of land tenure and other social organizations of production are prevalent for the region.

In order to fulfill the above-mentioned criteria, as a first step, I have tried to use the macro national [2] data, specially in relation to conditions (a) and (b). Also, a number of other sources have been consulted.[3] In addition, I relied on a number of earlier personal field observations.[4] However, the selection criteria depended mainly on

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(1) Note that climatical conditions have been allowed for, as each village is selected from a region with fairly homogeneous climatical conditions.

(2) Markaze Āmāre Iran (1972) and (1973).

(3) Gorgāni (1971), Safi-Nejād (1966), Markaze Āmāre Iran (1976).

(4) For Tehran, Gorgan, Gilan and Yazd I relied on a previous field survey which was carried out in 1973 (results have not been published). For Khuzistan I have relied on personal field observations in 1974 during an agricultural seminar in the area.

Table 1 : Shares of Ostāns in which the Case-studies are Located in Total Rural Population and Total Area Under Cultivation of the Country.

Ostans Surveyed	Rural Population (1000 persons)	Share of Ostān in Country's Total Rural Population. %	Area Under Cultivation (1000 hectares)	Share of Ostān in Country's Total Area Under Cultivation %
(1) Tehran	1,408	7	1,460	7.8
(2) Gilān	1,119	6	286	1.6
(3) Māzandarān & Gorgan	1,607	9	834	4.8
(4) Khuzestān	911	5	1168	6.7
(5) Yazd	138	0.8	40	0.2
TOTAL	5,179	27.8	3788	21.1

Source: Markaze Amāre Iran (1977) pp. 31-32 and (1975) p. 53.

a preliminary field survey carried out in the area. This procedure is explained in (pp .127 - 128). The combination of the two sources of information i.e., documented material, and field observations, provided a fairly reliable guide for selecting the apparently typical cases.

The four agro-business farms surveyed in this study are the oldest units of this type in Iran. Therefore, it may be expected that their operations are more developed than those of the relatively newer units. Also, the area of holdings allocated to these four units is about 50% of the total land area held by agro-business farms in Iran.[1] But, as a

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(1) Total area of holdings allocated to agro-businesses is 148000 hectares (Chapter One, Section Two, pp. 40-42). The total area of holdings for the four case-studies is 6800 hectares, (pp 117-119).

number of the more recent units have not started operations yet, the four agro-businesses under study effectively represent more than 50% of the holding areas.

The Statistical Unit

As stated earlier, two types of case-studies have been selected: a) villages and b) agro-businesses. Due to the structural differences between the two types, the basis of selecting statistical units will be different for each. In the following paragraphs it will be demonstrated that, due to the complex structure of production in a village the statistical unit may be the village, the production unit or the household, according to the type of information required. But for agro-businesses, the statistical unit will be the case-study itself, which is a single agro-business farm.

As stated earlier (Chapter One, Section One, pp. 10 - 14), in the majority of Iranian villages a number of production activities are carried out at the village level. The extent of the dependency of production upon the village may vary between minimal dependency for the division of water to collective village activities i.e., various types of boneh. For the collective village production activities, in the selected villages, the statistical unit has been the village itself. As the extent of the activities varies among the different villages, it is not possible to make generalizations about the type and the number of variables which can be studied collectively. This criterion has been decided for each case-study according to its special characteristics.

The basic statistical unit for the village case-studies is the agricultural production unit bahre-bardāye keshāvarzi, in and around the villages under study. It is defined as an agricultural production entity being directed under a single management. The terminology is inclusive of

peasant holdings, as well as other types of farms included in the case-studies. The management may be composed of one or more managers who undertake production activities. The boundaries of a production unit include land owned or rented, but not leased out.(1)

In certain marginal instances, it was difficult to distinguish between land rental systems and what may be broadly defined as a modified version of share-cropping.(2) Two examples of this type were observed in the case-studies. First, in some instances, where in fact a rental system was being observed, the rent was paid as a percentage of the crop production.(3) Second, in one instance the owner gave a piece of land for cultivation to workers in exchange for the services provided elsewhere.(4) Insofar as a producer did not receive any means of production other than land and water, and was not responsible for returning to the owner anything other than cash or a portion of the produce, I decided to classify him as an independent producer. Otherwise, the producer was considered to be a part of a larger production unit. Another problem arose in regard to the definition of a production unit as one having a single manager or partnership, This situation happened in cases where an individual had, at one and the same time, a production unit managed by himself alone, and was a partner in another production unit. In these cases I decided to weigh

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(1) Markaze Āmāre Iran (1972) p.8.

(2) As nasaq right is an important element in the traditional share-cropping in Iran, and since after the Land Reform the labourers working on land do not have this right, the term share-cropping is loosely applied here.

(3) In villages Booraki (Khuzestān) and Ahmad-Ābād (Yazd) this phenomenon was observed.

(4) In village Chahār-Dāngeh (Tehran) the large capitalist producer extended land allotments for wheat cultivation to workers of his orchard as a portion of their wages.

the importance of each activity and call the person involved a single producer or a partner accordingly.

Prior to the selection of production units, an overall survey of the village population was carried out in which the statistical unit was a household. The purpose of this survey was to set up a frame for farm selection and to count the village population. As in this study the prime concern is agricultural production unit, and not the rural households, the latter, as a statistical unit, has not been used in the analysis.

SECTION III : CHARACTERISTICS OF THE CASE-STUDIES

a: The Villages.

The villages under study have been selected from distinctly heterogeneous agricultural producing areas. As (Table 2 and the map p. 92) show they are scattered in various parts of the country. The crop pattern and climatic differences together with the cultural heritage make each of these villages a member of a distinct category of village types. In addition, their pre-Land Reform systems of tenure have been non-uniform. Furthermore, in two cases the geographical location of the villages vis-a-vis Teheran and the agro-businesses appears to have played a major role in determining their production conditions.

Four out of the five villages under study have been selected from the more advanced agricultural producing areas of Iran. Thus while the production behaviour of each village is fairly representative for its area, the areas are above the average for the country. Thus all these four villages have the following characteristics:

(a) availability of surplus production for sales;

(b) some access to modern technology (the villages are, by Iranian standards, mechanized);

(c) access to roads and markets.

The rationale for this criterion of selection goes back to the basic

theme of the dissertation. I intend to compare these case studies with the agro-business farms. Therefore I have tried to select areas whose resource endowments are not dramatically different from these corporations. The majority of the newly established large-scale corporate farms are located in areas that are richly endowed with natural resources.(1) This is particularly true for the Dez Dam area from which I have selected the agro-business case-studies. All these farms have access to good roads; they all make use of modern technology, which, in the majority of cases, is far more capital intensive than those used by autonomous farms.(2)

The fifth village is situated in Khuzistan near the Dez Dam area, where the four agro-businesses are also located. In addition, the village is situated in the area under the watershed of the Gatvand Dam, so that the law concerning agricultural land under the watershed of dams is applicable to this village. This law states that all owners may be forced to sell their lands to the Government who will then rent them to large-scale producers.(3)

Unlike the other four villages this one is selected from a backward area. However, it can provide a different type of comparison. First the village is very similar to those that were removed as a result of the polarization policy. Therefore it can present a picture of what the production conditions in the area were like previously. Second, two external effects of the agro-farms upon their surrounding villages may be studied:

(a) the transfer of technology effect; and

(b) the effect of uncertainty of land tenure that such units create in the areas surrounding them.

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(1) See Vezārate Keshāvarzi (1970). Exceptions to this rule are in some farm corporations that have been established in poorer areas such as Sistan or parts of Kerman. See Vezārate Ta^{e}āvon va Omoore . Roostāha (1974).

(2) The only exception in our case-studies is the landlord unit in Chahar-Dangeh. See pp. 114-117.

(3) Shaybani (1976), Appendix, pp. 1-2.

Table 2 : Description of Villages

Names of Villages	Shahrestan	Ostān	No. of Households	Population	No. of Production Units	No. of Observations	Type of Agricultural Production	Type of Machinery Used
Ahmad-Ābād	Yazd	Yazd	162	817	109	72	Grains, Summer-Crops, Cereals	Tractor
Tālesh-Mahalleh	Langerud	Gilan	150	852	140	72	Tea, Rice, Silk. Summer-Crops	Tiller Rice-Grinder
Turāne-Turk	Gonbad Kavus	Gorgan	97	589	54	45	Cotton, Grains, Summer-Crops	Tractor Combine
Chahār-Dangeh	Karaj	Central	*P / T: 146 / 22	P / T: 766 / 111	P / T: 53 / 20	P / T: 47 / 20	Cereals, Summer-Crops, Fruit, Flower, Sugar Beet.	Tractor
Booraki	Shushtar	Khuzestan	112	582	57	37	Grains, Summer-Crops, Cotton, Sugar Beet, Cereals	Tractor

* P = Permanent T = Temporary: Ejare – Kars

Two villages, in Yazd and in Gilan, present conventional peasant and village production systems. They are composed of peasant producers only, and the village organization plays a direct role in production activities. In the case of the Gilan village climatic conditions make this dependency on village organization minimal; it applies only in respect of the division of water for irrigated land. The Yazd village is a case of modified collective farming. The village in Gorgan, on the other hand, is a case of the development of capitalist farming and of the disintegration and disappearance of peasant production; whilst the village in Teheran shows the effects of a large city upon its surrounding villages. Furthermore, due to the special conditions of the existence of a large capitalist unit within the village, and because this unit belongs to the old landlord, there is a special kind of social and economic interaction between the peasant holdings and the capitalist unit. Finally, the village in Khuzestan presents a backward village in a fertile land. The existence of the large agro-business units in the area, and the potential threat to the villagers of these types of units taking over the village lands, have created special economic and social conditions which are distinctly different from those in the other four villages.

In all cases villages with a number of households ranging between 100-200 have been selected. A highly significant percentage of the Iranian villages falls into this population category about 24% of the total rural population.[1] As a sample of about 60-90% of production units has been selected in each village, this has afforded a sufficient number of various categories of farming units for statistical tests, where other social and production conditions have been almost homogeneous within the village. As a result, a range of 45 to 72 production units has been included in the

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(1) Markaze Āmāre Iran (1972), p.4.

sample in each village (Table 2). These 45 to 72 farms (or agricultural production units) in the typical villages will then provide the basic units for statistical analysis.

In order to clarify the specific characteristics of the case studies a summary introduction to each village is presented in the following paragraphs:

(1) Ahmad-Ābād Moshir (Yazd):

As stated earlier, rural areas in the central parts of Iran suffer from the shortage of water. As a a result in these areas the source of irrigation has historically been the qanāt. Furthermore, various collective production activities have developed in order to make the best use of the most scarce resource: water.

Ahmad-Ābād presents a village of this type. Here fairly sophisticated collective activities, locally referred to as sahrā, have developed. These activities have not been distorted in the period after the Land Reform. It should be noted that even before the Land Reform each farmer's nasaq was mafrūz. The villagers stated that the mafrūz right on the land provides more incentive for farmers to improve the soil quality of their holdings. Thus the Land Reform has only transferred the right of ownership of the lands that the farmers were already holding. Due to the fact that the shares of the joint holders on each sahrā are delimited, and since collective activities are limited to investments in and division of water plus land rotation and ploughing, I will call the system semi-collective.

The main ploughlands in the village are divided into fifteen parts.(1) Each part is called a Sahrā. The ratio of water to land is fixed nearly the same for all farmers. Every owner of the land, in proportion to his share of water, owns a piece of land on every sahrā. Each year, depending

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(1) In addition to these there are also another four sahrās that use a different source of irrigation. The operational systems of these four are similar to the main ones, but less sophisticated. Also, the system of tenure is rental and not based on ownership as in the main ones.

on the amount of the annual water, a number of sahrās are cultivated. Since the water is limited, a number of sahrās are left fallow. On each sahrā similar crops are sown by all farmers. The crop rotation pattern on each sahrā is summer-crops, wheat and then fallow (for one year or more). Ploughing is done by tractor on each sahrā. Payments for use of tractor are made according to the share of ploughlands.

Historically the main source of water in the village has been a qanat. Water of the qanat is owned collectively by all farmers in unequal shares, in proportion to the size of the farms. The water then rotates regularly among the cultivated sahrās, where it is further divided into the different allotments. In 1963 the farmers dug a deep well to increase their water supply. The shares of the investment paid by each farmer followed the old pattern, that is they were proportionate to the farm size. Also their shares in the new source of irrigation were proportionate to the size of their lands. In addition, there may be a seasonal flow of water from the mountains. The farmers have built qanat-like tunnels to direct this water to the village ploughlands.

Although on each sahrā similar crops are sown e.g.,wheat or summer-crops, each individual farmer decides independently on the selection and the application of types as well as the amount of seeds or other inputs. Marketing is carried out on an individual basis. Farm sizes[1] do not vary dramatically (Table 3). They are nearly all small, that is, less than 13 hectares. In addition to the crop cultivation all farmers are engaged in small scale animal husbandry and fruit production. In the majority of cases a significant amount of the food of a farming households is produced within its own farm.

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(1) Note that due to data limitations the concept of farm size as defined in Chapter One, Section Two, p. 27. is not applied here. In the course of the study the concept of size has been applied approximately, often meaning hectarage.

Table 3 : Maximum and Minimum Size Farms in Five Villages

(hectares)

Village	Maximum	Minimum	Mean	Variance
Ahmad-Ābād	13	0.3	3.72	9.55
Tālesh-Mahalleh	6.3	0.1	1.03	1.06
Turāne-Turk	195	1	21	1276.2
Chahār-Dangeh	330	0.4	7.47	1557.3
Booraki	80	2	14.71	245.31

(2) Talesh-Mahalleh (Gilan)

Climatic conditions in the area around the Caspian Sea are distinctly different from those of the rest of the country. Unlike most other parts, this area does not suffer from a shortage of water, and rain plays an important role in feeding agriculture. Thus the social conditions of production are different from those in the more arid parts. In these parts collective production activities become minimal, and just concern the division of water for the irrigated land. Historically, in Gilan the settled rural population has lived in conventional villages and has been engaged in the farming activities. Rice is the major crop in Gilan, but in Lāhyjān, where the case-study was made, tea is also a major historic output.

Being typical of the villages in the area, Tālesh-Mahalleh produces rice and tea. The village is endowed with good soil and abundant water. Tea is completely rain fed, whereas rice is only partially irrigated. There are water reservoirs (pools) which are used collectively for the irrigation of the rice. Except for the division of this water, there is no other collective village activity. The village is composed of small holdings (Table 3), and there are no large-scale farms around it. Thus Tālesh-Mahalleh, like Ahmad-Ābād, represents a conventional village where small-

holders of land operate on their farms. Except for the use of mechanical tillers for ploughing, all methods of production are traditional.

(3) Turāne-Turk (Gorgan)

The Gorgan area has had the longest history of agricultural mechanization in Iran.(1) In the distant past agricultural production was dominated by the tribal systems, and the main output was animal products. After the second world war there came a drastic change from this system to rapid mechanization and the development of large-scale mechanized farms producing cotton and wheat. This process was accompanied by the immigration of people from outside Gorgan to the area. Many agricultural labourers came from the South East of the country. At the same time purchase of the land by residents and non-residents was taking place. The so-called "land fever", as the rush of people to obtain agricultural land was described, continued till 1960. Also a number of large farms were given by the Shah to the military. Thus farms of various scales came into existence. The redistribution of the Crown Lands began in 1950(2) and this created a number of small-scale farms. Later on the Land Reform added to this category.

The present picture of agricultural exploitation in Gorgan is dominated by capitalist farming. Along with it, there are the remainders of the historically tribal systems. These have been mixed and influenced by the new systems.(3) Most villages are newly established.(4) Since the dominant system of production is capitalistic, the producers in each village have many characteristics similar to those of the capitalist producers. Individual farms operate independently of each other: for

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(1) Okazaki (1968), p.1.

(2) Gorgani (1971), pp. 152-157.

(3) As explained in the general methodology I did not intend to study the tribal systems. Therefore Turāne-Turk is not a Turkaman village.

(4) Turkaman (tribal) villages came into existence in 1930's, when there was a country-wide attempt to settle the tribes. Most of the non-tribal villages are also new. They came to existence either during the agricultural expansion period or were greatly expanded during this period (Gorgani, Ibid, p.153).

example, conventional village organizations for the division of water or other types of collective sharings in the use of inputs are non-existent. Each single farm (or at most two or three farms) has its own deep or semi-deep wells. Again, in cases where river water is used, each farm uses its own water pump. In short the role of the village is reduced to that of residential community only. Furthermore there seems to be a tendency for some peasant holdings to join together and become capitalist producers, while many other small-holdings are disappearing. This point will be illustrated for Turāne-Turk. In addition, the bulk of output comprises cotton for sale.

In addition to the villages and the tribal producers, there are also many large-scale cotton and wheat producing farms outside the village boundaries. They vary in size from some thousand hectares to about fifty, sometimes less. These are locally referred to as sāzemān. On these farms labour-intensive techniques are used to produce cotton. The labourers operate on a kind of crop-sharing agreement.(1) These units have, according to the Land Reform Law, been declared mechanized and thus exempted from the Law.

The village of Turāne-Turk had its major expansion during the period after the Second World War; prior to this date it contained ten households only. Major outputs of the village are cotton and wheat, and to a lesser extent watermelons. With the exception of the use of a portion of wheat output for self-consumption, all output is produced for sale. Individual farms in the village operate independently and provide their own water for irrigation. It is typical of the area, that here farms vary substantially in size (Table 3), unlike the conventional villages. A comparison of the variations in the total number of land holding households just after the implementation of the Land Reform and in the survey period, indicates that there has been a tendency for a few farms to grow large at the expense

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(1) They receive cash equal to one third of the value of their produce.

of others (Table 4). Furthermore, there is a substantial degree of mechanization in the village. Also, our observations indicate that farms of about four hectares or less were either expanding or going bankrupt and selling out. Thus there is a tendency for the peasant system of production to disappear in the village.

Around the village four cotton plantations exist. These are included in the survey.

Table 4 : Turane-Turk

Comparison of Number of Holdings at Land Reform and Survey Period

	Total Number of Households Receiving Land at the Reform	Total Number of Original Land Owners Becoming Landless
Total	104	72
Percentage	100	72

(4) Chahār-Dangeh (Tehran)

The majority of the villages around Tehran have certain characteristics which make them distinctively different from what is conventionally regarded as an Iranian village. The proximity to the capital appears to have affected the systems of land tenure and production in these villages.[1] Some, but not all, of these special characteristics have been observed in Chahār-Dangeh. They can be summarized as follows:

1) Many villages around Tehran have a relatively long history of mechanization. Thus, during the Land Reform, parts of the village lands were declared mechanized and exempted from the Land Reform Law.

2) Many owners of the land around Tehran were well informed and influential persons in Tehran. Many of them, shortly before the implementation of

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(1) Saedloo (1976), p.69.

the Land Reform Law, made agreements with their share-croppers by which, through the transfer either of money or part of the land, the latter transferred their nasaq-rights to the landlords. This transfer of rights in practice made the Land Reform Law ineffective. In addition to the use of this method, many land owners used their influence in Tehran to secure a substantial part of their land. As a result the farmers in such villages have not become fully independent of the landlords.(1)

3) Land speculation around Tehran appears to have had unfavourable effects upon production. Farm lands have been purchased by non-farmer speculators who have left them idle. In addition many farmers seem to be more involved in speculation than in production.

4) Each summer there is an inflow of seasonal migrants from the central parts of the country to villages around Tehran. These are skilled summer crop producers who seek the opportunities afforded by access to the Teheran market. They usually work on rented land and are thus referred to as ejāre-kars.(2)

In Chahār-Dangeh, prior to 1945, when the present land owner purchased the village, only traditional means of cultivation were being used and there was no sign of mechanization. From this date onwards the owner started bringing in modern tools and machines. At the time when the Land Reform was implemented parts of the production activities in the village were already mechanized. Due to mechanization and the use of personal power and influence, the landlord was able to secure a major part of the village lands. At the time when the village was surveyed, it was composed of the following categories of farms:

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(1) Personal field observation in villages in Shahriyar and Karaj areas 1973. In the case of transfer of nasaq-rights to owners the villagers claimed that in spite of the government propaganda they did not believe that the Land Reform was going to take place and considered it advantageous to sell the rights.

(2) Ashraf (1974), pp. 32-36.

a) The arbābi (landlord) unit: This production unit is composed of the following sections: (1) a highly mechanized apple orchard, including modern cold storage. This orchard has high yields and produces good quality apples (ha. 70). (2) The rest of the cultivated land is used for wheat production. Here only local and traditional methods of cultivation are applied (ha. 50).[1] (3) A segment of the land which is divided into small units and is left fallow for speculation (ha. 60).

b) A number of small owner-operated farms: These belong to the original share-croppers and produce mainly wheat. Yields of agriculture in these units are generally low. It may be hypothesized that a number of factors are responsible for these low yields: low skills, years of struggle with the landlord, and the diversion of time by farmers to various land speculation schemes or to other activities where they acted as middlemen.

c) A number of summer-crop producers from Yazd who rent land from the landlord. They employ a system of semi-collective production. In comparison to Ahmad-Ābād, their system is more collective and more mechanized. Each Spring three or four men come to the area. They rent the land, divide it into sahrās, and prepare the land for cultivation, ploughing and the use of fertilizers.[2] Later on the rest of the the men come; they build temporary homes and warehouses. Then women and children arrive and each household begins to work on its rented allotment. The marketing of the output is done collectively by a member of the group who owns a small truck.[3]

d) In addition to these, there are a number of flower producers, and a number of gardens and idle lands belonging to Tehrani land speculators.

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(1) The owner takes no interest in the production of wheat. Different allotments of land are given to the workers of the orchard as a part of their compensation.

(2) They use tractors for both ploughing and fertilizing.

(3) Due to heavy use of fertilizers the land which the Yazdies leave behind is improved for agriculture. The landlord rotates this land for the production of wheat in the following year and rents out the land that has been weakened by the production of wheat to the summer crop producers.

These units have not been surveyed.

The main sources of irrigation in the village are: (1) the village share of water from Kordān River, (2) three deep wells set up by the landlord that irrigate his farm as well as the ejāre-kari section. In addition to these the small owner operators have set up small wells for themselves, four to five metres deep.

Booraki (Khuzestān): This village is chosen from a backward area. One can observe only two significant changes in centuries-old methods of production: (1) the use of tractors for ploughing, and (2) cultivation of summer crops during Winter seasons. The latter has been introduced by the seasonal migrant labourers from the central parts of the country. However, the resultant output of the local producers is lower both in yield and in quality, partly because of their less-developed skills. The irrigation system in the village is rather haphazard. The pattern of crop rotation does not seem to follow a path that may allow for strengthening of the land.

B. Characteristics of the Agro-Business Farms

The four agro-business units are located in the area under the water-shed of the Dez Dam in Khuzestān. The land is considered to be very fertile and the temperature is suitable for double cropping each year.(1) The total amount of agricultural land is 125,000 hectares, of which 68,000 hectares is allocated to the privately owned agro-farms. This area has the longest history of this type of farm management in Iran and major agro-business farms are located in Khuzestān.(2)

The building of the Dam was completed in 1963. The original intention was to supply water plus technical aid to the farmers who worked on the land before the creation of the new irrigation system.(3) However, this

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(1) Safi-Ābād Research Centre Unpublished Reports on estimation of crop yields.

(2) Sāzemane Barnāmeh va Budjeh (1976), pp. 41-42.

(3) In the area allocated to the agro-farms in 1957 about 52,000 hectares were under cultivation. World Bank Report 1957.

did not materialize and in 1968 the law concerning the creation of the agricultural poles was passed and these four agro-business units came into existence in this area.[1] (Table 5).

Table 5 : Agro-Business Farms

Name of the Company	Date of Establishment	Total Land Allocated Hectares	Percentage of the Original Foreign Share to Total Shares
Iran California Commercial Farming	1970	10,[illegible]6[illegible]	29.2
Iran and America Company	1970	20,263	10
Iran Shell Cotts	1971	15,796	75
International Agro-business Corporation of Iran	1973	16,690	60

Source: Op. cit. p. 15.

Note that the percentage of foreign shares in total has been reduced, as the foreign share-holders have been trying to pull out. Unfortunately, up-dated figures were not available.

The land allocated to these units is rented from the Government on the basis of a thirty years' contract. The Ministry of Water and Power is responsible for building roads for each one thousand square hectares of land. Furthermore the government has assumed responsibility for the building of the main and secondary water and drainage canals for each area of one hundred hectares. The companies can import (tax free) all agricultural machinery and implements.[2] In addition, the government share in the total assets of the companies (combined figures for direct investments and long-term credit) for the agricultural year 1974-75 amounted to more than 61 per cent of the total assets of the companies (Table 6).

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(1) Shaybāni (1967), p.10.

(2) Sazemanee Barname va Budjeh, op. cit. pp. 30-39.

Table 6 : **Capital Investment by Iranian Government in the Four Agro-Business Companies 1974.**

Rls.1000

Total Capital of Companies*		1,700,000
The Iranian Governments Capital	Total investment of the Iranian Government in the Companies (including Credit and Direct Investment)	1,042,965.5
	Percentage on total Companies' Capital	61.35%
	Capital Investment of the Iranian Government per Hectare of Land Under Cultivation	58.334**

* **The Companies** are: 1. Iran and California, 2. Iran and America. 3. International. 4. Shell Cotts.

** **Capital** investments in Dams are not used in the calculations.

Source: Taken from files of the Companies' reports to the Agricultural Development Bank, 1974.

The agro-corporations in return are responsible for establishing **farms that make** optimal use of the land and water. They are expected to **bring new technologies** to the area. Furthermore, all stages of production, **including processing** of the output, were originally expected to be carried out on these farms.[1]

SECTION IV THE FIELD SURVEY

As stated earlier, the five villages included in the survey were **studied through intensive** field survey methods. The villages were surveyed **with the help of three** research assistants. We spent between eight to te

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(1) **Sāzemane Barname va Budjeh,** Ibid. p. 40.

weeks in each village. The variables to be measured included all farm input-output data plus a number of questions concerning innovation and adaptation and social and institutional factors. The interview method was used as the main approach in the study. However, direct measurements were also applied. Through a process of reiteration and elimination I have tried to obtain accurate data. But a number of important problems arose. These may be categorized as being of two types: (a) those variables that in spite of our efforts we could not get accurate information for, and (b) problems related to time limitations for the field survey, as a result of which sufficient reiteration process could not be applied for a number of variables.

The Variables

As the purpose of the study is to measure the productive performance of the different types of systems of agricultural production included in the case-studies, the following variables were included in the study:

a) A quantitative measurement of all farm output and factor inputs used in the process of production for one agricultural year.

b) A qualitative study of other social conditions of the village which appeared to have possible effects upon production.

d) A study of the farmers' response to adaptation of new technology.

Of these, the quantitative variables, due to their importance in the analysis, constitute the bulk of the variables to be collected from the field. The qualitative information has also been carefully studied. However, due to time limitations, questions concerning innovation and adaptation have been only marginally studied.

The measured input-output variables for each production unit are the

following:[1]

1) Farm output: Defined as all agricultural output produced during one agricultural year within the boundaries of a production unit. This includes (a) field crops (b) fruits (c) livestock (d) any products or processing of (a), (b) and (c). Both quantities and prices of each item have been inquired into.

2) Land: (a) Size of holding, (b) area under cultivation, (c) share of irrigated land in total area under cultivation, (d) type of tenure, (e) rents paid for land use, (f) amount of land purchased or sold, (g) payments made for purchase of land.

3) Water: (a) Source: river, qanats, deep or semi-deep wells, springs, etc. (b) total quantity of water used for one agricultural year, (c) payments made for purchase of water, (d) expenditures for upkeep of water sources (e) investments made for water, date and amount, (f) source of funds for investments. Private, Bank, Government.

4) Modern machinery: (a) types of machines, (b) types of activities for which the machines have been used, (c) type of ownership: self-owned or rented, (d) investments in machinery, amount, date, source of funds, rate of interest, (e) rental payments for use of machinery, (f) life expectancy of the machines.

5) Labour time: defined as the duration of all agricultural activities such as ploughing, sowing and weeding, pruning and irrigating, etc. in

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(1) Note that the following criteria was adopted in relation to items that were produced on the farm and were either consumed by the members of the producing household or were used in the process of production.
a) If a part of output was consumed by the producing household, it was measured and included in the total farm output.
b) If a part of farm's previous year's output was used in the production process the item was treated as a cost and local prices were imputed for it. If the item was produced and used within the same year, provided that both in quantity and value it was insignificant, no measurement of the item was made. However, where the inputs produced and used within the same year appeared significant in total, they were included in both output and inputs of the farm.

one year. It also includes the time spent travelling between fields or to markets, etc. for agricultural purposes. It excludes non-agricultural labour time and leisure time. Labour time has been differentiated according to whether it is family or non-family, and in each category according to whether it is male, female or child. All wages are recorded.

6) Current inputs: (a) seeds, (b) fertilizers, (c) pesticides, (d) all current inputs used for livestock, e.g. feedstock, vaccination etc. The quantity (where possible) and price of each item has been inquired for one agricultural year.

7) Storages and warehouses:(1) (a) type of warehouse and storage (b) ownership: owned or rented, (c) investments: date, amount, source of funds, rate of interest, (d) estimates of annual depreciation, (e) rents paid, or received, (f) annual cost of upkeep.

8) The number of type of work animals, as well as, expenditures involved for their upkeep.(2)

The following questions were asked concerning the village's organizational role:

1) Land: (a) existence of systematic division of land into boneh,

(b) land rotation between different crops.

2) Water: (a) existence of collective water supply and division,

(b) organization for division of water, (c) collective investments in water: source of funds, method of collective investments, (d) expenditure for upkeep of village collective water sources.

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(1) Where farmers have used part of their residential building space for such a purpose, the cost has been treated as psychic and no rental value is attached to it.

(2) Since four villages were selected from the more advanced area, the role of farm animals in production became minimal. Even for Boorak, farm animals did not play an important role in production. Thus, these sets of variables are unimportant in the analysis.

3) Machinery: (a) collective investments in machinery, (b) collective use of machines, i.e., ploughing a single boneh etc. (c) types of payments for use of machinery, (d) types of activities where machine is collectively used.

4) Any other type of social or organizational peculiarity of a single village under study which may have possible effects on output.

The questions concerning innovation and adaptation included the following items:

1) Machinery and implements: (a) date of commencement of use of all of the machinery and implements in the village, (b) who first brought the machine to the area e.g., government, large farms outside the village, large farms inside the village, peasant holders, (c) whether the production unit being interviewed used the machine immediately after it was brought to the area, (d) whether the production unit being interviewed uses the machines at all. (Other questions related to investment ownership etc. have already been stated above).

2) Biological inputs: (a) seeds: types of new seeds, (b) date of commencemen to use, (c) effect on output, (d) who first brought the new seeds, i.e. government, large farms outside the village, large farms inside the village. peasant holders, (e) if the production unit being interviewed was among the first users of the new seeds, (f) if the production unit being interviewed used these seeds at all. Similar questions were asked for fertilizers and pesticides.

Methods of Field Inquiry

A combination of interview method and direct measurements have been used in this study. As much as possible, I have tried to use the interview method. But in certain instances the method could not work and direct measurements were used. For the most part heads of production units have been interviewed. However, key informants, labourers and other members

of households residing in the village case-studies have also been interviewed.

As a first step, key informants were used for general questions concerning the village. These usually included the village headmen and elders, heads if the village cooperative societies, local shopkeepers, government agents such as local representatives of the Iran Statistical Centre, the Ministry of Rural Cooperatives etc. As a means of obtaining this general information, the village questionnaire was used (Appendix A) The information obtained from these sources usually had two purposes: a) to provide a guide for further study in the village e.g., types of crops, yields, use of machinery etc. and (b) to answer general questions concerning organization and other social aspects of production in the village. The first category of questions was at a later stage asked again of the individual producers, and the second category was informally checked from other sources in the village.

Most of the questions were put to heads of production units. The members of the families of producers were also interviewed randomly. Also, where hired wage labourers were employed, a random sample of these workers were interviewed. For the larger farms, owners, managers and a random sample of workers were interviewed. The questions were also informally checked in the village. For these questions the production unit questionnaire was used (Appendix C).

In the process of interviewing, guide tables (Appendix D) were used in order to help the interviewers to obtain accurate information. These tables included a complete listing of all the possible agricultural output produced within the boundaries of each farm, and of yields, prices, local measurement units, and estimates of the average labour time per hectare and per person in the village. These tables proved to be useful in the

process of interviewing the farmers. For example, a complete listing of all the agricultural output produced in the village could help the interviewers to remind the farmers in case the latter forgot to mention some products. The estimates of labour time in the village and the work calendar helped to give interviewers an idea of the approximate labour time used for various activities in the village in order to prevent their being misled by gross exaggerations of the labour input by farmers.(1) The other guide tables also played a role in helping to give the interviewers an idea of the village production variables.

Of course, in the course of the study we tried not to be biased in our recordings by these guide tables. Where the information provided by the farmers differed substantially from the guide tables, we tried to make further inquiries: somtimes the farmers were able to convince us that their answers were more accurate. Furthermore, guide tables themselves were subject to revisions and improvements as we got to know more about the variables.

Basic items of a questionnaire were entered into control tables after each interview was completed (Appendix E). In these tables major outputs and inputs were normalized according to hecterage and we were able to identify production units that appeared to show logically inconsistent

(1) These tables were constructed in the following way: (a) Saedloo (1975) has constructed tables for the required labour time per task and per month for the major agricultural crops for the different provinces according to whether or not the activities are, by Iranian standards, mechanized. As a first step for estimation I used these tables. But a number of problems exist in relation to these tables: Firstly, they are designed for each single crop only, while in the case of the present survey the producers were mostly multi-croppers and identification of their activities for each crop was difficult. Secondly, the tables include the required labour time for each crop. In practice, due to various inefficiencies in labour allocation, the farmers often put more time into the different tasks. Thirdly, the tables are designed to present the average labour time required for each province and do not give an account of the specific conditions of each single village.
(b) Having made a rough approximate estimate of the labour time required for each crop and for the various tasks in each season involved in the production, as suggested above, we tried to construct labour time calendars for each village with the help of the farmers.
The table thus constructed was used as a guide for further inquiries for each production unit.

input-output relations, e.g., with apparently appropriate quality and quantity of factor inputs resulting in low yields. In these cases we made a second inquiry. The repetition of the inquiries either produced different results or confirmed the first set of answers, e.g., the farmer produced other evidence of factual accuracy such as damage by pests, etc. There was still a third case, where the accuracy of the answers seemed very doubtful and the questionnaire was deleted.

During the length of the stay in each village, we tried to obtain information through informal sources. While to begin with the farmers were usually apprehensive about revealing information, the situation usually improved after we stayed for a period of time in the village. Thus we were able to obtain a good deal of information that was either not given to us at first or was considerably distorted.(1)

Direct measurements were employed where the questionnaire method failed to provide an answer. For example, in all cases a combination of interview and direct measurements was applied for the measurement of the quantity of water used in each production unit every year.(2) In a number of cases output was directly measured.(3) Also, a number of other inputs, e.g., seeds produced

(1) In the case of one village, Booraki, this approach did not work. As the village was under the potential threat of becoming a part of an agro-business concern, the farmers were extremely suspicious of outsiders and much as we tried there was no way of developing a feeling of trust.

(2) The farmers can reveal the relative shares of water in each village. They are also able to provide an approximate estimation of the seasonal variations in the water supply each year. However, local units of measurements for water are based either on the time in which it circulates or on the amount of land it irrigates. Neither method can be translated into the metric system. Therefore, we directly measured the amount of water available at the time we were in the village. Then according to the seasonal variations as stated by the farmers and the relative shares of each production unit in the total water supply, the quantity of water used in each unit was estimated.

(3) In Gilan we found that the villagers in general underestimated their rice production by about 25 per cent. It seems that the rational for this systematic proportional underestimation of the rice output was based on a traditional agreement among the farmers to underestimate their outputs in order to give a smaller share to their previous landlords. In spite of the fact that at the present they are owner-cultivators, the tradition of crop underestimation seems to persist. We discovered this systematic underestimation after having made direct measurements of a sample of about ten farmers. Once we told the farmers about the results of our direct measurements, they admitted having made systematic underestimations. Also, in a number of cases wheat output was double-checked through the direct measurement of bread consumption in number of households.

and used by the production unit, natural fertilizers, etc. were directly measured.

Certain types of information about farmers are usually documented. These include cooperative loans and the amount of land owned by farmers.(1) This information can be obtained from the local representatives of the Ministry of the Rural Development and Cooperatives or the local notary public. Depending on the farming conditions in a village, some items of information may become insignificant. In order to save time we used methods of estimation or made use of the local interviewers.(2)

Stages of Each Village Survey

Upon arrival in a locality nearly one week was spent for the selection of an apparently typical village. In this period, different local key informants were consulted. Also, we visited many villages that according either to the documented material or to the information obtained from the key informants were expected to fit the required conditions of the survey. In each village a group of elders and other farmers was interviewed on questions such as types of crops, yields, use of machinery, village organization of production etc. Having seen a significant proportion of the villages in the area, we selected the village case-study. The reason for not carrying out a more systematic preliminary survey was time limitations, as recording the preliminary survey and calculating the statistical parameters would have been time consuming.

The village having been selected, usually two or three days were spent settling down in the village, getting acquainted with the farmers and making a preliminary attempt to collect the general village information and set up the guide tables. At this stage an attempt was made to hold preliminary interviews with some heads of production units. All the information collected

(1) This latter item is unfortunately often out of date.

(2) For example in Gorgan native and poor quality fruit trees were grown in household gardens. Local assistants were asked to go around houses to count trees and report. We then made an estimate of total fruit per tree. In a few cases a similar procedure was adopted for households with two or three milking animals.

at this stage was considered preliminary and subject to further investigation.

A complete survey of all village households was then carried out. The objective of this inquiry was (a) to provide information about the village population and (b) to set up a complete listing of all farming units and the distribution of land in the village. The latter was used as a frame for the selection of production units to be included in the sample.

From the listing of all production units in a village, a sample of farms was selected to be interviewed. In this sample I tried to make a 100% inclusion of the farm sizes that were less frequent in the village. In the case of the less frequent farm sizes I also tried to avoid the elimination of their questionnaire through spending more time on rechecking the information obtained. For the farm sizes that were most frequent, a sample of at least 50% was included in the survey. For the following reasons, stratified sampling techniques as suggested in statistical books[1] were not applied.

1) In order to make stratified sampling selection, information must be available for classifying the sample elements into the same strata. But in this survey my purpose was to find the above classification. Therefore, to start with, the required information was not available.

2) It was possible to classify the statistical parameters for each strata after a sufficient number of observations was made. I could then calculate the variance among the elements of each strata and increase the number of observations in the strata in which the variance was large, in order to make an approximately optimal stratified sampling selection. However, if the purpose of optimal sampling selection is reduction of cost, it must be noted that calculation of aggregate farm production for the multi-cropping Iranian farmers in the field is very time consuming and therefore expensive. I therefore decided that it was less time consuming to increase the

(1) See for example Lesli Kish (1967).

number of observations to more than the minimum required and avoid having to make calculations of means and variances of strata in the field.

Usually each head of a production unit was interviewed on two occasions. During the first interview questions concerning all farm output, except for animal husbandry, and all farm inputs, except for labour, were posed. In a second interview labour input was inquired about. If a farmer raised animals these were also asked about in the second interview.(1) Furthermore, all the missing points or the seemingly unreliable information obtained during the first interview were checked a second time.

The reasons for dividing interviews into two parts are threefold. First, it is usually very fatiguing for farmers to spend hours of interview trying to use their memory. It was, therefore, more practical to break the time into two periods. Second, labour time is the most difficult item of the questionnaire. Interviewers must be well acquainted with the farm output and its cultivation techniques in order to help remind the interviewees of their different activities. It was therefore practical to start inquiring about labour time after having spent more time in the village. Third, since an interview was divided in two parts, there was time for the team to examine the items obtained in the first interview and to find the missing or inaccurate points for reiteration.

The above-mentioned procedure was usually practicable. However, it was not observed strictly. First, in the case of the large farms, sometimes more than two interviews were required. Second where we were already

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(1) As stated earlier, most of the production units included in the survey concentrate on crop production and animal husbandry is marginal to their operations. Therefore only very short questionnaires concerning animal husbandry were used. However, in a few cases where the farmers were substantively involved in the production of animal husbandry, separate questionnaires and interviews were used for them. In the process of survey I found it more practical to inquire about non-family labour employed for animal husbandry while interviewing the farmers on their animal husbandry. (Appendix C_3 and C_4).

acquainted with the village activities, and since the time required for interviewing small farms was relatively short, it was often practical to complete the information during one interview.

While we were carrying out the survey of the production units in each village, other relevant survey activities were also going on. During the period of stay in the village, information concerning village production organizations and other social conditions of the village was being collected. Also, in between the various activities, the guide tables were revised and the control tables were regularly used. Regular meetings of the research team were held in which we checked the questionnaires and discussed our approaches and advised each other on the relevant survey issues.

An Evaluation of the Data

Through a process of checking the information at the various stages of the field survey, as mentioned earlier, I tried to eliminate the number of questionnaires which appeared to be unreliable. Thus, with the exception of the village Booraki, for the other four villages the number of questionnaires whose reliability was doubtful and had to be eliminated did not exceed 8% of the total number of observations (Table 7). But in the case of the village Booraki about 30% of the questionnaires had to be deleted. Furthermore, the possible margin of error in the observations that have been used in the analysis is probably greater for this village. In some instances averages for yields or labour inputs have been manipulated in the figures. Thus, for the reasons that were stated earlier (footnote (1), p.126,) the data for this village on the whole is not very accurate. But in the case of the other four villages, with the few exceptions that are stated below, it is fair to say that through intensive field survey procedures and a process of reiteration and elimination highly reliable data has been collected from the field whose observation errors are likely to be small.

Table 7 : Elimination of Questionnaires

Name of Village.	Total Number of Production Units in the Village	Total Number of Production Units Interviewed	Number of Observations Included in Analysis	Number of Observations Deleted
Ahmad-Ābād	109	77	72	5
Tālesh-Mahellah	140	78	72	6
Turāne Turk	54	50	45	5
Chahār-Dangeh	73	69	67	2
Booraki	57	50	37	13

For certain items it proved difficult to obtain an accurate response from the farmers. These items are listed below:

1) Information concerning agricultural credit is usually difficult to obtain. The farmers in one agricultural year may obtain various forms of very short term credit. Often they cannot remember the exact duration of the loans. In addition, the interest paid on loans may include cash payments as well as payments in kind or labour services. These proved to be difficult to assess. Where rich farmers used various forms of bank credits, they were often unwilling to reveal these loans. Furthermore, there were interest free loans exchanged between relatives and friends. These were also difficult to assess. Also, it was difficult to distinguish whether the loans were spent on production or consumption. In summary, the part of the questionnaires concerning the volume of loans and the rate of interest remained unanswered.

2) In most cases there was no way of obtaining information concerning the annual depreciation figures of either farm machinery or buildings. The farmers either claimed ignorance about these items or gave figures that

appeared to be grossly unreasonable. As a result this part of the questionnaires remained unanswered.

3) A number of figures given by the farmers for investment either in water or in machinery or other items appeared to be unreliable. Since in many instances the investments were made in previous years and at different time intervals, they seemed to have difficulty remembering them.

4) It was not possible to obtain figures concerning labour time per agricultural task. The Iranian farmers being multicroppers are usually involved in different types of activities at one time. Therefore, they could not give information concerning each specific task. In addition, although the farmers appeared to employ their labour with different intensities, we were unable to evaluate the different intensities of the labour inputs. The only figures on labour that could be obtained were the aggregate labour times per season.

5) As there are certain legal restrictions on land transactions in the village, which are often disregarded by the landowners, the farmers were very reluctant to answer questions concerning land transactions and prices.

6) Certain items such as traditional agricultural tools and implements proved to be very difficult to quantify. As the value of these inputs in total was insignificant, they were omitted from the questionnaires.

7) Finally, since sufficient time was not allocated for reinterviewing, and checking the questions concerning innovation and adaptation the information concerning these items is less reliable than the other parts of the questionnaires.

SECTION V : THE AGRO-BUSINESS DATA

The data concerning the four agro-business companies are considered confidential and are difficult to obtain. Thus, where possible, I have used the actual figures. However, for the most part I had to rely on the projected figures as estimated by the original proposals of these companies.

The actual figures include: (a) farm output, (b) size of farm and area under cultivation and (c) rents, (e) quantity of water used and (f) payments for the purchase of water. For the most other variables I used the projected estimates as presented in the original proposals of these companies. According to the Agricultural Development Bank reports[1] the actual costs in these companies by far exceeded these projected figures. Therefore, the data used in this study under-estimate the costs of the companies.

SUMMARY

1) The existing documented information on rural Iran is insufficient to allow for a macro and analytical study of the farm input-output and the relevant social and organizational factors. To overcome this problem it would ideally have been desirable to carry out a macro sample survey of the whole country. However, practical limitations prevented this approach. As a result, I have tried to supplement the existing information by a survey of five villages and four agro-businesses only.

2) In order to study not only technical input-output relations, but also the social and organizational aspects of production, I have employed the method of case-study. Provided that each case is a nearly self-sufficient whole in which the interaction between the different economic and social factors can be observed, the case method seems to be appropriate for the purpose of this study. Many writers have argued that peasant production activities are closely related to the village community. I have also argued that where capitalist farms exist in or around a village case-study they are likely to interact with the village production activities. Therefore, for the study of the autonomous production systems in Iran, mainly peasant producers, I have selected the 'village' as a case for study and if around a village case-study independent capitalist farms are observed, they too have been included in the case-studies.

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(1) Agricultural Development Bank (1978) and (1975).

Since each agro-business corporation embodies an ensemble of production activities and relations, each agro-business has been treated as a case-study.

3) Obviously with a micro study of five villages and four agro-businesses, it will be unrealistic to expect to make statistical inferences for the country as a whole. Therefore, I have tried to select the case-studies in such a way that each represents a significant proportion of the regions from which it has been selected. In order to achieve this goal, an attempt has been made to choose villages whose types of crops, yields, and social organizations of production were representative of the regions from which they were selected. The selection of the apparently typical cases was carried out through use of the documented information about the relevant regions, as well as by a preliminary field survey of the regions for the selection of a typical case-study. Since for this procedure a systematic random sampling approach was not applied, and as sufficient information about the population from which the sample has been drawn is not available, it is difficult to demonstrate the extent of the representativeness of the village data. But as a result of the specific procedures applied for the selection, it can be said with certainty that the cases are not untypical for the regions from which they come.

The area of holdings allocated to the four agro-business units under study is about 50% of the total area of land allocated to these types of farms in Iran. In addition, these four units are the oldest ventures of this type in Iran. Thus their operations may be expected to be more developed than the more recent units. Therefore, it can be said that the four agro-farms under study may be representative of this type of venture in Iran.

4) The ultimate purpose of this study is to evaluate the economic performance of each agricultural production unit. However, in the process of field

survey, as a result of the complex structure of production in each village and in relation to the type of information required, the statistical unit has been the village, the farm or the farming household. For the types of production activities that are collectively carried out at the village level, the village itself has been used as a statistical unit. For the bulk of information obtained from each village a single production unit has been selected as a statistical unit. Finally for the population census carried out in each village, the household has been used as the survey unit.

For the agro-business farms each agro-business unit has been used as a statistical unit.

5) The villages under study have been selected from distinctively heterogeneous agricultural producing areas and are scattered in the various parts of the country (Map p.92). The crop pattern and climatic differences together with the cultural heritage make each of these villages a distinct category of village types. In addition their pre-Land Reform systems of tenure are non-uniform. Furthermore, in two cases the geographical location of the villages vis-a-vis Tehran and the agro-businesses appear to have played a major role in determining their production conditions.

6) Four out of the five villages under study have been selected from the more advanced agricultural areas of Iran. Thus while the production behaviour of each village is fairly representative for its area, the areas are above the average for the country. The reason for this selection criteria is that I intend to compare these villages with the agro-business farms. Since the four agro-businesses under study are located in fertile land and have access to modern technology, it seemed more appropriate to select villages that come from the more advanced agricultural producing areas.

7) Two out of the four villages, in Yazd (Ahmad-Ābād) and in Gilan (Tālesh-Mahalleh), present undistorted systems of peasant and village

production. They are composed of peasant producers only, and the organization of the villages plays a direct role in productive activities. In the case of the Gilan village (Tālesh-Mahalleh), due to climatical conditions, this dependency is minimal, being confined to the division of water for irrigated land. In the Yazd village (Ahmad-Ābād) we have a case of modified collective farming. The village in Gorgān (Turāne-Turk) on the other hand represents a case of the development of capitalist farming and of the disintegration and disappearance of peasant production; whilst the village in Tehran (Chahār-Dāngeh) shows the effects of a large city upon its surrounding villages. Furthermore, due to the special conditions of the existence of a large capitalist unit within the village, and because this unit belongs to the old landlord, there is a special kind of social and economic interaction between the peasant holdings and the capitalist unit.

8) The fifth village (Booraki) is located in Khuzestān in an area near the four agro-business units under study. Furthermore, the village is located under the water-sheds of a newly built dam, which makes it potentially threatened by becoming a part of an agro-business concern. Unlike the other four villages this one, though located in fertile land, is a backward village as far as production techniques are concerned. However, being close to the agro-business farms, it can provide a different type of comparison and the possible interaction between the agro-businesses and their surrounding villages may be studied through this village.

9) The four agro-business units under study are located in Khuzestān. They are among the oldest units of this type. They have rented land and water under a thirty-one year contract at subsidized rates from the government. In addition the government is responsible for building water canals and roads for these units and has allowed them to import machinery and equipment tax-free. The units are in return responsible for using the land and water

for agricultural production and creating a complete chain of agricultural production and processing in these farms.

10) The five villages included in the survey were studied with the help of three research assistants and we spent a period of eight to ten weeks in each village. Basically the method of interview was used. But in certain instances we used direct measurements. Through a process of reiteration and elimination with the few exceptions, I have tried to obtain reasonably accurate data. The variables included in the survey are all farm output and factor inputs as well as a number of the relevant social and institutional variables. Also, the survey includes a study of the farmers' innovative and adaptive behaviour in relation to changes in farm technology. Due to time limitations, only a limited number of variables have been included in the latter part of the survey.

11) The total number of households in each village varied between 100-200. A preliminary survey of the village households was carried out in order to identify the number of production units in each village and their relevant sizes. An attempt was made to include in the survey all the production units whose sizes were less frequent in the village. For those farms whose sizes were more frequent a sample inclusion of at least 50% was allowed. After having eliminated those questionnaires whose data did not seem reliable, a sample of 37 to 72 production units was used for the analysis in each village.

12) In the case of the four advanced villages, with few exceptions, highly reliable input-output data was collected from the field. But for the backward village Booraki, the reliability and the accuracy of the data appears to be questionable.

In the case of all the five villages accurate information on the following items of information could not be obtained: volume of credit and rate of interest, depreciation, labour time per task, and the intensity of

work, land transaction and prices and a number of investment figures. Also, as a result of time limitations, the information collected on innovation and adaptation was not sufficiently cross-checked in the field.

13) Due to government restrictions, direct field survey of the agro-business companies was not possible. Thus where possible I have tried to use the actual data as reported by the companies, i.e. agricultural output figures, land under cultivation, quantity of water used and payments for land and water rentals. However, for the most part I had to rely on the projected figures of the companies. Since according to the different sources the actual costs by far exceeded the projected figures, the data used in this analysis under-estimates costs.

CHAPTER IV

METHODOLOGY APPLIED FOR ANALYSIS OF DATA

This chapter presents the methodology applied in the dissertation in order to evaluate the relative economic efficiencies of the different farm management systems included in the case studies. On the assumption that output is functionally determined by all its inputs, including institutional factors, an attempt is made to find if systematic variations in output may be observed in relation to measured inputs and systems of farm management.(1)

In order to observe purely technical input-output relations, quantitative measurements of nearly all farm output and farm factor inputs have been used. This makes total productivity analysis possible. Since these variables include mechanical and biological inputs and labour skills, that part of the technological coefficient related to purely physical quantities is also measured. A similar quantitative measurements for the "farm management systems", which have been broadly defined to include various systems and scales of production, was not possible. If it were possible to include a measurement of all the quantitative inputs in the production functions, then it would be reasonable to identify the residual differences to what could be called a "farm management" specific effect. However, it should be noted that this effect can count both for pure organizational differences or pure scale differences or a combination of both; and it should be stressed that there is no way of separating what is due to scale or to separating organization from scale in this analysis.

In addition to measuring the combined effects of all inputs on output, I was also interested in measuring the effects on output of single inputs. This approach allows tests of the following hypotheses:

a) Whether there are specific single inputs causing significant differences in output,

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(1) There exists an extensive literature concerning problems associated with productivity measurement, interpretations and explanations. In the present study no attempt is made to enter into the discussion of these theoretical and practical problems of productivity, except insofar as it aids my own analysis.
See among others Brown, ed., (1967), Arrow (1961), Griliches (1963), Salter (1966) or Bharadwaj (1974).

b) whether certain specific farm management systems are more able to obtain higher marginal returns per specific single inputs, and
c) assuming differences in the original factor endowments in the different farm management systems, whether the decisions are made in relation to obtaining higher returns from the relatively more scarce resources.

In order to test the above hypotheses, ideally, the relevant production functions should have been estimated and used as models. However, practical limitations prevented this approach and I decided on simpler statistical models using analysis of variance and analysis of covariance.(1) The analysis of covariance model can be regarded as a linear approximation of a non-linear production function. Therefore, it has certain similarities to a linear production function. However, it explicitly differs from a linear production function because it allows for a constant term. The assumptions of the analysis of variance models are more restrictive; therefore the model is less sensitive. However, since it requires less sophisticated data, the test has been applied to all methods of categorization, inclusive of the agro-business farms for which accurate estimates of factor inputs were not available (Chapter Three, pp. 132-133). The test of analysis of covariance is less restrictive in its assumptions, and therefore more sensitive. However, this statistical model requires accurate and detailed measurements of single inp Therefore, where such measurements were not available, i.e. agro-busine

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(1) As stated in Chapter Three (pp. 108-109) for each case study I have covered a sample of at least 60% of all production units. As a result, the means of the samples are probably the means for each case study. Therefore, in strict comparisons within a village case-study, in order to draw conclusions for that village, there may be substantial emphasis on the observed descriptive statistics. However, there is interest in drawing inferences for a larger population. As stated earlier, each case study typifies a certain segment of an agricultural producing area and systems in Iran. Although the exact size of this population is not known, nonetheless, it is interesting to find if the observed differences are valid for the total population from which they come. For this purpose statistical tests are applied.

farms, this test has not been applied.[1]

The quantitative variables include the measurement of all farm output and factor inputs used in the process of production. For the most part of the analysis, values rather than physical quantities have been used. This approach allows for a common denominator for all the variables included in the study. However, since in the real world the assumption of perfect competition does not hold, this approach poses measurement problems. I have made some partial attempts to adjust for a number of very obvious price distortions. However, measurement problems remain a weakness of this study. Furthermore, in the case of agro-business farms, accurate data on factor inputs was not available. In a number of cases I had to rely on the projected estimates of costs which are lower than the real figures. Using this data, I have tried to make robust tests.

A general categorization of systems of agricultural production has been presented in Chapter One (Section Two pp 26-42). This general approach has been adopted as the basis of categorization of the farm management systems in the case studies. As seen in Chapter One, a major determinant for classification of systems of production is farm size. As a result, scale of production and organization of production cannot be considered mutually exclusive. Therefore, in this study "farm management systems" is used broadly to include both scale and organization of production and the dummy variable may measure either or both effects. Since the focus of the case studies has been on peasant producers, an attempt has been made to provide sub-categories of these producers according to size or apparent organizational differences. Also, as much of the debate concerning the production efficiency of peasant producers in Iran

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(1) This test has only been applied to cases where farm-management systems within a single village were being compared.

is related to the organizational role of the village (Chapter One, Section One, pp 16-20) and since the composition of the farm management systems in each village case-study is somewhat different from others, and these differences may lead to overall productivity differences in each village, the farms in a single village may be categorized as a group and compared with other villages. As will be seen later, due to data limitations, I was unable to draw conclusions from these comparisons and only exploratory studies, to reach certain hypotheses to be tested by future researchers, were made.

In summary, the analyses have been carried out using three levels of categorization of data: 1) categorizing the farm-management systems in a single village according to size and apparent organizational differences. To these categories, both tests of analysis of variance and analysis of covariance have been applied. 2) treating all farms in a single village case-study as a category, and comparing the villages with each other. Due to insufficiency of information to measure for the various social and organizational factors, for these comparisons statistical tests have not been applied, only exploratory descriptive analyses have been used in order to reach a number of possible hypotheses for future research on the subject. 3) comparisons of the autonomous case-studies with the agro-business units. Since the data for the agro-farms was not sufficiently adequate for tests of analysis of covariance, only tests of analysis of variance have been carried out.

SECTION I : STATISTICAL MODELS

In order to measure the effect upon output of factor inputs and farm management systems, ideally, specific production functions to fit the data should have been constructed. Unfortunately, practical limitations did not allow for this approach. Therefore I have relied

on simpler models using analysis of variance and analysis of covariance, to test the above-mentioned hypothesis. These models measure not only the purely technical input-output relations of all measured variables, but also provide measurements for the dummy variable, which is assumed to quantify the farm management effect. In order to clarify the differences between the two approaches, a simplified single input production function has been used to show the basic structure of each model.(1) Also, an attempt has been made to explain the effects of multiple inputs in each model. In addition, I have tried to illustrate some of the basic weaknesses of the two models.

a: Analysis of variance, Single Input:

Using a productivity index, (output divided by input), this model tests for equality of means (productivities) between the different categories (which is equivalent to testing for equality of slopes when output is regressed on input). Symbolically -

$$\frac{Y_{it}}{O_{it}} = \mu + \alpha_i \qquad (1)$$

Where:

$i = 1, \text{---} I$

$t = 1, \text{---} T$

Y_{it} is the output of the i th farms with t level of input

O_{it} is the input of the i th farm at the t th level

μ = the mean level (mean productivity ratio)

α_i = the i th effect (deviation from the mean)

Multiplying both sides by O_{it}, the following equation is obtained

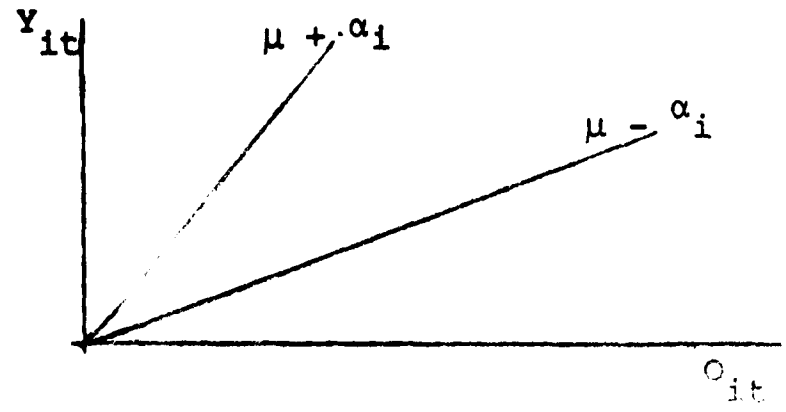
$$Y_{it} = \mu O_{it} + \alpha_i O_{it} \qquad (2)$$

The test applied in this model is:

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(1) A formal presentation of general statistical models of analysis of variance and analysis of covariance has not been made here, as these general models can be found in many statistical textbooks. Among others see: Rao (1973) or Dunn & Clark (1974).

all $\alpha_i = 0$ i.e. test of equality of slopes in (2), or test of equal means in (1)



Note that the model does not allow for inclusion of constants in equation (2), i.e., marginal productivity equals average productivity. Since in reality this assumption is not necessarily valid, where difference in slopes are observed, i.e. the test has rejected the hypothesis of equal means of productivities, it cannot positively identify whether the differences are due to the fact that the assumption of identical production functions is not valid, i.e. the differences are due to farm management systems, or whether they have been caused by the omission of other input factors (which would be caught by the constant in (2)).

b: Analysis of covariance, Single Input:

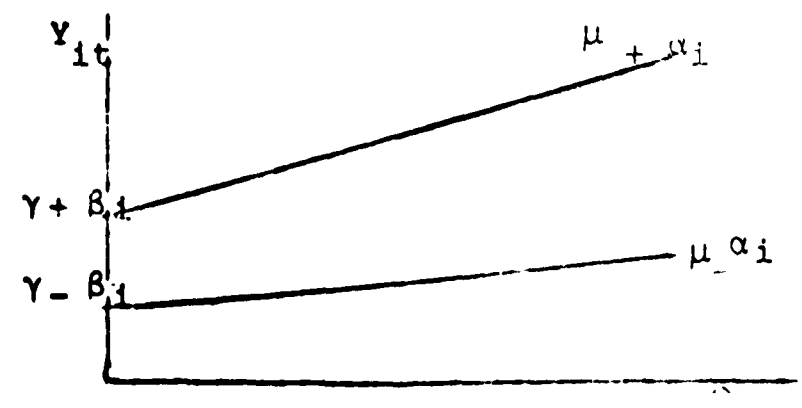
Using the same single input production functions, the analysis of covariance model may be presented in the following equation:

$$Y_{it} = \gamma + \beta_i + \mu O_{it} + \alpha_i O_{it}$$

Where:

γ is a constant in the equation, the mean effect of all unmeasurable (dummy) inputs.

βi is the i th group effect on unmeasurable inputs (as a deviation from γ) all other variables being the same as the previous model.



It is worth thinking of this model as a production function. The analysis of covariance model can be regarded as a linear approximation of the non-linear production function. The model differs from a linear production function because it allows for a constant term (γ) significantly different from zero. While in a linear production function it would be expected that the constant should not be significantly different from zero, i.e., zero output with zero inputs. In the absence of sufficiently accurate data to set up a non-linear production function to measure the combined effect of scale and organization of production, this model is likely to provide a reasonably good approximation of the true production function specially since only a short interval of the true production functions are being measured.

Since the present model resembles a linear production function, it might seem that features of a linear production function could be utilized. For example, in a proper production function the sums of elasticities should provide a measure of returns to scale. However, in the case of the present model the analysis approximates a separate production function for each group; this means that the returns to scale within a group could be estimated but that there is no restriction to make the returns to scale the same for all groups. The present model can then best be regarded as having fitted different production functions for each group. As a result summing the elasticities which were not measured for each group separately, but just for all groups, would not provide a meaningful measure of returns to scale.

Another point to note is that in a production function it is possible to test the relative commercial efficiencies of the production units through comparisons at each level of the marginal revenue products obtained with prices. Since from a production function cost functions and marginal costs can be found, the abovementioned comparisons are possible. However, this type of approach probably needs too accurate an estimation to be applied to the present model where only approximations of the production functions are made.

The model tests the following hypotheses:

1) All adjusted means (group mean effects) = 0 or $\mu_i = 0$ (all i)

i.e. mean effect of all unmeasurable inputs are identical for the two groups, i.e., there is no "farm management" specific effect. (there is no pure scale or pure organizational or a combination of both scale and organization effect.)[1]

2) Zero slope = 0, i.e., μ is zero. This tests whether the measured input affects output (i.e., whether marginal productivity is zero or a positive number) taken over all categories.

3) Equality of slopes, $\alpha i = 0$ (all i) i.e., whether marginal productivities are equal for both categories.

Thus, if the null hypothesis of equal mean productivities is rejected in the analysis of variance test, then the covariance model can identify if the differences are due to:

a) "farm management" specific effect or b) differences in the marginal productivities for the two groups.

Also the covariance model tests whether the measured input has significant general effects on output.

c) Effects of Multiple Inputs in both Models

An important difference in the two models exists in relation to the treatment of the effects of multiple inputs. In the analysis of variance model we can use only a single variable in the denominator. When there are several inputs, this must either be a weighted average of all inputs (the so-called total productivity ratio) or some subset of inputs, usually one only (called a partial productivity index). Both of these approaches have some weaknesses. The partial approach is the less satisfactory, since it omits completely some factors then differences in group means may be due to these omitted factors rather than a specific group effect. The total productivity index, although including all factors, does not allow for their interdependent action on output.

(1) It is worth noticing that there are probably "farm management" effects within groups and between groups. It seems that the easiest way to test these differences is to divide the production function into different groups and see if the coeffients of the production function remain the same

Variations in each factor are assumed to have identical effects on the ratio, whereas a more general approach would allow different factors to have different effects on output.

This latter problem is completely solved by the use of covariance analysis with many covariates. Each input can have a separate and different effect on output. Thus the model can positively identify the factors causing differences in output. However, the weakness of the model lies in its assumption of linear production functions. But, it can be argued that as the analysis only covers short intervals in the production functions, therefore, a linear function may be a close approximation of the actual production function.(1)

Application of Models:

Unfortunately, as the analysis of covariance model required more sophisticated data, it could only be applied to the comparisons of farms within a single village, where the quality of the data was adequate for the requirements of the model. The test of analysis of variance has been applied both to the comparisons of farms in a single village and to the comparisons of villages with the agro-business farms.

In using the farms in a village as a single category and trying to find the specific village organizational effect, unfortunately, due to insufficiency of the number of villages observed, it was not possible to control for the village organizational factors, as the effects of other social and institutional factors could not be measured separately. Thus

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(1) I made log-transformations for both models in order to comply with the distributional assumption (condition of normality) of the statistical model. The results obtained from the log-transformations made no qualitative difference to the analysis. Therefore they are not presented in the Thesis.

the dummy variable would have included a number of unmeasured variables. Therefore, it seemed hardly worth using a statistical model for these analyses, and a descriptive exploratory approach was adopted.

A possible alternative to the descriptive approach would have been to separate the effects of purely farm management differences in a single village from other social and organizational factors. This approach could allow a separate measurement of the scale effect and measure for the remaining dummy variable. But it would still be weak as the dummy would have included not only village organizational effects, but also other social and economic variables affecting output. Due to the smallness in size of computer facilities, it was not possible to use a model that treated separately effects of scale factors in a single village from village organization and other existing social and institutional factors.

SECTION II : THE VARIABLES

The Measured Variables

As there are two statistical models, two different forms of variables have been used in the analysis:

1) For the analysis of variance productivity ratios have been set up.

2) In the case of analysis of covariance, the dependent variable is output and the independent variables are the inputs of each factor.

For the most part of the study, values rather than physical quantities have been used (see pp 155-166 of this Chapter). A list of the variables for each model are presented below:

a: Variables for Model I:

In this model different productivity ratios have been used. The major emphasis is upon the total productivity ratios. These ratios are obtained through the division of the value of the total output by the total

rental values of all measured inputs used in its production. Since both input and output have been weighted by their price variables, it has been assumed that qualitative differences in both inputs and output, as well as the purely physical technological coefficient, are also measured.(1) Higher total productivity ratios are expected to have resulted from a more efficient farm management system. Symbolically:

$$EG = \frac{\text{Value of total gross agricultural production of a unit produced in one agricultural year}}{\text{Total rental values of all measured factors employed in one year}} = \frac{OG}{RG}$$

Where:

OG = Gross value of all agricultural output (crops, fruit, and animal husbandry) produced within the boundaries of a farm in one agricultural year.

and

RG = Rental value of land + Rental value of water + Value of labour input + Value of current inputs + Annual depreciation of machinery

Economists are often interested in studying either net output (gross output less depreciation) or net value-added (net output less the value of all current inputs except for capital and labour), in relation to inputs. I have therefore tried to construct productivity indices in relation to these concepts. Symbolically:

1) $EN = \frac{ON}{RN}$ where:

ON = Net value of output, gross value of output less depreciation or (OG - DEPM). Where:

DEPM = Annual depreciation of machinery

and

RN = RG - DEPM

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(1) This assumption has the obvious weakness that the assumption of perfect competition is violated in the real world. This point discussed on pp 155-166.

Thus, except for the omission of capital consumption, all other measured output and input variables are included in the productivity ratio.

2) $EA = \frac{OA}{RA}$ where:

OA = Net value added, net value of output less current inputs (ON - VCUR).

VCUR = The value of all fertilizers, pesticides and seeds used in one year.

RA = RN - VCUR

Thus except for the omission of capital consumptions and current inputs, all other measured inputs are included in the productivity ratio.

Since in the analysis of variance, the strongest results can be obtained from productivity ratios which are inclusive of all measured variables, the test has only been applied to EG. But the other two variables, i.e.EN and EA are tabulated in the text in order to provide further illustration of the productivity ratios.

With respect to partial productivity ratios also, gross output, net output and net value-added have been used in the numerator of the ratios to measure each partial productivity. But again, tests have been applied to the ratios concerning gross output divided by single inputs only. As stated earlier, the tests applied to these ratios are weak and therefore can only be treated as exploratory. In the following paragraphs, each of the partial productivity ratios used in the analysis is evaluated and defined.

Land hectarage, both total land available to a holding and land under cultivation, provides interesting partial productivity ratios of output per unit of land.(1) My observations indicate that land quality differences in a single village are not substantial. Also, among the

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(1) The bulk of studies of India are based on this type of partial productivity ratio. Also, the Indian literature provides extensive criticism of this type of analysis. Among others see: Khusro (1964), Bharadwaj (1974), Rudra (1973).

peasant and small capitalist producers in a single village, land is usually divided in such a way that every producer has an almost fixed proportion of the different qualities of lands. Thus, the assumption of homogeneity may hold to some extent. However, it becomes more problematic and less scientific if an attempt is made to compare various localities on the basis of this variable.

The following productivity ratios have been computed for this partial productivity.

$$\frac{OG}{TLA} \quad , \quad \frac{ON}{TLA} \quad \text{and} \quad \frac{OA}{TLA}$$

where TLA = Total land area (ha.) available to a production unit (cultivated plus fallow)

The second sets of variables include:

$$\frac{OG}{LA} \quad , \quad \frac{ON}{LA} \quad \text{and} \quad \frac{OA}{LA}$$

where LA = area under cultivation in a single production unit.

Partial productivity ratios with respect to the quantity of water used are useful indicators for a single locality where the volume of water from rainfall is identical. However, in comparing different geographical locations these partial productivities become arbitrary. Again, where comparisons are made for the areas where irrigation, rather than rainfall, plays a major role, they may be meaningful, but this criterion should not be used for the humid areas where the bulk of the production is rainfed. This partial productivity measurement is symbolically presented in the following manner:

$$\frac{OG}{QW} \quad , \quad \frac{ON}{QW} \quad \text{and} \quad \frac{OA}{QW}$$

Where: QW = Quantity of water used in a production unit in one year.

Partial productivity ratios with respect to labour days of work have

the disadvantage of not showing skill, age or sex differences. Nor do the number of days reflect the intensity of work. Nonetheless, in certain instances they are useful tools of analysis. Symbolically:

$$\frac{OG}{DAY} \quad , \quad \frac{ON}{DAY} \quad \text{and} \quad \frac{OA}{DAY}$$

DAY = The equivalent of adult male-labour days (for labour of women and children wage differentials, as coefficients, have been used to estimate equivalent male-labour days).

Due to the importance of adult man-days of work, ratios with respect to this input have also been constructed

$$\frac{OG}{MAN} \quad , \quad \frac{ON}{MAN} \quad \text{and} \quad \frac{OA}{MAN}$$

Where MAN = Man-days of adult male labour.

As in the majority of cases the use of machinery and current inputs by the farmers does not account for a substantial percentage of the inputs, partial productivity ratios with respect to these inputs have not been constructed.

b: Variables for Model II:

In this model, gross value of output, OG, is the dependent variable and the independent variables are all the measured inputs i.e. LA, QW, DAYS, VCUR and DEPM. The net output ON and the net value-added OA have not been used in the analysis, as their results would have been weaker than those obtained from regressing gross output on all factor inputs.

Note that, as the model has only been used for a single village at a time, I have assumed almost identical land quality. Also, LA (area under cultivation) rather than TLA (area of holdings) has been used, as it seemed more logical to assume that the area under cultivation, rather than the size of holding, would have a critical effect on output.

Farm Management Systems

As stated earlier, categorization of the farm management systems included in the case studies is based on the general pattern suggested in Chapter One (Section Two, pp 26-40). As suggested in that Chapter, scales of operation and systems of production are closely interlinked and cannot be considered as mutually exclusive. Therefore, the term "farm management system" in this study is defined broadly to include scale, as well as social organization of production. Also, as the bulk of information in the present study comes from the study of five villages, it has been possible to make a more detailed study of the peasant producers. So, I have tried to provide sub-categories of peasant production systems on the basis of size or apparent organizational differences.

Unfortunately, due to the pioneering nature of the study in certain marginal instances, the distinction between peasant and capitalist producers is vague. This fault in the study is very much due to the pioneering nature of the survey which proved defective in finding a quantitative measurement of the farm size, defined as the aggregate value of all farm inputs, that defines the border-line distinguishing between peasant and capitalist systems. The observations were insufficient to provide such a general quantitative measurement. For this reason, and because there were practical difficulties involved in measuring farm size as defined above, land hectarage was used as a proxy for farm size. Obviously this approach has shortcomings and inadequacies.[1] Nonetheless, under the circumstances, it was the most appropriate.

Three stages of categorization and comparisons of the system have been adopted. First, the case studies have been grouped into two categories:

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(1) The Indian literature provides substantial criticism of the use of acreage as a means of measuring farm size. See for example Patnaick (1972), pp. 1613-24.

semi-government corporations (agro-businesses) and autonomous units (the five villages and their surrounding mechanized farms). Second, observations in each village have been used as a single category and comparisons have been made between villages. Third, observations in a single village have been categorized according to size or apparent differences in social organization of production. The description of the case-studies presented in Chapter Three (Section Two, pp.105-119) provides a clarification and justification for the first stage of categorizations. The other two stages are discussed in the following paragraphs.

As shown in Chapter One (Section One, pp 10 - 14) much of the debate concerning the productive efficiency of peasant farmers in Iran rests on the organizational role of the village. Furthermore, as shown in Chapter Three (Section Two, pp.100-3, though in an arbitrary and non-comprehensive fashion, the five village case-studies have been selected in such a way that each represents a specific and distinct type of Iranian village. Although an attempt was made to compare the effect of the organizational role of the village, and of the existence of interaction between the various types of farm management systems in a locality, because of the insufficiency of the number of observations and as a result of computational problems it was not possible to measure these effects. Nonetheless, due to the importance of this subject, the farms in each village have been grouped as a single category and compared with farms in other villages in an exploratory and descriptive fashion.

For the comparisons of the farms in each case-study, as a first step an attempt was made to identify farms with obvious differences in social organizations of production. Thus the so-called 'mechanized farms'

outside the administrative boundaries of a village were treated as a separate category since they did not belong to the village communities. Also, where the social organizations of production were distinctively different in one village these were treated as separate categories. Thus, in Chahār Dāngeh the ejāre-kārs who operate on the land rental bases and are only temporary residents of a village, were treated as one category and the 'owner operated' farms as another. Obviously the arbābi unit has to be treated as a separate category.

Since the aim of this study is to identify the farm management categories that show greatest differences in output per unit of total inputs, where no obvious differences of the social organizations of production within a single village could be observed,(1) an attempt was made to identify the comparative output-input ratios that show substantial differences in productivities. For this purpose, total productivity ratios should ideally have been constructed and tests of analysis of variance should have been applied to the various possible categories in order to identify which categories showed the highest differences. However, this procedure would have been time-consuming. As a result, a simpler and more approximate approach of using hectarage as a means of grouping the data was adopted.

As a first step I tried to group the data into size categories which seemd to have the largest differences in either yields per hectare or gross value of output per hectare. Thus I tried to bias the results for showing productivity differences. Of course, this procedure was very approximate. In order to provide a more systematic approach to the categorization problem, tests of analysis of variance were applied to the

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(1) In the case of the larger size farms in Turane-Turk it can be disputed that their social organization of production is distinctly different from others i.e. dependence on hired wage labourers and crop-sharers. However, our method of grouping according to hectarage also, put them in a separate category.

gross value of output per hectare, grouped into different alternative categories that appeared to have largest productivity differentials, in order to identify which groups show the greatest differences in productivities. The following procedure was adopted:

1) The test of hypothesis of equal mean output per unit of land input was applied to the groups of farms that seemed to show greatest productivity differentials, and the F scores were calculated.

2) Around the seemingly critical optimal points for categorization, two other points not far from the first critical point, plus and minus a short distance from it, were also tested and their F scores were calculated.

3) The resultant F scores were tabulated and compared. The grouping pattern that showed the highest F ratios, i.e. largest differences in the mean group productivities, were selected as the farm management categories to be studied (Table 1).

In (Table 2), I have presented the number of observations and the range of farm size in each category of farms, selected by apparent organizational or size differences, within each village.

Measurement Problems:

As already shown for most of the study both output and input variables have been measured by values rather than physical quantities, in order to weight the variables and provide a common denominator. The following are the reasons:

1) Iranian farmers are multi-croppers. They combine all their inputs for the production of different crops. As a result, it is difficult to assess physical yields per unit of inputs.

2) There is a problem of heterogeneity of inputs.

3) For certain inputs the farmers can only reveal total payments for that factor, not the physical quantities.

Table 1 : Grouping of the Data (1)

(A) **Ahmad-Ābad**

Number of Observations	Size of Holdings ha's	F Ratio
17	6 - 13	2.9734
55	1 - 5.2	
21	5 - 13	3.9016*
51	1 - 4.9	
26	3.6 - 13	6.2596*
46	1 - 3.5	
33	3 - 13	9.4129*
39	1 - 3	

(B) Tālesh-Mahalleh

Number of Observations	Size of Holdings ha's	F Ratio
17	1.3 - 6.3	2.9734
55	0.1 - 1.3	
21	1.1 - 6.3	3.9016*
51	0.1 - 1.1	
26	1.0 - 6.3	6.2596*
46	0.1 - 1	
33	0.9 - 6.3	9.4129*
39	0.1 - 0.8	
35	0.8 - 6.3	11.8783*
37	0.1 - 0.72	

(C) Turāne-Turk

Number of Observations	Size of Holdings ha's	F Ratio
11	15 - 105	0.4264
4	8 - 12.5	
26	1 - 6	
11	15 - 105	1.5015
7	6 - 12.5	
23	1 - 5.5	
11	15 - 105	1.6417
10	5.5 - 12.5	
20	1 - 5.5	
12	12.5 - 105	0.8036
3	8 - 9	
26	1 - 6	
12	12.5 - 105	2.1196
6	6 - 9	
23	1 - 5.5	
12	12.5 - 105	2.1198
9	5.5 - 9	
20	1 - 5	

(C) Continued

13	9 - 105	0.4478
2	8 - 8.05	
26	1 - 6	
13	9 - 105	1.7154
5	6 - 8.05	
23	1 - 5.5	
13	9 - 105	1.7186
8	5.5 - 8.05	
20	1 - 5	

(1) The independent variable is OG/TLA.

* Rejection of the null hypothesis of equal means at 5% significance.

Table 2 : Farm Size Categories in Each Village

Unit : Hectare

		GROUP 1		GROUP 2			GROUP 3			GROUP 4		
	Range	Mean	No. of Obs.	Range	Mean	No. of Obs.	Range	Mean	No. of Obs.	Range	Mean	No. of Obs.
Ahmad-Abad	3-13	6.18	33	1-3	1.5	39	-	-	-	-	-	-
Talesh-Mahalleh	0.8-6.5	1.58	35	0.1-0.72	0.40	37	-	-	-	-	-	-
Turane-Turk	12.5-105	37.58	12	6-9	7.17	6	1-5.5	3.04	23	195-45	112	4
Chahar-Dangeh	330	330	1	0.4-18	2.95	46	0.43-7	1.7	20	-	-	-
Booraki	2-80	14.7	37	-	-	-	-	-	-	-	-	-

As a result, values seem to be more relevant than physical quantities.

This approach has the obvious problem of the various price imperfections in the market. In Bharadwaj's words:

"The competitive assumptions are violated in a fundamental way in an agrarian economy in which the 'extent' of market penetration, as also the 'character' of markets, is very different. We may briefly mention here some of the crucial features that differentiate the agrarian markets. The point to note is that while markets have penetrated into the rural economy in a deep and significant manner, the extent and 'type' of involvement in markets of the different sections of the peasantry are not at all uniform. The character of markets reflects and to a significant extent is determined by the local patterns of power". (1)

Thus, the basic measurement problem in this study is to find monetary values that reflect the true social opportunity costs. Admittedly, only partial success has been achieved in this respect. In relation to this problem, three different approaches have been adopted:

1) For the most part, with slight modifications, reliance is put on the local market prices.

2) Certain variables could not be obtained from the field. Therefore, these have been estimated according to the closest available proxy.

3) Due to substantial price imperfections, valuations concerning the agro-business farms posed special problems, and these will be treated separately.

As a rule, within the boundaries of a single village, if no quality differences existed for a variable, a single price was accepted for it. This single price was often the median, not the mean. Often the median is the norm since it excludes overstatements or understatements of the prices which are due to unusual conditions. The acceptance of a single

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(1) Bharadwaj (1974), p. 3.

price for a homogeneous item prevents such price imperfections as pre-harvest sales, etc. from affecting the value of the variables.

Unless otherwise stated, the relative prices of the different variables including quality differentials, as determined by the forces of the market, are accepted. At times there were obvious problems in connection with the use of the relative prices. For example, I assumed that soil and climatical differences, as well as distance from the major markets, would be reflected in the local rental values of land and water in each village.(1) This method did not always work. In certain instances, i.e., Tālesh-Mahalleh, sensitivity analysis had to be carried out. In other cases, i.e., Chahār-Dangeh and Turāne-Turk, this factor made the results inconclusive (See Chapter Five, Section Two, pp. 221-222).

Differences in skills were assumed to be reflected in wages. For the family labour relevant market wages were imputed. These imputations have been weighted according to the average number of days of work in each season and to the related seasonal wages.(2) A number of Indian writers have stated that the family wage rates should be considered below the going market rates.(3) The argument is mainly based upon India's being a labour surplus economy, which does not appear to have the same validity in the case of Iran, as in the period under study there were shortages of labour and availability of off-farm jobs. However, there

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(1) Khusrow (1964), in attempting to assess the effect of land fertility in Indian agriculture, uses land revenue as a means of valuation. However, in the case of Iran agricultural land is not taxed; therefore rents are the only means of valuation.

(2) Nath (1974) expresses the importance of seasonality in labour and wage imputations.

(3) Among others, see Sen (1962).

is no doubt that family labour, as a result of its relationship to land, differs qualitatively from non-family labour. Furthermore, it is possible that for reasons such as security of tenure, family labour may be less mobile than expected. Thus real wages for family labour may be somewhat different from the going market wage rates. However, it was not possible to assess these differences.

Another problem of valuation arose in regard to the depreciation of farm machinery. In most cases there was no way of assessing the annual depreciation through direct methods of valuation.(1) As a result, in the case of tractors, I used the money paid for its use. A similar procedure was adopted for combines. As these figures also included the wages of the drivers, the latter figures were estimated and taken out of the depreciation figures. Nonetheless, the remaining figures may still over-estimate depreciation, as the profits of the owners would still be included in the figure. For the water pumps and wells I could not identify the value for depreciation. As a result I left these values to be included in the price of water used. Using these procedures, total cost figures are unaffected but the net values are somewhat distorted.

For the labour quarters and warehouses, where a part of the farmer's residence was used for these purposes, I assumed the cost to be psychic and no depreciation was charged for it. However, where separate buildings

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(1) I interviewed some of the distributors of the machines. They stated that the life expectancy of those machines depended upon upkeep, type of soil and use of machine. Furthermore, in some cases, where identical machines were not available in the market, I could not estimate the value of the machine if it was being sold new. The price index on machinery is too inadequate to be used for this purpose. Finally, V.F. Nowshirvani, who was concurrently making a study of farm mechanization in Iran, advised me not to use the depreciation tables set up by the Ministry of Finance and Economics, since during his study of the farm machineries in Iran these figures had been tested and proven inadequate.

had been set up for such uses, I assumed the life expectancy of the buildings to be thirty years and in consultation with the local builders made an estimate of the original value of the buildings and then depreciated accordingly.(1)

Valuations concerning the rate of interest posed special problems. Variations of this rate within peasant producers may be between 6 per cent for cooperative loans, 12 per cent for commercial bank rates, and up to 20 to 30 per cent for rates charged by shopkeepers and pedlars. For the capitalist farms, most ofter it is the 12 per cent commercial rate, sometimes the lower preferential rates charged by the Agricultural Development Bank. Unfortunately, in relation to the five village case-studies, the data is not adequate to provide estimates of the rates of interest. (Chapter Three, Section Four, p.131). Also, as stated earlier, I have tried to provide a single price for the homogeneous items, in this case capital. Therefore, the rate of interest for all calculations has been assumed to be uniform at 12 per cent, since this rate appears to be the most common in Iran. In connection with the agro-business farms, valuation of the rate of interest posed further problems, These farms mostly receive loans from the Agricultural Development Bank at preferential rates ranging from 4 to 8 per cent. Insofar as capital is an identical item for all units, I have tried to weight identical items with a single price; therefore, the 12 per cent interest rate has also been applied to these units. However, a counter-argument may be presented stating that the units have allocated their resources according to the rates available to them. In order to overcome this problem, sensitivity analysis, using an average of 6 per cent interest rate on capital, has

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(1) The Central Bank of Iran also assumes the life expectancy of the rural buildings to be thirty.

been used for these units.

Several problems arose in connection with the landlord unit in Chahār Dangeh. This unit used a certain number of more sophisticated farm machines that were not found elsewhere in the case studies. For the measurement of the depreciation of these machines, I relied upon the estimates of the owners. Furthermore, this unit concentrated on apple production. For the waiting period and the life expectancy of the orchard, I relied upon the views of the owner and of other apple producers in the locality.

This unit posed further problems. For example, a considerable amount of land was left fallow for speculative purposes. It may be argued that speculative land should not be treated as a part of the owner's farming operations. My own judgment is that it should be included, as these lands are potentially cultivable. If the owner is not cultivating the land, this should be considered as inefficiency in resource allocation. Nonetheless, to allow alternative judgments, productivity measurements, excluding the rents allocated to the speculative land, have been made.

Another controversial problem, concerning the arbābi unit, arises in relation to the inclusion of the cold storage system as a part of the farming operations. This problem becomes important because not only was the cold storage being used for the farm products, i.e. apples, but it was also rented to other producers. There was no way of estimating what percentage of the capacity was self-used. Therefore, the following alternative procedures were applied: (1) the inclusion of the storage system as an integrated part of the farm, thus counting both the depreciation and the revenue obtained from it in the measurements, and (2) complete exclusion of the storage system from the analysis. Both procedures have shortcomings. In the first method, as all revenue obtained from the storage system was included in the output, the gains received by the

owner for renting parts of the system to other farmers were included in his farming operations. The second approach is also problematic. The owner stored apples and sold them in seasons when apples were more expensive. In excluding storage from the measurements, the cost for that part of the appreciation in the price of the apples due to storage was counted as zero.

Still another problem with respect to this unit exists. The owner and his sons have assumed a special managerial interest in the apple orchard. The remaining parts of the farming operations are treated marginally. In fact, the remaining land under cultivation in this unit is given for cultivation to the workers of the orchard as part of their salary. Thus we may be interested in evaluating the productive efficiency of the orchard alone. This alternative procedure was also adopted.

The agro-business units posed special measurement problems: First, for a substantial part of the calculation of costs, actual data were not available. As a result, reliance was placed upon the projected estimates for these units, provided by the original proposals to the Agricultural Development Bank. Actual costs incurred by these units have by far surpassed the estimated projections.(1) However, I did not have access to the Bank files and had to rely on the projected estimates. Thus, it should be noted that as a result of under-estimation of the cost figures, should the results reject the null hypothesis of equal means between these units and the autonomous ones, and show higher productivities for the autonomous units, in reality the differences would be greater than my estimates indicate. Also, should the agro-business farms show higher total productivity ratios, as their costs have been under-estimated, the results would be non-conclusive.

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(1) Agricultural Development Bank (1976 and 1978), unpublished.

Second, various investments and other costs have been undertaken by the government for the creation of these units. These include:

(a) Investments in the dam:

(b) Various investments for the creation of the water canals and roads:

(c) The social cost of removing villages and their inhabitants:

(d) Costs of building new homes for the original dwellers of the area, etc.

Of these costs, data is available only for the part related to the annual depreciation of the Dez Dam accruable to these units.[1] In this respect I have used two alternative assumptions for cost calculations:

1) Since for the autonomous units I have assumed that the depreciation costs related to deep wells and water pumps are included in the price of water, no extra cost has been used for these capital consumptions. A similar approach has been adopted for the agro-business farms.

2) An alternative assumption can be made on the basis of the fact that similar substantive public investments for irrigation have not been made for the autonomous units. Therefore, allowance should be made for these depreciation cost calculations for the agro-businesses. Both methods have been used in this study.

Third, as stated in Chapter Three (Section Three, pp.117-19) land and water rentals charged to the agro-business units are in general lower than the market rates. For example, with the exception of Talesh-Mahal'eh, for all other villages, we can assume inferior quality of land, as compared with the land allocated to the agro-businesses.[2] However, the combined

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(1) Depreciation figures obtained from Khuzestan Water and Power Organization (1972).

(2) According to Agricultural Development Bank (1978), a number of agro-business operations have rented out land to Yazdi ejare-kars in order to make profit from the difference in rents. These ejare-kars are paying rents higher than comparable figures in Teheran or Yazd.

land and water rentals are higher for these villages than the corporation units. (Table 3). Thus, as alternative means of measurement, the agro-business units have been treated by two methods of calculation:

(a) their own actual rental payments, and

(b) computation of each village land and water rentals, when comparisons with the related village are made.

Table 3 : Average Land and Water Rentals for Cultivated Area for Five Villages and Four Agro-businesses.

	Land Rls. hectare	Water Rls. cubic meter	Total value of Water used per hectare Rls.	Total Land and Water rentals per hectare Rls.
Ahmad-Ābād	13,975	1.16	23,206	37,182
Talesh-Mahalleh	30,000	0.10	-	30,000
Turāne-Turk	4,224	2.5	10,930	15,154
Chahār-Dāngeh	20,140	1.00	30,126	50,266
Booraki	700	0.68	2,210	2,910(1)
Agro-businesses	1,500	0.5	9,114	10,614

(1) Note that the reason that the total land and water rentals for this village are lower than the agro-business is that they use less water. Should the use of water per hectare for this village be equal to the agro-farms, then the figure would be Rls. 13,228, which is larger than the relevant figure for the agro-businesses.

Fourth, the actual area under cultivation of these units is far below their capacity. In order to tackle this problem, three alternative procedures have been adopted:

(a) Land and water rental charges have been made only to the actual areas under cultivation (for this notation LA has been used),

(b) These charges were made in accordance with the total area for which the building of the water canals has been completed; but this total area has not come under full utilization due to the delays of the programmes of the agro-farms.(1) (In this case the notation ZLA has been used).

(c) The agro-business units may be regarded as an integrated part of the Dez Dam project. In this context, delays in land utilization can be regarded as a social opportunity cost of this government venture. At the time of the survey, about one-fifth of the total life expectancy of the Dez Dam had been depreciated.(2) This integrated project, and thus the agro-business units, should have passed through the stages of infancy and ought to have entered full capacity. Therefore land and water rental charges have been made for the whole area allocated to the farms. (For this purpose notation TLA has been used).

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(1) Note that in the original proposals of the units, the area under cultivation of the farms for the year under study exceeds the area used in calculations of part (b).

(2) Rabbani (1971).

SUMMARY

1) On the assumption that output is functionally related to its factor inputs and the systems of farm management, broadly defined to include both scale and organizational factors, I have tried to find if systematic variations in output may be observed in relation to factor inputs and farm management systems. In order to test this hypothesis, two statistical models i.e. analysis of variance and analysis of covariance have been used. The analysis of variance model is more restrictive in its assumptions, and therefore less sensitive. But since it requires less sophisticated data the model has been used for all the different categories of farm management systems. The analysis of covariance model is more sensitive, but since it requires more sophisticated data, the model has been used for the inter-village comparisons for which reliable and detailed information was available.

2) Both statistical models can measure the effects on output of the combined factor inputs. While the analysis of variance model can only show if significant differences in output per total factor inputs exist between the different farm management categories under study, it cannot positively show the factors causing these differences in the mean total productivity ratios. But the analysis of covariance model can identify whether the differences in the mean outputs are caused by the measured inputs or the farm management specific effects.

3) In addition to measuring the combined effects of all inputs, I was also interested in measuring the effects on output of single inputs. But since the assumption of independence of variables is violated in economics, and as the analysis of variance is based on the assumption of independence of variables, the model cannot provide satisfactory partial productivity analysis with respect to a single input. However, in order to make an exploratory analysis, partial productivity indices using analysis of

variance model have been used, but the results should be regarded as non-conclusive. This problem is completely overcome in the analysis of covariance model and the results of this model can be regarded as conclusive.

4) Measured variables include all farm output and all factor inputs used in the process of production during one agricultural year. As there are two models, two forms of variables have been used. For the analysis of variance productivity ratios, output divided by input have been used. For the total productivity analysis, indices using total output divided by all inputs have been used. But for partial productivity analysis, output has been divided by a single input. For the analysis of covariance model output has been regressed by all its factor inputs, each being presented as a single variable.

5) Farm management systems have been broadly defined to include both scale and organization of production. In accordance with the general definitions of systems of production presented in this dissertation, the farm management systems have been categorized as follows:

a) Semi-government corporations (agro-businesses) and

b) autonomous units (peasant and capitalist farms).

Within the latter, as much as possible, peasant and capitalist farms have been treated separately.

c) As the focus of the study is on peasant producers, therefore sub-categories of this system according to size or apparent organizational differences have been provided.

6) As seen in Chapter One (Section One, pp 10 - 14) much of the debate in Iran concerning peasant production behaviour rests on the organizational role of the village. Therefore, in this analysis an attempt has been made to evaluate the organizational role of the villages on production and the effects on output of the interaction between the different

systems of production existing in a locality. Unfortunately, as the number of village observations were insufficient, I could not control for the various other social and economic variables acting on outputs of villages. Since the number of unmeasured variables were numerous and it was not possible to control for a single organizational effect or interaction of different systems in a locality, statistical models have not been applied to these comparisons, and only descriptive analyses providing for a number of hypotheses to be tested by future researchers have been carried out.

7) On the basis of the above-mentioned division of data into different farm management systems, three stages of categorization of data have been used.

a) Categorizing the farm-management systems in a single village according to size and apparent organizational differences. To these categories, both tests of analysis of variance and analysis of covariance have been applied.

b) Treating all farms in a single village case-study as a category, and comparing villages with each other. Due to insufficiency of information, for these categories only exploratory descriptive analyses have been used in order to set up possible hypotheses for future research.

c) Comparisons of the autonomous units with the agro-businesses. Due to inadequacy of the data for the agro-farms, only tests of analysis of variance have been applied to these categories.

8) For the most part, in order to weight the measured variables and provide a common denominator, values rather than physical quantities have been used. This approach has the obvious drawback that, due to market imperfections and price distortions, monetary values do not reflect the true social opportunity costs of the variables. However, there seemed to be no better alternatives to use. I have tried to m

certain modifications and sensitivity analyses in the cases where obvious price distortions were being observed.

The measurement problems were most acute in the case of agro-business farms:

a) As actual data was not available for a number of cost items, projected estimates of the original proposals of the companies were used. But these projected figures under-estimate the actual costs.

b) Government preferential land and water rentals were charged for these units. As a result the units, in relation to these two inputs, show lower costs than the potential market rates. In order to overcome this problem, sensitivity analyses using land and water rentals equivalent to those of each of the five village case studies were used for comparisons with the relevant village.

c) Due to various delays in the use of the potentially available land and water to the agro-farms, both inputs are under-utilized. Again, sensitivity analyses adjusting for the potential land and water have been applied to these units.

CHAPTER V

EMPIRICAL RESULTS : THE VILLAGES

In this Chapter the empirical results obtained from the study of the five villages are presented. The Chapter is composed of three sections. In the first part, the different categories of farm management systems within a single village, as defined in Chapter IV (Section Two, pp 152 - 155) are studied. In the second section, an exploratory attempt has been made to compare the effects on productivity of the village organization and other related social aspects of production. In the third section I have made an exploratory comparative study of the farmers' innovative abilities and responses to the changes in techniques of production.

SECTION I : INTER-VILLAGE COMPARISONS

A : Ahmad-Ābāde Moshir (Yazd)

As stated earlier, this is a conventional village composed of peasant farms only. They are grouped in two categories (Chapter IV, Section II, p.157 Table 2):

(1) Medium size peasant holdings ranging in area between 3 and 13 hectares.

(2) Small size peasant producers varying in size between 1 and 3 hectares.

A study of the inputs per hectare of the land under cultivation for each group shows the following results (Table 1):

1) Application of water, current inputs and machinery is higher for the larger size category.

2) The input of labour is higher for the small-size category. However, the difference becomes very small when the per hectare inputs of the male adult workers are compared. Also, the relative share of the family labour in total is higher for the smaller size category.

3) The percentage share of the area under cultivation in the total size of holdings is higher for the smaller size category.

Table 1 : Ahmad - Abad

Mean Values of Measured Independent Variables per Hectare of Land Under Cultivation for Each Group.

Variables \ Group		GP1	GP2
1	QW/ha.	20572	19005
2	DAYS/ha.	161.1	182.26
3	VCUR/ha.	32696	31499
4	DEPM/ha	944.9	414.2
5	MAN/ha.	119.17	122.97
6	Family Labour in Total %	66	88
7	Area Under Cultivation to Total %	33	50

Units: 1) m^3/ha.

2) Total labour adjusted to equivalent male adult labour days/ha.

3) Rls./ha.

4) Rls./ha.

5) Male-adult labour days/ha.

6) Per Cent

7) Per Cent

Table 2 : Ahmad-Abad

Estimates of Mean Total Productivity Ratio per Group

Rls/Rls.

EG		EN		EA	
GP1	GP2	GP1	GP2	GP1	GP2
1.2727	1.1089	1.2761	1.1148	1.4404	1.19[illegible]1

The total productivity ratio (EG), which embodies all the quantitative variables, has been used for the analysis of variance test. The results of the test indicate significantly higher output per total factor inputs for the medium peasant producers (Tables 2 and 4).

Tests of analyses of variance have also been applied to the gross value of output divided by a single input, in order to make an exploratory analysis of the relation of farm output with each single input and the overall effects of management systems. Since the assumption of independence of variables is violated in these analyses, the results will not be conclusive and may only be used to help interpretation of the total productivity analysis. The tests indicate that partial productivity ratios with respect to total area of holdings (O/TLA), i.e. output per hectare of farm size, are higher for the smaller size category (Tables 3 and 4). Partial productivity with respect to the quantity of water used (O/QW) is higher, but insignificantly different, for the medium size category. The productivity ratio with respect to totallabour input (O/DAY) is significantly higher for the medium size category. The ratio with respect to adult male labour input (O/Man) is higher for the medium size category, but insignificantly different (Tables 3 and 4).

The most sensitive test used for this village is the analysis of covariance model. Not only is the statistical model able to test the significance of the difference in group means, but it can also provide information on the factors responsible for the differences. For this model, the gross value of output (OG) has been used as the dependent variable and all measured factor inputs have been used as independent variables. The farm management specific effect has been measured by a dummy variable (Table 5).

The complete model of analysis of covariance, in which the effects of both the constant (farm management) and the variables (all measured

Table 3 : Ahmad-Ābād

Estimates of Mean Partial Productivity Ratios per Group

	G		N		A	
	GP1	GP2	GP1	GP2	GP1	GP2
1 O/TLA	32734.89	45402.45	32422.09	38063.49	22132.61	30030.39
2 O/QW	5.0759	4.2857	5.0274	4.8468	3.5090	3.2887
3 O/DAY	636.4592	519.1982	630.7107	503.9282	439.6875	331.4072
4 O/MAN	876.1265	771.1432	868.2659	747.8542	611.8794	505.4436

Units: 1) Rls/ha.

2) Rls/m^3

3) Rls/Total labour adjusted to equivalent male adult labour days.

4) Rls/male adult labour days.

Table 4 : Ahmad-Abad

Summary Results Analysis of Variance

F R a t i o s				
EG	OG/TLA	OG/QW	OG/DAY	OG/MAN
4.4790*	9.4129*	0.0378	4.1050*	2.1372

* The hypothesis of equal mean ratios for the two groups rejected at 5% significance level.

Table 5 : Ahmad-Ābād

Analysis of Covariance, Estimates of Means of Inputs and Outputs per Group (1)

Variables / Groups	OG 1	LA 2	QW 3	VCUR 4	DEPM 5	DAYS 6
Group I	202490	2.02	40368	61953	1835	307
Group II	67493	0.72	13781	20759	1528	132
Total	129367	1.35	25967	40784	1669	212

Units: 1) Rls.

2) ha.(land under cultivation.

3) m^3

4) Rls.

5) Rls.

6) Total labour adjusted to equivalent male adult labour days.

inputs) are allowed to be different between groups, shows a high $\bar{R}^2$ (0.97), indicating that most variations are explained by the model and that the random effects are very small, i.e., the model is a good fit for the data (Table 6).

The following hypotheses have been tested by the analysis of covariance model and the results are presented in Tables 6 and 7:

1) The null hypothesis that the independent variables, i.e. factor inputs, have no effects on output. The test allows for the possibility that the different inputs may have different effects on each group and allows the constant to be different between the two groups. Thus the test examines whether all the slopes are equal to zero. For short, it is called the hypothesis of zero-slopes.

The F-value for the zero-slopes (66.40) strongly rejects the null hypothesis that output is not affected by inputs i.e., at least one of the variables has an effect on output. (Table 6).

2a) The tests of the null hypotheses that none of the individual measured factor inputs have any effect on the output. For this test the model constrains all measured inputs to have the same effect in each size group but does allow the constants to differ (to account for non-measured inputs). For short it is called the individual input effects test. Then each factor is tested to see whether it has an effect (slope) significantly different from zero.

The t-values for each of the individual inputs reject the null hypotheses of no effect and show that in fact all measured single inputs have significant positive effects on output (Table 7). Elasticities standardized by the mean values of the variables also show the relative importance of inputs on output. The elasticities indicate that the inputs affect output in the following order of importance:

1) Labour, 2) water, 3) current inputs (Table 7).

Table 6 : Ahmad-Ābād

Summary Analysis of Covariance

Dependent Variable	$\bar{R}^2$	F-Value for Zero-Slopes	F-Value for Equality of Slopes and Constant	F-Value for Equality of Constant Effect	F-Value for Equality of Slopes
OG	0.97	66.3984*	7.4100*	2.0634	6.7329*

* Rejection of the null hypothesis at 5% significant level.

Table 7 : Ahmad-Ābād

Individual Input Effects(1)

Inputs	Elasticities(2) Standardized by Mean Values of Variables	t-Tests for Effects of each Variable	$\bar{R}^2$
LA	0.26	+ 1.[illegible]34*	0.95
QW	0.36	+ 2.8788*	
VCUR	0.27	+ 4.0685*	
DEPM	0.17	+ 3.2963*	
DAYS	0.37	+ 2.7674*	

(1) Note that the regression coefficients have not been presented as the data have been measured in different units, but have been scaled to show elasticities measured at the mean.

* Rejection of the null hypothesis at 5% significance level using a one-sided test.(1)

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(1) I have applied a one-sided test, as it is expected that the factor inputs would have positive effects only.

(2) Note that the elasticities have not been measured for each group separately.

2b) The test of the null hypothesis of the equality of both the constant and the slopes of the two groups, i.e., the constant effect is the same for both groups and no differences in the marginal productivities of the covariates between the two groups exist. The test allows the covariates to have effects on output and examines for possible differences of the effects of both the constant and the covariates on the output levels of each group. For short it is called the hypothesis of equality of both slopes and constant.

The F-value for equality of both slopes and constants (7.41) rejects the null hypothesis that both the size specific effect and the marginal productivities of the covariates, are equal for the two groups.

3a) The test of the null hypothesis of equality of constant effect, i.e., the level of output between groups is not affected by unobserved factors. The test allows for the covariates to affect output differently and for the possibility of the differences in the slopes of the covariates. For short, it is called the hypothesis of equality of constants.

The F-value for the equality of constants (2.06) is insignificant, indicating that the size-specific effect is insignificant on output.

3b) The null hypothesis that the slopes are equal for both groups, i.e., variations in inputs have the same effect on output in the two groups and for all inputs (at the same level of inputs). Thus it tests whether the production functions of the two groups are identical. For short it is called the hypothesis of equal slopes.

The F-test for equality of the slopes (6.73) rejects the null hypothesis of equal slopes, i.e., there are differences in the marginal productivities of some of the inputs for the two groups.

To summarize, the regression show that each of the five single factor inputs has a significant effect on output. Also, analysis of both variance

and covariance models show that the medium size producers have significantly higher output levels relative to their total measured inputs. The analysis of covariance model shows that the differences are not due to the farm-management specific effects. It also shows that the medium size producers have higher marginal productivities for their factor inputs, suggesting that perhaps the combination of the measured factor inputs in the medium size farms produces higher marginal productivities.

A number of results obtained from partial productivity analysis, though weaker and perhaps non-conclusive, are worth mentioning insofar as they will further clarify the following arguments: Partial productivities with respect to land input are significantly higher for the small size category, while those with respect to labour input are higher for the medium size peasant holders. But the difference in partial productivities with respect to adult male labour input is insignificant.

A possible explanation for the above results may be presented as follows, in terms of the relative factor endowments of two groups.

1) The availability of family labour is more limited for the larger units than the small-size category. (Table 1). Thus, in order to obtain more gains from the land, paid labourers must be employed. In this case, the farming household is likely to be unwilling to employ labourers at a rate below the marginal returns equivalent to wages. In addition, relative to the smaller farms, the medium size units are financially capable of using relatively more of the other inputs, e.g., water[1], current inputs, etc. (probably accounting for their marginal returns). These producers are therefore likely to try to optimize overall gains.

2) The supply of the family labour is relatively more abundant in the smaller farms. (Table 1). Also, the supply of the land is more limited

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(1) The deep well in the village was originally started with a few relatively larger holders of land. Then the shares were sold to others. But, some wealthier farmers bought relatively more shares than the poorer ones.

and the financial limitations on purchasing other inputs are probably more serious. Thus, through greater application of the almost costless female and child family labour, and by bringing a larger percentage of the land under cultivation to the points below the marginal gains acceptable to the larger units, they may try to maximize gains from the more limited land input.(1) Note that the application of adult male labour is less extensive in these units (Table 1); also, that marginal returns per adult male labour input are not significantly different for the two categories (Table 4). Since off-own-farm jobs are more available for adult male labourers, they are unlikely to work for less than a minimum marginal return on their own farms.

3) The above reasons for the differences in the productive performance of the two groups are based on the differences in the factor endowments of the two categories. But, in spite of these apparent differences, it is not surprising to note that the tests do not indicate any farm-management specific effects. An explanation for this result can be presented in relation to the existence of semi-collective organization of production in the village. This probably makes the farm organizations of production fairly homogeneous.

It can be concluded that although the tests do not positively show any size specific effects, the inputs which affect output significantly, appear to have different patterns for each category which seem to be inherent for each farm size category. As a result the medium size peasant holders show more overall productive behaviour, while those in small size category t· to get higher returns per unit of land input.

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(1) Note that the seasonal nature of agricultural activities, together with the requirements of specific skills for certain tasks, causes employment of non-family labour even for the smaller units.

Tālesh-Mahalleh (Gilan)

Like Ahmed-Ābād, this is a conventional village composed of peasant holdings only. They are grouped in two categories (Chapter Four, Section Two, p.157 Table 2).

1) Medium-size peasant holdings ranging from 0.8 to 6.3 hectares.

2) Small-size production units ranging from 0.1 to 0.72 hectares.

A study of the inputs per hectare of the land under cultivation for each group shows the following results (Table 8):

1) Application of both labour and current inputs is higher for the smaller size category. Also, the relative share of family labour in the total is higher for this group.

2) Application of machinery is higher for the medium-size category.(1)

Table 8 : Tālesh-Mahalleh

Mean Value of Measured Independent Variables per Hectare of Land Under Cultivation for Each Group.**

	Variables \ Groups	GP1	GP2
1	DAYS/ha	345.8	383.7
2	VCUR/ha	10000	15400
3	DEPM/ha	1424	1057
4	MAN/ha	125.5	149.4
5	Family Labour in Total %	54	83

** Tea is completely rain-fed. A substantial number of the farmers were tea producers only. Therefore, the inclusion of the average quantity of water used would have been meaningless.

Units: 1) Total labour adjusted to equivalent adult labour days/ha.
2) Rials/ha.
3) Rials/ha.
4) Male-adult labour days/ha.
5) Per cent.

(1) Relative to the medium-size farms, the smaller producers used a larger proportion of their holdings for tea, some being solely tea producers. As no machinery is used for tea production this category as a whole uses less machinery.

The following results have been obtained from the analysis of variance tests.

1) The total productivity ratio (EG) is higher, but insignificantly different for the medium-size groups. (Tables 9 and 11).

2) The partial productivity ratio with respect to the area of holdings (OG/TLA) is significantly higher for the small-size category. (Tables 10 and 11).

3) The partial productivity ratio with respect to total labour input (OG/DAY) is higher, but insignificantly different, for the medium-size category. (Tables 10 and 11).

4) The partial productivity ratio with respect to man days of adult male labour input is higher, but insignificantly different, for the smaller-size category. (Tables 10 and 11).

The complete model for the analysis of covariance test shows a high $\bar{R}^2$ (0.94) indicating that most variations are explained by the model and that the random effects are very small (Table 13).

The hypotheses tested by the analysis of the covariance model show the following results (Tables 13 and 14):

1) The F-value for the zero-slope (26.50) strongly rejects the null hypothesis that output is not affected by inputs i.e., at least one of the variables has an effect on output (Table 13).

2a) The t-values for each of the individual inputs reject the null hypothesis of no effect and show that both area of holdings and labour input have significant positive effects on output. Elasticities standardized by the mean values of variables also show the relative importance of these two inputs on output (Table 14).

2b) The F-value for the equality of both slopes and constants (0.92) accepts the null hypothesis that both the size specific effect and the marginal

Table 9 : Tālesh-Mahalleh

Estimates of Mean Total Productivity Ratios per Group

Rls./Rls.

EG		EN		EA	
GP_1	GP_2	GP_1	GP_2	GP_1	GP_2
1.5195	1.4142	1.5298	1.4186	1.6378	1.5047

Table 10 : Tālesh Mahalleh

Estimates of Mean Partial Productivity Ratios per Group (1)

		G		N		A	
		GP_1	GP_2	GP_1	GP_2	GP_1	GP_2
1	O/TLA	95752.1	125987.3	94337	125009.5	84294.6	110680.7
2	O/DAY	282.5	259.4	278.1	257.2	247.6	227.4
3	O/MAN	763	943.3	751.3	930.6	667.6	810.6

(1) Partial productivities with respect to water used will be meaningless in this village since most agriculture is rain-fed.

Units: 1) Rls./ha.

2) Rls./total labour adjusted to equivalent male adult labour days.

3) Rls./male adult labour days.

Table 11 : Tālesh Mahalleh

Summary Results Analyses of Variance

F R a t i o			
EG	OG/TLA	OG/DAY	OG/MAN
0.7776	11.8783*	0.9174	0.4960

* Rejection of the null hypothesis of equal mean productivities at 5% significance level.

Table 12 : Tālesh-Mahalleh

Analysis of Covariance, Estimates of Means of Inputs and Outputs per Group

Variables / Groups	OG 1	LA 2	QW 3	VCUR 4	DEPM 5	DAYS 6
Group I	151809	1.637	474	16140	1970	569
Group II	50977	0.389	75	6028	238	192
Total	99992	0.997	269	10944	1080	376

Units: 1) Rls.

2) ha.

3) m^3

4) Rls.

5) Rls.

6) Total labour adjusted to equivalent male adult labour days.

Table 13 : Tālesh-Mahalleh

Summary Analysis of Covariance

Dependent Variable	$\bar{R}^2$	F-Value for Zero-Slopes	F-Value for Equality of Slopes and Constant	F-Value for Equality of Constant Effect	F-Value for Equality of Slopes
OG	0.94	26.5017*	0.9182	4.0002*	0.9353

* Rejection of the null hypothesis at 5% significance level.

Table 14 : Tālesh-Mahalleh

Individual Input Effects

Inputs	Elasticities Standardized by Mean Value of Variables(1)	t-Tests for Effects of each Variable	
LA	0.60	4.4268*	$\bar{R}^2$
QW	0.00	-0.7576	
VCUR	0.00	0.8263	0.94
DEPM	-0.05	-0.5488	
DAYS	0.27	2.2962*	

(1) Note that the regression coefficients have not been presented as the data have been measured in different units, but have been scaled to show elasticities measured at the mean.

* Rejection of the null hypotheses at 5%

productivities of the covariates are equal for the two groups (Table 13).

3a) The F-value for the equality of constants (4.0002) rejects the null hypothesis of no farm management specific effect[1] (Table 13).

3b) The F-test for equality of slopes accepts the null hypothesis that the marginal productivities of the covariates are the same for both groups.

To summarize, the regression show that both the farm size and the labour input have significant positive effects on output. Although the total productivity ratio is higher for the medium-size farms, the analysis of variance test shows no significant differences between the two groups, suggesting that the slopes of the production functions are not different for the two groups. This result is positively confirmed by the analysis of covariance test, which shows no significant differences in the marginal productivities of inputs between the two groups. But the analysis of covariance model shows that the higher output levels (relative to the total measured inputs in the medium-size farms) are due to the farm-management specific effect, indicating that the organizational factor in the medium-size farms causes higher overall productivities.

A number of results obtained from partial productivity analysis, though weaker and perhaps inconclusive, are worth mentioning insofar as they will further clarify the following arguments: The partial productivity ratio

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(1) At first this result may appear to contradict the result obtained from 2b. However, in the case of the test for both slopes and constant, the interaction between slopes and constant may mean that they cancel each other out and result in an insignificant F-ratio. But such a result does not preclude the possibility that either slopes or constant may have significant effects on output.

Also note that the significance of the constant effect in this model does not contradict the result obtained from the analysis of the variance model. The latter assumes that both groups have zero constants and tests for the equality of slopes. Thus where output differences between the two groups are due solely to the constant effect, the analysis of variance test may fail to show significant differences between means.

with respect to the area of holdings is significantly higher for the small-size producers, while the ratio with respect to total labour input is higher, but insignificantly different, for the medium-size producers. However the ratio with respect to the adult male labour input is higher, but insignificantly different, for the small-size category.

This village is tea and rice producing; both crops are highly labour intensive. This is also shown by the results of the regression analysis, the labour input showing a significant effect on the overall output. Therefore, a possible explanation for the above-mentioned results may concern the relative factor endowments of the two factors of land and labour for the two groups, these being likely to have caused the subsequent organizational differences between the two groups

1) The availability of family labour is more limited for the larger units than for those in the small-size category (Table 8). Thus, in order to obtain more gains from the land, paid labourers must be employed. In this case, the farming household is likely to be unwilling to employ labourers at rates below marginal returns equivalent to the wages, i.e., the producers do not try to optimize gains from the land only, but make an attempt to obtain higher gains from the combination of the two factors of land and labour.(1)

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(1) As can be seen in Table 8 the small-size producers apply more current inputs than do the medium-size producers. This phenomenon does not contradict the argument for the greater purchasing abilities of the medium-size farms as proposed for Ahmad-Ābād pp. 178 - 179 In Tālesh-Mahalleh, as a result of the more favourable natural conditions and perhaps because of differences in the attitudes of the farmers to changes in techniques of production (see Section Three pp 233 - 234 on the whole the farmers apply fewer current inputs than they do in Ahmad-Ābād. (This is also indicated by the insignificant effects of current inputs and machinery on output). As a result, although the small-size farms in this village apply more current inputs than do the medium-size farms, comparisons with Ahmad-Ābād show that the small-size farms in the latter village apply more current inputs per hectare than do their counterparts in Tālesh-Mahalleh. Also, note that other costs, especially payments for the use of water, are substantially higher in Ahmad-Ābād. Thus it can be hypothesized that the small-size producers in Tālesh-Mahalleh do not hit the cost ceilings beyond which their purchasing abilities may prevent them from using more inputs.

2) The supply of the family labour is relatively more abundant in the smaller farms, while the supply of land is more limited for this group. As a result, through greater application of the almost costless female and child family labour to the points below the marginal gains acceptable to the larger units, they try to make higher gains from the more limited land input. Note that this group is not so generous in the application of the male adult labour input. As a result of this the partial productivity ratio (with respect to this input) though insignificantly different, is higher for the smaller size category. As in the case of Ahmad-Ābād, it can be argued that since off-farm jobs are relatively more abundant for the adult male labour, they are unlikely to be willing to apply their labour below a minimum marginal return on their own farms.

Turane-Turk (Gorgan)

In this village four categories of farms have been distinguished (Chapter Four, Section Two, p. 157 Table 2):

1) Large holdings in the village ranging from 12 to 105 hectares. They include a range of large peasant and peasant-capitalist production units.

2) A number of medium-size farms varying in area of holdings from 6 to 9 hectares.

3) Small-scale peasant producers with farm sizes ranging from 1 to 5.5 hectares.

4) Four mechanized farms (sāzemān) situated around the village, 45-195 hectares.

A study of the measured factor inputs for each category of farms shows the following results (Table 15):

1) The quantity of water input is identical for all farming categories.

2) The quantity of total labour input is highest for the small-size category. The medium-size peasant producers rank second, the large producers in the village third and the mechanized farms fourth. A similar

pattern is observed for the application of the male adult labour per hectare. Note that the differences in total labour applications between the large-size producers in the village and the mechanized farms is not substantial. But the difference between the adult male labour and the family labour applications is large.

3) The application of current inputs is highest for the medium-size peasant holdings and smallest for the large-size producers in the village.

Table 15 : Turāne-Turk

Mean Values of Measured Independent Variables per Hectare of Land Under Cultivation for Each Group.

	Variables \ Group	Group 1	Group 2	Group 3	Group 4
1	QW/ha.	4316	4316	4316	4316
2	DAYS/ha.	179.4	237.7	243.2	176.4
3	VCUR/ha.	7667	12596	9324	9443
4	DEPM/ha.	1578	1746	1455	567
5	MAN/ha.	127	117	149	89
6	Value of pestic-ides/ha.	5840	6830	5010	5840
7	Family Labour in total %	12	42	84	1

Units: 1) m^3/ha

2) Total labour adjusted to equivalent male adult days/ha.

3) Rls/ha.

4) Rls/ha.

5) Male adult labour days/ha.

6) Rls/ha.

7) Per cent.

4) The application of machinery is highest for the medium-size farms. It is lowest for the so-called mechanized farms.

As indicated by Table 16, the total productivity ratio (EG) is highest for the medium-size producers. The large-size producers in the village rank second, the mechanized farms third and the small peasant producers in the village rank fourth. Note that the mean total productivity ratios for the mechanized farms and the small peasant producers are very close.

Table 16 : Turāne-Turk

Estimates of Mean Total Productivity Ratios

Rls./Rls.

	GP 1	GP 2	GP 3	GP 4
EG	1.2095	1.4970	0.9119	0.9350
EN	1.2193	1.5230	0.9089	0.9325
EA	1.2667	1.7941	0.9219	0.9238

As there are four groups in the village and the category of mechanized farms includes four observations only, it was not possible to use these farms as a separate category in the statistical models, because of the limitations related to degrees of freedom. I have tried to make a partial attempt to get round the problem by doing all the statistical tests twice. In the first series of tests the four mechanized farms have been completely omitted, leaving only the three categories in the village. In the second series of tests I have included these four observations in the same category as the large holdings (group one) in the village. Obviously the latter categorization suffers from the problem of mixing two apparently different farm management systems. The results are bound to be affected by this mixture and may not point to conclusive results concerning these mechanized farms. Nonetheless, under the circumstances it seemed the best possible

approach.

The two series of tests, using the analysis of variance model, have been distinguished by using the notations EG_1 where the four mechanized farms have been excluded from the analysis, and EG_2, where these farms are included. In both of the two series of tests, as there are three groups to be tested for the equality of means, an attempt has been made to test for the equality of all means, and to make pair-wise tests between the mean total productivity ratios of each two groups. The tests show the following results (Table 17):

1) The F-values for equality of all mean group ratios (5.60 and 5.19) for both series of tests using EG_1 and EG_2 as dependent variables, reject the null

Table 17 : Turāne-Turk

Summary Analysis of Variance Total Productivity Ratios

Dependent Variable	F-Value for Equality of all Means	F-Value for Equality of Mean GP_1 & GP_2	F-Value for Equality of Mean GP_1 & GP_3	F-Value for Equality of Mean GP_2 & GP_3
EG_1	5.5995*	1.9567	4.1287*	9.6359*
EG_2	5.1858*	3.2829	2.9320	9.6604*

* Rejection of the null hypothesis of difference in mean productivity ratios at 5% significance.

hypothesis of equal means and show that at least two group means are significantly different.

2) The F-value for equality of group means for the first and the second categories, using EG_1 as the dependent variable, is insignificant (1.96). This indicates that while the medium-size farms show higher total productivity ratios than the large-size farms in the village, they are insignificantly different.

However, when EG_2 is used as the dependent variable, i.e., the four mechanized farms are included in the first category, the F-value (3.28) for the equality of the means of the first and second categories becomes

nearly significant. This indicates that once the four mechanized farms are included in the first category the group mean is sufficiently reduced to become almost significantly different from the medium-size category. Thus it can be said that the total productivity ratio for the mechanized farms is probably significantly lower than the medium-size farms.

3) The F-value (4.13) for equality of slopes for groups one and three, using EG_1 as dependent variable, shows a significantly higher total mean productivity ratio for the large-size producers in the village as compared with the small-size peasant producers.

However, when the four mechanized farms are included in the first category (EG_2), the F-value (2.93) is insignificant. This indicates that once the four mechanized farms are included in the first group, the mean total productivity ratio of this group is sufficiently lowered to make its difference from the small peasant producers insignificant. This implies that the mean total productivity ratio of the four mechanized farms, though slightly higher, is insignificantly different from the small peasant producers.

4) The F-value (9.63) for the equality of mean total productivity ratios for the medium size and the small-size peasant producers, significantly rejects the null hypothesis of equal means and show that the medium-size farms have higher total productivity ratios.

The following results have been obtained from the partial productivity analysis [1] (Tables 18 and 19):

1) Mean partial productivity ratios with respect to the total area of holdings (OG/TLA) are highest for the medium-size farms. The second highest group is the small-size category. Third and fourth are the large-size farms in the village and the mechanized farms, respectively. The F-value (2.50) for equality of all group means is insignificant. Thus the null

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(1) In all the tests the four mechanized farms are included in the first group.

Table 18 : Turāne-Turk

Estimates of Mean Partial Productivity Ratios

		G				N				A			
		GP1	GP2	GP3	GP4	GP1	GP2	GP3	GP4	GP1	GP2	GP3	GP4
1	O/TLA	41438	57056	43000	29865	39772	55319	41565	29097	31140	42189	33165	18511
2	O/DAY	214.6	274.3	181.8	202.1	206.2	266.2	174.8	195.2	163.4	208.8	135.7	137.6
3	O/MAN	343.5	485.3	286.7	334	329.9	470.7	274.6	326.1	260.5	367.8	211.7	313.7

Units: 1) Rls/ha.

2) Rls/Total labour adjusted to equivalent male adult labour days.

3) Rls/male adult labour days.

hypothesis of equal means is not rejected.

2) The partial productivity ratios with respect to total labour input (OG/DAY) are again highest for the medium-size farms. Large-size farms in the village are second, the four mechanized farms third and the small peasant producers fourth. The F-value (1.161) for the equality of all mean partial productivity ratios shows that they are insignificantly different.

3) The partial productivity ratios with respect to male adult man days of work are highest for the medium-size farms. Second is the large size farms in the village, third the mechanized farms. The F-value (2.29) shows that they are insignificantly different.

Table 19 : Turāne-Turk

Summary Analysis of Variance Partial Productivities

F R a t i o s			
OG/TLA	OG/QW	OG/DAY	OG/MAN
2.5081	2.0968	1.6070	2.2912

For the analysis of covariance model, again two series of tests excluding the four mechanized farms (using OG_1 as the dependent variable, for short referred to as OG_1) and including the four mechanized farms (OG_2) have been used. The complete model of analysis of covariance, in which the effects of both the constants and the measured variables are allowed to be different between groups, show that for both series of tests (OG_1 and OG_2) the values of $\bar{R}^2$ are high (0.96 and 0.94). (Table 22).

The following hypotheses have been tested by the analysis of covariance model and the results are presented in Tables 22 and 23.

Table 20 : Turāne-Turk

Analysis of Covariance Estimates of Means Per Group (OG_1)

Variables / Groups	OG_1 1	LA_1 2	QW_1 3	$VCUR_1$ 4	$DEPM_1$ 5	$DAYS_1$ 6
Group I	1553690	37.900	157040	252894	55961	6805
Group II	407217	7.175	32095	90273	11460	1705
Group III	105811	3.135	13614	41543	4517	731
Total	573690	13.90	58297	113460	20590	2651

Table 21 : Turāne-Turk

Analysis of Covariance Estimates of Means per Group (OG_2)

Variables / Groups	OG_2 1	LA_2 2	QW_2 3	$VCUR_2$ 4	$DEPM_2$ 5	$DAYS_2$ 6
Group I	200174	51.86	191904	57856	57856	9239
Group II	407217	7.175	32095	90273	11460	1705
Group III	105811	3.135	13614	41543	4517	731
Total	819910	21.00	85717	197390	24408	3886

Units: 1) Rls.

2) ha.

3) m^3

4) Rls.

5) Rls.

6) Total labour adjusted to equivalent male adult labour days.

1) The F-values for the zero-slopes (28.54 and 26.23) for both series of tests (OG_1 and OG_2) strongly reject the null hypothesis that output is not affected by inputs, i.e., at least one of the variables has an effect on output (Table 22).

2a) The t-values for each of the individual inputs, for both series of tests (OG_1 and OG_2) reject the null hypothesis of no effect (Table 23). Where the test is carried out for OG_1, only water shows a significant positive effect on output, the rest being insignificant. However, for OG_2 in addition to water, land size also shows a significantly positive effect and labour shows a significantly negative impact on output.(1)

Elasticities standardized by the mean values of the variables show that for OG_1 the effect of changes on output resulting from the changes in the quantity of water used is very strong. For OG_2, the order of importance of the imputs are the following: 1) area of holdings, 2) labour input (negative effect) and 3) quantity of water used (Table 23).

2b) For both OG_1 and OG_2, the F-values for equality of both slopes and constant (1.13 and 0.16) accept the null hypothesis that both the size specific effect and the marginal productivities of the covariates are equal

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(1) It is puzzling to have obtained a significantly negative effect for labour, as we would normally expect only positive effects of the factor inputs. Two possible explanations, though perhaps neither is satisfactory, may be as follows:

1) The significantly negative result for this variable is obtained where the mechanized farms are included in the sample. These units employ immigrant labourers from the South-Eastern parts of the country. As far as skills are concerned, the quality of these labourers is inferior to that of the local labourers. Thus, it may be hypothesized that perhaps the significantly negative sign of the labour input in the regression have resulted from these qualitative differences.

2) Another explanation may follow from the possibility that the very small-size peasant producers over-employ labour. To this has been added the labour input of the mechanized farms, which are of lower skills and quality. The combination of the two factors has resulted in a significantly negative labour effect on the overall output.

Table 22 : Turāne-Turk

Summary Analysis of Covariance

Dependent Variable	$\bar{R}^2$	F-Value for Zero-Slopes	F-Value for Equality of Slopes and Constant	F-Value for Equality of Constant Effect	F-Value for Equality of Slopes
OG_1	0.96	28.64*	1.1274	0.08705	1.1232
OG_2	0.94	26.2349*	0.1653	0.1304	0.0719

OG_1 Includes village production units only, and OG_2 includes village production units and mechanized farms.

* Rejection of the null hypothesis of no effect at 5% significance level.

Table 23 : Turāne-Turk

Individual Input Effects

	Elasticities Standardized by Mean Values of Variables (1)		t-Test for Effects of Each Variable		R_1^{-2}	$\bar{R}_2^2$
Dependent Variables / Independent Variables	OG_1	OG_2	OG_1	OG_2		
LA	0.23	0.98	0.4073	3.5214*	0.96	0.96
QW	1.19	0.30	5.0562*	1.8670*		
VCUR	-0.19	0.06	-1.1685	0.3254		
DEPM	0.14	0.12	0.17506	0.6104		
DAYS	-0.25	-0.41	-0.6215	-2.1726*		

(1) Note that the regression coefficients have not been presented as the data have been measured in different units, but have been scaled to show elasticities measured at the mean.

* Rejection of the null hypothesis at 5% significance using a one-sided test.

for all groups (Table 22).

3a) F-values for equality of all constants (0.09 and 0.13) for both OG_1 and OG_2 are insignificant, indicating that the size specific effects on the output are insignificant (Table 22).

3b) The F-tests for equality of slopes (1.12 and 0.07) for both series of tests (OG_1 and OG_2) accept the null hypotheses of equal slopes.(1)

To summarize, the analysis of variance tests shows that the mean total productivity ratios are not equal for all groups. But this result is not confirmed by the analysis of covariance model. The latter shows that some inputs have a general overall effect on output. But neither the slopes nor the constants have different effects on the different categories.(2)

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(1) This result appears to contradict the results obtained from the analysis of variance tests (significant F-ratios for the equality of all means (Table 17). The difference may be explained by the fact that in the analysis of variance all inputs have been aggregated, while for the covariance model they are used separately. Thus, probably where the inputs are used separately, they do not have significant effects on the overall slope. But once they are aggregated together, the overall slope may be significantly different.

(2) As shown above, the majority of the statistical tests for this village show insignificant results. (This is also true of the partial productivity analysis), while in the case of the two previous villages, Ahmad-Ābād and Tālesh-Mahalleh, there were more significant results obtained from the analysis. This is striking since in Turāne-Turk, as a result of the existence of greater variations in both size and organization of production, I expected to find more significant differences among the categories of farms. A possible explanation for this result may be in terms of the sample size of this village. While in the case of the first two villages, 72 observations were categorized in two groups, here 41 to 45 observations have been categorized in three groups. Thus, it is possible to argue that perhaps if the sample size had been larger for this village, more significant results could have been obtained from the analysis.

The pair-wise tests between groups carried out by the analysis of variance indicate that the medium-size farms have significantly higher productivity ratios than both the small-size producers and the mechanized farms. The medium-size farms also have higher total productivity ratios than the large-size farms in the village, but they are insignificantly different. The large-size farms in the village have significantly higher total productivity ratios than the small peasant producers. The large units also have higher total productivity ratios than the mechanized farms, but as a result of data limitations statistical tests of significance have not been carried out for these two groups. While the mean total productivity ratios are slightly higher for the mechanized farms, as compared with the small peasant producers, they are not significantly different.(1)

Although partial productivity analyses are in general weak and non-conclusive, and in the specific case of this village the tests have all shown insignificant results, it is worth mentioning that all partial productivity ratios are highest for the medium-size farms. For the partial productivity ratio with respect to land, the second highest is the small-size peasant producers. For all other ratios the second highest is the large size farms in the village.

From the above results it is possible to derive the following generalisations:

1) The relatively superior overall productive behaviour of the medium-size farms as compared with the small peasant producers, (like the two previous villages), can be explained in terms of the relative abundance of the family labour and the more limited supply of the land for the small peasant producers. As indicated by Table 15, application of the family labour

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(1) Note that for the analysis of covariance, pair-wise tests for the equality of slopes have not been carried out.

for the small peasant producers is almost twice that of the medium-size farms. Although the results of the analysis of covariance do not indicate any significant effects of the use of either current inputs or machinery on output, the application of water being identical for both groups, it is still plausible to hypothesize that perhaps the combination of the various input factors in the medium size farms is such as to allow higher overall productivities.

Unlike the other two villages, in this one the medium size farms show even higher partial productivity ratios, with respect to the area of holdings, than the comparable figure for the small peasant producers, though the tests do not show significant differences. Two alternative hypothetical arguments can be presented for this result. First, since the labour input shows a significantly negative sign in the regression, (see Foot-note on p. 159) it may be argued that perhaps the small-size peasant producers over-employ the labour input. Second, although the regression shows no indication of the effect of machinery on output, it may be hypothesized that since the village is more mechanized than the two previous ones,through greater use of machinery, which perhaps stems from greater purchasing abilities, the medium-size farms have been able to obtain higher results from their input of land.

2) Comparisons of the medium-size peasant holders with the larger units in the village do not lead to any conclusive results. The medium-size farms show higher productivity ratios, but the tests do not indicate any significant differences. It is possible to hypothesize that the absence of significant evidence supporting the superior productive performance of the medium-size farms may be due to the smallness of the sample size; perhaps with a larger sample significant results would have been obtained. (See Foot-note on p.195) If the argument is based on this assumption, then a possible explanation for the superior performance of these farms may be

found in the relative abundance of the family labour for these production units. It can be argued that the family labour may be superior to hired wage labourers in terms both of incentives and ease of access. First, it can be hypothesized that since returns from farming activities and the income accrued to the family coincide, the family labour may have more incentives to work hard. This may especially be true in times of emergency where the family labour may be willing to put in longer hours of hard work to overcome the problems; the wage-labourer is unlikely to have as much incentive to work hard. Second, at times of emergency family labour is easily accessible, while there may be a time-lag before wage-labourers can be found. This may have negative results on output as for some agricultural activities the timing of the tasks may be crucial.(1)

3) Comparisons of the medium-size farms and the mechanized farms point to the superior performance of the former. It can be argued that the overall system of farm management in the medium-size farms appears to be superior to the mechanized farms. While at both the managerial and labour levels the medium-size farms depend heavily on family labour; the mechanized farms at the managerial level are partially dependent on wage-earning managers and at the labour level on the immigrant low-skilled workers. Thus the overall organization of farm is different for this category and probably inferior to the organization of the medium-size farms.(2)

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(1) Note that for the year under study there were labour shortages in the countryside and farmers complained that after they were unable to find agricultural labourers when they needed them.

(2) Another hypothetical argument in favour of the superior performance of the medium farm size category relative to the other two larger categories, may be concerned with the financial positions of these categories. The medium-size farms appear to be financially capable of applying sufficient machinery and current inputs in order to get higher output. (Application of these factors is highest for this group). It can be hypothesized that they probably make just about enough to meet the required costs. Therefore, they are likely to be careful not to allow resource wastes. While it can be hypothesized that the two larger categories are better able to afford waste, and this could be one reason for their apparently lower overall productivities. It must be noted that,

4) A similar though weaker argument than the one presented for the medium-size farms, may be presented for the relative superior performance of the larger units in the village as compared with the small-size farms or the four mechanized farms.

5) The insignificant differences in the productivities of the small-peasant holders and the mechanized farms suggests that perhaps the organizations of production, though different, are equally inefficient in both cases. For the small-peasant holders it may be argued that perhaps the inefficiency results from the over-application of the family labour and the financial inability to purchase a sufficient quantity of other required inputs. In the case of the mechanized farms the inefficiencies are probably due to the absence of the sufficient owner family managerial and labour inputs and the use of relatively less skilled immigrant labourers.

Chahār-Dāngeh (Tehran)

As stated in Chapter Four (Section Two, pp. 157 Table 2) three different categories of production units, based on organizational differences, have been observed in this village.

1) The arbabi (landlord) unit with the area of holding equal to 330 hectares. It is composed of an apple orchard, wheat cultivation, plus purely speculative land (Table 24).

2) Owner-operated farms ranging in size between 0.4 and 18 hectares.

3) Seasonally immigrant summer-crop producers ranging in size from 0.43 to 7 hectares.

Since the arbabi unit is a single observation, it could not be included in the statistical tests.

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first, the existing evidence for this village does not provide empirical support for this argument, and second, even if the argument is valid it is not certain whether the wastefulness may begin to show in the larger farm category in the village.

Table 24 : Chahār-Dāngeh

Arbābi Unit

Size of Holding ha.	Area Under Cultivation ha.	Apple		Wheat	
		Size of Orchard ha.	Yields T/ha.	Area Under Cultivation ha.	Yields T/ha.
330	108	68	23	40	1.2

A study of the input patterns for the three groups show the following results (Table 25):

(1) The per hectare input of water for the owner-operated farms is substantially less than for the other groups, one fifth of the arbābi and less than half of the ejāre-kārs. This is due to the fact that the arbāb, in addition to having village rights on the nearby river, has set up deep-wells.[1]

(2) Man-days of labour are highest for the ejāre-kārs and by far lowest for the arbābi unit. The difference in the total labour application between the owner-operated and the ejāre-kārs is not great. However, it was obvious that the ejāre-kārs worked more intensively during each work-day. Also, the application of the adult male labour is substantially higher for the ejāre-kārs.

(3) The arbābi unit uses more machinery per hectare than the other two groups. The owner-operated farms are second and the ejāre-kārs third.

The total productivity ratio (EG) is highest for the ejāre-kārs and lowest for the arbābi unit (Table 26). The results of the test of analysis of variance between the ejāre-kārs and the owner-operated farms show that the differences in total productivity ratios between the two groups is insignificant (Table 28).

The following results have been obtained from the partial product-

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(1) According to the statements of the owner-operated farmers, they receive less than their fair shares from the river water.

Table 25 : Chahar-Dangeh

Mean Value of Measured Independent Variable Per Hectare for Land Under Cultivation for Each Group.(1)

	Variables \ Groups	GP_1	GP_2	GP_3
1	QW/ha	95518	18867	49669
2	DAY/ha	58.77	373	385.4
3	VCUR/ha	31786	16129	47915
4	DEPM/ha	12153	742	5517
5	MAN/ha	58.77	121.82	282.40
6	Area under Cultivation to Total %	43	62	100
7	Family Labour to Total %	4	96	68

Units: 1) m^3/ha

2) Total labour adjusted to equivalent male adult labour days/ha.

3) Rls./ha

4) Rls./ha

5) Male-adult labour days/ha.

6) Per cent

7) Per cent

Table 26 : Chahār-Dangeh

Estimates of Mean Total Productivity Ratio per Group

Rls./Rls.

	GP_1	GP_2	GP_3
EG	0.7104	0.8248	0.8464
EN	0.6822	0.8178	0.8454
EA	0.5656	0.7485	0.8203

ivity analysis (Tables 27 and 28).

1) Partial productivity ratios with respect to the area of holdings are highest for the ejāre-kārs and lowest for the arbābi unit. Test of analysis of variance for the ejāre-kārs and the owner-operated farms show that this ratio is significantly higher for the ejare-kars.

2) Productivity ratios with respect to the quantity of water used are highest for the owner-operated and lowest for the arbābi unit. The results of the analysis of variance test for this ratio between the second and third groups show that it is insignificantly different between these two groups.

3) Partial productivity ratios with respect to total labour input are highest for the arbābi and lowest for the ejāre-kārs. The results of the tests between the owner-operated and the ejāre-kārs are insignificant.

4) Partial productivity ratios with respect to male-adult labour input are highest for the arbābi unit and lowest for the owner-operated. Tests of significance between the ejāre-kārs and the owner-operated show insignificant results.

The complete model of analysis of covariance in which the effects of both the constant and the measured variables are allowed to be different for the two groups (owner-operated and ejāre-kārs) show high $\bar{R}^2$ (0.95) indicating that most of the variations are explained by the model and that

Table 27 : Chahar-Dangeh

Estimates of Mean Partial Productivity Ratios per Group

		G			N			A		
		GP_1	GP_2	GP_3	GP_1	GP_2	GP_3	GP_1	GP_2	GP_3
1	O/TLA	40401	43874.5	170865.5	35355.9	42422.3	169376.5	21440.3	27088.31	134850.8
2	O/QW	1.6977	3.7322	3.4393	1.4856	3.6068	3.4071	0.9009	2.4863	2.6767
3	O/DAY	1655.57	490	376.014	1448.83	473.623	372.364	878.59	349.896	290.452
4	O/MAN	1655.57	578.009	604.94	1448.83	558.584	599.518	878.59	404.338	472.044

Units: 1) Rls./ha

2) Rls./m^3

3) Rls./total labour adjusted to equivalent adult male labour days

4) Rls./male adult labour days

Table 28 : Chahār-Dangeh

Summary Results Analysis of Variance

	F R a t i o s			
EG	OG/TLA	OG/QW	OG/DAY	OG/MAN
0.0351	166.5242*	0.1687	0.4515	0.0261

* The hypothesis of equal means ratios for the two groups is rejected at 5% significance level.

the random effects are small (Table 30).

The following hypotheses have been tested by the analysis of covariance model and the results are presented in Tables 30 and 31.

1) The F-value for the zero-slopes (62.14) strongly rejects the null hypothesis that output is not affected by inputs i.e., at least one of the variables has an effect on output (Table 30).

2a) The t-values for each of the individual inputs reject the null hypothesis of no effect and show that both area of holdings and current inputs have significantly positive effects on output (Table 31).

Elasticities standardized by the mean values of the inputs also show the relative importance of the effects of these two inputs on the output (Table 31).

2b) The F-value for equality of both slopes and constants (6.00) rejects the null hypothesis that both the size specific effect and the marginal productivities of the covariates are equal for both groups.

3a) The F-value for the equality of constants (6.30) rejects the null hypothesis of no farm-management specific effect, indicating that organizational differences between the two categories have caused differences in the levels of output for equal inputs between the two groups.

3b) The F-test for equality of slopes (0.73) is significant, i.e., differences in productivities of the two groups cannot be attributed to the

Table 29 : Chahar-Dangeh

Analysis of Covariance, Estimates of Means of

Inputs and Outputs per Group

Variables / Groups	OG	LA	OW	YOUR	DEPM	DAYS
Group 1	126487	-	33221	19329	3984	319
Group 2	297633	-	84264	46180	3104	779
Total	178349	-	48687	27465	3717	458

Units: . 1) Rls.

2) Ha. (Land under cultivation).

3) m^3

4) Rls.

5) Rls.

6) Total labour adjusted to equivalent male adult labour days.

Table 30 : Chahār-Dangeh

Summary Analysis of Covariance

Dependent Variable	$\bar{R}^2$	F-Value for Zero-Slopes	F-Value for Equality of Slopes and Constant	F-Value for Equality of Constant Effect	F-Value for Equality of Slopes
OG	0.95	62.1365*	5.0906*	6.3020*	0.7286

* Rejection of the null hypothesis at 5% significance level.

Table 31 : Chahār-Dangeh

Individual Input Effects

Inputs	Elasticities Standardized by Mean Values of Variables (1)	t-Tests for Effects of Each Variable	$\bar{R}^2$
LA	1.1050	16.3828*	0.95
QW	0.0626	- 0.5826	
VCUR	0.2862	4.4070*	
DEPM	0.0557	- 1.8574	
DAYS	0.0149	- 0.1505	

(1) Note that the regression coefficients have not been presented as the data have been measured in different units but have been scaled to show elasticities measured at the mean.

* Rejection of the null hypothesis at 5% significance level.

differences in the marginal productivities of the inputs.

To summarize, in the case of the owner-operated and the ejāre-kārs the regression shows that the area of holdings and the current inputs have overall positive significant effects on output. Both analysis of variance and analyses of covariance models show no significant differences in output resulting from the marginal productivities of the inputs. But the analysis of covariance test shows that the organization of production of the ejāre-kārs has resulted in the significantly higher output for this group.

Since the arbābi unit was a single observation, it could not be included in the statistical tests. Thus no conclusive results concerning this type of system may be drawn. However, the data for this unit tends to suggest lower overall productivities.

The following reasons appear to explain the higher overall productivities of the ejare-kars in comparison with the owner-operated farms:

1) As the analysis of covariance suggests, the productivity differences are due to the organizational differences of the two groups. The ejāre-kārs operate on the basis of organized collective activities. Also, they possess better farming skills, which are combined with hard work. On the other hand, for the owner-operated farms there is no organized collective farming. Also, in general the level of skill is lower than in the ejāre-kārs. In addition, two external factors seem to have acted unfavourably upon the organization of production of this group. First, the village being close to Tehran, farmers are diverted from production by land speculation and various other activities as middlemen, so that in many instances farming becomes only a secondary activity. Second, according to the statements of the farmers, years of struggle with the landlord and a general state of insecurity which prevailed for a long time has hindered the development of agriculture by the local farmers.

2) According to the farmers limitations on the supply of water are a major problem for production in the owner-operated farms, whereas the

ejāre-kārs, so long as they have paid for it, can increase their water supplies.(1) Also, the ejāre-kārs applied more current inputs per hectare than the owner-operated farms; this has had a significant effect on output(2) (Table 31).

In relation to the arbābi unit, it can be hypothesized that although the unit is being managed by trained managers who appear to be willing to do their best for the apple orchard, there are inefficiencies in this large-scale unit which cause waste. First, it can be argued that should the unit have been smaller, it could not have afforded to leave a portion of the land uncultivated. Although a smaller unit may also be interested in land speculation, it will still cultivate all the land,(3) because it cannot afford waste. Second, the owners were only interested in the apple-orchard, and wheat production, due to its lower monetary returns, was

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(1) The regression (Table 31) does not show a significant effect of the quantity of water on output. The effect of this factor is likely to have been picked up by the organizational factor.

(2) Note that among the owner-operated farms, with the exception of a single observation ha. 18, all other units varied in size between 0.4 and 4 hectares. Therefore this category is basically composed of the small peasant holdings. As a result, the differences between the very small and medium size farmers could not be observed here. A similar situation is observed for the ejāre-kārs. With the exception of two observations (ha. 7 and 5), the rest owned a maximum of four hectares, whilst more than fifty per cent had one hectare or less. Therefore this category is also composed of the small peasant holders. This factor also explains the fact that, in spite of the high skills and very organized collective farming activities by this group, the total productivity ratio (EG) is less than one. Through application of the nearly costless female and child family labour, they try to get the highest possible gains from the land.

(When ejāre-kārs were asked if they were satisfied with the returns derived from production, their answers were yes. They stated that the gains from the summer-crop production are higher than those from selling their labour in non-farming activities. It is interesting to note that for them the basis of comparison is the net returns accrued per adult male labourer).

(3) Even in some cases where the owner-operated farmers had sold a portion of their lands to land speculators in Teheran, if the new owner was absent, they often took advantage of the situation and cultivated the lands that no longer belonged to them.

neglected. It may be argued that for these owners the opportunity cost of extra managerial time may have been higher than the potential returns from the higher outputs of wheat. Therefore, they chose to allow wastage, through low yields, for the production of this output. It appears that from the point of view of the enterprise these are not waste, but the result of rational cost benefit calculations. It can be hypothesized that under similar conditions other production units of this type may also behave similarly. Thus it can be hypothesized that this allowance for waste is an inherent characteristic of these types of units.

Explanatory Notes on the Arbābi Unit:

In the above analysis, the total productivity ratio of the arbābi unit has been calculated inclusive of the land rental charges accruing to the purely speculative land which is left fallow. It may be argued that the portion of the land used for speculation should not be included in the farming activities of the owner. But a counter argument is presented here stating that the speculative land is potentially productive. Therefore, rents accrued should be included in the costs of the unit. However, even if the argument in favour of the exclusion of the speculative lands is accepted, total productivity ratios for this unit are still lowest (Table 32).

Another computational problem relates to the question of whether the cold-storage should be included as a part of the owner's farming operations. In Table 32 I have calculated the total productivity ratios of this unit, excluding the cold-storage from the computations. As the cold-storage is rented to other users and the owner makes a profit on it, the exclusion of this storage from the calculations reduced the total productivity ratios.

Table 32 : Arbābi Unit

Alternative Methods of Calculating Productivity Ratios

Rls./Rls.

			EG	EN	EA
Total Production Unit	(1)	Cold Storage Excluded	0.6916	0.6854	0.5724
	(2)	Rents on speculative lands excluded	0.7951	0.7725	0.6732
	(3)	Both (1) and (2) excluded	0.7848	0.7799	0.6852
Apple Orchard	(4)	All costs included	0.8926	0.8894	0.8371
	(5)	Land rents excluded	0.9554	0.9540	0.9298
	(6)	Family labour excluded	1.1266	1.1314	1.6075
	(7)	Both (5) and (6) excluded	1.2285	1.2381	1.4303

The area under cultivation in the arbābi unit consists of a highly mechanized apple orchard plus wheat production. The wheat production is not supervised by the owners. This portion of the land is given to the workers of the orchard to use for cultivation, as a part of their labour compensations. Thus from the point of view of the owners production activities are limited to the apple orchard only. Should productivity ratios be calculated for the orchard alone, then the ratios will be highest among the three categories (Table 32).

Note that the apple orchard from the point of view of social accounting shows lossess, the total productivity ratio being less than one (Table 32). However, from the view point of the enterprise it is profitable. First, the owners do not impute rents for the land used for the orchard. They treat it as a capital investment which will increase in value as a result of land speculation.(1) Second, the owners do not assign costs to their own managerial supervision. Rather they are interested in the overall gains accrued to them.(2) Should these two costs be subtracted from the calculations, then the total productivity ratio is substantially greater than one (Table 32).

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(1) The argument that they could rent all their holdings inclusive of the apple-orchard and accrue rents does not hold. It is in fact due to the presence and the activities of the landlord, and because of the mechanized apple-orchard, that he has been able to secure his ownership. Should he leave the village and rent all the land, it is likely that there will be claims of ownership against him.

(2) Statements of the owners in their interviews.

Booraki (Khuzestān).

As mentioned earlier, due to data defficiencies in this village no grouping of the data into various categories could be made (Chapter Four, Section Two, p. 157, Table 2.).

In general both total and partial productivity ratios are low in this village (Table 33).

Table 33 : Booraki

Mean Value of Productivity Ratios for Each Group

		G	N	A
		1	1	1
1	E	0.5638	0.5833	0.4957
2	O/TLA	8871.6871	8079.3975	6485.2259
3	O/QW	3.1454	2.8302	2.2166
4	O/DAY	259.8477	219.4465	179.7275

Units: 1) Rls./Rls.

2) Rls./ha.

3) Rls/m^3

4) Rls./total labour adjusted to equivalent adult labour days.

As indicated by Table 34, the application of the different inputs per hectare are also low in comparison with other villages.

Regression analysis have been used to study the effects of the factor inputs on output. The $\bar{R}^2$ (0.99) for the regression is high (Table 36).

The results of the regression analysis are presented in Table 36 and indicate that current inputs, machinery and labour input all have a positive significant effect on the output. Land size has shown a significantly

Table 34 : Booraki

Mean Value of Measured Independent Variable per Hectare

	Variable	Mean Value
1	QW/ha	477.95
2	DAYS/ha.	93
3	VCUR/ha.	277.26
4	DEPM/ha.	136.40

Units: 1) m^3/ha

2) Total labour adjusted to equivalent adult male labour/ha.

3) Rls./ha.

4) Rls./ha.

negative effect, which is puzzling. It is possible to argue that the negative effects of some other variables, not included in the model, may have been picked up by the area under cultivation.

Table 35 : Booraki

Regression Analysis, Estimates of Means

OG 1	LA 2	QW 3	VCUR 4	DEPM 5	DAYS 6
175023	14.78	47795	31983	11207	10835

Units: 1) Rls.

2) ha.

3) m^3.

4) Rls.

5) Rls.

6) Total labour adjusted for equivalent adult male labour.

Table 36 : Booraki

Individual Input Effects

Inputs	Elasticities Standardized by Mean Values of Variables	t-Tests for Effects of Each Variable	$\bar{R}^2$
LA	-0.4415	-2.3200*	0.99
QW	0.0294	0.2832	
VCUR	0.5052	5.2099*	
DEPM	0.4366	5.1380*	
DAYS	0.5635	4.8426*	

* Rejection of the null hypothesis of no single input effect at 5% significance.

It is generally believed that natural conditions, as well as agricultural know-how in this village used to be very similar to those of the villages whose area are presently irrigated by the Dez Dam, where the four agro-businesses are located. Agricultural yields were studied in 1957 for the latter area. Comparison of this data with the present figures show lower results for Booraki (Table 37). Although it is possible to argue that differences in the methods of estimation may have resulted in different estimates, the two figures appear to be significantly different to support the hypothesis of actual productivity decline in Booraki.

From the above evidence, it is possible to hypothesize that the generally low level of productivities in this village may be attributable to the following factors:

1) The generally low level of inputs that, according to the regression analysis, play significant roles on output. Also, for the labour input the

Table 37 : **Gross Value of Output Rls. per Hectare**

Area presently under Dez Irrigation Project in 1957*	Booraki
14000	8872

Source: World Bank Report 1957. Values are updated using the Central Bank's price index.

general level of skills is low.

2) It is possible that the existence of the agro-business farms around these villages, combined with a general state of insecurity of tenure, may have created a lack of incentive for farmers to invest in farming and improve their cultivation methods. Although this hypothesis has not been tested here, comparisons with the value of output per hectare before the establishment of these farms and the survey period as presented in Table 37 tend to support the above hypothesis.

SECTION II : PRODUCTIVITY COMPARISONS OF THE FIVE VILLAGES

As stated in the survey methodology (Chapter Three, Section 2,p.105-7 each of the five villages under study have been selected to represent a distinct type of village system in Iran. As stated in Chapter Four (Section Two, pp153-54)in order to compare the productivities of these villages, all the farms in each village have been treated as a single category and comparisons have been made between them. Unfortunately, due to data limitations it was not possible to apply statistical models to these comparisons (Chapter Four, Section One pp146-149 But an exploratory analysis has been made in order to derive certain hypotheses to be tested by future researchers.

As indicated by Table 38, the total productivity ratios are highest for the two conventional villages Ahmad-Ābād and Tālesh-Mahalleh, which consist of peasant holders only. This evidence makes it possible to hypothesize that in cases where the organization of production in a village has remained undistorted, i.e., where there are no capitalist producers in the village and the village plays a traditional role in production activities, the overall resource wastes in the village community as a whole appear to be smaller than in the cases where the organizational role of the village has been distorted and there are capitalist farms in the village.

Table 38 : Mean Values of Total Productivity Ratios for Each Village

Productivity Ratio	Ahmad-Ābād	Tālesh-Mahalleh	Turāne-Turk	Chahār-Dangeh	Booraki
EG	1.1839	1.4650	1.0713	0.8296	0.5640
EN	1.1878	1.4727	1.0757	0.8240	0.5830
EA	1.3097	1.5694	1.303	0.7672	0.4960

Comparisons of the productivity ratios for Ahmed-Ābād and Tālesh-Mahalleh suggest the relative superiority of the latter. (Table 38). However, it can be argued that the figures may be misleading. Firstly, the total rental values of the land plus water used per hectare under cultivation is higher for Ahmad-Ābād as compared with Tālesh-Mahalleh.[1] In order to adjust for this factor, sensitivity analysis, imputing land and water rental charges for Tālesh-Mahalleh that are equivalent to those in Ahmad-Ābād, has been used. However, the resulting productivity ratios are still higher for Tālesh-Mahalleh. It can be further argued that the natural and climatical conditions are very favourable to agriculture in

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(1) Chapter Four, Section Two, p. 165, Table 3.

Table 39: Sensitivity Analysis for Ahmad-Ābād and Talesh-Mahalleh

	EG	EN	EA
Ahmad-Ābād	1.1839	1.1878	1.3097
Talesh-Mahalleh (Land and water rentals equivalent to Ahmad-Ābād)	1.3252	1.3294	1.3901

Tālesh-Mahalleh, while the opposite is true for Ahmad-Ābād. The latter village is located on the rim of the desert and conditions for agriculture are extremely difficult. Therefore the imputation of equal rental charges for the land under cultivation in both villages will not reflect objective opportunity costs. This point cannot be quantitatively demonstrated, but the argument may be further supported through the use of the average prices of the major types of crops in the two villages. As indicated below, in Tālesh-Mahalleh expensive cash-crops, such as rice,(1) tea and unprocessed silk are produced. None of these can be produced in Ahmad-Ābād. Instead the latter produces less expensive crops such as wheat, barley and summer crops. Thus, it may

Table 40 : Average Price of Major Crops

Ahmad-Ābād		Tālesh-Mahalleh	
Major Crops	Price Rls/Kg.	Major Crops	Price Rls/kg.
Wheat	13.33	Rice	50
Barley	10	Tea (Green Leaves)	7
Summer Crops (Average of various types)	5.6	Unprocessed Silk	405

(1) The quality of the rice produced in the area is considered among the best in the country.

be hypothesized that the village organizations of production are equally efficient in both cases. But the natural conditions are more favourable in Gilan.

As already stated, comparisons of total productivity ratios of Turāne-Turk, a village with capitalist development of farming, with the two conventional villages show that the figures are lower for Turāne-Turk (Table 38). It must be noted that the climatical and natural conditions in Turāne-Turk are more favourable than in Ahmad-Ābād. Although in an area relatively more arid than Tālesh-Mahalleh, Turāne-Turk is also located in the Caspian region. But in spite of the relative climatical advantages, it shows lower productivities than Ahmad-Ābād.(1) This evidence supports the hypothesis that perhaps the overall resource wastes are greater in a village including capitalist producers than one with the peasant farmers only.

It may be argued that the four mechanized farms around Turāne-Turk, since they are administratively independent of the village, should not have been included in the productivity evaluations of this village. Of course, a counter argument may be presented by stating that these units are a part of the overall system of the capitalist development of farming in the area. Therefore, they should be included in the analysis. But even if the first assumption is accepted, the exclusion of the mechanized farms from the productivity ratios results in slight increases in the ratios, but still shows lower productivities than Ahmad-Ābād.

Table 41 : Sensitivity Analysis for Ahmad-Ābād and Turāne-Turk

Variable \ Village	Ahmad-Ābād	Turāne-Turk Mechanized farms excluded
EG	1.1839	1.0833

(1) Note that land and water rental charges are lower for Turāne-Turk than for Ahmad-Ābād. (See Chapter Four, Section Two, Table 3, p. [illegible].

In the ranking of the productivity ratios, Chahār-Dangeh is fourth (Table 38). It should also be noted that while the other three villages show total productivity ratios which are greater than one, thus indicating net profits, this village shows losses.(1) A possible explanation for this relative inefficiency, at least as compared with the two conventional villages, may be given in terms of two distorting factors in the village: 1) the existence of a large and powerful capitalist unit in the village that appears to exercise power over the peasant holders, and is wasteful in terms of its own resource allocation, and 2) the location of the village near Tehran, and the consequent speculative activities in the village.

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(1) A study of the land and water rental charges in this village shows that the rates are highest for Chahar-Dangeh (Chapter Four, Section Two, Table 3, p 165.). However, in view of two factors, at least in comparison with Ahmad-Abad, it is difficult to attribute the higher rates to the market distortions.

a) The proximity to the Tehran market makes the transportation costs lower and the output prices higher. /The ejare-kars sold their summer-crops more expensively than their counterparts in Ahmad-Abad./

b) A part of the potentially productive land is unused, consequently the rental charges per hectare under cultivation show higher figures.

/For all production units in all the villages an average land rental charge has been used for all the cultivable land, and then weighted for the actual area under cultivation./

Although at least a part of the land and water rental differentials between Turāne-Turk and Chahār-Dangeh may be justifiable (see footnotep.159) in view of the substantial price differences for these items between the two villages, it is difficult to conclude with certainty that the total productivity ratios are actually higher for Turāne-Turk (Table 38). But, if we accept the hypothesis of higher total productivity ratios for Turāne-Turk, then as one possible explanation for the differences, it can be hypothesized that the capitalist unit in Chahār-Dangeh appears to exert more power upon the peasant holders than the comparable units in Turāne-Turk do, the relative distortions in the power relations of the units in a single locality may partly explain the extent of production inefficiencies. This hypothesis may be further supported by the evidence of the two conventional villages which are composed only of the peasant producers, and where, therefore, the differences in the relative powers of the peasant holders are much more balanced than in either of the other two villages with the capitalist producers.

As expected, Booraki shows by far the lowest productivity ratios (Table 38). Although, in general, comparisons of the average per hectare quantities of the single inputs between the different villages may be misleading, in the case of Booraki the results are so obvious that such comparisons may be justified. As indicated by Table 42 practically all the per hectare factor inputs are considerably lower in this village than in the other four villages. To this can be added the general state of backwardness of the organization of production and skills in the village. Finally, as already suggested, the existence of the large-scale agro-businesses in the area and the potential threat to the security of tenure in this village appear to have had adverse effects upon productivities. This point further supports the hypothesis of the distorting effects of the imbalances of power relations in a locality upon productivities. O

course, in the case of Booraki the distortion is most acute among the five villages.

SECTION III - INNOVATION AND ADAPTATION

The survey results presented in the preceding two Sections show the relative output-input relations of the different farm size categories. It is also interesting to study the extent by which these farm categories are either seeking new improved farm technologies or are resisting to change. As in addition to a study of productive use of the factor inputs under the existing level of technology in these farms, it is relevant to explore the abilities of farmers to improve production techniques.(1)

As stated in the methodology (Chapter Three, Section IV, pp.120-123) a number of the questions concerning transfer of technology were included in my survey. Again it must be emphasized that this part of the study was not central to the theme of the survey, and time and budget limitation

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(1) For example, note that Schultz's statement that peasant farmers are efficient but poor, (Schultz (1964)) has been criticized by some writers who state that an important factor to consider should be innovation (see for example Lipton (1967) pp. 327-351).

Also note that much of the Iranian argument in favour of the creation of large corporations rests on two assumptions:

(a) diseconomies of small scale for peasant producers in using new technology, and (b) the inability and resistance of peasant farmers to adopt new technology.
(See Rohani (1976) and (1967)).

Table 42 : Mean Value of Independent Variables Per Village

	Village → / Variables ↓	Ahmad-Ābad	Tālesh-Mahalleh	Turāne-Turk	Chahār-Dangeh	Booraki
1.	QW/ha.	20098	-	4316	64056	478
2.	DAY/ha.	167.51	375	185	206.23	93
3.	VCUR/ha.	31995	11043	8837	29785	277
4.	DEP/ha.	866	1346	1129	7494	136.4

Units:

1) m^3/ha.

2) Total labour days adjusted for adult male labour days/ha.

3) Rls./ha.

4) Rls./ha.

prevented a more comprehensive study of this subject. As a result, in many respect the study is incomplete. Either some important relevant issues such as market distortions, information, local availability of the factors, etc. have been overlooked, or sufficient time for cross-checking of the items in the questionnaires could not be allocated to this part of the survey. Consequently, this part of the study is exploratory and only a number of possible hypotheses have been reached. However, since the information provides another dimension to the study of productivities it is presented in this section.

The study covers the farmers' use of two types of new inputs mechanical and biological:

1) The mechanical inputs are defined as all types of farm machinery and implements that did not traditionally exist in the Iranian villages.(1) Insofar as machinery is concerned, use of all types of machines, regardless of the length of its use in the area, has been considered as transfer of technology. This approach was adopted since in many parts of Iran even the use of tractors for ploughing is a phenomenon of the past ten years.(2) Thus, although in some regions, notably Gorgān and Tehran, mechanization has had a much longer history, in the context of the country as a whole it is fair to assume that the use of machinery is identical with the adaptation of new technology.(3)

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(1) Note that these are not necessarily foreign produced or designed machines as a number of new types of farm implements have been made by local enterprises, mostly located in the small towns near agricultural producing areas (Nowshirvani (1977), pp. 121-164).

(2) Nowshirvani (1977), p. 52.

(3) Concurrently with my survey, V.F. Nowshirvani was carrying out a study of farm mechanization in Iran for the International Labour Organization. (Nowshirvani (1977)). The data that was collected in my survey was given to him to use in his analysis. Since he actually tabulated the data, for convenience sake, where possible I have used his tabulations. He, too, was interested in the relationship of farm-size and use of machinery. Again, where he has already made the analysis on the subject, I have used his results.

2) The biological inputs are grouped into seeds and fertilizers. They may include modern or high quality traditional biological inputs which have been introduced into a locality during the past ten years. For the purpose of this study, an innovator is a person or an organization that first brings a new input to the area under study.

In studying the extent of use of new biological and mechanical inputs in the five villages, my immediate impression was that there are substantial regional variations in the extent of the transfer of technology to these areas. Unfortunately, due to the limitations of the data a rigorous quantitative presentation of these differences is not possible. However, a study of Tables 43 - 48, in spite of the limitations of the data, appears to confirm this impressionistic view of the subject.

As indicated by Tables 43 - 48 it seems that Turāne-Turk is more diverse than all other villages in terms of the use of machinery, and that the farmers own a larger number of the farm implements. Chahār-Dangeh is also diversified in the types of machinery owned by farmers. (Tables 43 and 47).[1] It must be noted that considering the extent of the use of rented machinery in Chahār-Dangeh, the number of machines owned does not show the extent of mechanization in the village. Therefore, both the ownership and the rental operations must be considered together. Also, in Chahār-Dangeh, in addition to the farm machinery, there is a cold storage unit which belongs to the arbāb. Furthermore, Chahār-Dangeh appears to have used substantially more kinds of biological inputs during the last ten years than all the other villages (Table 43). In this respect Turāne-Turk

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(1) Note that the data problems are very acute with respect to this village. While it was possible to assess the number of the basic machines owned by the arbāb, and thus include them in Table 1, the details of the use of machinery for this farm were not available. Therefore Table 46 does not include the arbābi unit, and so it differs substantially from Table 42. Also note that the total number of farms surveyed in this village is 67 but only 48 are included in Table 46.

Table 43 : Number of Basic Machines Owned per Village and per Hectare of Land Under Cultivation (1) and the Total Number of New Biological Inputs per Village

	Tractors		Tillers		Combines		Mini-Trucks		Trailers		Pumps		Total number of new biological inputs **
	No.	No./ ha 100	No.	No./ ha 100	No.	No./ ha 100	No.	No./ ha 100	No.	No./ ha 100	No.	No./ ha 100	
Ahmad-Ābād	7	3.25	2	1.5	-	-	-	-	-	-	-	-	11
Tālesh-Mahalleh	-	-	6	8	-	-	-	-	-	-	-	-	2
Turāne- Turk	14	1.47	-	-	4	0.42	2	0.21	12	1.3	35	3.6	19
Chahār-Dangeh	2	1	4	2	-	-	6	3	-	-	23*	11.5	26
Booraki	2	0.36	-	-	1	0.18	-	-	-	-	6	1.04	1

(1) Note that the data presented in this Table differs from the I.L.O. Tables since in this case further readjustments have been made in accordance with the original questionnaires. The difference is especially acute for Chahār-Dengeh, which in the case of the above Table includes all the surveyed farms. But the I.L.O. results (Table 47), due to problems related to the detailed nature of the Table, and because of the insufficiency of the detailed information, have excluded a substantial number of the farmers, including the arbābi unit.

* In the case of Ahmad-Ābād all three pumps and for Chahār-Dāngeh six pumps are designed especially for deep-wells and therefore their capacity is not comparable with the other pumps in the survey which are basically designed for smaller wells.

** This item includes the sum total of the number of the new types of seeds, fertilizers and pesticides.

Table 44 : Ahmad-Ābād.

Pattern of Agricultural Machinery Use

Machinery & Equipment	No. of Users	Type of Ownership (units)			Average Duration of Use (years)		Instances of Rentals by Owners				
		Individual	Joint	Rented	Since Purchase	Since First Usage	Rent Out	Do not Rent Out	Median holding Size of Users (hectares)	Maximum holding Size of Users (hectares)	Minimum holding Size of Users (hectares)
Tractor	72	3	4	65	5.6	13.5	7	0	2.7	13.0	0.3
Tiller	4	2	0	2	2.5	11.0	0	2	6.7	9.2	2.2
Ploughs	72	3	4	65	4.3	13.5	5	0	2.8	13.0	0.5
Disc Harrows or Ploughs	2	1	0	1	-	4.0	0	1	5.0	5.0	2.1
Sprayers	9	7	1	1	3.6	-	0	8	5.0	10.0	1.0
Thresher	71	2	3	66	6.5	12.4	3	2	2.3	13.0	0.3
Trailers	48	2	2	44	5.3	8.2	3	1	3.2	5.0	0.6
Trucks	2	0	0	2	-	-	-	-	5.0	5.0	2.0
Pumps	76	2	1	73	4.0	15.0	3	0	2.7	50.0	0.7

Source: My field survey data tabulated by Nowshirvani (1977), p. 82.

Table 45 : Tālesh-Mahalleh

Pattern of Agricultural Machinery Use

Machinery and Equipment	Type of Ownership (Units)				Average Duration of Use (Years)		Instances of Rentals by Owners					
	No. of Users	Individual	Joint	Rented	Since Purchase	Since First Usage	Rent Out	Do Not Rent Out		Median Holding Size of Users (hectares)	Maximum Holding Size of Users (hectares)	Minimum Holding Size of Users (hectares)
Tillers	42	1	5	36	1.8	3.8	4	2		1.1	6.4	0.2
Border Makers	1	0	0	1	-	-	-	-		-	0.5	0.5
Threshers	43	0	6	37	6.0	3.3	5	1		1.0	6.4	0.2
Trucks	10	2	-	8	1.5	-	0	2		0.8	6.4	0.2

Source: My field survey results tabulated by Nowshirvani(1977), p.86.

Table 46 : Turāne-Turk

The Pattern of Agricultural Machinery Use

Machinery and Equipment	Type of Ownership (Units)				Average Duration of Use (Years)		Instances of Rentals by Owners				
	No. of Users	Individual	Joint	Rented	Since Purchase	Since First Usage	Rent Out	Do Not Rent Out	Median Holding Size of Users (hectares)	Maximum Holding Size of Users (hectares)	Minimum Holding Size of Users (hectares)
Tractors	45	8	6	31	7.6	17.6	7	7	5.7	195.0	1.0
Ploughs	44	7	6	31	5.0	16.8	7	6	5.5	195.0	1.0
Disc Harrows or Ploughs	45	8	6	31	5.0	16.0	7	7	5.7	195.0	1.0
Border Makers	1	1	0	0	3.0	3.0	0	1	-	45.0	45.0
Ditchers	3	3	0	0	5.0	8.0	0	3	5.0	195.0	45.0
Levellers	3	1	1	1	-	-	0	2	45.0	105.0	16.0
Planters	5	3	2	0	5.4	9.0	0	5	70.0	195.0	45.0
Cultivators	5	3	2	0	5.0	9.0	0	5	65.0	87.0	50.0
Sprayers	44	26	8	10	2.0	8.9	3	31	6.0	195.0	1.0
Combines	5	1	3	1	3.7	11.7	3	1	50.0	87.0	33.0
Trailers	13	8	4	1	6.1	18.5	3	9	45.0	195.0	2.0
Pumps	44	12	23	9	9.6	13.6	4	31	5.7	195.0	1.0

Source: My field survey results tabulated by Nowshirvani (1977), p.84.

Table 47 : Chahār-Dangeh

The Pattern of Agricultural Machinery Use

Machinery and Equipment	Type of Ownership (Units)				Average Duration of Use (Years)		Instances of Rentals by Owners					
	No. of Users	Individual	Joint	Rented	Since Purchase	Since First Usage	Rent Out	Do Not Rent Out		Median Holding Size of Users (hectares)	Maximum Holding Size of Users (hectares)	Minimum Holding Size of Users (hectares)
Tractors	47	0	0	47	-	-	-	-		2.9	18.0	0.4
Ploughs	47	0	0	47	-	-	-	-		2.9	18.0	0.4
Disc Harrows or Ploughs	39	0	0	39	-	-	-	-		2.9	18.0	0.5
Border Makers	3	0	0	3	-	-	-	-		2.5	2.5	1.9
Ditchers	4	0	0	4	-	-	-	-		2.0	2.5	1.5
Earth Moving Blades	1	0	0	1	-	-	-	-		-	1.0	1.0
Sprayers	22	5	7	10	2.5	-	0	12		2.9	4.0	0.5
Combines	1	0	0	1	-	-	-	-		-	2.9	2.9
Trailers	4	0	0	4	-	-	-	-		3.0	4.0	2.9
Trucks	9	1	0	8	-	-	0	1		2.9	18.0	0.9
Pumps	16	16	0	0	2.8	4.0	0	16		2.5	3.0	0.4

Source: My field survey results tabulated by Nowshirvani (1977), p.85.

Note that due to data limitations, a number of observations including the arbābi unit have been deleted from this Table.

Table 48 : Booraki

The Pattern of Agricultural Machinery Use

Machinery and Equipment	Type of Ownership (Units)				Average Duration of Use (Years)		Instances of Rentals by Owners				
	No. of Users	Individual	Joint	Rented	Since Purchase	Since First Usage	Rent Out	Do Not Rent Out	Median Holding Size of Users (hectares)	Maximum Holding Size of Users (Hectares)	Minimum Holding Size of Users (hectares)
Tractors	38	2	0	36	13.0	8.7	0	2	10.0	150.0	2.0
Ploughs	1	1	0	0	13.0	-	0	1	-	80.0	80.
Disc Harrows or Ploughs	37	1	0	36	-	8.7	0	1	10.0	150.0	2.0
Border Makers	2	0	0	2	-	-	-	-	-	150.0	5.0
Ditchers	1	1	0	0	-	-	0	1	-	80.0	80.0
Sprayers	4	2	0	2	3.0	7.0	0	2	60.0	150.0	7.5
Combines	2	1	0	1	12.0	-	1	0	-	150.0	80.0
Threshers	21	0	0	21	-	9.3	-	-	10.0	150.0	2.0
Pumps	28	3	3	22	5.6	10.7	2	4	10.0	150.0	2.0

Source: My field survey results tabulated by Nowshirvani (1977) p.83.

ranks second. From the above analysis it may be hypothesized that the two villages which include capitalist farms among their production units appear to show a greater diversity in the use of the new inputs.

A comparison of Ahmad-Ābād and Tālesh-Mahalleh indicates that in terms of both machinery and new biological inputs Ahmad-Ābād is more diversified than Tālesh-Mahalleh (Tables 43, 44 and 45). Both of these villages are located in areas composed mainly of peasant holders, and each includes peasant holders only, so that the differences cannot be explained through variations in the systems of production. However, their climatical conditions and cropping patterns may partly explain the differences. Crops grown in Tālesh-Mahalleh are rice and tea. Due to the natural conditions, irrigation does not require the use of pumps. For land preparation for rice, tillers are used; a similar preparation does not appear to be necessary for tea. In Ahmad-Ābād the natural conditions of production are more difficult; therefore there is a greater need for the use of mechanical inputs. Comparisons of the diversity in the application of the new biological inputs for the two villages indicate a greater variety for Ahmad-Ābād. The only two new biological inputs reported for Tālesh-Mahalleh are chemical fertilizers and pesticides, both of which have been introduced by the government. A partial explanation for these differences may be seen in the differences in the crop patterns of the two villages. The quality of the rice produced in Tālesh-Mahalleh is among the best in the country. This to some extent may explain why the farmers have not tried to use new types of seeds. But a similar argument cannot be based on the quality of tea produced in the area, where there is much room for improvement, and where no attempt by the farmers to improve the quality has been observed. It is also difficult to conceive that improvement could be obtained through changes in the patterns of crops in this village, since both tea and rice

are expensive cash crops. But in the case of Ahmad-Ābād, it appears that there are various alternative types of seeds for both wheat and summer crops available. Furthermore, the farmers seem to be keen on trying new types. It can be hypothesized that differences in both climatical conditions and crop patterns in the two villages may be accounted for by the extent of use of new inputs. But it may also be hypothesized that the peasants in Ahmad-Ābād are more progressive and innovating than their counterparts in Tālesh-Mahalleh.

The backwardness of Booraki has been mentioned several times in the earlier parts of this dissertation. The data on farm machinery also indicates the relative backwardness of this village compared with Ahmad-Ābād, which has a somewhat similar cropping pattern (Tables 43, 44 and 48). An important point to note about the village is the fact that no transfer of technology between the neighbouring agro-business farms and this village has taken place. On the contrary, according to the statements of the farmers, they would have mechanized more had there been security of tenure for them.(1)

An overall study of mechanization in these villages shows that the most widely used machinery for production is tractors for ploughing (Tables 44 - 48). There was only one village, Tālesh-Mahalleh, where some respondents did not plough their land mechanically. However, those who did not report mechanical ploughing were producers of tea, for which the land preparations required for rice are not needed. These units were also

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(1) An interesting observation about the village was the striking number of locally produced carpets owned by the farmers. These carpets had been bought during the past five or six years. A similar phenomenon was not observed in any other village. Unfortunately, I made no systematic study of this phenomenon. However, given the insecurity of tenure in the area, it is possible to explain the purchase of carpets as a secure investment for the farmers. Though this information cannot lead to conclusive results, perhaps it is safe to hypothesize that had there been security of tenure at least a part of this investment would have gone to productive use.

in the smallest size category. Thus it may be concluded that, for ploughing, the size of the holding affects mechanization indirectly, through the impact of size on the cropping pattern. This inference is based on the observation that the smaller farms tended to specialize in growing tea, but nearly all the small-holdings that grew rice used power tillers for ploughing.(1)

Threshing is also widely mechanized in these villages. (Tables 44 - 48). Both Ahmad-Ābād and Tālesh-Mahalleh show that practically all holdings that were mechanically ploughed also used mechanical threshing. In Booraki, also, the majority of the holders reported mechanical threshing. In Turāne-Turk mechanical threshing is not reported, but this is to be expected since the majority of the farms only grow cotton. But in the other instances where wheat production is reported, combine harvesters are used (Table 46). Also, in Chahār-Dangeh threshing is done by driving-tractors. In addition, one unit reported the use of combine harvesters. In the cases where mechanical threshing was not reported, no grains were grown. Thus, once allowance for the cropping pattern is made, it can be concluded that threshing has become widely mechanized.(2)

Apart from the above-mentioned operations, pumps and sprayers were also in common use. But aside from these, other implements were less widely used and in any case were confined to the large farms only. Tables 44 - 48).(3) This shows that apart from ploughing and threshing, holding size affects mechanization of other operations. This impact of size on mechanization may be partly explained by input market distortions and partly by technical factors and the existence of the economies of scale.

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(1) Nowshirvani (1977), pp. 81-87.

(2) Ibid, p. 87.

(3) Ibid, p. 88.

On the very small plots, it may not be economical to mechanize any operation beyond ploughing. Or where intensive mixed cropping is practised on a small-holding, it is not practical to use mechanical planters, cultivators and harvesters. However it is hard to imagine that for the type of implements under consideration, appreciate economies of scale exist for holding sizes of over a few hectares.(1)

In the few cases where data was available, the average length of time each machine had been owned or used was calculated. The larger holdings have tended to mechanize certain operations earlier than others. This may be explained either by the fact that they face different factor prices, or because to the extent that mechanization is an innovation and therefore a risk, they are better able to bear it. On the whole observations indicate that for the type of mechanization where there exist economies of scale, the larger farms mechanize earlier. However, in the absence of scale economies there is not sufficient evidence as to which group is the innovator. The Spearman rank correlation coefficients between the size of holding and the length of use, in the cases where reasonably adequate data was available, show the following results (Table 49). There are some positive relationships between the size of holding and the date of adoption for tractors, but for pumps and sprayers this association is weak.(2)

An important feature of the nature of mechanization as shown in Tables 44 - 48 is the extent of the use of rented machinery, especially tractors and threshers. Other implements are also rented but to a lesser extent.(3) Though the existing evidence is not sufficient to conclude that the available machinery is being used at full capacity, the widespread use

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(1) Ibid, pp. 88-89.

(2) Ibid, pp. 89-90.

(3) Ibid, p.88.

Table 49 : **Relation Between Size of Holding and Date of Adoption of Machinery** .

Village \ Machines	Tractors	Pumps	Sprayers
Ahmad-Ābād	0.57* (n = 8)		
Turāne-Turk	0.76** (n = 12)	0.23 (n = 17)	0.22 (n = 16)
Chahār-Dangeh (1)		0.16 (n = 17)	0.49* (n = 10)

* Significant at the 10% level.

** Significant at the 1% level.

The numbers in parentheses signify the number of observations.

(Source: My field survey results processed by Ibid. p. 90).

of the rental operations, as well as the impressions of interviewers from the field, indicate that the machines were being used at near full capacity. In the case of the cold storage in the arbābi unit in Chahār-Dangeh, the storage was being fully used in all seasons by being rented to various importers or producers of fruit. In the case of Turāne-Turk, where according to farmers the village had excess capacity of both tractors and combines, the machines were being used not only in the surrounding villages, but as far away as areas in the North of Khorasan. In other villages, there were always many instances of either renting from outside or renting to outside villages. On the whole the rental operations give the impression that the existence of unused capacity is unlikely.

In the few cases where data could be relied on, it appears that the average length of time that a specific type of machinery was used is longer

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(1) For Chahār-Dangeh the coefficients are for years owned rather than used.

than the period of its ownership (Tables 44 - 48). This suggests that mechanization first spread through custom work. The farmers first tried to test the economical use of a specific type of machine by renting it, and then purchased the machine. This sequence is likely to ensure that inefficient factor combinations are kept low, as farmers have the opportunity of experimenting with at least a limited range of different implements.(1)

It is interesting to note that approximately 25% of the machines used by the farmers had been purchased from the government-owned factory which makes agricultural machinery and sells them on credit basis. Thus it may be said that in the overall spread of mechanization in the villages the government has played a direct role.

Among the major obstacles for the spread of mechanization in its early stages, the unavailability of parts and services is often cited. In the case of the surveyed villages, it appears that the inadequacy of repair firms is not as severe as is usually believed. In answering the question concerning the local availability of parts and service, the following results were obtained:

Table 50 : Local Availability of Spare Parts

No. of respondents / Village	Not Available	Available
Ahmad-Ābād	7	6
Tālesh-Mahalleh	2	6
Turāne-Turk	1	8
Chahār-Dangeh	6	2
Booraki	No respondents	No respondents

(Source: My field survey results tabulated by Ibid.p.92)

(1) Ibid, p. 89. In two instances, the average period of ownership is longer than that of use. This anomaly may be explained by the fact that figures do not always refer to the same group. Usually more observations are available for the period of use. Ibid, p. 108.

Because many of the users rented their equipment, they were not concerned about the problem. As a result the responses are few, and therefore insufficient for a definite conclusion. But given the tendency of most people to be critical of repair work, the responses are not very discouraging and indicate that the problem is no longer universal.(1)

For the biological inputs the following results were obtained in terms of the relationship between the type of the system of production and innovation. (Table 51). Firstly, in Chahār-Dangeh, where the greatest variety of the new inputs has been observed, the largest contributor is the arbāb, 66%. The second most important contribution comes from the ejāre-kārs, 20%. These travelling farmers who come to the area on a seasonal basis, have brought with them a number of the new seeds and crops which have gained widespread use in the village. Secondly, in Turāne-Turk, which has the second highest variety of the new biological inputs, the government organizations are the factors mostly responsible for the spread of the new biological inputs (78%). The large farmers also have contributed to this innovation (22%). It is interesting to note that a proportion of the innovating larger farms have farmers who have brought the seeds as a result of their travels outside the province. Thirdly, in Ahmad-Ābād the peasant producers, especially those who have travelled outside, are the major contributors to the new inputs (82%). Fourthly, as explained and analyzed before, in Talēsh-Mahalleh very little biological innovation has taken place. The two observed cases, of chemical fertilizers and pesticides, have been introduced by the government. Fifthly, the case of

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(1) Ibid, pp. 91-92. Newshirvani attributes the diminishing importance of inadequate servicing facilities partly to the growing number of local manufacturing establishments, most of which (87%) also do repair work. P. 92.

Table 51 : Source of Innovation of Biological Inputs(1)

Innovator	Villages									
	Ahmad-Abad		Talesh-Mahalleh		Turane-Turk		Chahar-Dangeh		Booraki	
	No.	%	No.	%	No.	%	No.	%	No.	%
Total number of new biological inputs	11	100	2	100	19	100	26	100	1	100
Government	2	18	2	100	15	78	2	7	1	100
Factories	-	-	-	-	-	-	2	7	-	-
Large farms outside village	-	-	-	-	2	11	-	-	-	-
Large farms inside village	-	-	-	-	2*	11	17	66	-	-
Travelling farmers	5	45	-	-	2*	11	5	20	-	-
Medium size Peasant Farmers	4	37	-	-	-	-	-	-	-	-

* The large farms inside the village in Turane-Turk have brought in new seeds as a result of the farmers' travels outside the province.

(1) Each type of new seed or fertilizers or pesticides has been counted as one innovation.

Booraki indicates only the introduction of the chemical fertilizers by the government. No changes have been introduced by the farmers themselves. However, during the period of ten to twenty years prior to the date of the survey, production of the various types of summer-crops in winter time has been introduced to the area through ejāre-kārs coming from the central parts of the country.

From the above analysis it can be hypothesized that the main contributors to the changes in biological inputs in the surveyed villages are the following: Government organizations, capitalist farmers and travelling farmers. The government, mainly through co-operatives, has introduced new biological inputs in the surveyed villages. These include chemical fertilizers, pesticides and various types of seeds. The capitalist farmers have also played an important role in the transfer of technology. It is also interesting to note that an important role in the transfer of technology is played by the travelling farmers. Although I made no systematic study of the relation of the farm size to the extent of the innovating abilities of these groups, I observed that all categories of farm sizes, including the landless, contributed to this phenomenon. It is also interesting to note that the purpose of the travel could vary between pilgrimage, visiting migrant friends or relatives, seeking agricultural employment outside the village of origin, or off-farm jobs. This phenomenon appears to contradict the general belief that technological changes are brought about either by the large farms or government, and that the peasants do not contribute to them.(1)

A study of the relationship between farm-size and response to the new biological inputs is presented in Table 52. Three categories of response have been used:

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(1) This view has been expressed by Rohani (1967).

Table 52 : **Response to Use of New Biological Inputs According to Farm-Size Categories**

Village	Farm-size Categories	Response			
		Immediate (1)	With Lag	Non-Adaptors	Total
Ahmad-Ābād	GP_1	60	20	20	100
	GP_2	45	15	40	100
Tālesh-Mahalleh	GP_1	85	15	-	100
	GP_2	83	14	3	100
Turāne-Turk	GP_1	100	-	-	100
	GP_2	100	-	-	100
	GP_3	100	-	-	100
	GP_4	100	-	-	100
Chahār-Dangeh	GP_1	100	-	-	100
	GP_2	70	20	10	100
	GP_3	100	-	-	100

(1) The cases of immediate response and innovation have been summed up in this column.

1) Those who respond immediately, or are the innovators.

2) Those who adopt the new input with a time-lag, and

3) Those who do not change.

Here again the extent of the regional variations is important. In Turāne-Turk, where mechanization of farming and the introduction of new inputs has a long history, the farmers have learned by experience that the new inputs tend to increase either the quality or the volume of output; therefore they respond immediately to the changes. In Chahār-Dangeh, the two progressive categories, the arbāb and the ejāre-kārs, show immediate response to improvements. But in the case of the owner-operated farms there is a substantial proportion of late or non-adaptation. The figures on Ahmad-Ābād reflect both late adaptation or no response for both categories, the extent of no response being higher for the smaller size category. However, for this village the figures may be somewhat misleading. A substantial part of the new biological inputs consists of the seeds for summer crops. Improvements on these seeds are often made by the various peasant groups in the country. These types of improved seeds are not laboratory-produced high-yielding crops, but only modestly improved. Thus, their adoption does not dramatically change the output. As a result, it is interesting to note that the peasant producers in this village are progressive and try to test and evaluate various types of crops. Also note that the cases of no response should not be considered as strong resistance to change.

SUMMARY

The empirical results presented in the preceding pages lead to the following conclusions:

1) In all villages where comparisons between medium-size farms and small peasant producers were possible i.e., Ahmad-Ābād, Tālesh-Mahalleh and Turāne-Turk, the results of analysis of variance show significantly higher total productivities for the medium-size farms. In the case of Chahār-Dangeh, a medium farm size category could not be set up by the data. But, in this village, the ejāre-kārs who appeared to have a well organized system of production and had the highest total productivity ratio in the village, showed total productivity ratios that were less than one, while in the case of other villages the medium-size farmers all had productivity ratios that were substantially larger than one. As the ejāre-kārs in general had small-holdings, it may be hypothesized that if their farm sizes were large enough to be categorized as medium, they would probably have shown higher productivity ratios.

2) The results of the analysis of covariance tests, for the three villages whose samples include medium size farms, show a size-specific effect only for the case of Tālesh-Mahalleh. For Ahmad-Ābād, it can be argued that since the village has an overall social organization of boneh, the organization of the farms are likely to be fairly homogeneous. But the main impact on output comes from the differences in the two categories both in the level of inputs and the marginal productivities, i.e., the input patterns which appear to be inherent in each category have caused the output differentials. It can be argued that although there is no direct evidence of organizational differences between the two categories, farm size indirectly, through its impact on the input patterns, appears to have caused productivity differentials in this village. In the case of Turāne-Turk, it is possible to argue that the lack of a positive evidence, in

support of the hypothesis of impact of a size-specific effect on output, may be due to the insufficiency of the sample size. Also, pair-wise tests of the analysis of covariance for this village have not been carried out.

In general, it is possible to argue that although the data for these villages do not always positively confirm the existence of a size-specific effect for the medium-size peasant holders, there is some indication that either the organization of production or the apparently inherent pattern of inputs in these villages may have caused the productivity differentials.

3) Where capitalist farms existed in or around a village, the data tends to support the hypothesis that these farms have in general lower total productivities than the medium-size farms. However, with the exception of the comparisons of the mechanized farms with the medium-size farms in Turāne-Turk, the statistical tests do not show significant differences between the two categories. As the sample of the capitalist farms in the survey does not appear to be large enough to make it possible to draw conclusive results, it can be hypothesized that perhaps with a larger sample it would be possible to obtain significantly different results from these comparisons.

4) The data also appears to suggest that as the size of the capitalist farms grows larger, they tend to show lower overall productivities. This factor can be observed in the comparisons of the larger-size farms in Turāne-Turk with the mechanized farms, the latter showing substantially lower productivities. Also, the arbābi unit in Chahār-Dangeh, in spite of having trained managers, shows low overall productivities. Unfortunately data limitations do not allow for a test of this hypothesis. But the evidence make it possible to hypothesize that as farm sizes become larger there is a greater tendency for resource waste.

5) A possible explanation for the apparent superior performance of the medium-size farms relative to the smaller and the larger categories may be the relative quantity of family labour available to this category. This labour appears to be sufficient to meet the requirements of managerial and emergency tasks. Since the income of the family labour and the gains from the farming activities coincide, it is possible to hypothesize that for these operations the family labour would have greater incentives and be more easily accessible than wage-earning labour. However, unlike the small-size peasant producers who appear to have excess female and child family labour (which they seem to employ at lower marginal returns), the medium-size farms, in order to obtain higher returns per land input, have to employ wage labourers. They will therefore not be willing to do so at marginal returns below the going wage-rates. It may be argued that the capitalist farms usually lack sufficient family managerial and labour inputs to meet the managerial and emergency requirements of their farms, and this phenomenon may explain their lower productivities in comparison with the medium-size farms. This problem appears to be more acute for the larger capitalist farms, as compared with the smaller ones.

Another reason for the apparently superior performance of the medium-size farms may concern their financial ability to purchase the required inputs, in order to obtain higher yields, as against the general inability of the smaller units to do this, while at the same time the medium-size farms have the financial constraints of not being able to afford waste, unlike the capitalist farms who are better able to afford waste. The data gives some indication of support for the latter argument in respect of the larger capitalist farms.

6) An exploratory comparative study of the productivities of the five villages shows that the two conventional villages Ahmad-Ābād and Talesh-Mahalleh show highest total productivity ratios, which tends to suggest

that where peasant production is the only system working in a village, the total productivities tend to be higher. Also comparisons of Turāne-Turk, comprising smaller capitalist farms, with Chahār-Dangeh, which includes a very large capitalist farm, tend to suggest that perhaps where the size of capitalist farms in a village becomes larger, there is a tendency for greater overall resource waste. Possibly this factor may be partly attributed to the greater imbalance of the relative powers of producers in a locality. This argument may be further supported by the apparently negative influences of the agro-business farms upon the village Booraki. Of course, since a systematic study of these arguments has not been carried out in this research, and as there are some indications of price distortions in the comparison of at least two villages, these hypotheses are inconclusive and left for the future researchers to study.

7) The evidence of Ahmad-Ābād and the ejāre-kārs in Chahār-Dangeh tends to support the hypothesis of the productivity gains in the collective farming operations. The productivity gains accrued may be attributed to the economies of scale resulting from the fact that a number of the operations are carried out collectively, while the individual incentives are not taken away. But it must be noted that the total area of holdings in Ahmad-Ābād does not exceed ha. 300 and the ejāre-kārs hold fewer than ha. 40. Thus from the present evidence it is not possible to hypothesize the potential existence of scale economies where some thousands of hectares of land are involved.

8) In terms of mechanization and use of new biological inputs, my exploratory study suggests that the villages comprising capitalist producers, i.e. Turāne-Turk

and Chahār-Dangeh, are more diversified than others. Also, the areas in which these two villages are located have the longest history of capitalist development of farming in Iran. Since the evidence indicates that a number of the new inputs were brought by these units to the area, and that in a number of instances the larger farms are still the only users of certain mechanical implements, it can be hypothesized that the capitalist farms appear to have a positive role in transfer of technology.

Other groups that have played a positive role in transfer of technology are a) government, through sales of agricultural machinery by the state-owned factories and through sales of biological inputs through the cooperative organizations and b) travelling farmers, regardless of the size of their production units.

The evidence of Booraki makes it possible to hypothesize that there is no transfer of technology between the agro-business farms and the surrounding villages. On the contrary, it appears that the existence of these units and the potential threat to the security of tenure inhibit the farmers from investing in farm machinery.

9) Data limitations prevent a rigorous study of the relationship of farm size to the adoption of new technology. But the data tends to suggest that the larger farms adopt certain operations earlier than others, namely those involving economies of scale. However, a number of mechanical operations seem to be in widespread use. Also, in terms of biological inputs the very small-size group appears to be less responsive, but only a small percentage shows no response. The data tends to suggest in addition, the existence of regional variations in the extent of innovation sought by the peasant farmers, a phenomenon which may partly be attributable to the culture and traditions of a locality.

10) The data appears to suggest that the average period of use of mechanical

inputs exceeds the period of their ownership. This evidence makes it possible to hypothesize that the farmers try to test the profitability of the machines before attempting to invest in them. Furthermore, an approximate examination of the rental operations indicates that the unused capacity of the machines is not substantial. The data also tends to suggest that the availability of repair services in the areas under study is not a major problem. In summary, on the basis of these results it can be hypothesized that the extent of resource waste on the machinery in the villages under study ought not to be substantial.

CHAPTER VI

THE AGRO-BUSINESS FARMS

This chapter aims at making an appraisal of the productive performance of the four agro-business farms included in the case-studies. The evaluations made are of two kinds: first, the extent to which these farms have been able to meet their production objectives; and second, a comparison of the productivities in these farms and the five villages under study. The results indicate that the agro-business farms have been unable to fulfil their production objectives. Also, they are economically less efficient than the five villages. In the third part of the chapter an attempt is made to analyse the reasons for the failure of these units.

1. Production Objectives and Actual Performance

One of the major objectives of the agro-business farms was to provide a complete chain of production, processing and marketing of the output, in a single business unit. The proponents of the agro-business farms argued that this chain of production would solve two problems: First, where production and complete processing of the output take place in one farm, then transport costs become minimal. Second, it was stated that the terms of trade are more favourable to industry than agriculture. Thus under ordinary circumstances the farmers are getting less than their fair share of output while the food producing industries receive more than their fair share. Through a combination of the two stages of production in one unit, the adverse effects of the agricultural terms of trade would be offset by the industrial advantages.[1] Although this idea in itself may

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(1) Rohani (1967), pp. 71-81.

sound reasonable, in practice none of the farms has set up complementary industries. They did not include industrial operations, but are in fact only very large farms. The activities involve only the production and marketing of the unprocessed raw material.(1)

The most vigorously pronounced claim of the agro-business farms was that the system would create conditions under which an optimum use of the two scarce resources land and water could be made.(2) By 1977, more than one-quarter of the life expectancy of the Dez Dam had depreciated.(3) At this stage full utilization of the potential is normally expected. But only about 30 per cent of the total area allocated to the agro-business units had been brought under cultivation. The remaining land and water were still being left idle. If the establishment of the agro-business units was assumed to be an integral part of the Dez irrigation project, then the objectives have not been met. An alternative test rests on the fact that since the decision to set up the agricultural poles in the area was made only in 1968, and as there were various delays in the completion of the irrigation canals, from the point of view of the companies only, the land for which the irrigation canals had been completed could be counted as potentially usable. Even if this is accepted, only 60 per cent of this capacity was being used by 1974.(4) It must be added that the research carried out by the Safi-Ābād Research Centre indicates that the climatical conditions in the area are suitable for double cropping

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(1) Agricultural Development Bank (1978), pp.1-2.

(2) Rohani (1967), pp. 78-88.

(3) The life expectancy of the Dam has been estimated to be fifty years (Rabbani (1971), pp. 132-165). The building of the Dam was completed in 1963.

(4) Agricultural Development Bank, unpublished sources.

each year. However, even single cropping has not been fully achieved.(1)

The climatical and natural conditions in Khuzestān are considered to be very favourable to agricultural production. In fact the area under the Dez Dam irrigation project has often been compared with the Imperial Valley in California. Various tests of cultivation by the Safi-Ābād Research Centre have resulted in high yields.(2) However, the four units under study have in general been unable to meet the potential crop-yields of the area. A study of the estimated projections of the crop-yields and the actual performance of the companies for 1974, indicates that for the most part these objectives have not been met (Table 1).

Among the major arguments used to favour the establishment of the very large-scale units, was the fact that the economies of scale of operation would result in the reduction of costs to a minimal point. Therefore, the operations would be highly profitable. According to the various tests carried out by the Safi-Ābād Research Centre, in a short interval of two or three years, the farming operations in the area could result in net profits. The projected estimates by the four companies, with the exception of one, also showed net profits for 19[illegible] (Table 2). However, the actual results indicate net losses of nearly Rls. 25,000 per hectare under cultivation. The difference between the estimated and the actual figures per hectare amounted to about Rls. 30,000 (Table 3). According to the Agricultural Development Bank Report, the situation has further deteriorated for the years after 1974.(3)

It is interesting to note that comparisons of the value of gross output produced in the area in 1957, prior to the establishment of the Dez Irrigation project, with the output obtained by the four companies in 1974.

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(1) Agricultural Development Bank (1978), pp. 4-5.

(2) Ibid, pp. 4-5.

(3) D. and R. (1967) Annex "A" Agriculture.

Table 1 : Comparisons of Yields per Hectare of the Actual and Estimated Projections of Major Agricultural Products for the Four Companies

Tons./ha.

1 9 7 4

Name of the Company	Wheat		Sugar-Beet		Corn		Cotton		Alfalfa	
	Estimated	Actual	Estimated	Actual	Estimated	Actual	Estimated	Actual	Estimated	Actu
Iran & America	4	1.09	50	26	5	-	3.5	0.758	18	3.1
Iran Shellcotts	-	3.244	-	37.14	5	2.8	-	0.569	16	4
Iran & California	3.5	2.19	40	45.5	4	2.8	2.5	0.65	15	4.1
International	2.5	3.5	35	41.3	3	-	2	0.3	-	4.5
Weighted Average	3.33	2.11	41.67	39.52	4.25	2.8	2.67	0.56	16.33	4.0

Source: Projected figures: the original proposals of the Companies to the Agricultural Development Bank.

Actual figures: extracted from the files of the Agricultural Development Bank. (Unpublished).

Table 2 : **Projected Estimates of Profit/(Loss) of the Four Companies**

Rls. 1000 1 9 7 4

Iran and America	52316
Iran Shellcotts	26653
Iran and California	15960
International	(44920)
Total:	50009

Table 3 : **Comparisons of Actual and Estimated Projected Cumulative Profit/(Loss) of the Four Companies**(1)

Rls. 1000 1 9 7 4

	Total	In One Hectare
Estimates of Profit/(Loss)	50,009	2,796
Actual Profit/(Loss)	(349,140)	(19,527)
Difference of Estimate and Actual Profit/(Loss)	399,149	22,324
Depreciation of the Dez Dam Related to the Region of the Four companies	(97,002)	(5,425)
Total Actual Loss Including the Dez Dam Depreciation	(446,142)	(24,953)
Difference of Projected and Actual Profit/(Loss) including the Dam's depreciation	496,151	27,749

(1) In these calculations the difference between the interest rates accrued to the Government's capital and the interest rates paid by the companies have not been taken into consideration.

Source: **Projected figures:** the original proposals of the Companies to the Agricultural Development Bank. Unpublished.

Actual figures: extracted from the files of the Agricultural Development Bank. Unpublished.

show a net increase of only 23 per cent for a period of nearly twenty years, or an average annual growth rate of slightly more than one per cent (Table 4). According to the official figures, the average annual growth rate of agriculture for the country as a whole during the period 1963-1976, is estimated to be at 4.6 per cent at constant 1974 prices.(1) Even though the reliability of the national figures may be challenged and a lower rate of 2.5 per cent (2) adopted, (Chapter Two, Section One, pp. 49-55) nonetheless the growth rate in the area is substantially below the national average. It should be further noted that in 1957 the area presently under the Dez irrigation project was considered backward and the agricultural yields were substantially lower than in the more developed regions. Considering the massive investments that have been allocated to the project, and the fact that already more than one quarter of the life expectancy of the project has been depreciated, it may be stated that the agro-business projects of the Dez Dam have, at least so far, failed to fulfill their productive objectives.

Table 4 : Comparisons of the Net Value-Added Produced in the Area Presently Allocated to the Four Companies in 1957(3) and in 1974.

Rls./000 constant 1974 prices

No.		
1	Net value-added 1957	726,560.2
2	Net value-added 1975, not adjusted for depreciation of Dam	1,046,779.2
3	Net value-added 1975, adjusted for depreciation of Dam	896,996.6
4	% increase of 2 over one	44
5	% increase of 3 over one	23

Source: Figures for 1957 taken from the World Bank Report (1959), unpublished. Price adjustments have been made using the Central Bank price indices Bank Markazi (1976), pp. 5-10.

(1) Bank Markazi Iran (1977) revised estimates of National Income, Unpublished.

(2) Price (1975), p. 1.

(3) The total area under cultivation in 1957 amounted to ha. 51390. While in 1974 it was only ha. 17879.

Productivity Comparisons Between the Five Villages and the Four Agro-Businesses

As stated earlier, in order to compare productivities of the agro-businesses with those of the five villages under study, rough estimates of productivity ratios, both total and partial, have been made for the agro-business farms.(1) However, as in many instances actual costs for the agro-businesses were not available, projected estimates of these costs as presented in the original proposals of these companies were used. Since in practice the actual costs have exceeded the proposed estimates, my estimations are unlikely to bias the results against the agro-businesses. Another problem of estimation is related to the size of these farms, i.e., whether only the area under cultivation (LA) or the area for which the water canals have been completed (ZLA) or the total area allocated to these farms should be treated as the area of holdings of the companies. To overcome this problem, I have used three sets of data for comparisons, each being based on one of the three above criteria for the size of farms according to which land and water rental charges are allocated. Since the agro-business farms are paying subsidized land and water rental charges which are lower than the comparable figures for the five villages, I have also carried out sensitivity analysis. Thus in comparing the agro-business farms with each village, land and water rental charges equivalent to those of the village have been imputed. Thus the analysis of data has been carried out in two ways. (1) Using the actual land and water rental charges assigned to the agro-business farms, and (2) imputing land and water rental charges for the agro-businesses equivalent to the comparable figures

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(1) For a detailed explanation of methods of calculation and adjustments for the different alternative assumptions of land and water rental charges, see Chapter Four, Section Two, pp. 164-166.

for the villages. Each of the two series of tests has been carried out using three different assumptions of the size of holdings, LA, ZLA and TLA. In all cases, where netted productivity ratios are used, alternative methods of (a) disregarding the depreciation costs of the Dam, or (b) allowing for these costs, have been used.

Comparisons of the total productivity ratios EG, EN and EA, between the agro-business farms and the four progressive villages indicate that without allowance for any adjustments either for the area under cultivation or the land and water rental values, this ratio is in general higher for the villages.(1) (Tables 5 and 6).

The results of the analysis of variance model, using EG as the dependent variable, show that the difference is always significant for the two conventional villages Ahmad-Ābād and Tālesh-Mahalleh (Table 7). For Turāne-Turk the difference becomes significant only when adjustments for the land and water rentals for the agro-business units are made for ZLA. For Chahār-Dangeh at all three different assumptions of the area of holdings for the agro-farms, the difference in the total productivity ratios remains insignificant.

Comparisons of the total productivity ratio (EG) between the agro-business farms and Booraki show that the ratio is higher for the agro-business farms where the land and water rental charges are made either for LA or ZLA. (Tables 5 and 6). But where the total area of the agro-businesses, TLA, is

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(1) If instead of 12% interest charge on the agro-business loans 6% is charged (see Chapter Four, Section Two, pp. 161-62) the mean total productivity ratio for these units using LA, becomes 0.8469, which is higher but insignificantly different (F ratio 0.0931) from Chahar-Dangeh. But all other comparative results remain unchanged.

Also note that the productivity ratio EA, (Tables 5 and 6) is slightly higher for the agro-business farms as compared with EA for Chahar-Dangeh.

Table 5 : **Mean Total Productivity Ratios: Villages**

Rls/Rls.

Name of Villages	EG	EN	EA
Ahmad-Ābād	1.1839	1.1878	1.3097
Tālesh-Mahalleh	1.4650	1.4727	1.5694
Turāne-Turk	1.0713	1.0757	1.1303
Chahār-Dangeh	0.8296	0.8240	0.7672
Booraki	0.5640	0.5830	0.4960

Table 6 : **Mean Total Productivity Ratios: Agro-businesses**

Rls./Rls.

Land and water rental charges for the area under cultivation LA	E	
	G	0.8175
	N_1	0.8068
	N_2	0.5757
	A_1	0.7819
	A_2	0.5411
Land and water rental charges for the area with completed water canals. ΣLA	G	0.653
	N_1	0.6193
	N_2	0.4318
	A_1	0.6327
	A_2	0.4287
Land and water rental charges for the total area of holdings. ΣLA	G	0.5323
	N_1	0.504
	N_2	0.3723
	A_1	0.5001
	A_2	

Subscript 1 means that the depreciation of the Dam is not included in computations and subscript 2 the inclusion of this cost in computations.

Table 7 : **Summary Analysis of Variance**

Agro-Business and Five Villages: Dependent Variable EG

	F Ratios		
Villages	LA 1	ZLA 2	TLA 3
Ahmad-Ābād	4.352*	9.641*	14.612*
Tālesh-Mahalleh	6.2587*	10.104*	13.155*
Turāne-Turk	1.1705	3.3500	5.4197*
Chahār-Dangeh	0.0030	0.6876	1.8741
Booraki	2.5993	0.3402	0.0429

1) **LA**, land and water rental charges for area under cultivation.

2) **ZLA**, " " " " " with completed water canals.

3) **TLA**, " " " " the total area of holdings.

* **Rejection of the null hypothesis of equal mean total productivity ratios at 5% significance level.**

considered, then Booraki shows a slightly higher ratio. The netted total productivity ratio EN, using the area of LA for the agro-businesses, is higher for the companies if the depreciation of the Dam is not accounted for. However, once adjustments for the depreciation are made, Booraki shows an almost higher ratio. All the EN ratios are higher for Booraki if ZLA or TLA are used for the rental charges. The productivity ratios using the net-value-added (EA) are lower for Booraki if the area for the companies is assumed to be LA. However, the situation becomes reversed if ZLA or TLA are used and the adjustments for the depreciation of the Dam are made (Tables 5 and 6).

All these tests of analysis of variance using EG as the dependent variable show that the ratios between Booraki and the agro-businesses are insignificantly different (Table 7).

Where the imputed land and water rental charges for the agro-business units were equivalent to those of the five villages, then all the total productivity ratios EG, EN and EA at all the different assumptions of the area of agro-business LA,ZLA and TLA,showed lower results for the farm companies (Tables 8, 9, 11, 12, 14, 15, 17, 18, 20, 21).

The tests of analysis of variance (using EG as the dependent variable) based on all three different assumptions of size of holdings for the agro-business farms, and using imputed village land and water rental charges for these units show that all five villages have significantly higher total productivity ratios than do the agro-farms (Tables 10, 13, 16, 19, 22).

Partial productivity analysis has certain limitations, and in the specific case of comparing villages with the agro-business farms the tests are even less conclusive due to climatical differences, variations in crop patterns, etc. than in the cases where the comparisons are made under more homogeneous conditions. Nonetheless, as the announced objective of these farms has been the optimum use of land and water, it will be [illegible]

Table 8 : Mean Values of Total Productivities for Agro-Farms

Imputed Land and Water Rentals Equivalent to

Ahmad Ābāde Moshir

Rls./Rls.

LA Land and water rental charges for the area under cultivation	G	0.1378
	N_1	0.1201
	N_2	0.0851
	A_1	0.1178
	A_2	0.0829
ZLA Land and water rental charges for the area with completed water canals	G	0.0768
	N_1	0.0659
	N_2	0.0445
	A_1	0.0645
	A_2	0.0430
TLA Land and water rental charges for the total area of holdings	G	0.0495
	N_1	0.0423
	N_2	0.0328
	A_1	0.0414
	A_2	0.0293

* Subscript 1 means that the depreciation of the Dam is not included in computations and subscript 2 the inclusion of this cost in computations.

Rental value of land = Rls. 6,000 per hectare

Value of a cubic metre of water = Rls. 1.16

Table 9 : Mean Values of Total Productivities for Ahmad Ābād Moshir

Rls./Rls.

EG	1.1839
EN	1.1887
EA	1.3097

Table 10 : Summary Analysis of Variance Agro-farms and Ahmad Ābāde Moshir. Imputed Land and Water Rents Equivalent to Ahmad-Abad

Dependent Variable	F Ratios		
	LA 1	ZLA 2	TLA 3
EG	38.38*	41.07*	45.28*

1) **LA.** Land and water rental charges for the area under cultivation.

2) **ZLA.** " " " " " " " with completed water canals

3) **TLA.** " " " " " " total area of holdings.

* **Rejection of the null hypothesis of equal mean total productivity ratios at 5% significance levels.**

Table 11 : Mean Value of Total Productivities for Agro-Farms Imputed Land and Water Rentals equivalent to Tālesh-Mahalleh

Rls./Rls.

		E
LA Land and water rental charges for the area under cultivation	G	0.5394
	N_1	0.5006
	N_2	0.3466
	A_1	0.4951
	A_2	0.3395
ZLA Land and water rental charges for the area with completed water canals	G	0.3802
	N_1	0.3429
	N_2	0.2852
	A_1	0.3378
	A_2	0.2293
TLA Land and water rental charges for the total area of holdings	G	0.2752
	N_1	0.2487
	N_2	0.1833
	A_1	0.2452
	A_2	0.1813

Subscript 1 means that the depreciation of the Dam is not included in computations and subscript 2 the inclusion of this cost in computations.

Rental value of land = Rls. 30,000 per hectare

Value of a cubic metre of water = Rls. 0

Table 12 : Mean Values of Total Productivities for Tālesh-Mahalleh

Rls./Rls.

EG	1.4653
EN	1.4727
EA	1.5694

Table 13 : Summary Analysis of Variance Agro-Farms and Talesh-Mahalleh. Imputed Land and Water Rents Equivalent to Talesh-Mahalleh

Dependent Variable	F Ratios		
	LA 1	ZLA 2	TLA 3
EG	13.13*	18.14*	21.76*

1) LA. Land and water rental charges for the area under cultivation

2) ZLA. " " " " " " " with completed water canals

3) TLA. " " " " " " total area of holdings

* Rejection of the null hypothesis of equal mean total productivity ratios at 5% significance level.

Table 14 : **Mean Value of Total Productivities for Agro-Farms Imputed Land and Water Rentals Equivalent to Turane-Turk Rls./Rls.**

		E
LA Land and water rental charges for the area under cultivation	G	0.0700
	N_1	0.0603
	N_2	0.0428
	A_1	0.0591
	A_2	0.0416
ZLA Land and water rentals charges for the area with completed water canals	G	0.0378
	N_1	0.0323
	N_2	0.0217
	A_1	0.0316
	A_2	0.0210
TLA Land and water rental charges for the total area of holdings	G	0.0235
	N_1	0.0204
	N_2	0.0152
	A_1	0.0200
	A_2	0.0149

Subscript 1 means that the depreciation of the Dam is not included in computations and subscript 2 the inclusion of this cost in computations.

Rental value of land = Rls. 4,170 per hectare

Value of a cubic metre of water = Rls. 2.5

Table 15 : Mean Value of Total Productivities for Turāne-Turk

Rls./Rls.

EG	1.0713
EN	1.0757
EA	1.1303

Table 16 : Summary Analysis of Variance. Agro-Farms and Turāne-Turk Imputed Land and Water Rents Equivalent to Turāne-Turk

Dependent Variable	F R a t i o s		
	LA 1	ZLA 2	TLA 3
EG	19.60*	20.89*	21.47*

1) **LA.** Land and water rental charges for the area under cultivation

2) **ZLA.** " " " " " " " with completed water rental

3) **TLA** " " " " " " total area of holdings

* **Rejection of the null hypothesis of equal mean total productivity ratios at 5% significance level.**

Table 17 : **Mean Values of Total Productivities for Agro-Farms**

Imputed Land and Water Rentals Equivalent to Chahār-Dāngeh

Rls./Rls.

		E
LA **Land and water rental charges for the area under cultivation**	G	0.1530
	N_1	0.1337
	N_2	0.0948
	A_1	0.1372
	A_2	0.921
ZLA **Land and water rental charges for the area with completed water canals**	G	0.0859
	N_1	0.0739
	N_2	0.0498
	A_1	0.0723
	A_2	0.0483
TLA **Land and water rental charges for the total area of holdings**	G	0.0547
	N_1	0.0476
	N_2	0.0356
	A_1	0.0466
	A_2	0.0347

Subscript 1 means that the depreciation of the Dam is not **included in computations and subscript 2 the inclusion of this cost in computations.**

Rental value of land = Rls. 10,000 per hectare

Value of a cubic metre of water = Rls. 1

Table 18 : Mean Value of Total Productivities for Chahār-Dangeh

Rls./Rls.

EG	0.8296
EN	0.8240
EA	0.7672

Table 19 : Summary Analysis of Variance Agro-Farms and Chahār-Dangeh Imputed Land and Water Rents Equivalent to Chahār-Dangeh

Dependent Variable	F Ratios		
	LA 1	ZLA 2	TLA 3
EG	10.04*	12.15*	13.19*

1) LA. Land and water rental charges for the area under cultivation

2) ZLA. " " " " " " " with completed water canals

3) TLA. " " " " " total area of holdings

* Rejection of the null hypothesis of equal mean total productivity ratios at 5% significance level.

Table 20 : Mean Value of Variables for Agro-Farms

Imputed Land and Water Rentals Equivalent to Booraki

Rls./Rls.

		E
LA Land and water rental charges for the area under cultivation	G	0.2199
	N_1	0.1944
	N_2	0.1381
	A_1	0.1849
	A_2	0.1291
ZLA Land and water rental charges for the area with completed water canals	G	0.1267
	N_1	0.1097
	N_2	0.0742
	A_1	0.1074
	A_2	0.0719
^{TLA} Land and water rental charges for the total area of holdings	G	0.0821
	N_1	0.0718
	N_2	0.0537
	A_1	0.0704
	A_2	0.0523

Subscript 1 means that the depreciation of the Dam is not included in computations and subscript 2 the inclusion of this cost in computations.

Rental value of land = Rls. 700 per hectare

Value of a cubic metre of water = Rls. 0.68

Table 21 : **Mean Value of Variables for Booraki**

Rls./Rls.

EG	0.5638
EN	0.5833
EA	0.4957

Table 22 : Summary Analysis of Variance Agro-Farms and Booraki Imputed Land and Water Rents Equivalent to Booraki

Dependant Variable	F Ratios		
	LA_1	ZLA_2	TLA_3
EG	5.83*	9.54*	11.57*

1) **LA.** Land and water rental charges for the area under cultivation

2) **ZLA.** " " " " " " " with completed water canals

3) **TLA** " " " " " " total area of holdings

* **Rejection** of the null hypothesis of equal mean total productivity ratios at 5% significance level.

to make a comparative study of the returns for each of these inputs with the comparable ratios for the villages. Also, where highly mechanized farms are involved, it would be natural to assume that the labour productivity will be substantially higher in comparison with the village farms. This hypothesis will also be tested through partial productivity analysis.

Partial productivity ratios with respect to the land under cultivation are higher for all the four progressive villages (Table 23). Tests of analysis of variance indicate that, with the exception of Turāne-Turk, the ratio is significant for all the other villages (Table 24). However, even for Turāne-Turk the difference becomes significant once the area for the agro-farms is assumed to be at least ZLA (Table 24).

Since in Chahār-Dangeh a part of the fallow land is potentially productive, an alternative test is to examine the significance of the difference where the total area of holdings are used. In this comparison, the higher productivities of Chahār-Dangeh become significant only where the area for the agro-farms is assumed to be either ZLA or TLA (Tables 23 and 24).(1)

Partial productivity ratios with respect to the land under cultivation are significantly higher for the companies than for Booraki (Tables 23 24). But the difference becomes insignificant once TLA is used for the units (Table 24).

Partial productivity ratios with respect to the input of water are higher for all the three villages Ahmad-Ābād, Chahār-Dangeh and Booraki

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(1) Note that in Chahār-Dangeh not all the fallow land is potentially productive. Only a portion of the fallow arbabi land could be used for cultivation. Therefore, partial productivity ratios with respect to TLA under-estimate the results.

Also, the partial productivity ratios with respect to the total area of holdings for Ahmad-Ābād will be meaningless in this context, as due to water limitations no further land can be brought under cultivation.

For the other three villages TLA and LA are identical.

Table 23 : Mean Partial Productivities with Respect to Land

Agro-businesses and Five Villages

Rls. (Gross value of output/ha.

Agro-business Farms			Ahmad-Abad		Tālesh-Mahalleh		Turāne-Turk		Chahār-Dangeh		Booraki	
LA 1	ZLA 2	TLA 3	LA	TLA	LA	TLA	LA	TLA	LA	TLA	LA	TLA
33417	18092	11096	38875	35550	102231	102231	37116	37116	90915	50441	8872	8872

Table 24 : Summary Analysis of Variance Partial Productivities with Respect to Land. Agro-businesses and Five Villages**

Villages	F Ratios		
	LA	ZLA	TLA
Ahmad-Abād	16.66*	25.534*	35.63*
Tālesh-Mahalleh	14.03*	20.09*	26.79*
Turāne-Turk	1.66	7.60	19.35*
Chahār-Dangeh (LA)	4.41*	6.65*	9.19*
Chahār-Dangeh (TLA)	1.94	3.34	5.09*
Booraki	18.68*	7.13*	2.69

** Except for Chahār-Dangeh that analyses have been carried out for both LA and TLA, for all other villages LA has been used.

1) LA area under cultivation.

2) ZLA area with completed water canals (for agro-businesses only)

3) TLA Total holding area

* Rejection of the null hypothesis of equal mean productivity ratios at 5% significance.

(Table 25).[1] The difference is significant for Ahmad-Ābād (Table 26), whereas for Chahār-Dangeh it becomes significant only where the total quantity of potentially available water for the area is used for the agro-farms. The ratio is insignificantly different for Booraki (Table 26).

Output per unit of total labour input is higher for the agro-business units (Table 27). The difference is significant where comparisons are made with Tālesh-Mahalleh and Turāne-Turk (Table 28). Otherwise, this ratio is insignificantly higher for the agro-business farms.

It is possible to argue that in the two villages Tālesh-Mahalleh and Turāne-Turk, highly labour intensive crops such as rice, tea and cotton are being produced. Therefore, perhaps the significantly lower partial productivity ratio with respect to labour can be partly explained by the crop patterns.

Another factor to note is the composition of the labour-force in the companies, which is mainly adult male labour. If the gross value of output divided by the adult male labour input is used for comparisons, then this ratio is higher for the three villages Ahmad-Ābād, Tālesh-Mahalleh and Chahār-Dangeh (Table 27).

In the above comparisons, the bulk of the farms included in the village case-studies were peasant units. It is also interesting to make a comparison between the capitalist farms included in the case-studies with the agro-business units. As Table 29 indicates, the total productivity ratio (EG) is higher for the sāzemans in Turāne-Turk. A similar pattern is observed for the ratios EN and EA. The productivity ratio (EG), using only land and water rentals for the cultivated area, is higher for the companies in relation to the arbābi unit in Chahār-Dangeh. However, once the ratios are netted for depreciation, including the depreciation costs of the dam, then the

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(1) Tālesh-Mahalleh and Turāne-Turk are not included since they are located in humid areas and rain plays an important role in agriculture.

Table 25 : Mean Partial Productivity Ratios with Respect to Water Agro-businesses and Five Villages

Rls/m³

Agro-businesses			Ahmad-Abad	Chahar-Dangeh	Booraki
Quantity of Water for LA 1	Quanity of Water for ZLA 2	Quantity of Water for TLA 3			
1.89	0.99	0.61	5.03	3.61	3.14

Table 26 : Summary Analysis of Variance Partial Productivities with Respect to Water. Agro-businesses and Five Villages

Villages	F Ratios		
	Quantity of Water for LA	Quantity of Water for ZLA	Quantity of Water for TLA
Ahmad-Abad	10.23*	18.37*	20.78*
Chahar-Dangeh	1.67	3.79*	5.12*
Booraki	0.78	2.18	3.23

1) Gross output divided by the actual quantity of water used for irrigating the area under cultivation.
2) Gross output divided by the potential quantity of available water to irrigate ZLA (area with completed water canals).
3) Gross output divided by the potentially available water to irrigate the total area of holdings.

* Rejection of the null hypothesis of equal mean partial productivity ratios at 5% significance

Table 27 : Partial Productivities with Respect to Labour: Agro-businesses and Five Villages[1]

	Agro-businesses	Ahmad-Abad	Talesh-Mahalleh	Turane-Turk	Chahar-Dangeh	Booraki
1 OG/DAY	682	573	277	199	473	260
2 OG/MAN	682	819	830	341	602	-

Table 28 : Summary Analysis of Variance Partial Productivities with Respect to Labour: Agro-businesses and Five Villages.

Dependent Variable	F Ratios				
	Ahmad-Abad	Talesh-Mahalleh	Turane-Turk	Chahar-Dangeh	Booraki
OG/DAY	0.67	37.93*	42.25*	0.41	0.86

1) OG/DAY gross value of output divided by total equivalent of male adult days of work.

2) OG/MAN gross value of output divided by adult male labour input.

* Rejection of the null hypothesis of equal mean productivity ratios at 5% significance.

Table 29 : Total Productivity Ratios: Agro-businesses and Capitalist Farms

Rls./Rls.

		EC	EN[1]	EA[1]
Agro-business Units	LA	0.61	0.57	0.53
	ZLA	0.65	0.43	0.42
	TLA	0.53	0.37	0.36
	Rental charges of Chahar-Dangeh LA	0.15	0.09	0.09
Sāzemans (Turāne-Turk)		0.93	0.93	0.92
Arbābi Unit (Chahār-Dangeh)		0.71	0.68	0.56

1 **Both EN and EA are inclusive of the dam depreciation costs.**

arbābi unit shows a higher ratio. Also, all the total productivity ratios related to the arbābi unit are higher than the agro-businesses once the rental charges for the agro-business units are made for ZLA and TLA. Furthermore, when the land and water rental charges for the companies are made equivalent to Chahār-Dangeh, then even for the area under cultivation of the companies, the total productivity ratio EG shows a substantially smaller figure for the agro-farms.

The arbābi unit in Chahār-Dangeh is the only other highly mechanized farm in the sample, aside from the four agro-business farms. Therefore, it is interesting to make a comparison of the labour productivity of this unit with the agro-business farms. The comparison indicates that this ratio for the arbābi unit is almost twice the comparable figure for the agro-business farms (Table 27 and Chapter Five, Section One, p. 205 Table 27.)

To summarize, the comparative analysis of the five villages and the four agro-businesses shows that the two conventional villages, regardless of the assumptions for cost calculations, have higher total productivity ratios than the agro-business farms. The analysis also indicates that the two villages Turāne-Turk and Chahār-Dangeh also have higher total productivity ratios, but the differences, using the subsidized land and water rental charges for the agro-business farms, are not always significant. However, once the subsidized rental charges are removed, then even Booraki shows a significantly higher total productivity ratio.

A comparison of the large capitalist farms in the survey with the agro-business farms appear to show higher productivities of the capitalist farms. Thus, it can be concluded that even where the agro-farms show higher total productivity ratios, this result is due to subsidized land and water rental charges rather than to a more productive use of inputs.

The results of the partial productivity analysis appear to support

the following conclusions:

1) In terms of land use the four progressive villages are more productive than the agro-business farms.

2) In terms of the more productive use of water, even Booraki appears to have a superior performance.

3) Even in terms of labour productivity. in spite of the heavy use of machinery, it is doubtful whether the returns for the labour input is substantially higher in these companies. Comparisons with the mechanized family farm in Chahār-Dangeh suggest the inferior performance of the agro-businesses.

Reasons for Failure

From the analysis presented in the preceding two sections, it is fair to conclude that the four agro-business farms included in the survey have, at least so far, failed to fulfill their claimed objectives and in general show lower productivities than the five surveyed villages. As stated earlier (p 252), these farms are located in very fertile land and unlike most Iranian agricultural producers are not faced with water shortages. In addition, the government has been very generous to these units in extending loans (p. 284, Table 3) which are far larger than the loans available to the autonomous units (Chapter Two, Section One p.62). Therefore the problem cannot be explained in terms of resource limitations, and should be sought either in the management system of these farms or other relevant institutional factors. In the following pages a number of the institutional factors which appear to have contributed to the failure of these farms are presented. There may be also some other contributing factors for which, unfortunately, I have no evidence.[1]

1. In general, the existing evidence on the productive performance of the agro-business units indicates their inferior performance in relation to the peasant farms included in my village case-studies. Also, the results of the previous section indicate that the capitalist farms included in the case-studies show superior productivity ratios relative to the four companies. Furthermore, the study by IBRD (Chapter Two, Section Two, pp 82-83) tend to show that the production performance of the large capitalist farms included in their survey is superior to that of the four agro-business units.

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(1) For example there is allegation of corruption about these farms. But I have found no evidence supporting it. Rohani, the minister responsible for these policies is now in jail. But the charges against him are not clear, and he has not yet been put on trial.

The report of the Agricultural Development Bank states that in spite of the fact that managerial salaries are very high and the labour wages are reasonably high in these companies, both management and labour being wage-earners, do not show incentives to work hard.(1) According to the report, this is one of the major factors responsible for the failure of the companies.

In relation to the scale of operation, the following factors are worth mentioning. Firstly, the companies have been unable to use all the potential cultivable land. Secondly, where they did cultivate the land, they were unable to meet the potential yields that had been obtained in the smaller Safi-Ābād farm. Thirdly, according to the Bank report where the units tried to expand operations yields have further declined. Two of the companies that expanded the area under cultivation more rapidly than others experienced falls in the yields and consequently tried to limit the cultivated area.(2)

From the above-mentioned results two closely related hypotheses concerning economies of scale in agriculture and land labour and management relations can be drawn:

a: The above evidence tends to throw doubt on the possibility of the economies of large-scale in agricultural production in Iran. As the evidence suggests that the medium-size peasant producers show higher overall productivity than the capitalist farms, which in turn appear to be more productive than the agro-business farms. Within the latter category, those who tried to expand operations

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(1) Agricultural Development Bank (1978) pp. 11-12, 44 and 67. According to this report the average daily wages paid to unskilled labour in the companies amounted to Rls. 500 for 1977 . According to Hab-khoo (1977 p. 54) average daily wages in 40 sample villages scattered in the country amounted to Rls. 450 in 1976.

Also note that the Bank Report does not specify the exact amount of the managerial salaries. But repeated statements are made about these salaries being too high.

(2) Agricultural Development Bank (1918), pp. 33 and 43.

faster show lower productivities than the rest.(1)

b) The evidence of the five villages suggested that the superior performance of the medium-size farms relative to the larger units may be explained in terms of the availability of family labour for both manual and managerial work. Here it can be hypothesized that the relative superiority of the capitalist farms to the agro-businesses can be sought in terms of the role of family management as against the semi-bureaucratic salary-earning management of the agro-business farms. It can be argued that where the management is the direct beneficiary of the output and profits it is likely to have greater incentives and try to show entrepreneurial abilities. A similar incentive to avoid waste, and increase profits, may not exist for a salary-earning manager. Also note that the argument presented in the previous chapter (in terms of the existence of emergency types of work in agriculture which require immediate action) also holds for the agro-business farms. While in the cases where the management's interests directly coincide with the gains from the farming activities, the managers are likely to try to work harder during the emergency tasks, in the case of the salary earning managers it is unlikely that they will be willing to sacrifice their time off and holidays in order to cope with emergencies.

2. The social organization of production set up in the agro-business farms has been imported from abroad, without any attempts to modify it to the local conditions. It can be argued that the imported system has greatly contributed

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(1) Note that where reference to the possible economies of scale in the boneh has been made, the overall scale of the operation is small compared to that of the agro-business farms, e.g., about 300 hectares for Ahmad-Abad or abour 40 hectares for the ejare-kars in Chahar-Dangeh. Anyhow, boneh is based on small holdings and only certain operations are carried out collectively.

to the failure of the companies.[1] Firstly, the management, being mainly foreign, was unable to communicate with the workers and to train them for their jobs. Under these conditions the managers, instead of trying to grasp and understand the local conditions, tried to superimpose systems which may have been potentially workable under completely different social settings but had little relevance to Iran. This, according to the Agricultural Development Bank, has had major drawbacks for production.[2] Secondly, it is important to note that the social structure of the land-labour relations in the agro-business farms is completely alien to the systems of land tenure in Iran. As stated in Chapter One (Section One, pp 5-9), while historically the state has always challenged the security of the land ownership by the landlords, the security of the tenancy of the peasants has remained undisturbed. As a rule, the peasants do not expect to be pushed out of their farms by the government. But in the case of the Dez irrigation project not only were they forced to sell their lands, but according to the various reports the compensation which they received was substantially below the market value of their lands.[3] Since the majority of the workers employed by the companies are the original farmers of the area, there has been evidence of various social problems with the workers.[4]

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(1) Among the most successful of very large capitalist farms, with a complete chain of production and processing, the Yek-o-Yek company can be cited. It is interesting to note that the company has made various types of crop-sharing agreements with agricultural labourers; also, as stated in Chapter Two (Section Two, pp 79-80) the farm corporations have made various modifications in their methods of wage payments, making them similar to crop-sharing agreements. The agro-businesses, however, have made no such modifications.

(2) Ibid, pp. 47 and 68.

(3) Marzi (1976) unpublished, p.6.

(4) Files of the companies, Agricultural Development Bank, unpublished.

Not only has the social organization of production in the farms been based on imported models that were not adjusted for the conditions of Iran, but even the use of machinery and the techniques of production have been irrelevant to and inefficient for the local conditions. For example, with respect to the importation of the types of machines to be used in the area, no market research was carried out by the firms in order to find out for which types of machines spare parts are available in Iran. As a result a substantial part of the machinery has remained unused due to the lack of spare parts. Also no serious attempt has been made to train the required man-power to use the machines. Again, due to shortages of trained labour machines have remained unused.(1) All these factors have substantially added to the cost without making an equivalent contribution to production.

3. The increasing losses of the companies have been met mainly through the resources of the Agricultural Development Bank. The foreign and a number of private Iranian partners have tried to pull out. As indicated by Table 30, both the volume of the loans provided by this Bank and its share in the total assets of the companies increased substantially by 1975. In addition to this Bank, other Iranian banks and government organizations have also made substantial contributions.(2)

The Bank Report emphasizes the fact that the salaries of the managers have been too high in relation to their relevant qualifications. Also, it states that the foreign partners, once they realized that the companies were making losses, tried to recover their original capital through allocation of high salaries to their management.(3)

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(1) Ibid. pp. 41 and 45.

(2) Ibid. pp. 17-30.

(3) Ibid. pp. 17-30.

Table 56 : Comparison of the Original Paid in Capital Assets, ADB Loans at Commencement and 1975 of the Four Companies Participating in Current prices

Name of the Company	Original Capital Assets	Original Share of ADB in Total Assets %	ADB Loans Approved at Commencement	Increased Paid in Capital Assets 1975	Share of ADB in Total Assets 1975 %	ADB Loans Approved at 1975 [1]
Iran California Commercial Farms	15.3	20	75	250	32.67	407
Iran and American Company	100	-	125	220	15.87	190
Iran Shell Cotts	60	15	110	600	15	455
International Agro-business Corporation of Iran	610	15	457	610	15	457
TOTAL	865.3	13	763	1660	17.4	1509

Source: Agricultural Development Bank (1978) pp. 16-30.

1 Note that the actual amount of the loans outstanding at 1975 exceed these figures. The above figures do not include the rate of interest accrued to the loans extended prior to 1975.

It has already been stated that the transfer of technology to the area has not been adjusted to the local conditions. It must be added that the available evidence shows that at times this transfer has been made in a completely unreasonable way. For example, on the average the cost per hectare for the land-levelling and the establishment of the irrigation canals within the farms has amounted to Rls. 100,000. But careless and haphazard methods of land levelling have caused the removal of the organic material in the soil which is useful for cultivation.(1)

Here it can be hypothesized that the presence of substantial government capital has permitted excessive waste. It is unlikely that such enormous waste of resources would have taken place had private financial sources been at stake.

Having stated the apparent factors contributing to the failure of these farms, an obvious question to ask is whether the evidence suggests that the agro-business system is in general inefficient for Iran, or in the case of these four units has been inefficient.(2) My arguments in terms of the diseconomies of scale and management and labour incentives suggest that the agro-businesses are potentially inefficient for Iran. However, the presence of other institutional factors, that seem to have contributed to the inefficiency of the system, which are not necessarily an inherent part of an agro-business farm, point to a more cautious approach in concluding with certainty that an agro-farm is in general incapable of being a viable and efficient production entity in Iran. Such conclusive results could be obtained only by further study of the subject.

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(1) Ibid. p. 35.

(2) I have confined myself to generalize only for the case of Iran, as my evidence concerns this country only. For example, it may be argued that under conditions where the technological coefficient is very high so that the natural factors are controlled for, the argument in terms of emergent conditions may lose validity. Also, it can be argued that under the social conditions in which the collective spirit of work is valued, then the argument of the family incentives may lose importance. These arguments are beyond the scope of this dissertation, and therefore not examined.

A Note On The Possible Use of Social Prices:

As the preceeding analyses have been based on market prices, it is possible to argue that had social prices been considered the results might have been different. Unfortunately, no quantitative measurement of the relevant social prices are available. However, it is possible to develop some notions about these prices. The following characteristics may be attributable to a socially more optimum production system:

a) The production system can produce relatively higher returns in terms of the socially more scarce resources.

b) The production system directly invests in the socially more scarce resources. Thus it is able to increase the supply of these resources.

c) Although the specific production system under study may not directly invest in the socially more scarce resources, it seems to be the only type of system of production which is able to use these resources once they have been made available by other investors, e.g. government.

d) The specific type of production system under study can be instrumental in bringing in new technology to an area and therefore, be useful in the process of transfer of technology.

A study of the agro-business farms in Iran, in terms of the abovementioned four criteria, appears to negate the possibility that in terms of social prices the farms may be considered successful. Firstly, as indicated in pp.251-2b. and pp. 283-284, these farms have been wasteful in terms of use of three scarce factors of production namely land, water and capital. Secondly, the agro-businesses have played no role in the direct investments in water, which for an arid country like Iran appears to be the most scarce resource for agriculture. These investments have been made by the government. Even in terms of investing for land levelling or use of machinery, they have heavily depended on the government funds, which could have been allocated to a different type

of production system. Thirdly, as the water canals of the dam have been designed to provide water for each land allotment of about 80 - 150 hectares,(1) there seems to have been no compulsion for the government to have rented land to these very large size corporations. Each land allotment with a separate water canal system could have been rented either to capitalist farmers or to collective peasant farming groups who operate on a rental basis. Should the government have been interested in a specific type of land levelling mechanism, it could have then imposed it as a part of the rental contract. Also, the government could have provided credit for these initial investments to the capitalist or peasant farmers. Indeed the example of ejareh-kārs who have rented land from the agro-business farms to produce summer crops (Chapter IV, p. 164 foot-note 2) confirms the possibility of the practical applicability of this suggestion in relation to collective peasant farmers. Fourthly, as seen in Chapter V (Section Three, p. 234) the agro-business farms do not appear to have played any positive role in transfer of technology to the neighbouring areas. Also, as stated in p. 283, even in terms of their own farm technology they do not appear to have successfully employed the appropriate methods.

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(1) Ministry of Agriculture internal reports.

SUMMARY

1) The evidence of the four agro-business farms indicates that in general they have failed to fulfill their production objectives. Also, comparisons of the total productivity ratios of these farms with those of the five villages indicate that for the most part they are lower for the agro-farms. Even in cases where the total productivity ratios are higher for these units the difference is due to the subsidized land and water rental charges of these units. Once adjustments are made for these rates, then the ratios are lower for the agro-farms. Comparisons of the agro-farms with the capitalist farms in the survey also indicate that in general the latter shows higher productivities.

2) As the four units are operating on fertile land and have access to substantial loans from the government, their failure cannot be explained in term of resource limitations and should be sought in institutional factors. The existing evidence suggests that in general there may diseconomies of scale for these very large farms in Iran. Also the use of wage-earning managers as against family management running its own business seems to be a factor causing the relatively lower results of these units as compared with the capitalist farms. In addition, in the specific case of these farm units imported models of management and technology have been brought to the area which have little relevance to the conditions of the country. Furthermore, the massive government financial support of these units appears to have grossly exaggerated their inefficiency.

CONCLUSIONS

In general, the preceding analysis makes it possible to conclude that there is no evidence supporting the hypothesis that the production performance of the semi-government corporate systems is superior to that of autonomous agricultural producers. On the contrary, the case of the four agro-business farms points to the failure of these systems, and while the farm corporations seem to be more successful than these agro-business farms, the evidence tends to suggest that the productivity increases in the farm corporations have resulted from substantial government investments, rather than from more efficient resource allocation.

A macro study of the production performance of the autonomous agricultural producing units, given the over-all macro-economic variables (especially the government policy) acting on these systems, throw doubt on the hypothesis of the inherent production inefficiencies of these units. On the contrary the production performance of the autonomous systems during the period of the Land Reform make it possible to hypothesize that under apparently unfavourable overall economic conditions, the autonomous units have been rather efficient agricultural producers.

A study of the relationship of farm-size and productivity in the case studies presented in this dissertation has yielded the following results: First, the medium size peasant producers, in all cases where comparisons were possible, have shown higher total productivities than the very small-size peasant producers. But it appears that the medium-size peasant producers also show higher total productivities than the larger size farms. In general the data makes it possible to hypothesize that with the increase in the size of farms there is a tendency for the total productivity ratios to decline. This evidence is more apparent in the comparisons of the agro-business farms with the autonomous producers. Also within the agro-business farms, it seems that the ones which expanded the area under

cultivation more rapidly have shown lower productivity ratios. The macro evidence on the relationship of farm size and productivity, though insufficient to allow for conclusive evidence, tends to support my micro results. Thus it can be concluded that the existing evidence throws doubt on the existence of economies of large-scale agricultural production in Iran.

The results of my exploratory comparison of the village case-studies, make it possible to hypothesize that in areas and in villages where mainly peasant producers are operating, the overall productivities tend to be higher than in localities where mixed peasant and capitalist or peasant and agro-business systems exist.

A number of writers have argued that there are productivity gains from economies of scale in the social organization of boneh. But they have not presented technical input-output studies to support the hypothesis. My own micro studies, though insufficient to draw conclusive results, tend to support the possibility of productivity gains from the organization of boneh. But in this respect it is important to note two factors:

1) the social organization of boneh is based on small-holdings and individual incentives. Only certain activities are carried out collectively.

2) the scale of the organization of boneh never exceeds the ploughlands of a single village; in the case of Ahmad-Ābād, which is a fairly large Iranian village, this area is about 300 hectares. Therefore the evidence of boneh does not lead to the conclusion that similar scale economies are possible where some thousand hectares of land are involved.

In this dissertation it has been hypothesized that a key factor accounting for the relative production success of the different farm size and management systems, is the relative share of family labour and family management in these farming categories. The supply of land is very

limited for the smaller peasant producers. Thus through a greater application of the nearly costless female and child family labour, to the point below marginal returns equivalent to wages, they try to obtain higher results from the more limited supply of land. But the medium-size farms, in order to obtain higher returns from the land input, have to employ wage-labourers. Therefore, they would not be willing to do so if the marginal returns from the land input are below the going market wage rates. In comparing the medium-size farms with the larger units, again the argument for family labour is used. The apparently superior performance of the medium-size farms has been attributed to the relative abundance of family labour and family management in these units as compared with the larger categories. It has been argued that because the profits of these farms and the gains of the family coincide, this type of labour and management has a greater incentive to work. Also, because the dependence of agricultural work on natural conditions, means that there are often emergency tasks to perform, the availability and stronger incentive to work of the family labour makes it more efficient than non-family labour. The capitalist farms have, in varying degrees, to depend on wage-labourers. Not only may this type of labour have fewer incentives, but also, at times of emergency, it may not be available. The apparently superior performance of the capitalist farms to the agro-business ones has also been explained in terms of the superiority of family management to salaryearning managers. Again the argument concerning incentives and emergency tasks in agriculture has been used.

The evidence of the five surveyed villages makes it possible to hypothesize that the medium-size peasant producers have the highest total productivity ratios. But due to the data limitations it is not possible to identify a general size boundary for these apparently most productive peasant farms. But it can be hypothesized that the lower boundary of the

size category is where there is not an over-supply of the family labour to be employed at lower marginal rates of return than wage rates and where the production unit is financially capable of affording the required current inputs to obtain higher returns. The upper limit appears to be the point from which the family labour is not sufficient to carry out the bulk of emergency production activities without substantial dependence on wage-labourers.

Another point to note is that my sample is based on a cross-section of data and does not provide a dynamic analysis. However, if the hypothesis of the more productive role of family labour is accepted, then it can be argued that at higher technological coefficients, where machinery would substitute for a part of human labour, it would be possible to obtain equally high productivities from the capitalist farms whose use of machinery and size of farm allow for the bulk of the human labour to be provided by the family. However, this statement needs further clarification. The evidence of the larger capitalist farms in the survey gives some indications that the units, being better able to afford it, appear to be wasteful. On the basis of this evidence it can be argued that there may be some size limitations by which a capitalist farm through increasing substitution of machinery for human labour may remain efficient.

The micro evidence on transfer of technology suggests that the capitalist farms are more innovating than the other groups and appear to have played an important role in the transfer of technology. The government through cooperatives and by sales of agricultural machinery, has also played a part in the transfer of technology. Some of the more outward-looking and progressive peasants have also brought new factors of production to an area. In general, the peasants do not appear to show a lack of response to new inputs. Furthermore, the evidence indicates that probably the

unused capacity of the farm machineries in the villages is not substantial. However, the evidence of the agro-businesses indicate that these units have had no role in the transfer of technology to the neighbouring villages, though by creating insecurity of tenure they may have had some negative impact on investments. Furthermore, it appears that the type of technology brought to the agro-business farms has not been appropriate for the local conditions. Therefore, it has caused resource waste. Thus the evidence of my case-studies does not support the argument proposed by the supporters of the semi-government corporations in relation to the superior institutional abilities of the large-scale corporations for adapting new technology.

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APPENDIX : QUESTIONNAIRES

A - Village Questionnaire

Ostan or Farmāndārykol Shahrestan Dehestān Ābādi

Name of Interviewee(s): 1.

2.

3.

Village population : A. Number of Households

B. Total Population

Pre Land Reform Land Tenure System

Previous Landlords : 1.

2.

3.

Size of Land held by each ex-landlord in the village:

Dates Land Reform started and finished in the village:

In what stage of Land Reform has the village been considered:

How much village land was considered exempted from the Land Reform Law:

PRESENT LAND TENURE SYSTEM : A. NUMBER OF LAND HOLDING HOUSEHOLDS

B. NUMBER OF KHOWSHNESIN HOUSEHOLDS

C. NUMBER OF LARGE MECHANIZED PRODUCTION UNITS IN AND AROUND THE VILLAGE

UNIT OF OWNER(S) : 1.

2.

3.

LAND FERTILITY(1)	PREVAILING UNIT PRICING PER HECTARE(2)	CONVENTIONAL RENTAL VALUESOF LAND	
		IN CASH	IN KIND

1) Categorization of village lands according to its fertility.

2) Prices relevent to each type of land.

MEASUREMENT UNITS IN VILLAGE

NAME OF UNIT	APPLICATION	METRIC SYSTEM EQUIVALENT

Complete listing of all fruit and crop production in the village (categorized into irrigated and un-irrigated)	Productivity per Unit of Land Size or Per Input of Seeds	Types of Seeds Used and their Quality	Types of Fertilizers and their use per Square Meter

TRANSACTIONS OF AGRICULTURAL PRODUCTS

Parties to Transactions	Types of Purchase		Methods of Payment		
	Crops and Fruits	Animal Husbandy	Cash	Pre-harvest	
				Ex-Change For Goods	Ex-Change For Money
Village Shopkeepers					
Pre-harvest buyers					
City Tradesman					
Factories					
Others					

PRICES AND TYPES OF FERTILIZERS

Type	Unit	Price

PRICES AND TYPES OF PESTICIDES

Type	Unit	rice

LAND

1. **Is the village soil of a good quality for agriculture ?**

2. **How is the ploughland rotations in the village:**

3. **Is the water shortage the reason for limited use of ploughlands ?**

4. **Does the quality of village soil vary from the standpoint of potentiality for cultivating various products ?**

   Geographical location of the different qualities of lands

5. **Do different lots of village land vary so far as the potentiality for cultivating various products is concerned ?**

6. **Differentiation of lands from the standpoints of irrigated, non-irrigated fallow and under cultivation:**

WATER

Is there an organization in the village for the division of water ? (Explain).

Persons responsible for irrigation.

How the price of water is paid.

How the wages of the persons responsible for irrigation are paid.

The role of Water and Power Authorities in the organization of water distribution in the village.

Is any irrigation fee paid to Water and Power Authorities ?

Do the existing water distribution methods contribute to a considerable waste of this resource ?

Types of irrigation network.

Relationship of irrigation network with land distribution.

Relationship of the irrigation network with product type.

Was there a major change in the irrigation system during the last fifteen years.

Did these changes contribute to improvements in irrigation methods.

On the whole, have the existing water resources increased during the **recent years** or decreased? (Give reasons for)

Is water a bottleneck or not?

Solutions suggested by villagers to increase water resources.

Dried out Sources

Source	No.	Water Quantity	Reason for drying out	Date

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EXISTING WATER SOURCES OF THE VILLAGE

Source	No.	Quantity	Date of Construction	Capital investment at the time of construction	Present Value	Ownership			General and seasonal sufficiency of water	Source of Investment				
						One owner	Several owners	Name of co-owners		Cash	Loan			
											Loan granting agency	Date received	Duration	Rate

ANIMAL HUSBANDRY

What are the main types of livestock in the village ?

Is animal husbandry one of the farmers' main income sources ?

Names of the most important villagers involved in animal husbandry.

Is there a pasture in the village ?

What are the animal husbandry methods in the village ?

Location of the stables for the livestock.

Are disinfectants used for cleaning the stables ?

Has there been any changes in the stables in the village ? (In what way and when).

Who were the pioneers for this ?

PASTURE

What is the size of the village pastures .

Do these pastures suffice for the village livestock ?

Is there a possibility to further develop animal husbandry with the existing pastures ?

Have measures been taken to develop the pastures ?

- **the persons who did it**
- **the extent of increase of pastures**
- **the method of expansion**

Do the villagers believe in expanding the pastures ? (In what way ?)

Has the Government taken any measures to develop the pastures up to now.

Do the villagers pay rentals for the pastures ? (Amount and source of payment)

Beehive	No. Self-consumption Sales	Do other agricultural products (silkworm...) exist in the village ? (Explain)

COOPERATIVE SYSTEM

1. Date of establishment

2. Does the cooperative operate solely in this village or is it part of a larger cooperative?

3. If a part of a larger cooperative, are the farmers satisfied with the system?

4. Types of activities:

   Loans

   Fertilizers and pesticides

   Seeds

   Purchase of agricultural output

   Sales of consumer goods

Sources of Village Loans	Conditions	Uses			Interest	
		Agri-culture	Animal husbandry	Consum-ption	In Kind	In Cash
1. Co-op eratives						
2. Banks a. b. c.						
3. Factory						
4. Persons						

Needs of the villagers from the standpoint of receiving loans:

Efforts for long-term loans, and the problems involved:

The views of the residents on the appropriate loan receiving **systems** and the amounts of loans:

MACHINERY

Types of Machines	Application	Prevalent rent in the village			Domestic or Foreign made Machines	Location of Repair Shop	Are the spare parts available in the village	Remarks
		Per hectare	Per Hour	Product				
		In Cash	In Kind	Per kilogram				

INNOVATION

Who brought improved seeds and saplings to the village first?	Who brought chemical fertilizers and insecticides to the village first?	Who brought Agricultural Machinery for different applications to the village?
1. Date:	1. Date:	1. Date:
2. Date:	2. Date:	2. Date:
3. Date	3. Date:	3. Date:

B : OVERALL HOUSEHOLD SURVEY

No.

Name of Head of Household:

Number of Members of Household:

Size of Holding: Owned:

Rental: Rented Out:

Renting:

Type of holding: ☐ Sole Proprietorship

☐ Partnership

Names and Number of Partners: 1.

2.

Members of Household	Name	Age	Literacy	Job				Seasonal Migrations		Notes
				Agriculture		Non-Agriculture		Location	Duration	
				Main	Side	Main	Side			
Head										
Wife										
Male Children										
Female Children										
Other Members:										
Female:										
Male:										

C_1 : Production Unit Questionnaire

Name of the Head of Production Unit:

Date of Interview:

Size of Production Unit	**Owned**	Rented	Rented Out	Irrigated		Un-Irrigated	
				Area under cultivation	Area left fallow	Area under cultivation	Area left fallow

Rent and Typesof Rental Payments:

Land Tenure System

☐ **Sole Proprietorship**

☐ **Partnership** Names of Partners: 1.

2.

Other:

Name(s) of Manager(s):

Land Transactions

Purchasing Land			Selling Land		
Size	**Date**	**Price**	**Size**	**Date**	**Price**

WATER

Sources	Water Share		Rented		Rented Out				Water Sufficiency
	Quantity	Price	Rental Season	Quantity	Price	Rental Season	Quantity	Price	

INVESTMENT IN WATER

Has the holder invested for Water? Yes ☐ Individual ☐ Partnership ☐ No ☐

Type of Partnership: Name of Partners: 1.
2.
3.

No.of Sources	Type	Date	Amount (Rials)	Source of Capital		
				Cash	Loan	Interest Rate

If there exist water shortage and holder has made no attempts to develop water sources (reasons):

Repair and upkeep expenditures for wells, Qanats and Streams 1352-53:

CROP PRODUCTION FALL - 1352 to FALL - 1353 (1973-1974)

Types of Crops	Summer or Winter Crops	Area under Cultivation	Total Production	Self Consumption

CROP PRODUCTION FALL 1352 to FALL 1353 (1973-1974)

Types of Crops	**Quantity Sold**	Sale Price (Rials)	Seeds		
			Type of Seeds	Quantity	Price

FERTILIZERS AND PESTICIDES USED FOR FALL 1352 to FALL 1353 (1973-1974)

Chemical Fertilizers		Natural Fertilizers		Plant Insecticides	
Type	Quantity	Price	Quantity	Price	Value of Insecticides

Is the owner among the first group that used:

Chemical Fertilizers Yes ☐ No ☐

Pesticides Yes ☐ No ☐

REASONS FOR SELECTION OF TYPE OF SEED

SEED	SEED	SEED	SEED	SEED
* Reasons for Selection of this type of Seed				
1. Inaccessibility to better types of Seeds.				
2. Expensiveness of other seeds	1 2 3	1 2 3	1 2 3	1 2 3
3. Advantage of this type of Seed over others	4-	4-	4-	4-
4. Other				
* Date Utilization started:				
* Source of information:				
1. Government Organization				
2. Factories	1 2	1 2	1 2	1 2
3. Large Production Units in Village	3 4	3 4	3 4	3 4
4. Large Production Units Outside Village	5-	5-	5-	5-
5. Others				
* Who brought this Seed to village first?				
1. Government Organization	1 2	1 2	1 2	1 2
2. Factories	3 4	3 4	3 4	3 4
3. Large Production Units in Village	5-	5-	5-	5-
4. Large Production Units Outside Village				
5. Others				

REASONS FOR SELECTION OF TYPE OF SEEDS

SEED	SEED	SEED	SEED	SEED	SEED
1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3
4-	4-	4-	4-	4-	4-
1 2	1 2	1 2	1 2	1 2	1 2
3 4	3 4	3 4	3 4	3 4	3 4
5-	5-	5-	5-	5-	5-
1 2	1 2	1 2	1 2	1 2	1 2
3 4	3 4	3 4	3 4	3 4	3 4
5-	5-	5-	5-	5-	5-

AGRICULTURAL YEAR 52-53 (73-74) PERMANENT CROPS

Type	Area Under Cultivation	No. of Trees			Trees cultivated 52-53		Type of tree		
		Total	Fruitful	Sapling	No.	Price	Low Quality	Improved Quty. with Traditional Methods	Improved Quty. with Modern Methods

AGRICULTURAL YEAR 52-53 (73-74) PERMANENT CROPS

Total Output	Sale		Self-Consumptn.	Animal Fertilizer		Chemical Fertilizer			Use of Insecticides
	Qty.	Price	Qty.	Qty.	Price	Type	Qty.	Price	Value of Insecticides

REASONS FOR SELECTION OF TYPE OF SAPLING

Type of Sapling	Type of Sapling	Type of Sapling	Type of Sapling
* **Reasons for selecting this type of tree:**			
1. **Inaccessibility to better types of trees**	1 2 3	1 2 3	1 2 3
2. **Expensiveness of better quality Saplings**	4-	4-	4-
3. **Advantages of this type of tree over others.**			
4. Other			
* Utilization Commenced:			
* Source of Information:			
1. Government Organization	1 2	1 2	1 2
2. Factories	3 4	3 4	3 4
3. Large Production Units in Village	5-	5-	5-
4. Large Production Units Outside Village			
5. Others			
* Who first brought this Sapling to the area:			
1. Government Organization	1 2	1 2	1 2
2. Factories	3 4	3 4	3 4
3. Large Production Units in Village	5-	5-	5-
4. Large Production Units Outside Village			
5. Other			

Plant Improvement

Have any measures been taken to improve the quality of trees?

Yes ☐ No ☐

If done:	☐ Increase in Product
Effects	☐ Increase in Sales Price
	☐ Other

MACHINERY

Type	No.	Ownership				Type of Purchase					Date of Purchase	Domestic or Foreign	Location of the Repair Shop	Spare Parts Available in Location or not.
		Individual	Partnership	Names of Partners	Cash	Instalments								
						Period	Interest	Down Payment	Amount of Average Payment	Total Payment				

MACHINERY (OWNED)

Cost of Upkeep				Rents Received					
Fuel	Repair	Labour	Total	Per hectare		Per Hour		Per Total Crop	Total rents received
				Cash	Commod-ity	Cash	Commod-ity	Kg.	

INNOVATION FOR USE OF MACHINERY			RENT PAID ON AGRICULTURAL MACHINERY				
Type of Machine	Applicability	Has the holder been among the first people to use this type of machine?	Rent			Total Rent	Notes
			Cash	Commodity			
				Kind	Quantity		

TRADING AND WAREHOUSE

Type of Crops and Fruit Production	Sales			Transportation of Products		
	Purchaser	Location	Pre-Harvest or Post-Harvest Sales	Type of Vehicle		Rental
				Motor Vehicle	Animal	

Warehouse and labour quarters:

Type of building:

☐ New

☐ Old

Date of construction:

Value of building:

Construction cost:

Does the holder have problems in storing output?

(Explanation):

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LOANS OUTSTANDING FOR 1352-53 (1973-74)

Name of Agency Granting Loans 52-53	Principal Amount of Loans	Use of Loan			Date Received		Duration of loan/Month	Annual Interest Rate		Date of Exhaustion of the Loan	
		Agriculture	Animal Husbandry	Consumption	Month	Year		Cash	Commodity	Month	Year
1. Cooperatives											
2. Banks											
3. Factories											
4. Persons											
5.											

TABLE OF LOANS (CONTINUED)

Conditions of obtaining loan				NOTES
Collateral	Membership in the Cooperatives	Local Confidence	Other	

C_2 : PRODUCTION UNIT QUESTIONNAIRE: LABOUR

FAMILY LABOUR FORCE

Agent	No.	Amount of work (per work-days)				
		Fall	Winter	Spring	Summer	Year Total
Head of Holding						
Wife 1. 2.						
Male Members of the family over age 15 1. 2. 3.						
Female Members of the family over age 15 1. 2. 3.						
Male Members of the family under age 15 1. 2.						
Female Members of the family under age 15 1. 2.						

SHARE - CROP [illegible]

FALL							
Agent		No.	Number of Working days	Wage			
				Cash	Commodity		Total Amount
					Type	Amount	
Male Labour	Technician						
	Skilled						
	Unskilled						
Female							
Child							

SHARE - CROPPING FARM

WINTER

Agent		No.	Number of Working days	Wage			
				Cash	Commodity		Total Amount
					Type	Amount	
Male	Technician						
Labour	Skilled						
	Unskilled						
Female							
Child							

SHARE - CROPPING AND FORCE

Agent		No.	Number of Working days	Wage			
				Cash	Commodity		Total Amount
					Type	Amount	
Male Labour	Technician						
	Skilled						
	Unskilled						
Female							
Child							

SHARE - CROPPER LABOUR FORCE

SUMMER

Agent		No.	Number of Working days	Wage			
				Cash	Commodity		Total Amount
					Type	Amount	
Male	Technician						
Labour	Skilled						
	Unskilled						
Female							
Child							

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TABLE [illegible]

Agent		No.	Number of Working days	Wage			
				Cash	Commodity		Total Amount
					Type	Amount	
Male Labour	Technician						
	Skilled						
	Unskilled						
Female							
Child							

WINTER

Agent		No.	Number of Working days	Wage			
				Cash	Commodity		Total Amount
					Type	Amount	
Male	Technician						
Labour	Skilled						
	Unskilled						
Female							
Child							

SPRING

Agent		No.	Number of Working days	Wage			
				Cash	Commodity		Total Amount
					Type	Amount	
Male Labour	Technician						
	Skilled						
	Unskilled						
Female							
Child							

Agent		No.	Number of Working days	Wage			
				Cash	Commodity		Total Amount
					Type	Amount	
Male	Technician						
Labour	Skilled						
	Unskilled						
Female							
Child							

C_3 : PRODUCTION UNIT QUESTIONNAIRE: ANIMAL HUSBANDRY

Type of Animal	Feeders or Milking	Beginning of the year inventory		Reproduction		Purchase		Mortality		Sale		Self consumption		Year end inventory	
		No.	Value	No.	Value at the end of year	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value

ANIMAL PRODUCTS

Type	Total amount	Amount of sale	Price	Amount of self consumption	Notes
Milk					
Yogurt.					
Butter					
Cheese					
Wool					
Hide					
Eggs					

EXPENDITURES OF ANIMAL HUSBANDRY

TYPE	VALUE
Feeding **(Inclusive of rent of pasture)**	
Medicine and Veterinary	
Transportation	
Other	

MEASURES FOR IMPROVING ANIMAL HUSBANDRY

Type	BREED				FEED			VACCINATION & MEDICINE				STABLE			Note
	Low Native	Good Native	New Breed	Date	Sufficiency of Regular Food	Supplemental Food	Date	Type	Adequate	Inadequate	Date	Hygienic	Date	Non-Hygienic	

	TYPE	SALES					
		Purchaser	Location	Type	Type of Sales: Forward Marketing - Cash	Price	Cost of Transportation
1. How did the farmers learn about the new breeds?							
2. Who started the breeding improvements ? ?							
3. Who started establishing hygenic stables ?							

AGENT			No.	Fall	Winter	Spring	Summer	Total Year	Total Amount of Labor
Shepherd	Male	Experienced							
		Unskilled							
	Female								
	Child								
Veterinarian									

C_4 : PRODUCTION UNIT QUESTIONNAIRE : ANIMAL HUSBANDRY (LONG FORM)

Type of Animal.	Feeder or Milker	Beginning of Year inventory		Reproduction		Purchase		Mortality		Sales		Self-consumption		Year end inventory	
		No.	Value	No.	Value end of year	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value

	Quantity of Output	Quantity of Sales	Value	Quantity of self-consumption	Wages of Shepherds	Cost of purchased food for animals
Milk						
Animal Fertilizer						

D : Guide Tables

Complete listing of major products	Yield per hectare	Unit price

Machine	Type of Use	Rent per unit of area or hour

	Type	Unit	Price
Fertilizers			
Fertilizers			
Fertilizers			
Fertilizers			
Fertilizers			
Anti-Pests			

Work	Daily wage
Male (unskilled)	
Male (skilled)	
Female	
Child	

Name of Production manager	Size of Farm	Fields per hectare of main crops		Man-days of work per hectare				Quantity of water per hectare	Anti-pest per ha.	Chemical fertilizer per ha.	Animal fertilizer per ha.	Feeds per ha.	Part paid for machines per ha.	
				Summer	Spring	Winter	Autumn							