SUMMARY OF CONCLUSIONS
AND POLICY IMPLICATIONS

The farm sector in Iran has witnessed significant changes since the dawn of the Islamic-Revolution in 1979. Consequently, the pattern of agricultural development that has tended to evolve is the manifestation of the outcome of the interplay between these changes over the years. As such, the study of the pattern of agricultural development during the post-Islamic Revolution era in Iran seemed to be educative as well as rewarding primarily because Islamic Revolution marks a great landmark in the history of economic development of Iran.

The primary objective of the present study has been to describe, examine and analyse the pattern of agricultural development in Iran during the post-Islamic Revolution era. The study is divided into nine chapters. The first Chapter deals with the issues and objectives of the present study. This was followed by Chapters on economic profile of Iran, review of existing evidence, database, concepts and methodological framework, infrastructure for agricultural development, institutional framework in terms of land reform measures and agricultural price policy, temporal growth in the use of farm inputs and pattern of overall and regional agricultural development. This, the final Chapter, summarizes the highlights of the preceding Chapters and appraises the overall performance
of Iran’s agricultural development experience to ascertain if the policies pursued by the government in this regard during the post–Islamic Revolution period have been of some consequence or not. Besides, pointing out some of the important determinants of the pattern of agricultural development in Iran during this period in passing, it also focuses upon some of the most important policy implications emanating from the study from the point of view of future growth of this sector. An attempt has been made, in the following pages, to give a brief chapter-wise summary of main conclusions of the study, followed by a brief discussion on the role of various factors that make the pattern of agricultural development as revealed by our empirical findings and a few policy implications for the consideration of the planners and policy-makers engaged in the task of determining the direction for the future course of agricultural development in Iran.

It will not be inappropriate to proceed by briefly mentioning the objectives of study, which were to examine:

(i) the growth of infra-structural facilities for agricultural development, such as irrigation, credit, marketing, power, etc;

(ii) the pattern of institutional development, covering in particular, the issues pertaining to the land reform and agricultural price policy including input subsidisation and ensuring of the support prices to the Iranian peasantry in respect of agricultural commodities;

(iii) the growth of technology–in–use over time, with particular reference to improved seeds, chemical fertilisers, pesticides, and farm mechanisation;
(iv) the time profile of the cropping pattern,

(v) the time profile of output expansions and growth rates, during the post - Islamic Revolution period i.e. the temporal growth of area, production and productivity levels of major individual crops as well as of overall crop output; and

(vi) the regional disparities in the pattern of agricultural development.

In Chapter II we examined the economic profile of Iran. In particular, our focus was on the general socio-economic and physical characteristics of Iran, its changing economic structure in terms of growth performance of sectoral composition of income, labour force utilisation and other related developments. Our analysis of the said issues in this chapter points to a number of conclusions. **First**, there exists considerable diversity in Iran in terms of soils, climatic conditions, rain, topography etc. This obviously has important implications for the pattern of agricultural growth. **Second**, in view of the existence of the possibility of area expansion for purposes of cultivation, it appears that the Ricardian benefit of *extending the margin of cultivation* has not been completely lost in Iran as yet. **Third**, future growth in agriculture can be realised by means of extension of irrigation facilities on the one hand, and ever increasing use of modern farm inputs and improved agricultural practices on the other. **Fourth**, in the historical retrospect, agriculture has had always been playing an important role in the economy of Iran. This has been so in spite of the fact that this sector in recent times has been overshadowed by the rise in the significance of oil in the economy of the country. On the basis of an in-
depth examination of various policy measures initiated during Shah’s period, our study notes that contrary to the then official rhetoric, the agricultural policy of that period was characterised by a two-fold shift. In the first instance, there was a tilt in favour of the non-agricultural sector as against the farm sector. And second, it marked a shift from subsistence farming towards mechanised and commercial farming. And finally, economic structure of Iran, in spite of overall modest growth since the dawn of Islamic Revolution owing to a wide variety of adverse internal and external factors, has undergone some important changes in terms of the behavioural pattern of sectoral composition of output and labour force utilisation. This is borne out by the fact that while the relative share of agricultural sector in the composition of Gross Domestic Product at Factor Cost (in terms of 1982–83 constant prices) has increased from about 17 per cent in 1980–81 to roughly 24 per cent in 1995–96, that of labour absorption in this sector has declined to about 24 per cent from about 32 per cent during the same period. Thus, our results indicate that against the general backdrop of an era of overall economic downslide since the dawn of the Islamic Revolution in 1979, the farm sector in Iran, thanks to the implementation of a number of policy measures by the government of the day, has experienced a significant change.

In Chapter III, we surveyed the existing evidence to understand and gain some important insights into the issues pertaining to the farm sector in Iran as have fascinated the attention of the researchers from time to time both in the pre-and post-Islamic Revolution eras. This review of literature exercise, though not very exhaustive, has, nevertheless, been quite informative, rewarding and immensely useful in that it has helped us in
gaining an understanding of the major issues concerning the agricultural
growth experience in Iran. In addition, it has also provided us the necessary
backdrop for our subsequent empirical analysis of the theme under
consideration. However, regardless of the importance of these earlier
studies in the area in such important respects, a careful examination of
these studies indicated that most of them are theoretical, use inappropriate
statistical tools or are even bereft of statistical rigour. It is not surprising
therefore that in the absence of enough empirical substance concerning the
performance of the agricultural sector such studies make only half-baked
conclusions. And moreover most of these studies, in view of their dealing
with one or the other aspect of agricultural performance in Iran owing to
their having had only a limited scope of inquiry, reveal only the disjointed
bits of the pattern of agricultural development in Iran. In addition, almost
all these studies invariably point out that the observed dualistic pattern of
development in Iran more or less conforms to the foreign enclave type of
dualism in the pre-Islamic Revolution period with agricultural sector
languishing far behind in comparison to the non-agricultural sector. And
again, almost all these studies observe that the development of the oil based
industry together with the neglect of the agricultural sector has indeed
tended to perpetuate the said observed pattern further. As such,
comprehensive information is not available regarding the development of
the agricultural sector in Iran, which otherwise, as noted earlier in the
preceding analysis, continues to be an important constituent of the Iranian
economy. Our broad conclusion, therefore, was that in view of big research
gaps there was the need for carrying out a study in the present mould.
Chapter IV discussed the details regarding the database, concepts and variables and the methodological framework as used in the present study. The study is based on secondary data only which have been obtained from the published reports and official records of various ministries of the Government of Iran, Central Bank of the Islamic Republic of Iran, international bodies like the United Nations, etc. The methodology used in the present study is varied in the sense that our research-kit consists of various statistical tools. The main limitations of the data used in the study have also been spelt out so that findings as well policy implications emanating from the study are understood and evaluated in their proper perspective.

Chapter V of the study discusses the expansion of such infrastructural facilities in Iran as have played an important role in its agricultural growth during the post-Islamic Revolution period. To be more specific, our focus in this chapter has been on the growth of irrigation and institutional credit facilities, marketing infrastructure for agricultural development, consumption of power and other infrastructural facilities. From this chapter, the following main conclusions about the growth of infrastructural facilities in Iran during the post-Islamic Revolution era can be drawn:

(i) Irrigation expansion in Iran, during the said period, seems to have made notable progress both in absolute and percentage terms of area covered. For example, while area under irrigation has increased by approximately 32 per cent i.e., from 4445.6 thousand hectares in 1980–81 to about 5857 thousand hectares in 1995–96; in percentage terms, irrigated acreage, in these years, accounted for about 38.43 and 46.49 per cent respectively. In fact, this expansion of irrigation facilities has been faster than the corresponding growth of area under
cultivation during the said period. Moreover gross irrigated area across crops has throughout the period remained heavily tilted in favour of wheat, barley and paddy. This is owing to the fact that these are major food crops in Iran, the growing population pressure over the years has, in their case, necessitated the raising of yield rates. Our analysis also underlines the fact of the existence of a great potential in respect of increasing the output of wheat by means of extending irrigation facilities to hitherto unirrigated areas engaged in the cultivation of this particular crop. Moreover, in view of considerable scope for effecting improvements in the irrigation base in Iran, tackling problems of loss of water and growing tendency towards drilling power driven deep- and semi-deep wells, our analysis focuses upon the need for undertaking efforts to harness the potential that has thus far remained untapped and also upon simultaneously making an efficient use of the existing water resources.

(ii) In regard to institutional sources of farm credit, our results point towards impressive growth both in terms of expansion of bank branches as also in the amount of advances made by the banks to the agricultural sector. For instance, while the number of bank branches have increased by about 86 per cent during the 1983 – 95 period, the loans advanced to the agricultural sector by Agricultural Bank and other commercial banks have multiplied by more than 40 – fold i.e., from roughly 130 billion Rials in 1980 – 81 to about 5331.5 billion Rials in 1995 – 96. The increase is equally impressive on per hectare of area cultivated basis as well. These developments have led to increased banking density in Iran, expansion of bank deposits and credits and has also, to a considerable extent, tended to rid the Iranian peasantry of the exploitative clutches of non-institutional
sources. Thanks to the growing institutionalisation of farm credit, the structure of term credit by the Agricultural Bank has significantly shifted in favour of short-term loans. This has helped in the recycling of the agricultural credit. An examination of the pattern of sizewise distribution of farm credit by the Agricultural Bank further points towards a remarkable decline of - 61.29 per cent in absolute terms and even a more pronounced decline from about 82.8 per cent to just 3.35 per cent during the period 1981 – 93 in case of loans below 0.5 million Rials. Against this sharp decline, loans of bigger amounts have recorded a tremendous growth both in absolute and relative terms. Our analysis of loans issued and outstanding by Agricultural Bank and other commercial banks for the period 1980 – 81 and 1994 – 95 is further indicative of phenomenal growth of the incremental flow, which in turn, signals towards greater buoyancy in terms of increase in the delivery system leading to significant growth in the institutional farm credit. In an overall sense, our analysis points towards a decline in borrowings from non-institutional sources on the part of Iranian peasantry and greater participation on the part of the government in such an important matter in the post-Islamic Revolution era. This should, however, not be construed to mean that the peasantry in Iran has been completely weaned away from non-institutional sources. Needless to stress, these sources continue to play an important role at the grassroots level due to the fact that institutional sources are alleged to have benefited the top echelons of the Iranian peasantry due to their strong socio-economic stranglehold, and are also easily accessible with minimum formalities in the matter of obtaining credit. That there is the urgent need for necessary correctives in this regard can, therefore, scarcely be overemphasised.
(iii) In respect of the impact of growing institutional finance on the performance of the farm sector, our study notes that 1 per cent increase in bank loans leads to 0.793 per cent increase in value added in agriculture. It implies that value added in the farm sector can be accelerated by means of added provision of institutional finance. The existing institutional mechanism, in this regard, therefore needs to be appropriately expanded and strengthened further.

(iv) Capital formation is regarded as the central issue in the process of growth of a sector. Our results indicate that while capital formation in agriculture has recorded a decline of – 21.34 per cent during 1980 – 94 period, value added in this sector, in contrast, seems to have registered an increase of about 84.67 per cent during the same. In other words, while a deceleration has been experienced in terms of the former, the trend has just been the opposite in case of the latter during the period under reference. As such, the declining trend in respect of capital formation in the farm sector is a clear warning sign and worrisome development from the viewpoint of its future growth. This trend needs to be reversed by means of necessary corrective measures. The need for doing so on an urgent basis gets further support from the sectoral comparison of ICOR (Incremental Capital Output Ratio) index which lends empirical substance to the view indicating that agricultural sector in Iran is better placed in relation to other sectors from the point of view of suitability of investment conditions.

(v) The consumption of power in the agricultural sector has, inter alia, come to be regarded the sine qua non of its growth in the modern system of production. Our results indicate that during 1980 – 94 period, number of electrified villages has multiplied between 4-5 times. This has had a positive impact on the consumption of power in
the farm sector which increased from 4.84 per cent in 1980–81 to 8.20 per cent in 1995–96. It shows that the post-Islamic Revolution period government has tended to attach considerable importance to the use of power in the farm sector. Consequent upon these efforts, a marked tendency has emerged towards progressive energisation of deep- and semi-deep wells in Iran. However, in view of overwhelming importance of timeliness of various field crop operations in agriculture, our study notes the need for undertaking more vigorous efforts in this regard. In view of vulnerability of the small sized farms owing to their poor resources base, our study, among other things, also stresses the need for giving due weightage to such farms in providing power for agricultural use.

(vi) The problem of agricultural marketing is one of the most formidable problems confronting the farm sector in Iran. Focusing upon the importance of this important infrastructural facility in various forms, our study focuses on important issues pertaining to the structure, conduct and performance of agricultural marketing in Iran. That a large part of the agricultural marketed surplus in Iran passes through informal markets and channels and this, in turn, adversely affects both the producers and the consumers of farm goods is an important observation made by our study and needs to be underlined in particular. Furthermore, our study notes that the structure of agricultural markets in Iran consists of regulated as well as unregulated markets. While Grain Organisation and Rural Cooperatives and Unions belong to the former category and are largely involved in the foodgrains transactions, the latter category of markets, mainly dealing in non-foodgrain crops are the ones on the other hand, in which Mizandar (weightkeeper) plays an important role. Wholesale Markets (Primary as well as Terminal) and Retail
Markets in Iran are largely engaged in the marketing of commercial crops. While examining the working of the agricultural marketing in Iran, our analysis points towards its several defects such as lack of organisation among the peasantry, economic vulnerability of the peasantry, lack of well-developed means of transport and communication, multiplicity of intermediaries, lack of marketing information as also of education consciousness on the part of the Iranian peasantry at the grassroots level so on and so forth. To stem the existing rot in this regard, our analysis suggests the need for the introduction of suitable remedial measures including effective monitoring of the functioning of agricultural markets by the government.

(vii) And with regard to other items of agricultural infrastructure (i.e., a network of extension services, organised agricultural research, transport and communication, public health, education, etc), our study notes that these items do tend to play a significant role in the process of growth of this sector. What is important to be noted in this regard is that while the post - Islamic Revolution period government in Iran seems to have shown a keen interest in respect of the growth of these facilities, in view of several data constraints in respect of these facilities, however, it has not been possible for us to carry out empirical investigations in their case.

In an overall sense, our analysis in this chapter shows that the increased provision of these infrastructural facilities in Iran overtime has made a notable impact on the growth of the farm sector. With the expansion and strengthening of these infrastructural facilities, most notably irrigation, the cropping pattern, in spite of an overall stability during the period under consideration, has begun to change, albeit, slowly. The expanded availability of other infrastructural inputs like consumption of
power, marketing facilities, farm credit, extension services, education and the like have also tended to influence the growth of the farm sector quite favourably. This is in spite of the fact that considerable scope exists even now for further expansion and improvement in respect of all of these infrastructural facilities. And since declining trend in capital formation is a major area of concern, the planners and policy-makers of Iran, as engaged in the task of agricultural planning, must pay immediate attention to devise the appropriate remedial measures.

Our focus of discussion in chapter VI is on such Institutional factors which play a critical role in the process of agricultural growth anywhere. This Chapter, began with a discussion of land reform measures as have been implemented in Iran, both in the pre–and post–Islamic Revolution periods together with their outcomes and implications. This is followed by a detailed analysis of the agricultural price policy in terms of its objectives, formulation, implementation, characteristic features, price support policies. Besides, considerable attention has also been given to the government policy of subsidisation of the farm sector. The following important points seem to emerge quite clearly from our discussion in this chapter:

(i) An interesting fact which emerges from our discussion of land reforms is that in spite of much ado about land reforms in Iran, the pattern of distribution of ownership of land holdings since 1960s onwards, remains quite concentrated; in spite of the slight decline in Gini’s ratio from 0.6544 to 0.5896 over the 1973 – 1992 period. As such, the land reform laws, both of the pre – and post – Islamic Revolution eras have not succeeded in making a worthwhile dent on the problem of concentration of ownership of land holdings in Iran. The success achieved in respect of land reforms has, throughout the period.
remained far below expectations. Owing to this reason perhaps, the post–Islamic Revolution period government has laid considerable emphasis on the introduction of other complementary measures which belong to the genre of infrastructural, technological, other institutional factors (including agricultural price policy, subsidisation of farm inputs and the like) etc.

(ii) Our study notes that attainment of self-sufficiency through increased domestic production on the one hand, and reduced dependence on import of foodgrains, on the other, has, *inter alia*, been one of the major objectives of agricultural price policy in Iran. In this regard, the use of agricultural price policy as an instrument to achieve stable, efficient and balanced growth of agriculture has been officially adopted by the government of the post–Islamic Revolution era. Needless to overemphasise, the Ministry of Agriculture plays a key role both in the process of formulation and implementation of this policy. Furthermore, the agricultural price policy, as pursued in Iran, can at best be termed as positive in terms of time horizon with particular focus on increasing support prices of various commodities from year to year. Many other economic incentives are also given to the farm sector to boost agricultural production. In fact, a rational price policy has been in vogue in Iran, and it has been called upon to perform a diverse set of functions and strike a balance between various competing tasks assigned to it for performing. Support prices of agricultural commodities and subsidisation of farm inputs are the two planks of the policy in vogue. While the support prices aim at evening out fluctuations in prices of agricultural commodities, bringing improvement in terms of trade for the farm sector and provision of insurance to the agricultural produce, the subsidisation of farm inputs, on the other, promotes greater use of subsidised farm inputs.
inputs. Needless to overemphasise, both these measures have led to augmented agricultural production. This, in turn, has resulted into larger procurements on the part of the government. For instance, it is possibly owing to the implementation of these measures that government’s procurements of wheat as a proportion of its total production has recorded a phenomenal growth from 13.84 per cent in 1980 – 81 to about 52.57 per cent in 1995 – 96.

(iii) Our analysis of the pattern of farm subsidies shows that these have recorded a phenomenal growth during the period under reference. For example, the share of subsidy on wheat has grown from about 9.7 per cent in 1980 – 81 to about 59 per cent in 1995 – 96. In contrast, the share of fertilisers and pesticides subsidies in the total subsidies has declined from 38.42 per cent to about 11.7 per cent during the same period, although a remarkable growth is visible in absolute terms in this regard. What needs to be further underlined in this regard is that while the relative weight of subsidies in respect of other farm inputs seems to have recorded a tremendous decline from 51.84 per cent in 1980 – 81 to about 28.42 per cent in 1995 – 96; in absolute terms, the growth on this count has also been somewhat enviable. The only valid conclusion which seems to emerge from our findings in this regard is that during the period under reference, the pattern of agricultural subsidies has been marked by important structural change.

(iv) It is often alleged that both the planks of agricultural price policy in Iran have created certain spatial biases. This policy of food subsidisation has tended to benefit significantly the urban population as against its rural counterpart. This is borne out by the fact that as high as 63 per cent of the total amount of subsidy has been cornered by the former while the share of rural population has been noted to be about 37 per cent. In per capita terms also, an urban consumer seems
to be in an advantageous position vis-à-vis his rural counterpart in this respect.

(v) In the case of production related subsidies in the countryside as well it has been noted that most of these subsidies, having been linked to resources base of the farmers, have been gobbled largely by the upper layers of the Iranian peasantry. Likewise, it is also alleged that the practice of fixing a single uniform price for the whole country for a particular commodity can be labelled as not being equally remunerative for farmers of various regions or provinces. For instance, the regions/provinces practicing largely traditional dryland farming techniques, have to bear the brunt of higher cost of production. Consequently the margin of the farmers in these regions gets considerably reduced. However, these limitations apart and contrary to some prevalent misconceptions in this regard, our analysis suggests that agricultural price policy of the post-Islamic Revolution era, as an integral part of an overall complementary package for the growth of the agricultural sector, seems to be performing a commendable job in certain important respects such as increasing the volume of production and procurement in the case of basic agricultural commodities like wheat.

Chapter VII which deals with the temporal growth of the intake of farm inputs in Iranian agriculture begins by describing the meaning of the improved farm technology. It is observed that new farm technology consists of bio-chemical and mechanical components. This is followed by a discussion of the pattern of temporal growth of the intake of farm inputs in the agricultural sector of Iran. The main farm inputs covered are High Yielding Varieties of seeds, chemical fertilisers, pesticides and tractors. In
respect of the said farm inputs, our study, *inter alia*, underlined the following main points:

(i) The growth in respect of the distribution of improved varieties of seeds among Iranian farmers for a wide variety of crops like wheat, barley, rice, potatoes, sugar beet and pulses through a network of official agencies is quite significant. Moreover, this growth in the matter of distribution of improved varieties of seeds becomes still more pronounced when read against the background of overall unsatisfactory economic performance of the economy on the one hand, and prevalence of widespread practice on the part of Iranian farmers to use the traditional and home grown types of seeds, on the other.

(ii) Our study notes that the total consumption of chemical fertilisers in Iran has gone up from 1070 thousand tonnes in 1980 – 81 to 1933.8 thousand tonnes in 1995 96. On per hectare basis, the corresponding figures of the consumption for the said years were noted to be about 92.5 and 153 kilograms of nutrients respectively. This substantial increase in the use of chemical fertilisers in agriculture in Iran has been possible largely owing to government’s concerted efforts to step up the domestic production of chemical fertiliser and reduce the country’s dependence on imported brands.

(iii) The intake of pesticides as seen from the data pertaining to their distribution among the farmers, has been marked by year to year fluctuations. Subsidisation of this important input by the government does not seem to suggest a consistent pattern in this growth. In part, it could also be owing to government’s another policy which
emphasises the development of pest and disease resistant seeds to prevent damages to basic resources and environment.

(iv) Tractor is an important mechanical gadget in the category of farm implements and machinery. Our data in respect of the use of tractors in agriculture in Iran is suggestive of the fact that as a result of government’s policy of providing institutional support for the purchases of tractors, their number during the 1979 – 95 period has multiplied between three to four times i.e., from 70,942 in 1979 to about 258,538 in 1995. This has resulted into a significant decline in area cultivated per tractor i.e., from about 119.32 hectares in 1979 to approximately 48.72 hectares in 1995. This rapid growth of tractorisation is bound to have significant implications for the growth of farm sector in that it has tended to exert considerable impact on the timeliness of various field crop operations as also on the employment of human and bullock labour.

(v) Regarding pattern of investment in agricultural machinery and equipment and value added in agricultural production, our study notes that during the 1979 – 80 to 1993 – 94 period, the total and yearly investment in the former has tended to increase by 2304.52 and 164.61 per cent, while the corresponding increases in the latter have been of the order of 2104.52 and 150.32 per cent respectively. Thus both in terms of overall and yearly growth, investment in agricultural machinery and equipment has outpaced the growth in value added in agriculture. The remarkable growth in both these respects notwithstanding, and in view of the fact that agricultural machinery and equipment is only one of the many contributory factors to agricultural growth, our analysis strikes a note of caution in that it focuses upon the need of introducing other complementary
inputs as well, while stepping up efforts towards increased investments in agricultural implements and machinery.

Thus our findings, in this chapter, as such, are indicative of the fact that Iranian agriculture has been undergoing transformation from traditional to capital intensive improved farm technology. The increased application of improved farm technology, in addition to making a direct significant contribution to the growth of the farm sector, assumes considerable significance from the viewpoint of its giving a fillip to the process of forging and strengthening important inter-sectoral linkages with far reaching implications for the future growth of the former.

Chapter VIII forms the hub of the present study. In this chapter, we have attempted to analyse the pattern of agricultural development in Iran in terms of cropping pattern, expansion of area, the growth of production and productivity. Decomposition of increase in output of various crops in terms of area effect and yield effect has also been carried out in this chapter. As such, apart from becoming an exercise of mere academic interest, this exercise is bound to be very useful for purposes of policy formulation for the future. It is possibly owing to the fact that the behavioural pattern of the agricultural growth experience in Iran, in the overall as well as regional sense, constitutes an important step in the formulation and successful implementation of any programme to improve upon the growth performance of the farm sector. This would also show the success or failure of the policies of post-Islamic Revolution period government in the matter of agricultural development. Our endeavour to uncover the regional variations in the matter of agricultural development has proved to be quite rewarding in terms of the various insights that it provided into the theme
under consideration. The main conclusions that emerged from our analysis in this chapter on the overall and regional variations in the matter of agricultural development have been the following:

(i) Cropping pattern affects considerably the pattern of agricultural development in the sense that higher production can be realised through appropriate changes in this regard. In spite of some changes here and there owing to the introduction of new varieties of seeds, new techniques of cultivation and changing socio-economic and institutional conditions, the overall cropping pattern has nonetheless remained more or less stable. It has, throughout the period under reference, remained largely dominated by foodgrains crops like wheat, barley and rice. For instance, these three crops together have throughout the period under reference continued to account for more than two-third of the total area under all the crops covered in the study. One of the main reasons for this possibly has been the rapid population growth witnessed during the period. Though area under individual crops has also witnessed some changes here and there during 1980-81 to 1995-96, yet significant changes do not appear to have occurred in the cropping pattern in Iran except perhaps for pulses in which case, the relative share of area increased substantially from 3 per cent in 1980-81 to a little over 10 per cent in 1995-96. However, in spite of this, significant changes do not seem to have occurred in the cropping pattern of Iran during the period under consideration.

(ii) Foodgrains constitute the most dominant component of the Iranian agriculture. Area under foodgrains in Iran increased from 8,443,54 thousand hectares in 1980-81 to 10,044,70 thousand hectares in 1988-89. During the same period, production of foodgrains in Iran increased from 10,218,30 thousand tonnes to 10,975,40 thousand
tonnes. On the other hand yield per hectare of foodgrains in Iran declined from 1210.19 kgs in 1980-81 to 1092.65 kgs in 1988 – 89. Thus during the earlier phase, increase in the production of foodgrains is not found to be very impressive. As against this, during the later phase, i.e., between 1989 – 90 to 1995 – 96 period, area under foodgrains in Iran declined from 10111.01 thousand hectares in 1989-90 to 9867.34 thousand hectares in 1995 – 96. Furthermore, during the same period, production of foodgrains in Iran increased from 14632.28 thousand tonnes to 16140.24 thousand tonnes. Similarly, yield per hectare of foodgrains in Iran increased from 1447.16 kgs in 1989-90 to 1635.72 kgs in 1995-96. Thus, during the later phase, increase in the production of foodgrains is found to be mostly due to increase in the yield per hectare of foodgrains.

(iii) On the whole, during the period 1980-81 to 1995-96, area under foodgrains in Iran increased from 8443.54 thousand hectares in 1980-80 to 9867.34 thousand hectares in 1995-96. During the same period, production of foodgrains in Iran increased from 10218.30 thousand tonnes to 16140.24 thousand tonnes while yield per hectare of foodgrains in Iran increased from 1210.19 kgs to 1635.72 kgs. Thus during the overall period between 1980-81 and 1995-96, increase in the production of foodgrains is found to be mostly associated with increase in the yield per hectare of foodgrains.

(iv) Wide fluctuations in the volume of production during the reference period are a striking element of the farm sector in Iran. Production of foodgrains in Iran showed considerable fluctuations, which emanate from fluctuations in area and yield. The instability index is found to be 0.043 for area under foodgrains, 0.077 for production of foodgrains and 0.086 for yield per hectare of foodgrains during the period 1980-81 to 1995-96. Thus the instability in the production of
foodgrains in Iran seems to be mostly arising from instability in the yield per hectare of foodgrains. The instability index is found to be 0.016 for area, 0.080 for production and 0.074 for yield per hectare of foodgrains during the earlier phase period falling between 1980-81 and 1988-89. The instability index is found to be 0.026 for area, 0.042 for production and 0.027 for yield per hectare of foodgrains during the later phase of the period falling between 1989-89 to 1995-96. Thus the instability in foodgrains production during the earlier as well as later phase periods is found to be associated, in part, with instability in the yield per hectare of foodgrains, and in part with that in area. However, the degree of instability is found to be decreasing in respect of both production and yield per hectare of foodgrains during the later phase as compared to the earlier phase of the period under consideration.

(v) There are variations in the growth rates of production of different crops. During the period 1980-81 to 1995-96, wheat, barley, rice, pulses, all foodgrains, potatoes, onions, sugar beet and cotton showed positive and significant growth rates. The production of pulses showed the highest growth rate of 6.98 per cent per annum, followed by potatoes with 5.10 per cent, wheat with 4.29 per cent, all foodgrains with 4.07 per cent, rice with 3.94 per cent, barley and onions with 3.46 and 3.45 per cent, cotton with 3.14 per cent and sugar beet with 2.48 per cent per annum.

(vi) Our analysis of regional variations in growth pattern of various crops also points towards considerable inter-regional variations. These inter-regional variations in the pattern of agricultural development in Iran also point towards the mighty nature of the challenge facing the Iranian agriculture. For instance, in Iran, the slow growing regions (located largely in the eastern and central parts as also to some extent
in southern parts of the country) practising largely dryland farming with its disproportionately large weight in the total area and output determines the overall growth pattern of agricultural output. In view of this, what is quite obvious is the fact that it would not be possible to appreciably raise the rate of growth of output in Iran without bringing about an appreciable radical change in the growth pattern of such regions.

(vii) The decomposition analysis showed that a differential pattern is visible across regions in Iran in respect of the contribution of area and yield effects in total change in output of various crops. While in some regions, in the case of certain crops, area effect is more dominant in comparison to yield effect; in some other crops, on the other hand, the relationship between the two is other way round. As such, the pattern visible in this regard has been somewhat mixed in an over all sense.

The observed pattern of agricultural growth in Iran during the post-Islamic Revolution era can be summed up as follows. **First**, in respect of various crops covered in the study a differential pattern of agricultural growth with varying degree of instability in terms of certain key indications has been conspicuously present in the farm sector of Iran during the period under consideration. **Second**, important regional variations can also be discerned during the said period in the matter of growth rates of area, production and productivity levels or yield rates of each crop covered in the study. **And finally**, the decomposition of change in output in terms of the contributions of area and yield effects also suggests a differential pattern across crops and regions. However regardless of this broad conclusion, our analysis indicated that in comparison to area effect, yield effect was the main contributor to the growth of crop output during the post-Islamic
Revolution period in respect of a relatively large number of crops covered in the study and in large number of regions. All in all, our analysis, in this chapter, provided us with many interesting clues about the pattern of agricultural development in Iran across the various regions. The information pertaining to regional variations has, in fact, become available on an extensive scale probably for the first time, as we have not thus far come across any such information in any other study pertaining to the farm sector in Iran.

What have been the determinants of the observed pattern of agricultural development in Iran during the period under reference? A point-blank answer to this question cannot be attempted in precise terms. What is, however, worth observing in this regard is the fact that it is the outcome of the interplay between a wide variety of factors. The interplay between these factors in fact, can go a long way in the initiation and fostering of the process of farm growth in Iran. In this regard, it is interesting to observe that there is a wide variation in resource endowments in different parts of Iran in respect of the quality of soil, irrigation water, climate, sunshine, rainfall, etc. While these factors tend to determine, to a considerable extent, the cropping patterns and also impose constraints on the overall parameters of growth in different parts of the country, the adjustment of production patterns to the variations in resource endowments in different areas in the level of farm productivity can be introduced by means of an optimal-mix of an interaction between infrastructural, institutional and technological factors which influences the pace and pattern of agricultural growth in Iran. In conclusion, for providing an impetus to the growth of the agricultural sector in Iran, the country has to, as a policy decision, in addition to the
assured provision of technological farm inputs and other institutional changes, provide adequately for the various elements of infrastructure with particular thrust on further strengthening of the irrigation base, agricultural marketing, transport and communication, energy especially electricity, education particularly the technical education, production credit, extension services for dissemination of information, etc. The present study has not, however, investigated the impact of these factors for want of adequate quantitative information. There is thus an ample scope for conducting further research in all these areas.

Policy Implications

Taking note of the fact that agricultural sector has a vital place in the economic development of Iran and that it contributes roughly 27 per cent of Gross Domestic Product and employs about 28 per cent of the workforce, significant efforts have been made by the government to develop the farm sector in Iran. Though these efforts have led to considerable improvement in the level of agricultural productivity and its volume of production, the government has, nonetheless, had to import huge stocks of foodgrains from abroad to feed the increasing population. This has resulted into the depletion of precious foreign exchange reserves during this period. This coupled with the apprehension that oil reserves in the country might last only for a couple of decades makes it imperative for the government to formulate policies which would help to increase the volume of agricultural production on a sustainable basis. In view of the possibility of the emergence of such a situation, what are then the policy implications of our findings in the study from the point of view of future growth of the farm sector in Iran? In respect of policy implications of our findings in the
present study, it may be noted that augmentation of the volume of production is the prime objective of the post-Islamic Revolution government’s agricultural policy in Iran. Some basic considerations in the formulation of agricultural policy are as below:

1. attainment of self-sufficiency through increased agricultural production and dispensing with imports after some time if not immediately;
2. safeguarding of the poor from economic distress caused mainly by rise in prices of agricultural commodities, in general, and foodgrains, in particular, through appropriate safety nets; and
3. price stabilisation or protection against wide fluctuations in prices caused by climatic and production instability.

Considering the urgency to step up agricultural production, a new strategy of agricultural development will have to be carefully thought out. Two possible alternatives which can be given due consideration in this regard are in terms of resource-deepening and resource-widening strategies. According to the first strategy, resources should be concentrated only in the limited number of agriculturally developed regions / provinces where the income elasticity of demand for foodgrains is low and, therefore, there is an assurance of generation of substantial amount of surpluses which can, in turn, be used for supporting other developmental programmes having far reaching implications for the growth of the agricultural sector. And, second strategy focuses upon the need to widen the base of agricultural output growth by allocating resources among low productivity or agriculturally languishing regions and small farmers where the employment potential per unit increase is higher and the income elasticity of demand for foodgrains is also higher. This may give a high
overall rate of agricultural growth but may not necessarily result into large marketable surpluses. The primary task of agricultural policy, in this case, essentially is to resolve the trade-off between the two.

Between these two alternative strategies, the latter of course, is more appropriate for a country like Iran primarily because it envisions more equitable spread of the likely gains across different regions of the country and has larger appeal from the standpoint of socio-economic considerations as well which the post-Islamic Revolution Iranian governments have been professing time and again. Our study strongly suggests that there is the urgent need for laying greater emphasis on agricultural modernisation in Iran with special focus on agriculturally backward regions. Increased agricultural production along with improvement in the productivity levels of various crops, in fact, must necessarily form the pivot of any future strategy of agricultural growth in Iran. For this purpose, a multi-pronged strategy needs to be devised. Some important planks of the proposed strategy of agricultural growth which, in our considered opinion, must merit the serious consideration of the planners and policy-makers in Iran are as under:

First, irrigation is a critical factor for purposes of higher agricultural intensification in Iran. It is a most important factor to increase both agricultural production and productivity because in areas of insufficient rainfall or soil with poor moisture retention, irrigation is essential. The irrigation expansion and improvement are therefore the most important items for raising the level of land productivity. It is so because the adequate and assured provision of water is essential for the application of high yielding varieties of seeds of various crops as also of other improved
techniques of cultivation. Our results in the study indicate that during the period under reference, irrigation base in Iran has improved by somewhat 32 per cent. Structure of irrigation has also improved in favour of relatively assured means of irrigation like deep- and semi-deep wells. In spite of these positive developments, the fact still remains that the use of water resources is neither extensive nor optimal. Only about 47 per cent of the cultivated area have a provision of irrigation facilities. By implication, uncertain, meagre and unreliable rainfall still exercises its hold over more than half of the area under cultivation in Iran. The uncertainty and meagreness of rainfall which characterise the Iranian agriculture, essentially make the improvement and expansion of irrigation facilities as an area of high priority in any future programme of agricultural growth in Iran. Thus, expansion of irrigation and further improvement in the structure of irrigation and technological change remain the most critical factors from the point of view of future growth of Iranian agriculture. In this connection, in addition to, providing the irrigation facilities in areas which have hitherto been unirrigated, concerted efforts, wherever possible, also need to be directed towards better management and maintenance of the available irrigation works, lining of distributaries and water courses, land levelling and development, appropriate drainage system and efficient use of water at the farmers level for effecting significant improvements in the efficiency of the irrigation systems. Furthermore, since irrigation expansion epitomizes the opportunities and the growth needs of agriculture of the dryland farming areas, therefore regions / provinces with low irrigation percentages should be given preference in the development of this critical input in any future strategy of agricultural growth. In provinces/regions which have
limited scope for the expansion of irrigation in the distant future, the emphasis should be laid on agricultural research for developing improved dryland farming technologies which can contribute appreciably towards increase in agricultural yield rates and the volume of overall farm production. In such areas, besides laying growing emphasis on technological research in the direction of devising of a low water-consuming cropping pattern, appropriate harvesting techniques should also be developed simultaneously to conserve water-use for increasing cropping intensity.

Second, as noted earlier in chapter VI, there is no gainsaying the fact that the land reforms in Iran have succeeded to the tune of approximately 50 per cent. The ideal position in this regard would be if the government brings the unfinished agenda of land reforms to its logical conclusion. However, given the existing socio-economic and political set up in Iran, it is highly desirable that further efforts in the direction of land reforms are linked with the programme of increasing agricultural production. It needs to be kept in mind that only an equitable land tenure system can provide the institutional framework to make increased production based on modern technology possible. Besides, to ensure the effective participation of the small farmers and landless farmers and labourers in the emerging opportunities in the farm sector, land reforms must necessarily constitute an integral part of the process of agricultural modernisation of Iran. Redistribution of land and consolidation of holdings must be given proper attention.

Third, farm mechanisation helps in the expeditious performance of farm operations during the peak periods. By affecting the timeliness of
various field crop operations, it helps in saving time. Consequently, while the standing crops get more time to mature, the farmer exercises greater flexibility in the matter of various farming operations. In this way, multiple cropping gets facilitated. Therefore, appropriate farm machinery should be developed and used to reclaim waste land which human labour cannot accomplish unaided. Vigorous efforts must be undertaken in this direction.

Fourth, for realising very high productivities in land as well as labour, it is imperative that bulk of the small and marginal farmers participate in and benefit from the introduction of new farm technology. It is commonly observed that small farmers generally lag behind their large counterparts in the matter of adoption of new farm technology, these farmers should, therefore, be assured the financial facilities, the supply of new and improved varieties of seeds, chemical fertilisers and other farm inputs. These facilities should be provided at the grassroots level i.e., at the very doorsteps of the farmers. The opportunities in this regard can be ensured to them in equal measure through the provision of a wide range of supporting services, including supply of water for irrigation, fertilisers, credit, pesticides, marketing and so on. Proper water control and management of the canal irrigation system, construction of a master drainage system, emphasis on intensive cultivation, expansion of the network of extension services in the rural areas, strengthening of the existing institutional arrangement for the dissemination of the improved farm technology by means of organising farmers’ service societies are some of the important measures which need to be effectively implemented on a priority basis. Besides, the creation, extension and strengthening of an integrated and well-monitored credit structure along with the provision of
adequate safety-nets for the vulnerable sections of the peasantry are some of the other institutional measures which, if undertaken on a priority basis, can go a long way in accelerating the process of agricultural growth in Iran. New developments in agricultural sector should reach the peasants as early as possible through a well-developed network of extension services and other such agencies. In the matter of agricultural education, accelerated thrust should be laid on human resource development through upgrading training facilities and research efforts. The existing infrastructure for transfer of technology should be strengthened and made more effective and responsive to meet farmers needs. A massive programme of production and distribution of quality seeds of improved and recommended varieties for each crop, accompanied by appropriate quantities of other complementary farm inputs like chemicals fertilisers and plant protection chemicals, is very crucial for increasing the production of various crops. In this regard, the supplementation of the existing inadequate network of efficient extension services is another distinctive measure which needs to be accorded high priority in any future strategy of agricultural growth in Iran. Provision of hire purchase system especially in the matter of costly mechanical farm inputs should also be tried and introduced.

Fifth, timely announcement of support prices, adequate arrangements for the purchase of grains at support prices in advance at the beginning of the marketing season, striking a balance between producer and consumer prices of various food items and minimising the price-spread between pre-and-post harvesting seasons are some of the measures which can serve meaningfully for effecting improvements in the performance of the farm sector. The major considerations in determining the support prices should
therefore be: (i) the maintenance of income parity with competing crops for checking area shifts away from need-based crops; (ii) assurance of a reasonable minimum absolute income from the crop for making crop cultivation an economic proposition; (iii) assurance of a price which makes application of improved inputs a profitable proposition and which reflects demand-supply balance, and over and above, (iv) support price should be such which helps in achieving production targets and increasing the effectiveness in the use of scarce resources specifically land and irrigation water. A disquieting feature of the countryside in Iran in this regard has, however, been that the awareness and understanding of price policies and marketing improvement on the part of farmers are very low. Special emphasis therefore needs to be laid on providing up-to-date information to the farmers at the grassroots level. As in the case of farm production technology, the dissemination of information on price policies and marketing improvements should be made an integral component of agricultural extension programme. Appropriate mechanism needs to be devised so that policy programmes, circulars and pronouncements quickly trickle-down to extension workers at the lowest level. What is, therefore, even more important than all the afore-mentioned considerations is that farmers should be educated to keep an eye on the market. The announced support prices in respect of agricultural commodities should be given widest possible publicity. The farmers should be assured that in the event of market prices going down below the support prices, their produce shall be purchased by the public agencies at the announced support prices.

Sixth, to correct the maladjustment of crops, a properly conceived programme is needed under which cropping pattern should be studied. if
possible, at the micro level. The incentives which are required for crop adjustment should be worked out and adjusted appropriately in the existing agriculture related developmental programmes. In addition to the above, efforts should also be made to diversify further the production base of the farm sector by developing suitable subsidiary occupations like dairying, horticulture, seri-culture, etc. To ensure the success of such occupations on a sustainable basis, it is imperative to develop adequate infrastructure of production, processing, storage and marketing in respect of these agricultural sidelines. The Rural Cooperatives and Unions should be given the needed encouragement especially in the matter of marketing the products.

_Seventh_, the prospect of sustained growth of the agricultural sector in Iran remains the first area of vulnerability. Iranian agriculture continues to remain vulnerable to weather-induced shocks. Therefore, determined efforts would have to be made to reduce this vulnerability. This cannot, _inter alia_, be achieved without accelerating the process of capital formation in the agricultural sector. The existing trend, as brought out by our analysis in this study, has so far been anything except encouraging. Furthermore, given the fact that agricultural growth can come about only through rapid increase in productivity and changes in the cropping pattern, voluminous investments therefore are required to be made in water, land improvement and in technology development and its dissemination among the peasantry. Therefore, greater credit flow should be ensured to meet the investment requirements of the farming community for stepping up the growth of farm production. Efforts should also be made to ensure timely and adequate availability of credit, particularly to small farmers at reasonable rates so as
to enable them to make investments necessary for higher production. Crop insurance scheme which is already in operation as an instrument of providing security to the farmers against unforeseen contingencies should also be strengthened further. In plain words, public investment has to play a very critical role in the creation, expansion and strengthening of infrastructure for ensuring a sustainable accelerated growth of the farm sector in Iran in any future strategy. Our discussion of the temporal pattern of gross fixed capital formation in agriculture in Iran points to the urgent need for implementing a reform agenda with particular focus on enlarged productive investment in infrastructure for accelerated agricultural growth. In particular, the focus must necessarily be on the construction of roads, irrigation, agricultural marketing, storage facilities, rural electrification, development of appropriate technology, credit facilities, education, health so on and so forth. Obviously, investment in such critical areas must have a definite content and focus. Since the individual farmers are not capable of undertaking investments owing to resource constraints, the government has, therefore, to play a critical role in such important matters. Besides, in addition to provision of food safety-nets for the economically vulnerable sections of the Iranian population, it must make efforts towards progressive diversification of the agricultural sector. In precise terms, there is the need for a net transfer of resources from the non-agricultural to the agricultural sector in Iran. Various types of subsidies to the farm sector need to be rationalised and re-oriented in a manner as might give a fillip to the expansion of agricultural output. Preferential treatment in this regard should be given to the vulnerable sections of the Iranian peasantry.
Eighth, an important weakness of the observed pattern of agricultural development in Iran which gets manifested in terms of the decomposition of output effect into area and yield effects is that various provinces have different levels of absolute and comparative advantages in the growing of various crops. A comprehensive policy needs to be formulated in this regard, followed by concerted efforts to study and demarcate the provinces and regions for various crops based on national requirements and resource use efficiency.

And finally, the problem of regional disparities in the matter of agricultural development and their accentuation over time has been posing a serious challenge for the planners and policy-makers in Iran. For accelerating the agricultural growth and reducing regional disparities, steps will have to be taken to bring lagging regions in the mainstream of agricultural development. This will need huge infrastructural investments. Therefore, such provinces as are presently languishing in the matter of agricultural development and are attempting technological transformation of their agriculture on the lines of regions I & II (comprising provinces of Gilan, Mazandaran, Zanjan, Tehran, Semnan and others like east and west Azarbijans) must make strenuous efforts towards technological change including water management. These two, in fact, must be the keystone of policy by which aggregate agricultural production is increased in a manner to support overall economic development and transformation of the countryside in Iran. Thanks to a wide network of springs or fountains and a rapid multiplication of deep - and semi-deep wells in recent years facilitated by the flow of huge institutional finance and the government efforts, region I & some provinces in region II have experienced significant
growth in the matter of agricultural development. The regions aspiring to catch-up with the said regions in the matter of agricultural development must, therefore, accord a very high priority to the development of irrigation and its equitable distribution among different regions and among farms of different sizes within each region.

In sum, it is the infrastructural-cum-institutional-cum-technological development which essentially holds the key to the future agricultural growth of Iran within an overall rural-led strategy of economic expansion. The improvements in the volume of production as also in the level of farm productivity can be achieved by providing more irrigation facilities, introducing new high yielding varieties of seeds and by developing dryland farming techniques for areas either grossly deficient in irrigation at present and those likely to remain so in the distant future. Vigorous and timely efforts, therefore, are required to be undertaken in a co-ordinated manner to overcome the various bottlenecks in this regard so that farm sector in Iran is made to experience further acceleration in its growth. In fine, a well-conceived, meticulously designed, and thoughtfully implemented growth strategy, in our considered opinion, would certainly make an appreciable contribution in the process of transformation of the farm sector as also towards acceleration of its growth, besides reducing the dependence of the country on the import of foodgrains.