TRANSFER OF AGRICULTURAL TECHNOLOGY AMONG TRIBAL FARMERS OF I. T. D. P. 
CHHOTAUDAPEPUR, DIST. VADODARA

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Abstract
ABSTRACT

TRANSFER OF AGRICULTURAL TECHNOLOGY AMONG TRIBAL FARMERS
OF I.T.D.P. CHHOTAUNDEPUR, DIST. VADODARA

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As against the 7.54 per cent schedule tribes population in the country, schedule tribes in Gujarat state accounts for 14.92 per cent of the total population in the state. While in Vadodara district, tribal population constitute 25.35 per cent of the total population, of which 89.00 per cent tribes are agriculturist in Chhotaudepur, Naswadi and Pavi-Jetpur talukas of the district. This investigation was carried out in these talukas which are under developed, economically back-ward tribal talukas of Vadodara district. Chhotaudepur, Naswadi and Pavi-Jetpur talukas constitute sizable tribal population of 83.00 per cent; 80.00 per cent and 72.00 per cent respectively. I.T.D.P.- Chhotaudepur is working in these talukas since June 21st 1976. Inspite of the integrated planned efforts, the socio-economic situation of tribals, still remains backward and hence more well-integrat ed, intensive result oriented planned efforts are necessary. Integrated Tribal sub-plan Development Project (I.T.D.P.) has to
play leading and challenging role. Now it is clear that not only
capital or finance is the barrier of the tribal farmers but their
ignorance towards new agricultural technology and conservativeness are also the obstacles in their progress. The ignorance of
tribal farmers never persuades them to adopt the modern technology. It is true that India's real development lies in the development of these people. The gap between the poor and rich is very wide in many ways. The physical and mental separation of the tribals is responsible for their economic and social backwardness. They remain aloof from the rest of the society for generations. There is hardly any detailed research available on cropping pattern followed by the tribals and extent of their adoption of recommended agricultural technologies of important crops and attitudes of tribal farmers towards recommended technology. Therefore, the present investigation constitutes one such effort to study: Transfer of agricultural technology among tribal farmers of I.T.D.P. Chhotaudepur Dist. Vadodara. The present investigation was undertaken with the following objectives.

1. To study the personal and socio-psychological, situational and communication characteristics of the tribal farmers.
2. To study the cropping pattern followed by the tribal farmers.
3. To study the attitude of tribal farmers towards agricultural recommended technology (chemical fertilizers and high yielding varieties) for the major crops.

4. To identify and study the overall technological gap as against recommended technologies of major crops among the tribal farmers.

5. To study the level of yield of major crops on tribal farms.

6. To analyse and study the constraints associated with technological gap and ascertain the suggestions of tribal farmers to overcome the constraints associated with technological gap.

The present study was conducted in tribal area of Vadodara district of Gujarat state. Out of twelve talukas of Vadodara district, three talukas namely (1) Chhotaudepur (2) Naswadi and (3) Pavi-Jetpur were purposively selected. These talukas possess more than fifty per cent of the tribal population and I.T.D.P.-Chhotaudepur is also operating in these talukas.

The villages in each selected talukas were classified into three groups viz. (i) High (ii) Medium and (iii) Low communication facilities score developed by Murthy and Singh and two villages from each group were selected randomly. Thus six villages from each taluka were selected. In all 18 villages were selected from the above three talukas for the present study. From each village 15 tribal farmers were selected randomly. Thus the
total sample constituted 270 tribal farmers. The tool used for the study was an interview schedule having eight major parts related to different aspects. The data were collected from 270 tribal respondents through personal interview in the year 1993-94.

To ascertain the personal and socio-economic characteristics of the tribal respondents, socio-economic scale developed by Trivedi (1963) was used with the due modification. The psychological characteristics viz. economic motivation, scientific orientation, risk preference were measured with the help of scale developed by Supe and Singh (1974). Knowledge about recommended technology was measured with the help of teacher made test based on knowledge test developed by Jha and Singh (1970). Cosmopolite-localiteness was measured with the help of cosmopolite-localiteness scale developed by Singh (1973). Attitude towards high yielding varieties and attitude towards chemical fertilizers were measured with the help of attitude scales developed by Nair (1969) and Singh (1968) respectively. Source credibility was measured with the help of credibility index worked out by Sandhu (1975). Technological gap was measured with the help of technological gap index developed by All India Co-ordinated Research Programmes in extension education I.A.R.I. New Delhi (1979).

For analysis of the data of this study, percentage, coefficient of correlation, stepwise regression analysis and path
analysis were used. In all, one dependent variable i.e. overall technological gap and 27 independent variables were studied.

FINDINGS

The salient findings of the study were:

1. Majority of the tribal farmers were illiterate, belonged to medium socio-economic status, middle age group and having no membership in any social organisation.

2. Majority of the tribal farmers belonged to joint family with medium to large size of family and they possessed one kachha type house.

3. Majority of the tribal farmers were exclusively dependent on farming plus labour work with minimum farm power i.e. upto two bullocks and possessed local implements.

4. About 60.00 per cent migration was observed in sample tribal farmers.

5. Majority of the tribal farmers possessed upto 5.00 acres of land with 150.00 per cent cropping intensity.

6. Majority of the tribal farmers had annual income upto Rs. 10,000=00 with debt upto Rs. 5000=00.

7. Majority of the tribal farmers were found to have medium level cosmopolite - localiteness, economic motivation, scientific orientation and risk preference.

8. Majority of the tribal farmers had neutral attitude towards high yielding varieties, neutral attitude towards chemical fertilizers and medium level knowledge about recommended
technology of maize, paddy, tur and black-gram crop.

9. Among different sources of information, majority of the tribal farmers used neighbour and relatives and the credibility of village level workers and contact farmers was found to be high.

10. Majority of the tribal respondents had followed single cropping pattern and predominantly foodgrains oriented and especially kharif cereals oriented.

11. The average yields on tribal farms for crops viz. maize, paddy, tur, black-gram, summer groundnut and cotton were lower than the district average yields. The decrease in yield varies from 13.00 per cent to 69.00 per cent.

12. The extent of technological gap in use of high yielding, hybrid and improved seeds of varieties, use of farm yard manure, use of chemical fertilizers and use of plant protection measures in major crops viz. maize, paddy, tur and black-gram was found to have medium to high gap level among tribal farmers.

13. Among various personal, socio-psychological, situational and communication characteristics of the tribal farmers age, land holding, annual income, cropping intensity and sources of information had positive and significant relationship with their overall technological gap while occupation, type of houses, number of houses, migration habit, economic motivation, scientific orientation and knowledge level about maize, paddy, tur and black-gram crops had negative but significant relationship with their overall technological gap.
14. About 57.42 per cent \((R^2 = 0.5742)\) contribution of the variation in dependent variable (overall technological gap) was accounted by below said seven variables from highest to lowest.

(i) Knowledge level about tur crop
(ii) Knowledge level about black-gram crop
(iii) Knowledge level about maize crop
(iv) Migration habit
(v) Cropping intensity
(vi) Number of houses
(vii) Attitude towards high yielding varieties

15. The major variables contributing the maximum direct and negative effect on overall technological gap of the tribal farmers were occupation, type of houses, number of houses, migration habit, economic motivation, scientific orientation, knowledge level about maize crop, knowledge level about paddy crop, knowledge level about tur crop, knowledge level about black-gram crop, land holding and source of information, whereas the variable age, annual income and cropping intensity contributing maximum positive direct effect on overall technological gap.

16. The variables knowledge level about paddy crop, land holding, knowledge level about black-gram crop, source of information, type of houses, age and occupation contributed maximum to the overall technological gap indirectly in descending order, whereas the variables cropping intensity, knowledge level about tur crop, knowledge level about maize crop, scientific
orientation, economic motivation, annual income, migration habit and number of houses had contributed minimum total indirect effect on overall technological gap.

17. In case of 1st order substantial indirect effect the variable source of information had maximum effect followed by land holding, age and annual income in descending order whereas in second order land holding had maximum substantial indirect effect followed by number of houses, age and migration habit in descending order. Knowledge level of major crops, migration habit, land holding, sources of information, age and annual income were the key variables providing a way for all the variables in exerting their indirect substantial effect on overall technological gap.

18. Among all the constraints related with overall technological gap as perceived by the tribal farmers, poor soil condition, lack of irrigation facility, inadequate crop protection, lack of technical guidance, lack of information about new agricultural technology, lack of finance needed and inadequate tillage and farming methods were reported by majority of the tribal farmers and ranked in descending order.

19. Majority of the tribal farmers had suggested that training for new agricultural technology should be arranged, provision for long term loan for creating irrigation facilities should be made, provision for sufficient finance for crop loan should be made and arrangement for easy availability of inputs should be made.
Dr. J. C. Trivedi
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CERTIFICATE

This is to certify that the thesis entitled "TRANSFER OF AGRICULTURAL TECHNOLOGY AMONG TRIBAL FARMERS OF I.T.D.P. CHHOT-AUDEPUR, DIST. VADODARA" submitted by Shri Ambubhai J. Patel in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the subject of EXTENSION EDUCATION of the Gujarat Agricultural University is a record of bonafide research work carried out by him under my guidance and supervision and the thesis has not previously formed the basis for the award of any degree, diploma or other similar title.

Anand .
Date ¹ April    ,1995

( J. C. Trivedi)    
Major Advisor
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Anand.

Date 7 April, 1995

(A. J. Patel)
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Introduction
CHAPTER - I

INTRODUCTION

The history of Indian agriculture, in general, is one of low productivity of land, instability of farm output and income. Unless adequate steps are taken to raise and sustain farm productivity, the resulting agricultural instability will continue to erode Indian agriculture.

A serious attempt is being made in India to bring about increased agricultural production through the introduction of new technology. It is hoped that adoption of such new technologies will lead to increased yield of crops. It is generally accepted that introduction of new farm practices increase yields. Consequently, farmers who follow the new practices are able to increase crop yields.

Use of modern inputs and adoption of new agricultural technology are undoubtedly more important in increasing farm productivity. This is true particularly in the developing countries like India, where prosperity of the country is mainly dependent on agriculture. In India, considerable changes have been brought about in traditional agriculture during last two decades, through various programs involving use of modern inputs and new technology. However, the progress is not yet to the desired level of satisfaction because whatever progress that has been achieved so far, differs from one region to another. There are certain regions where the progress in agriculture is more
than the expectations. At the same time, there are other regions showing backwardness in agriculture. Backwardness is particularly observed in tribal areas of the country, which are scattered all over the country and are mostly located in small pockets in various states. Development of tribal agriculture is equally important to development programs in other areas in agriculture and in other fields of national economy, since the tribal population of the country constitute 7.54 per cent of the total population. Tribes are amongst the weakest sections of the society. The tribal economy is predominantly dependent on agriculture. Agriculture is not only their source of income but also a way of life. There are altogether 427 tribal communities all over India. Among these, ninety four per cent Indian tribes are living in rural India and 87.00 per cent of them are agriculturist and agricultural labourers having very low literacy level (16.35 per cent).

In Gujarat 92.68 per cent tribes are living in rural areas and 86.00 per cent are agriculturist and agricultural labourers having 21.14 per cent of literacy. Tribal areas being hilly, rocky and the land being undulating shallow having inferior type and very less awareness of agriculture resulting in backwardness. The tribal agriculture is mostly of subsistence in nature and characterised by the production of food grains just sufficient to meet their requirements generally at low level of living. The use of local seeds, growing rainfed crops, use of
family labours, use of crude tools and implements, production of self consumption constitute the main elements of such agriculture.

Gujarat is the fourth among the states with a sizable tribal population (14.92 per cent), preceded by Madhya Pradesh, Orissa and Bihar. The border and hilly tracts of Gujarat ranging from Banaskantha in the north to the Dangs in the south are largely inhabited by tribals. About 72.00 per cent of the tribal population is concentrated in eight districts namely; Panchmahals, Banaskantha, Sabarkantha, Vadodara, Surat, Bharuch, Valsad and Dangs. In Gujarat, there are 3.55 lakh tribal land holders who operate 8.52 lakh hectares of land. These tribal cultivators constitute about 11.30 per cent of the total number of land holders and 8.55 per cent of the total land cultivated in the state. In Vadodara district, tribal population constitutes 25.35 per cent of the total population, of which 89.00 per cent tribes are agriculturists in Chhotaudepur, Naswadi and Pavi-Jetpur talukas of the district. This investigation was carried out in these talukas which are under developed, economically backward tribal talukas of Vadodara district. Chhotaudepur, Naswadi and Pavi-Jetpur talukas constitute sizeable tribal population of 83.00 per cent; 80.00 per cent and 72.00 per cent respectively. The tribals have been an underprivileged class of population. Agriculture is the only source of livelihood for them. Their land is comparatively poor in quality and particularly without irrigation facilities. The
agricultural production is far from assured and stable.

Krishnaswamy and Patel (1974) while studying problems of tribal agriculture stated that even in context of the general backwardness of the tract, tribal farmers lagged considerably behind their non-tribal counterparts in respect of the farm investment made, farming technology used, farm family income realised and potential created for investment in the farm. Tribal farmers, therefore, constitute a unique subgroup of the group of dry farmers which itself forms one of the weakest sections of the rural sector.

From the foregoing discussion, it would appear that tribal farmers are further behind the already lagging non-tribals in realising the potential of available resources through the use of an appropriate technology.

It would be necessary to review the development activities and programmes undertaken by Government to improve the socio-economic condition of tribals through increased agricultural production. In brief the Government approach to the tribal area has been concluded as under.

The constitution provided enough frame for enabling fast socio-economic development of the tribal areas and the communities. Soon after the inauguration of Community Development, a
programme of special multipurpose tribals development projects was taken up for the tribal areas more or less on similar lines of Community Development programme. From the experience of special multipurpose tribal development projects, a programme of tribal development blocks was subsequently formulated for small area. This programme was gradually extended to about 504 units in the country which covered areas with more than two third tribal concentration. The small size of the area, the rigid schematic frame and other contributing factors did not allow a broader perspective of tribal development to emerge at the national level. Also other programmes like tribal welfare and tribal welfare development corporation started functioning in the tribal areas during said periods. These programmes gave an impression that the tribal side was being taken care of. Conceptually, any problem could be referred to the local administration who should find a solution. There was no such system, hence in these tribal areas the supplementary efforts under tribal development programmes proved to be so meagre as compared to sectoral investments that it could not be expected to provide sufficient thrust for the emergence of a balanced picture of tribal development. Thus the tribal development programme was of marginal utility.

M. Zaheer (1975) while reviewing the past efforts on tribal development observed that the main aim of the development programmes for tribals was to integrate them with the rest of the country. In effect what happened was that instead of the
benefits going to the tribal communities, this attempt strengthened the exploitative elements. Increase investment and change induced by tribal development programmes did not help the tribes because of improper planning and defective implementation of the programme in the past. The special programmes of their welfare and development had only a limited impact on them.

Our prime minister Morarji Desai (1977) has also emphasised on rural development that:

"We have to make the village the base of our economic progress. It is axiomatic that all efforts to deal with poverty and backwardness must be concentrated where the incidence is the greatest. Ours has been, since ancient times, a predominantly village-based society eighty per cent of our population lives in villages."

Due to relatively slow rise in agricultural productivity and rapid increase in population, already illnourished and afflicted with widespread poverty, India's agricultural sector is now facing an unprecedented challenge. Even in these days, when scientific advancement has made it possible to land man to moon. The traditional practices still dominate the agriculture. The introduction of new technology in 1966-67 ushered in a phase of dynamic development in field of agriculture and resulted in a progressive transformation from traditional to the modern agriculture. But in the context of the Indian economy there is a qualitative difference in the nature of agriculture. This fact also necessitated the emphasis on a social justice aspects of planning and certain special schemes were planned.
It is rightly emphasized by the Government of India (1976) in its Fourth Five Year Plan draft that:

"The new agricultural technology tends to add a further dimension of disparity between those who have the resources to make use of it and those who have not. There is, therefore, danger of emergence of a sharp polarization between the more privileged and less privileged class in rural sector; privileged in this instance relating to the resources and tools of development."

It is true that the commencement of special programmes like Small Farmers' Development Agency (SFDA), Marginal Farmers and Agricultural Labourers Development Agency (MFAL), Drought Prone Area Programme (DPAP), Integrated Tribal sub plan Development Project (ITDP) etc. are the only programmes directly related to rural development. It is a product of various studies carried out by the Govt. of India.

Overall picture of society illustrate that the position of the tribal farmer is still worse. They are the most vulnerable section of the population who are exploited the most. As old social and cultural handicaps, deeply attached to their land, numerous deities and beliefs, coupled with environmental factors have contributed towards their low level of living. Ethnically as well as culturally, these tribals remain at widely different stages of social as well as economic development.

Various programmes were planned to raise the agricultural production and to develop the entire tribal area, however.
they relatively remained the same. No developmental efforts can be of benefit to the local community unless the parasite is removed from the host body. It was rightly reported in the Dhebar Committee (1961) that:

"The review of the condition of the tribals before independence goes to show that the policy of isolation and drift meant nothing more than a maintenance of 'status quo'. It resulted in reducing the tribals to a state to penury in most part of India."

In this background the new strategy with special emphasis on special integration for development of tribal communities have been introduced. Since much have been done for them, though much more remains to be done. The fifth five year plan gives stress on evolving special approaches and plans which are required for different tribes under various condition of living. In this connection, Bawa Committee (1974) recommended that:

"Tribal people require a packages of services, the main components of which are credit, supply of seeds and other agricultural inputs, supply of consumer goods and marketing to produce both agricultural and minor forest. These activities constitute the major areas of exploitation of tribals. The co-operative structure should, therefore, provide integrated credit and other services to the tribals."

Dry farming programmes should be given highest priority than the other normal programmes in tribal areas.

*In this background, Integrated Tribal sub-plan Development Project (ITDP) has to play leading and challenging role. Now
it is clear that not only capital or finance is the barrier of the tribal farmers but their ignorance towards new agricultural technology and conservativeness are also the obstacles in their progress. In this context, Jaiswal and Kolte (1975) noted that the barriers in the way of the diffusion of farm innovations among the tribal people is lack of compatibility, communication and profitability; difficulties of initial cost of farm innovations, absence of target and budget oriented programmes; poor knowledge of extension workers; ineffective use of extension methods; lack of dedication and missionary zeal among the extension workers. Therefore, only to ensure viability to the tribal farmers by providing institutional credit and state assistance can not be rationalised. The ignorance of tribal farmers never persuades them to adopt the modern technology. Sinha (1973) stated that the "Garibi Hatao" from the tribals can not be done without taking a drastic step of excluding those who are economically better off among them. So equal attention must be provided to educate the tribal farmers and communicate the new technology to the door of farmers who are lying at the grass root of the society.

It is true that India's real development lies in the development of these people. The gap between the poor and rich is very wide in many ways. The physical and mental separation of the tribals is responsible for their economic and social backwardness. They remain aloof from the rest of the society for
generation. In this reference of tribal backwardness, Dar (1970) stated that the isolation of the tribal areas from the outside world has prevented the tribal from being exposed to new ideas and they are, therefore, extremely tradition bound and prime in their approach. This means that when conscious and deliberate efforts are made to introduce them to methods of agriculture with which they are unfamiliar, they are likely very slow in accepting them.

As regard their communication and adoption behaviour Singh (1970) stated that no systematic effort appears to have been made by the extension agencies to rope in the tribal cultivators to adopt scientific methods of cultivation. The situation which differentiate the tribal and non-tribal farmers by many ways, demand necessary modification and special arrangement in the ITDP programmes. Various studies reported that the programmes on the communication and extension activity aspects have been less emphasised. To motivate the tribal farmers who adhere to traditions and customs, from a subsistence farming to the commercial farming is only possible by providing education, training and communicating the research information, with necessary economic assistance.

1.1 STATEMENT OF THE PROBLEM:

It is clear from the foregoing discussion of this chapter that there is need for improving technological as well as
economic status of the tribal areas of the country.

Various researchers like Goswami and Saika (1970), Sinha (1973), Bhati and Swarup (1974), Basu (1975), Bapat and Brahmbhatt (1976) and Bhilegaonkar (1977-78) have reported that the development of tribals is a very complex procedure as they have their own socio-cultural and economic problems. Other researches by Bose (1969), Patnaik (1972), Bhati and Swarup (1974), Tripathi (1974), Kamaluddin sahib (1978), Sadamate (1978), Kulkarni (1979), Swaminathan (1982) and Trivedi (1984) have clearly pointed out that though overall agricultural production in the country has gone up, the impact has not been uniform under various farming systems and different categories of farmers, especially with tribal farmers. Some of the studies have also reported that tribal development depends upon the agricultural development of respective tribal areas.

The agricultural production depends on the three agricultural development processes viz:—

(i) Technology development (ii) Technology transfer and (iii) Technology sustenance.

Rapid increase in the number of technological innovations and their adoption in agriculture have generated immense potential for rural growth. Included in such innovations are the components of biological i.e. HYV/Hybrid etc., chemical i.e. fertilizers/ nutrients and mechanical technology which can
jointly be called new agricultural technology.

Unless the new agricultural technology developed by the agricultural research stations is transferred to the cultivators' fields and converted into production, it is a wasteful expenditure. There is at present big gap between what is achieved at research stations and what a farmer gets at his field. In case of tribals, the gap is more wider.

Use of modern inputs and adoption of new technology in agriculture are undoubtedly more important in increasing farm productivity. Tribal regions show backwardness in agriculture. Development of tribal agriculture is more important than other development programmes in the fields of national economy.

The integrated Tribal Development Project (I.T.D.P.), Chhotaudepur dist. Vadodara has started its functioning since 21st June 1976, with the objectives to narrow the gap between the level of development of tribal and other areas of the state and to increase the income from agriculture and thereby improve the quality of life of the tribal farmers. Also Intensive Agricultural Development Programme was going on for last several years. The new technology has been claimed size neutral. There is hardly any detailed research available on cropping pattern followed by the tribals and extent and their adoption of recommended agricultural technologies of important crops.
Therefore, the present investigation constitutes one such effort to study transfer of agricultural technology among tribal farmers of I.T.D.P. Chhotauldepur, Dist. Vadodara.

1.2 OBJECTIVES OF THE STUDY:

The present study was conceived with the overall objective to study transfer of agricultural technology among tribal farmers of I.T.D.P. - Chhotauldepur, Dist. Vadodara.

The specific objectives of the study were as under.

1. To study the personal and socio-psychological, situational and communication characteristics of the tribal farmers.
2. To study the cropping pattern followed by the tribal farmers.
3. To study the attitude of tribal farmers towards agricultural recommended technology (chemical fertilizers and high yielding varieties) for the major crops.
4. To identify and study the overall technological gap as against recommended technologies of major crops among the tribal farmers.
5. To study the level of yield of major crops on tribal farms.
6. To analyse and study the constraints associated with technological gap and ascertain the suggestions of tribal farmers to overcome the constraints associated with technological gap.
1.3 SIGNIFICANCE OF THE PROBLEM:

As against the 7.54 per cent schedule tribes population in the country, schedule tribes in Gujarat state accounts for 14.92 per cent of the total population in the state. In Gujarat 92.68 per cent tribes are living in rural areas and 86.00 per cent are agriculturist and agricultural labourers. There are 3.55 lakhs tribal land holders who operate 8.52 lakhs hectares of land. These tribal cultivators constitute about 11.30 per cent of the total number of land holders and 8.55 per cent of the total land cultivated in the state. In Vadodara district, tribal population constitute 25.35 per cent of the total population, of which 89.00 per cent tribes are agriculturist in Chhotaudepur, Naswadi and Pavi-Jetpur talukas of the district. They are amongst the weakest sections of the society. The tribal economy is predominantly dependent on agriculture. Agriculture is not only their source of income but also a way of life. Tribal areas being hilly, rocky and the land being undulating shallow having inferior type and very less awareness of agriculture resulting in backwardness. Chhotaudepur, Naswaadi and Pavi-Jetpur talukas of Vadodara district are the under developed, economically backward tribal talukas with a sizable tribal population of 83.00 per cent, 80.00 per cent and 72.00 per cent of the talukas respectively. I.T.D.P. - Chhotaudepur is working in these talukas since June 21st 1976. Inspite of the integrated planned efforts, the socio-economic situation of tribals, still remains backward and hence more well integrated, intensive result oriented
planned efforts are necessary. The very approach and statement of objectives given in section 1.2 of this chapter would indicate the practical utility of this research study. The study would provide information on extent of adoption of recommended agricultural technology of major crops of the tribal areas.

An attempt to know the yield level of major crops on tribal farms as well as constraints associated with overall technological gap among tribal farmers were also focused. The direct and indirect effect of independent variables on overall technological gap, and the extent of variation caused by the independent variables on overall technological gap would also be of great use. Little is known about the suggestions to overcome the constraints associated with overall technological gap among tribal farmers and hence it has become essential to know the possible and workable suggestions or solutions to overcome the constraints as perceived by the tribal farmers. Finally, the study would bring out certain factors viz:- actors' personal and socio psychological characteristics, situational and communication variables and constraints associated with technological gap as well as present yield on tribal farms, attitude of the tribal farmers towards chemical fertilizers and high yielding varieties of the major crops, cropping pattern followed by the tribal farmers and suggestions of the tribal farmers to overcome constraints as perceived by them.
The findings of this study will also be useful to the programme planners, administrators, extension workers, teachers and students who are directly or indirectly related with the task of development in tribal areas. Further, the findings of this study will be more useful to the bankers and other voluntary agencies working in tribal areas to enhance their development programmes for tribals.

The results of the study will be of immediate use to narrow down or removing the overall technological gap as against recommended technologies of major crops of the tribal farmers. Similarly, findings may also be extended to the other tribal regions of the country for narrow down the overall technological gap.

1.4 ASSUMPTIONS OF THE STUDY:

The study was based on following assumptions:

1. That all the tribes living in isolated rural areas with less awareness of agriculture and low literacy level resulting high overall technological gap.

2. That the evidence collected by personal interviewed of the tribal farmers are valid and adequate for the present study.

1.5 LIMITATIONS OF THE STUDY:

1. Only some of the characteristics of the tribal farmers
were studied.

2. The study largely relied upon the responses of the tribal farmers.

3. Findings drawn in this study are based on the verbal opinions of the tribal farmers to recall.

- o o o -
Review of Literature
CHAPTER - II
REVIEW OF LITERATURE

The purpose of this chapter is to review the literature related to the problem of this study. The literature reviewed so far has clearly revealed that few systematic literature on topic undertaken are available. No such systematic study has been conducted so far in any part of the Vadodara district of Gujarat State. A brief account of such literature related to the problem under study has been presented under the following heads.

2.1 Personal and socio-psychological, situational and communication characteristics of the tribal farmers.
2.2 Cropping pattern followed by the tribal farmers.
2.3 Yield level of major crops on tribal farms.
2.4 Technological gap among the tribal farmers.
2.5 Relationship of overall technological gap of the tribal farmers with their selected characteristics.
2.6 Extent of variation in the overall technological gap of the tribal farmers caused by independent variables.
2.7 Direct and indirect effect of selected independent variables on dependent variable (overall technological gap).
2.8 Constraints responsible for technological gap.
2.9 Suggestions to overcome the constraints associated with technological gap.
2.1 PERSONAL AND SOCIO-PSYCHOLOGICAL, SITUATIONAL AND COMMUNICATION CHARACTERISTICS OF THE TRIBAL FARMERS

2.1.1 Personal and socio-psychological characteristics:

2.1.1.1 Age:

Pandit (1981) stated that majority (84.00 per cent) of the tribal farmers belonged to middle age group i.e. 31 to 50 years of age followed by old age group (9.33 per cent).

Kanani (1982) reported that majority (56.67 per cent) of the tribal farmers were in the middle age group. This was followed by the young age group (34.67 per cent). Only 8.66 per cent were in the old age group.

Sinha et al. (1982) stated that majority of the tribal farmers were in the old age group.

Trivedi (1984) found that majority (62.78 per cent) of the tribal farmers were in the middle age group followed by 24.44 per cent in old age group.

Bhatt (1990) reported that nearly about half (46.67 per cent) of the tribal respondents belonged to middle age group.

Gamit (1993) reported that majority (57.50 per cent) of the tribal summer groundnut growers belonged to middle age group.
Nayak (1993) reported that more than two third of the tribal respondents (70.03 per cent) were found to be middle aged.

2.1.1.2 Education :

Pandit (1981) found that 60.00 per cent of the tribal farmers were illiterate.

Kanani (1982) revealed that majority (70.00 per cent) of the tribal farmers were illiterate. Only 10.00 per cent could read and write, 8.00 per cent could read only, 4.67 per cent had education upto primary level, 4.00 per cent upto middle education and 3.33 percent had education upto higher secondary and above.

Sinha et al. (1982) revealed that majority of the tribal farmers were illiterate.

A study conducted by M.L.V. Tribal Research Institute (1982) revealed that even after 37 years of independence, there is only one graduate in Saharia Bhills concentrated in two tehsils of Kota (Rajasthan).

Shukla (1985) recorded quite higher percentage of illiterate tribal farmers.

Bajaj (1985) reported that 45.90 per cent of the
respondents were illiterate.

Bhatt (1990) reported that more than two-third of the tribal respondents (71.33 per cent) had no education i.e. totally illiterate.

Gamit (1993) reported that majority (50.00 per cent) of the tribal summer groundnut growers had education starting from simply reading and writing to secondary level.

Nayak (1993) concluded that nearly one-third of the tribal respondents (35.00 percent) were found illiterates and around 43.33 percent had education upto primary level.

2.1.1.3 Social Participation:

Trivedi (1984) revealed that more than one half (55.56 per cent) respondents were members in one organisation while 37.22 per cent have not taken participation in any social organisation whereas, 2.22 per cent were holding position in the organisation.

Shukla (1985) reported that out of total beneficiary respondents about 72.50 per cent were not members of any organisation followed by 22.50, 3.75 and 1.25 per cent who were members
of one, more than one organisation and position holders respectively.

Bhatt (1990) stated that out of 150 tribal respondents 86.66 per cent tribal respondents were having no membership in any of the village organisation. Only 12.66 per cent respondents were members in one organisation followed by only one respondent (0.67 per cent) having membership in more than one organisation.

Gamit (1993) reported that more than two third (75.83 per cent) of the tribal summer groundnut growers had membership in one or more than one organisation.

Nayak (1993) revealed that more than half of the tribal respondents (55.84 per cent) were found having no participation in any of the organisation.

2.1.1.4 Occupation:

Hansada (1981) concluded that out of the 45 millions tribal people in India 90.00 per cent i.e. approximately 40 million were agriculturist and 10.00 per cent i.e. five million were landless agricultural labours who were dependent on the sale of forest product for their living.

Pandit (1981) observed that majority (84.00 per cent) of
the tribal respondents were fully dependent on farming whereas only 16.00 per cent were dependent on farming and others.

Kanani (1982) reported that majority (54.67 per cent) of the tribal farmers had farming occupation only. The respondents of farming plus labour work, farming plus cottage industry and farming plus handicraft were 20.67 per cent, 12.66 per cent and 12.00 per cent respectively.

Trivedi (1984) revealed that 62.22 per cent of tribal respondents were exclusively dependent on farming and rest were depending on both farming and other occupation.

Patel (1985) found that majority (69.19 per cent) of the respondents had derived their income from agriculture.

Patel (1988) stated that tribal farmers were dependent on farming and labour work.

Bhatt (1990) concluded that two-third (68.67 per cent) tribal respondents were dependent on farming with labour work for their livelihood, whereas, only 18.00 per cent tribal farmers were fully dependent on agriculture. Further only 10.66 per cent respondents were having farming with some kind of small business and only 2.87 per cent respondents had service with agriculture work.
Gamit (1993) reported that an overwhelming number of (83.33 percent) respondents had either farming or farming with animal husbandry as their occupation.

Nayak (1993) reported that an overwhelming majority of the tribal respondents (93.33 per cent) were fully dependent on farming.

2.1.1.5 Type of Family:

Pandit (1981) concluded that majority (55.33 per cent) of the tribal respondents belonged to joint family.

Kanani (1982) concluded that majority (58.67 per cent) of the tribal farmers belonged to the joint family, followed by those who were in the nuclear family (41.33 per cent).

Trivedi (1984) reported that more than two third (70.00 per cent) of the tribal respondents belonged to joint family type while 30.00 per cent were having nuclear family.

Shukla (1985) concluded that majority (55.00 per cent) of the respondents from both the categories beneficiary tribal respondents and non-beneficiary tribal respondents (78.75 per cent) had joint type of family.
Gamit (1993) reported that majority (90.00 per cent) of the tribal farm families belonged to joint family.

Nayak (1993) revealed that majority (60.00 per cent) belonged to joint families while only 40.00 per cent were having nuclear families.

2.1.1.6 Size of family:

Pandit (1981) reported that majority (59.34 per cent) of the tribal farmers had 5 to 10 members in their families.

Kanani (1982) revealed that the size of the family of most of the tribal farmers was (48.67 per cent) from 6 to 10 members.

Trivedi (1984) reported that more than half (51.57 per cent) respondents belonged to medium size of families, followed by nearly one-third (31.66 per cent) having large families and only 16.67 per cent of the respondents belonged to small size of family having less than 5 members in their families.

Shukla (1985) concluded that majority (52.50 per cent) of the respondents belonged to family having 6 to 10 members followed by 41.25 per cent and 6.25 per cent were found to be in the group having 5 members and above 10 members respectively.
Gamit (1993) reported that majority (70.00 per cent) of the tribal farm families had medium size of family.

Nayak (1993) reported that majority of the tribal respondents 64 (53.34 per cent) belonged to medium families having 6 to 10 members.

2.1.1.7 Type of houses:

Tamboli (1979) reported that almost all (99.33 per cent) tribal farmers were having kaccha houses made out of mud only.

Pandit (1981) observed that 76.67 per cent tribal farmers had kaccha houses made out of mud while 23.33 per cent had mixed houses made out of bricks and mud.

Trivedi (1984) reported that majority (96.11 per cent) of the respondents had possessed mixed type of houses.

2.1.1.8 Number of houses:

Trivedi (1984) reported that majority (80.00 per cent) of the respondents had one house, while 18.89 per cent of the respondents had two houses. Only 1.11 per cent respondents had more than three houses.
2.1.1.9 Farm power:

Pandit (1981) reported that majority (98.67 per cent) of the tribal farmers had five and more bullocks.

Trivedi (1984) reported that majority of the tribal farmers were exclusively dependent on farming only with minimum farm power i.e. upto two bullocks.

Nayak (1993) revealed that 60 tribal respondents (50.00 per cent) had 3 to 4 animals, followed by 46 respondents (38.33 per cent) had 5 and above 5 animals.

2.1.1.10 Material possession:

Pawar (1972) observed that investment in farm implements by tribal was very poor. The farm implements possessed by tribal farmers were of indigenous nature and entirely prepared from wood only.

It was observed in agresco report (1973) that 80.00 per cent of the Adivasi farmers had indigenous ploughs, while only two percent of them had improved ones.

Bhati and Swarup (1974) reported that each tribal farmer was owning a soil turning plow but other modern farm equipments
was non-existent among these tribals.

In report on technical feasibility survey for adoption of improved agriculture practices in tribal sub-plan area of Marathwada region (1979-80) it was observed that majority of tribal farmers (59.00 per cent) possessed local plough and harrow. Only two per cent of them had sprayers.

Trivedi (1984) reported that majority (85.00 per cent) of the tribal farmers had no improved implements. Majority (61.67 per cent) of the tribal farmers possessed upto two local implements.

2.1.1.11 Socio-economic status:

Pandit (1981) concluded that majority of the tribal respondents (62.67 per cent) were found in middle socio-economic status group. He found positive and significant relationship between adoption and socio-economic status of the tribal farmers.

Trivedi (1984) concluded that majority of the tribal farmers were illiterate, belonged to medium socio-economic status.

Bajaj and Nayak (1985) reported that majority (77.00 per cent) of the tribal farmers had a low socio-economic status in the community.
2.1.1.12 Migration habit:

Sambrani and Pichholiya (1975) reported that out of 99 sample tribal households from Panchmahals districts, only 13 households (about 13.00 per cent) were reported from which migration took place. The migrating labour force was predominantly male and averages to about two persons per household.

Vyas and Chaudhary (1977) reported about 13.00 per cent migration among tribal families.

Niga (1982) while talking on All India Radio dated 8th August, 1982, reported that eight per cent migration observed in Panchmahals district.

Trivedi (1984) reported that about 36.11 per cent migration was observed in sample tribal farmers.

2.1.1.13 Cosmopolite localiteness:

Singh (1965) stated that the key-communicators differ significantly from non-communicators with respect to cosmopoliteness in both agriculturally developed and under developed villages.

Murthy and Singh (1974) concluded that the localite-cosmopolite value orientation had a significantly negative
Bharaswadkar (1977-78) reported that 68.00 per cent of the tribal farmers were found to have high cosmopoliteness while 20.00 per cent had medium cosmopoliteness. Only 12.00 per cent had low cosmopoliteness.

Trivedi (1984) reported that cosmopolite-localiteness of the tribal farmers were found in medium level.

2.1.1.14 Economic-motivation:

Trivedi (1984) inferred that majority (64.45 per cent) of the respondents had medium economic motivation followed by 22.11 per cent who had high economic motivation. While 14.44 per cent of the respondents had low economic motivation.

Patel (1985) revealed that more than half (57.00 per cent) of the respondents were found to have medium economic motivation, followed by 23.00 per cent having high economic motivation.

Bhatt (1990) found that about two-third (65.00 per cent) of the respondents were found to have medium economic motivation, followed by 20.00 percent tribal respondents adopting hybrid maize cultivation, leaving only 12.00 per cent of the respondents
in higher level of economic motivation.

Gamit (1993) reported that clear majority (70.83 per cent) of the respondents had medium to low economic motivation.

2.1.1.15 Scientific orientation:

Patel (1983) concluded that majority (70.00 per cent) of the respondents were found in medium scientific orientation group.

Trivedi (1984) found that 62.77 per cent of tribal farmers had medium scientific orientation followed by 30.56 per cent having high scientific orientation.

Patel (1985) reported that 62.00 percent of the respondents were found to have medium scientific orientation followed by 23.00 per cent of the respondents having high scientific orientation. Only 15.00 per cent of the respondents were having low scientific orientation.

Gamit (1993) reported that two third (65.83 per cent) of the tribal respondents had medium level of scientific orientation.
2.1.1.16 Risk-preference:

Trivedi (1984) inferred that majority (53.89 per cent) of the tribal farmers had medium to high (25.00 per cent) risk-preferences.

Patel (1985) concluded that a great majority (78.00 per cent) of the respondents were found in medium risk-preference category followed by 16.00 per cent and 6.00 per cent in low and high risk-preference category respectively.

Bhatt (1990) found that a great majority (71.66 per cent) of the respondents were found to have medium risk-preference, followed by 17.34 per cent who had low and only 11.00 per cent respondents showed high level of risk-preference in adoption of hybrid maize cultivation technology.

Gamit (1993) revealed that majority (71.67 per cent) tribal respondents had medium risk bearing ability.

2.1.1.17 Attitude towards high yielding varieties:

Patel (1978) concluded that tribal farmers had favourable attitude towards working programmes of Integrated Tribal Development Project for their economic development. The statement "implementing intensive farming programmes and High yielding..."
varieties programmes etc." was favourable statement of tribal farmers with 2.993 average score.

Sadamate (1978) reported that high percentage (58.13 per cent) of tribal farmers had favourable attitude towards farming. He further concluded that attitude towards farming was negatively and significantly related to technological gap.

Trivedi (1984) reported that majority of the tribal farmers were found to have neutral attitude (56.11 per cent) towards high yielding varieties.

2.1.1.18 Attitude towards chemical fertilizers:

Singh and Singh (1968) revealed that majority of the respondents had favourable attitude towards chemical fertilizers. Similar result was found by Ram (1989).

Choudhary and Khan (1992) concluded that majority of the respondents (55.65 per cent) had moderately favourable attitude towards the use of chemical fertilizer. The rest of the respondents (45.35 per cent) showed more favourable attitude towards use of chemical fertilizer.

2.1.1.19 Knowledge about recommended technology:

Pandit (1981) revealed that the tribal respondents had
medium level of knowledge (76.00 per cent) whereas, 12.00 per cent each were in low and high level of knowledge of improved wheat cultivation technology.

Trivedi (1984) inferred that half (49.45 per cent) of the tribal farmers had low level of knowledge while 42.22 per cent of them had medium level of knowledge about recommended technology.

Shukla (1985) concluded that majority of beneficiary tribal farmers belonged to medium level of knowledge.

Bhatt (1990) revealed that more than half (58.00 per cent) of the tribal farmers had medium level of knowledge while nearly equal i.e. 32.00 and 30.00 per cent respondents had low and high level of knowledge of improved hybrid maize cultivation technology.

Ratnakar and Reddy (1991) reported that in agriculture programmes majority (53.10 per cent) of beneficiaries had low level of knowledge about recommended practices of paddy while 31.30 per cent and 15.60 per cent of them had medium and high level of knowledge respectively. Whereas in case of non-beneficiaries, 50.00 per cent of them were distributed under medium category, following 34.40 per cent and 15.60 per cent in low and high knowledge categories respectively.
Gamit (1993) reported that a clear majority (76.67 per cent) of the tribal respondents had medium level of knowledge.

Nayak (1993) reported that majority of the tribal respondents (67.50 per cent) were having medium level of knowledge regarding overall practices of improved paddy technology.

2.1.2 Situational characteristics:

2.1.2.1 Land holding:

Pandit (1981) reported that the majority (48.00 per cent) of the respondents were found to have a land holding more than 5.0 acres but up to 10.0 acres, whereas 36.00 per cent of respondents were having more than 10.0 acres of land.

Trivedi (1984) observed that 68.89 per cent of tribal respondents were having land up to 5.0 acres, whereas, 26.67 per cent of respondents were having land 5.0 acres and below 10.0 acres.

Patel (1985) found that 43.60 per cent of tribal farmers possessed medium size of holding (2.1 to 4.0 hectares), while 29.07 per cent of respondents had small size of holding up to 2.0 hectares.
Bhatt (1990) stated that half of the tribal farmers (51.33 per cent) were having small size of land holding (i.e. upto 2.0 acres) followed by more than one-third tribal farmers (38.00 per cent) who had medium size of land holding (i.e. 2.1 to 5.0 acres) whereas, only 10.67 per cent tribal farmers had large size (above 5.00 acres) of land holding.

Gamit (1993) reported that overwhelming majority (90.83 per cent) of the tribal respondents had land size upto three hectares.

Nayak (1993) summarized that majority of the tribal respondents (58.33 per cent) had a land holding within 5 acres, with an average size of 5.44 acres.

2.1.2.2 Annual income:

Pandit (1981) revealed that majority (54.00 per cent) of tribal respondents were having annual income of more than Rs.1,000=00 but upto Rs.2,000=00 per annum and 33.33 per cent of respondents were having income between Rs.2,000=00 to Rs.3,000=00 annually. Whereas only 12.00 per cent having annual income upto Rs.1,000=00 and only 0.67 per cent was having income above Rs.3,000=00 annually.

Trivedi (1984) stated that 34.33 per cent of the respondents were having annual income from Rs.501=00 to Rs.1,000=00,
while 18.89 per cent of the respondents had annual income upto Rs.500=00. The respondents having annual income from Rs.1,001=00 to Rs.1,500=00 were 13.90 per cent, whereas 23.88 per cent had annual income above Rs.1,500=00.

Sharma (1987) reported that out of the total sizable number of respondents in both the villages were in the annual income group range of Rs.1,500-2,500, followed by lower income group in which 40.81 and 33.33 per cent respectively. Very few respondents were in higher income group of above Rs.2,500=00 annually.

Patel (1988) stated that majority (72.38 per cent) of the respondents in tribal area had annual income upto Rs.10,000=00. This was followed by 25.72 per cent tribals who had income between Rs.10,000=00 to Rs.20,000=00. Leaving only 1.90 percent of respondents with annual income above Rs.20,000=00.

Bhatt (1990) revealed that two-third (66.00 per cent) of the respondents from tribal area belonged to category of low annual income of Rs.3,000=00 (low annual income group) followed by a category of Rs.3,000=00 to Rs.5,000=00 (i.e. medium annual income group) in which 23.34 per cent respondents belonged, while only 8.00 per cent (i.e. high annual group) had annual income of Rs.5,000=00 and above.
Garnit (1993) reported that majority (83.33 per cent) of the tribal respondents had low to medium level of income.

Nayak (1993) revealed that an overwhelming majority of the respondents (93.34 per cent) had an annual income of more than Rs.4,000=00 with an average income of Rs.6,075=00 per annum.

2.1.2.3 Indebtedness:

Kulkarni (1979) reported that 53.00 per cent tribal farmers were free from debt and remaining 47.00 per cent were debtors from Rs.400=00 to 5,000=00. Average debt work out was Rs.620 per family.

Trivedi (1984) reported that majority (68.33 per cent) of the respondents had no debt. One fifth of them (20.56 per cent) had reported debt of Rs.500=00, while 6.67 per cent of them reported debt from Rs.501=00 to Rs.1,000=00. Only 4.44 per cent had debt more than Rs.1,000=00.

Nath (1993) reported that three-fourth of the respondents (75.00 per cent) were having debt upto Rs.5,000=00.

2.1.2.4 Cropping intensity:

Patel (1978) revealed that cropping intensity of sample tribal farmers in Panchmahals district was 112.25 per cent, where
in only 12.25 per cent of the total cultivated area was under double cropped area.

Sadamate (1978) reported that highest (66.25 per cent) percentage of the respondents went for kharif cropping only leading to low cropping intensity. He found that cropping intensity was negatively and significantly related to technological gap.

Trivedi (1984) reported that majority (63.88 per cent) of the tribal farmers had cropping intensity upto 125.00 per cent. He further reported that the average cropping intensity of the tribal farmers in Panchmahals district was 128.58 per cent.

2.1.3 Communication characteristics:

2.1.3.1 Sources of information:

Pandit (1981) revealed that village level worker and cooperative personnel were major accessible formal information sources as reported by 53.33 per cent and 59.33 per cent of the tribal farmers respectively. While in case of informal sources neighbours, friends and relatives were major sources for 88.00 per cent and 72.00 per cent of the tribal farmers respectively. Radio and demonstrations were accessible mass-media to 18.00 per cent and 15.33 per cent of the tribal farmers respectively.
Trivedi (1984) reported that almost all (98.89 per cent) tribal farmers mainly utilised village level worker as a source of information and ranked first on source credibility index. Neighbours and relatives were used by 98.33 per cent of tribal farmers but they ranked fifth on source credibility index.

Thakrar (1986) stated that village level worker was utilized by 98.00 per cent of summer groundnut growers as formal sources of information.

Patel (1988) revealed that village level worker was regarded as the most formal sources of information for the tribal as well as non-tribal farmers.

Patel (1989) found that village level workers has been mentioned as the most utilised source of information by 94.00 per cent of hybrid castor growers for obtaining farm information.

Bhatt (1990) revealed that formal sources which tribal farmers mainly utilised was village level worker for hybrid maize cultivation technology.

Patel et al. (1991-92) revealed that relatives, neighbours and VLW secured first, second and third rank for getting information about maize cultivation as source of information respectively.
Thakor and Waghmare (1991-92) revealed that neighbours and friends were the foremost consulted source of information followed by village level worker and other niger cultivators in their village.

Gamit (1993) reported that village level worker (70.79 per cent), agricultural extension officer (68.33 per cent), farmers training center (49.00 per cent) were the most utilised sources of information by tribal summer groundnut growers.

Nayak (1993) reported that the personal sources of information were more familiar among the tribal farmers than the impersonal and mass media sources.

2.1.3.2 Source credibility:

Patel (1978) observed that village level worker ranked first on source credibility scale followed by progressive farmers.

Trivedi (1984) reported that among different sources of information majority of the tribal farmers used village level worker, neighbours and relatives, co-operative personnel, contact farmers and Talati-cum-Mantri and the credibility of village level workers and contact farmers was found to be high.
Rai and Choubey (1985) reported that communication sources and channels credible by the farmers were SMS of Agricultural University followed by village leaders, neighbours, friends-relatives, printed literature, village level workers, Panchayat chairman, AEOs and demonstration.

2.2 CROPPING PATTERN FOLLOWED BY THE TRIBAL FARMERS

Bose (1975) reported that settled agriculture is the primary source of livelihood for majority of the tribal communities. Though there are some isolated examples of improved agriculture adopted by the tribals, yet, by and large, agriculture in tribal areas is even now at subsistence level.

Patel (1978) observed that the cropping pattern of the tribal farmers was predominately food grains oriented (95.40 percent), especially cereal oriented (78.97 percent). The relative share of main cereals crops such as maize, paddy and wheat were 37.44, 23.11 and 18.42 percent of the total cropping pattern respectively. The relative share of legume crop was 16.43 percent. Among legume crops, the share of gram was 15.66 percent. The relative share of groundnut, cotton, kodara and vegetable crops were 3.96, 0.56, 0.77 and 0.08 percent of the total cropping pattern respectively.

Shridharan and Radhakrishan (1978) reported that there
was no shift in cropping pattern between 1966-67 in Nilgiris district of Tamil Nadu state. The average allocation between the crops was influenced by physical, economic, biological and socio-logical factors.

Trivedi and Patel (1991-92) revealed that almost all (100.00 per cent) the respondents followed single cropping pattern while 69.44 percent of the respondents followed double cropping and only 7.22 per cent of them had followed triple crop in their cropping pattern. The cropping pattern was predominantly food-grains oriented and there was no change over time in cropping pattern of the tribal farmers.

2.3 YIELD LEVEL OF MAJOR CROPS ON TRIBAL FARMS

Pawar (1972) reported that tribal agriculture is characterized by low per acre yields resulting in low farm income.

Sadamate (1978) stated that the production analysis of paddy crop for the kharif revealed that average yield of respondents was quite low i.e. 3.97 quintals per acre. Only 5.00 per cent respondents had a yield level about 7.1 quintals per acre. Whereas 95.00 per cent had a yield level upto 7.0 quintals per acre. He further reported that age, indebtedness, gap in varietal recommendations, gap in sowing operations, gap in manure fertilizers application, gap in water management, gap in plant
protection, gap in harvest - post harvest operations etc. were negatively and significantly related with yield figures. The technological gap components were negatively and significantly related whereas age and indebtedness were positively and non-significantly related with yield figures.

Trivedi (1984) revealed that average yield on tribal farms for all the crops except paddy was low per acre yields resulting in low farm income. The average yield of paddy was more by about 26.00 per cent than district average yield.

Nath (1993) reported that productivity of the respondents had negative but significant relationship with their technological gap.

2.4 TECHNOLOGICAL GAP AMONG THE TRIBAL FARMERS

Sadamate (1978) reported that the average technological gap in different components were plant protection measures (87.13 per cent), harvesting and post harvesting operations (86.56 per cent), management (86.40 per cent), manure-fertilizers application (72.25 per cent), varietal recommendations (53.26 per cent) and sowing operations (50.16 per cent). Only 27.49 per cent of the recommended rice technology was used by tribal farmers whereas the gap remained to the extent of 72.51 per cent.
Kulkarni (1979) reported that 36.00 per cent tribal farmers had high technological gap while 63.00 per cent had moderate technological gap. Only one percent had low technological gap. The extent of gap in use of manures, chemical fertilizers and plant protection measures was 72.81, 91.24 and 97.37 per cent respectively.

Pandit (1981) reported that majority of the tribal farmers (75.33 per cent) had medium level of adoption.

Trivedi (1984) reported that the extent of technological gap in use of high yielding, hybrid and improved seeds of varieties, use of farm yard manure, use of chemical fertilizers and use of plant protection measures in major crops viz. maize, paddy, wheat and gram was found to have medium to high gap level among tribal farmers.

Jaiswal and Rathore (1985) reported that the adoption gap was maximum in case of fertilizer application (52.6 per cent) whereas, it was minimum in case of variety (4.2 per cent).

Waghdhare and Mohammad (1986) reported that about two-third of the respondents were in low technological gap, whereas about one-third of farmers were observed in high technological gap in respect of using seed rate. About half of the farmers were using proper method of sowing with recommended seed drill while,
others were using traditional plough and included in the high technological gap. In case of sowing period, it was observed that about three-fourth respondents were in high technological gap category. It was observed that most of the sample farmers (65 per cent) were not applying manures to the wheat crop. Only 35.00 per cent respondents reported that they did apply 10-20 cart loads of FYM per hectare and thus found in low technological gap. The technological gap in respect of fertilizers use was reported high as compared to other practices of dry wheat cultivation.

Nath (1993) reported that more than half of the respondents (53.33 per cent) were of high technological gap category and a little less than half of the respondents (45.00 per cent) were of medium technological gap category. Only 1.67 per cent of the respondents were of low technological gap category.

2.5 RELATIONSHIP OF OVERALL TECHNOLOGICAL GAP OF THE TRIBAL FARMERS WITH THEIR SELECTED CHARACTERISTICS

2.5.1 Age and overall technological gap:

Trivedi (1984) concluded that age was non-significantly related to overall technological gaps among the tribal farmers of Panchmahals district.

Tyagi and Tyagi (1988) reported negative correlation
between age and technological gaps among the sugarcane growers.

Katarya (1989) reported that age of the farmers reflected negative and significant association with all the three categories of adoption score among the wheat growers.

Singh et al. (1991) reported that out of the total twelve variables, only one variable i.e. age was found to be positive and significantly correlated with knowledge gap of the respondents.

Wangiker et al. (1991) revealed that age of the respondents had nonsignificant relationship with their technological gap.

Kher (1992) revealed that correlation between age and adoption was not significant.

Nath (1993) reported that age of the respondents had positive and significant relationship with technological gap.

2.5.2 Education and overall technological gap:

Trivedi (1984) concluded that education level of the tribal farmers had no relationship with overall technological gap.
Tyagi and Tyagi (1988) reported that education was negatively related with technological gap.

Katarya (1989) reported that formal education was positively and significantly correlated with adoption. Therefore it can be inferred that the higher the formal education possessed by the farmer, higher will be the adoption of improved technology.

Singh and Rajendra (1990) reported that the variable education was found to have positive and significant association of adoption of Cos 767 variety of sugarcane.

Bhatt (1990) observed that education had nonsignificant association with the adoption of paddy crop.

Singh et al. (1991) reported that education had negative but significant correlation with knowledge gap of the respondents.

Kher (1992) reported that education had nonsignificant relationship with adoption of improved wheat cultivation practices.

Nath (1993) revealed that education of the respondents had negative but significant relationship with technological gap.
2.5.3 Social participation and overall technological gap:

Trivedi (1984) concluded that there was no significant relationship between social participation and overall technological gap of tribal farmers.

Tyagi and Tyagi (1988) reported that social participation had negative relationship with technological gap.

Katarya (1989) observed that social participation was positively and significantly associated with pre-adooption score.

Singh and Rajendra (1990) reported that social participation were found to have positive and significant association of adoption of Cos 767 variety of sugarcane.

Singh et al. (1991) reported that social participation had negative but significant correlation with knowledge gap of citrus growers.

Kher (1992) revealed that social participation had nonsignificant relationship with adoption of improved wheat cultivation practices.

Gamit (1993) reported that social participation of the tribal farmers had positive and significant relationship with
their extent of adoption of summer groundnut technology.

Nayak (1993) reported that social participation of the tribal farmers had positive and significant relationship with their extent of adoption of recommended paddy technology.

2.5.4 Occupation and overall technological gap:

Trivedi (1984) revealed that occupation had no significant relationship with the overall technological gap of the tribal farmers.

Tyagi and Sohal (1984) found that the variable occupation demonstrated a positive and significant relationship with adoption level of the respondents.

Patel (1990) indicated that there was significant relationship of occupation with the extent of adoption of recommended paddy cultivation technology.

Kher (1991) reported that occupation of respondents was found to be significantly related with the adoption of maize cultivation technology.

Nath (1993) revealed that occupation of the respondents was found to be nonsignificantly related with the technological gap.
Gamit (1993) observed that occupation of the tribal respondents was found to be negatively and nonsignificantly related with their extent of adoption of summer groundnut technology.

Nayak (1993) reported that occupation of the tribal farmers had negative and nonsignificant relationship with their extent of adoption of recommended paddy technology.

2.5.5 Type of family and overall technological gap:

Trivedi (1984) concluded that type of family had nonsignificant relationship with the overall technological gap of the tribal farmers.

Tyagi and Tyagi (1988) reported that family type had negative relationship with technological gap.

Nagpal and Yadav (1991) observed that family type had nonsignificant relationship with symbolic adoption.

Patel and Sangle (1991-92) reported that type of family of the tribal farmers had nonsignificant relationship with extent of adoption of improved practices.

Gamit (1993) revealed that family type had
nonsignificant relationship with their technological gap.

Nayak (1993) stated that type of family of the tribal farmers had negative and nonsignificant relationship with their extent of adoption of recommended paddy technology.

2.5.6 Size of family and overall technological gap:

Saxena et al. (1990) revealed that size of family had no association with acceptance of the technology.

Nagpal and Yadav (1991) reported that size of family showed nonsignificant association with symbolic adoption.

Patel and Sangle (1991-92) revealed that size of family had nonsignificant relationship with extent of adoption of improved practices.

Gamit (1993) reported that size of family of the tribal farmers had nonsignificant relationship with their extent of adoption.

Nayak (1993) revealed that size of family of the tribal farmers had nonsignificant relationship with their extent of adoption of recommended paddy technology.
Nath (1993) reported that size of family of the respondents had negative but significant relationship with their technological gap.

2.5.7 Number of houses and overall technological gap:

Trivedi (1984) revealed that number of houses possessed by the tribal farmers had nonsignificant relationship with overall technological gap.

2.5.8 Farm power and overall technological gap:

Trivedi (1984) reported that farm power had nonsignificant relationship with overall technological gap of the tribal farmers.

Nagpal and Yadav (1991) reported that herd size showed nonsignificant association with symbolic adoption.

Nayak (1993) revealed that animal power of the tribal farmers had nonsignificant relationship with their extent of adoption of recommended paddy technology.

2.5.9 Material possession and overall technological gap:

Trivedi (1984) reported that material possession (local implements) of the tribal farmers had highly significant relation
with their overall technological gap.

Katarya (1989) reported that possession of farm equipment was positively and significantly associated with pre-adopt-

ion.

Nagpal and Yadav (1991) revealed that material possession showed nonsignificant association with symbolic adoption.

2.5.10 Socio-economic status and overall technological gap:

Pandit (1981) found positive and significant relationship between adoption and socio-economic status of the tribal farmers.

Trivedi (1984) revealed that socio-economic status of the tribal farmers had nonsignificant relation with their overall technological gap.

Tyagi and Tyagi (1988) reported that socio-economic status had negative but significant relationship with technologi-
cal gap.

Singh and Rajendra (1990) reported that the variable socio-economic status was found to have positive and significant association of adoption of Cos 767 variety of sugarcane.
Singh et al. (1991) reported that socio-economic status had negative but significant correlation with knowledge gap of the respondents.

Wangiker et al. (1991) revealed that socio-economic status of the respondents had negatively nonsignificant relationship with their technological gap.

2.5.11 Migration habit and overall technological gap:

Trivedi (1984) reported that migration habit of the tribal farmers had nonsignificant relationship with their overall technological gap.

2.5.12 Cosmopolite-localiteness and overall technological gap:

Trivedi (1984) revealed that cosmopolite-localiteness of the tribal farmers had nonsignificant relationship with their overall technological gap.

Nagpal and Yadav (1991) revealed that localiteness-cosmopoliteness attribute showed nonsignificant association with symbolic adoption.

Singh et al. (1991) reported that cosmopoliteness had negative but significant correlation with knowledge gap of citrus growers.
Wangiker et al. (1991) revealed that cosmopoliteness had negative but significant relationship with their technological gap.

Nath (1993) reported that cosmopoliteness-localiteness had negative but significant relationship with their technological gap.

2.5.13 Economic motivation and overall technological gap:

Trivedi (1984) revealed that economic motivation of the tribal farmers had significant relation with their overall technological gap.

Bavalatti and Sundaraswamy (1990) reported that adoption level of dry farming practices exhibited nonsignificant relationship with economic motivation.

Nagpal and Yadav (1991) revealed that economic motivation attribute showed nonsignificant association with symbolic adoption.

Wangiker et al. (1991) reported that economic motivation of the respondents had negative but significant relationship with their technological gap.
Nath (1993) revealed that economic motivation of the respondents had negative but significant relationship with their technological gap.

2.5.14 Scientific orientation and overall technological gap:

Supe and Singh (1974) reported that scientific orientation was found to be significant to the prediction of rational behaviour of the farmers.

Trivedi (1984) revealed that scientific orientation of the tribal farmers had nonsignificant relationship with their overall technological gap.

Bavalatti and Sundaraswamy (1990) reported that adoption level of dry farming practices exhibited nonsignificant relationship with scientific orientation.

Wangiker et al. (1991) reported that scientific orientation of the respondents had negative but significant relationship with their technological gap.

Nath (1993) revealed that scientific orientation had negative but significant relationship with their technological gap.
2.5.15 Risk-preference and overall technological gap:

Sinha and Kolte (1974) concluded that risk preference was nonsignificantly related with adoption behaviour of farmers.

Trivedi (1984) reported that risk preference was significantly related with their overall technological gap.

Tyagi and Tyagi (1988) reported that risk orientation had negative but significant relation with technological gap.

Nikhade and Potdar (1989) revealed that risk preference of farmers was found to be related with adoption behaviour.

Bhatt (1990) revealed that there was significant relationship between risk preference of tribal farmers and extent of adoption of maize crop.

Juliana et al. (1991) stated that risk orientation was positively and significantly related to the level of adoption.

Wangiker et al. (1991) reported that risk preference of the respondents had negative but significant relationship with their technological gap.

Nath (1993) revealed that risk preference of the
respondents had negative but significant relationship with their technological gap.

2.5.16 Attitude towards high yielding varieties and overall technological gap:

Trivedi (1984) revealed that attitude of the tribal farmers towards high yielding varieties was nonsignificantly related to overall technological gap.

Katarya (1989) reported that farming attitude demonstrated positive and significant association with pre and post training adoption scores.

Patel and Sangle (1991-92) revealed that attitude of the tribal farmers towards farming had positive and significant relationship with the extent of adoption of improved practices of cotton crop.

Vekaria et al. (1993) revealed that attitude towards modern agricultural technology had positive and significant relationship with input use behaviour of the farmers.

Patel and Sangle (1993) reported that attitude towards farming had positive and significant relationship with techno-economic change score.
2.5.17 Attitude towards chemical fertilizers and overall technological gap:
Katarya (1989) reported that farming attitude demonstrated positive and significant association with pre and post training adoption scores.
Patel and Sangle (1991-92) reported that attitude towards farming had positive and significant relationship with the extent of adoption of cotton production technology by the farmers.

2.5.18 Knowledge about recommended technology and overall technological gap:
Trivedi (1984) revealed that knowledge level of the tribal farmers about recommended technology had highly significant relationship with their overall technological gap.
Sethy et al. (1984) concluded that knowledge of the technology had significant relationship with adoption of rice technology in all the three groups of the farmers.
Katarya (1989) reported that knowledge of technology before training was positively and significantly correlated with initial adoption. Post training knowledge showed positive and significant association with post training adoption score.
Singh (1990) reported that knowledge of paddy and maize practice was positive and significant relationship with the adoption behaviour of the tribal farmers.

Patel and Sangle (1991-92) reported that knowledge about technology had positive and significant relationship with the extent of adoption of cotton production technology by the tribal farmers.

Pathak and Sasimal (1992) reported that knowledge level shown its significant and positive relationship with the adoption of jute technologies.

Nath (1993) revealed that knowledge of the respondents had negative but significant relationship with their technological gap.

Gamit (1993) reported that knowledge of the respondents had positive and significant relationship with their extent of adoption of summer groundnut technology.

2.5.19 Land holding and overall technological gap:

Pandit (1981) stated that significant relationship between size of land holding of tribal farmers and their adoption level for wheat cultivation.
Trivedi (1984) revealed that land holding had nonsignificant relationship with overall technological gap of the tribal farmers.

Saxena et al. (1990) revealed that size of land holding was highly correlated with adoption of wheat technology ($r = 0.69$).

Singh (1990) reported that the adoption of paddy practices was influenced positively by the size of holding in Meghalaya. While size of holding in Sikkim which showed negative significant correlation.

Singh and Rajendra (1990) reported that the variable land holding was found to have positive and significant association of adoption of Cos 767 variety of sugarcane.

Singh et al. (1991) revealed that size of holding had negative but significant correlation with knowledge gap of citrus growers.

Patel and Sangle (1991-92) reported that land holding of the tribal farmers had nonsignificant relationship with their extent of adoption of improved practices of cotton crop.
2.5.20 Annual income and overall technological gap:

Kumari Sushama et al. (1981) reported that income had positive and significant relationship with adoption.

Trivedi (1984) revealed that income level of the tribal farmers had nonsignificant relationship with their overall technological gap.

Katarya (1989) reported that income was found positively and significantly related to the scores of pre-training and post-training for adoption of wheat technology.

Patel and Sangle (1991-92) reported that annual income had positive and significant relationship with the extent of adoption of cotton production technology by the tribal farmers.

Wangiker et al. (1991) revealed that land holding of the respondents had nonsignificant relationship with their technological gap.

Gamit (1993) reported that land holding of the tribal farmers had nonsignificant relationship with their extent of adoption of recommended summer groundnut technology.

Nayak (1993) revealed that land holding of the tribal
farmers had nonsignificant relation with their extent of adoption of recommended paddy technology.

2.5.21 Indebtedness and overall technological gap:

Trivedi (1984) revealed that indebtedness of the tribal farmers had nonsignificant relationship with their overall technological gap.

Tyagi and Tyagi (1988) reported that credit orientation had negative relationship with technological gap.

Patel and Sangle (1991-92) revealed that credit orientation had positive and significant relationship with the extent of adoption of cotton production technology by the tribal farmers.

Nath (1993) reported that indebtedness of the respondents had negative but significant relationship with their technological gap.

2.5.22 Cropping intensity and overall technological gap:

Sadamate (1978) found that cropping intensity was negatively and significantly related to technological gap.

Pathak and Mazumdar (1978) reported that cropping
intensity contributed significantly to the prediction of adoption behaviour of farmers.

Trivedi (1984) reported that cropping intensity of the tribal farmers had significant relationship with their overall technological gap.

2.5.23 Sources of information and overall technological gap:

Kumari Sushama et al. (1981) reported that use of information sources had positive and significant relationship with adoption.

Trivedi (1984) reported that sources of information used by the tribal farmers had highly significant association with technological gap.

Singh and Rajendra (1990) reported that extension contact were found to have positive and significant association of adoption of Cos 767 variety of sugarcane.

Bavalatti and Sundaraswamy (1990) reported that adoption level of dry farming practices exhibited a positive and significant relationship with extension contact.

Saxena et al. (1990) reported that farmers degree of contact with extension agency was found to have positive and
significant relationship with adoption of dryland technology in wheat.

Patel and Sangle (1991-92) reported that extension contact had positive and significant relationship with the extent of adoption of cotton production technology by the farmers.

Nath (1993) reported that sources of information used by the respondents had negative and nonsignificant relationship with technological gap.

2.6 EXTENT OF VARIATION IN THE OVERALL TECHNOLOGICAL GAP OF THE TRIBAL FARMERS CAUSED BY INDEPENDENT VARIABLES

The information about relationship of independent variables with overall technological gap will not provide the extent of variation caused by them. The information about extent of variation is useful for predicting the relative contribution of the independent variables. Hence, the review about the extent of variation in the overall technological gap of the tribal farmers caused by independent variables is presented below.

Pathak and Mazumdar (1978) reported that ten independent variables of socio-economic and agricultural infra-structure were fitted in multiple regression equation. only two variables i.e.
farm size and cropping intensity contributed significantly to the prediction of adoption behaviour of farmers.

Tyagi and Tyagi (1988) revealed that eleven variables were taken to determine their influence on technological gap in sugarcane technology. It is evident from the results of regression that education and credit orientation were the most important determinant of technological gap in case of small farmers. However credit orientation was found to be the most important factor of technological gap with regard to medium farmers. And in case of big farmers, education and family type were found to be the most important factors.

Singh et al. (1991) reported that the multiple regression value $R^2$ (0.3925) indicated that the seven independent variables contributed jointly to the extent of 39.25 per cent of the variation in knowledge gap regarding citrus production technology. The observed 't' values for the partial regression coefficient were significant in case of only four variables, viz. education, socio-economic status, extension contact and cosmopolitanism. These four variables were again fitted in multiple regression equation. $R^2$ value was found to be 0.3012 which shows that these four variables accounted for 30.12 per cent contribution while the remaining three variables had only 9.13 per cent contribution. The 't' values of partial regression co-efficient were also significant in all the above mentioned four variables.
Patel and Sangle (1991-92) reported that 78.50 per cent of the total variation in respondents' extent of adoption was explained through 16 variable considered for regression equation. It was concluded that out of 16 variables, four variables namely annual income, credit orientation, knowledge about technology and innovation decision process had significant effect on extent of adoption of improved technology by the tribal farmers. Regression co-efficient indicated that one unit change in these variables would effect 0.6313 units, 0.5182 units, 0.4756 units and 0.2128 units change in the respondents extent of adoption of technology respectively.

The 't' value for annual income, credit orientation and innovation decision process were significant at 0.01 level of probability and for remaining one variable value was significant at 0.05 level of probability. 

Tyagi (1991) revealed that in regression analysis, knowledge was the most important determinant of technological gap in case of small, medium and large farmers. However attitude was not found to be the most important factors of technological gap with regard to medium farmers. And in case of small and large farmers attitude was found to be the most important factor. These co-efficient of technological factors were all negative indicating that both factors had negative relationship with technological gap.
Pathak and Sasmal (1992) revealed that the partial regression co-efficient of age and farmers' goals were positively significant in the case of marginal farmers. This explains that these two variables are significant factors in the prediction of adoption of jute technologies in the case of marginal farmers. However, another variable family workforce showed significant but negative influence on the adoption of jute technologies.

2.7 DIRECT AND INDIRECT EFFECT OF SELECTED INDEPENDENT VARIABLES ON DEPENDENT VARIABLE (OVERALL TECHNOLOGICAL GAP)

Dependent variable (overall technological gap) is directly or indirectly influenced by different independent variables like personal and socio-psychological, situational and communication characteristics of the tribal farmers. Hence, the review about the direct and indirect effect of independent variables on overall technological gap is presented below.

Kumari Sushama et al. (1981) reported that socio-economic status had maximum direct effect on adoption of modern living practices in more developed area, followed by income and farm size. A relatively higher direct effect was contributed by socio-economic status and income. Since socio-economic status showed the maximum positive direct effect and also the second higher positive correlation value with adoption in more developed area, this variable could be considered as an important variable which influences the adoption of modern living practices by the tribes.
Kher (1992) revealed that the direct effect of occupation on adoption was negative and high and is mainly responsible for negative correlation. The variable occupation had positive effect through extension contact and participation in extension programme, therefore, both the variables i.e. extension contact and participation in extension programmes have a bearing on adoption behaviour because of positive indirect effect of occupation through these variables. The extension contact had positive correlation and positive direct effect. The extension contact therefore was mainly responsible for adoption behaviour because of positive direct effect. The direct effect of extension contact through participation in extension programme was also positive therefore both these variables have to be considered simultaneously in studying the adoption behaviour. However, the direct effect of extension contact through occupation was negative. The direct effect of participation in extension programmes was positive and low but indirect effect of participation in extension programmes through extension contact was positive and high and appears to be mainly responsible for positive correlation with the adoption behaviour. The direct effect of participation in extension programme through occupation was negative therefore, for enhancing the adoption rate extension contact and participation in extension programmes have to be considered simultaneously. The residual effect of all 3 independent variables on the adoption behaviour of the farmers was (0.5355)/ reflecting the existence of some other variables.
2.8 CONSTRAINTS RESPONSIBLE FOR TECHNOLOGICAL GAP

Pandit (1981) reported that lack of technical guidance and lack of knowledge were main constraints in transfer of wheat technology in Madhya Pradesh. Other major constraints were non-availability and high cost of inputs like organic manures, seeds, fertilizers and chemicals, high labour charges, lack of finance, lack of improved implements and lack of irrigation etc.

Trivedi (1984) found that among technological constraints "Inadequate crop production" and "lack of irrigation facilities" were perceived as main technological constraints by 89.44 per cent and 84.44 per cent of respondents, while poor condition of tribal area and "Inadequate tillage and farming methods" were reported by 18.33 and 15.00 per cent of respondents.

Thakrar (1986) observed the following constraints for low adoption of summer groundnut technology. (1) Irregular supply of electricity (2) Non-availability of canal water (3) Non-availability of pure seeds (4) High wages of labour and (5) Non-availability of labour at harvesting time.

Kokate and Tyagi (1988) found that tribals perception of difficult loaning procedure and unavailability of banking facility.

Patel (1988) observed that in tribal area supply of
canal water was irregular and field channels were not prepared in time which were the major constraints.

Bhatt (1990) found that 98.67 per cent of tribal farmers faced constraints in adoption of hybrid maize cultivation technology viz. lack of cash in hand for purchasing inputs followed by the constraints like inadequate credit facilities for purchase of inputs as reported by 93.33 per cent tribal respondents.

Ganorkar and Shirke (1992) found that message regarding paddy cultivation received by farmers was poor because messages were not in local language and farmers try to obtain more information and translate the message in their own language.

2.9 SUGGESTIONS TO OVERCOME THE CONSTRAINTS ASSOCIATED WITH TECHNOLOGICAL GAP

Bhilegaonkar (1977-78) reported that 90.00 per cent tribal farmers had suggested about easy availability of inputs in village or nearby places. Whereas 85.00 per cent demanded more financial help so as to adopt new agricultural technology. About 45.00 per cent had suggested communication of more information about new agricultural technology.

Pandit (1981) reported that 95.00 per cent of the tribal farmers had suggested that technical guidance should be given well in advance. While 92.00 per cent had emphasized to increase
irrigation potentiality and subsidy in input. Quick and timely supply of inputs and reasonable price of inputs were suggested by 86.00 and 88.00 per cent of the tribal farmers. Whereas 80.00 per cent suggested for prompt and timely supply of credit to tribal farmers.

Trivedi (1984) concluded that majority (above 87.00 per cent) of the tribal farmers had suggested that "arrangement for easy availability of inputs should be made","training for new agricultural technology should be arranged","provision for sufficient finance for crop loan should be made" and "provision of long term loan for creating irrigation facilities should be made".
Theoretical Orientation
CHAPTER - III
THEORETICAL ORIENTATION

This chapter is devoted to the development of the theoretical orientation for the study. The review of literature related to the problem of this study given in the preceding chapter helped in formulating theoretical orientation. The chapter has been sub divided into major heads as under:

3.1 Conceptual framework of the study
3.2 The paradigm
3.3 Definitions of some common terms
3.4 Derived hypotheses

3.1 CONCEPTUAL FRAMEWORK OF THE STUDY.

The basic objective of the tribal sub plan is to narrow the gap between the backwardness of the tribal areas and the economically and socially developed area with a view to improve the quality of life of the tribal people. The immediate objectives, however, are (1) elimination of exploitation in all forms, (2) speeding up the process for social and economic development, (3) building up inner strength of the people and (4) improving their organisational capabilities.

Broadly speaking tribal development includes social and economic transformation of the tribals. Agricultural development is one of the means to accelerate this transformation. The development of tribal agriculture needs technological transformation which is the key to the agricultural productivity. In a broad
sense the technological transformation includes all kinds of suitable innovations aimed at increasing the efficiency of production. Naturally, the diffusion and adoption of new agricultural technology suitable to local conditions can only help the upliftment of tribal people.

Acceptance and use of new agricultural technologies is a type of human action in the form of behavioural change. The adoption is a decision to continue full use of an innovation. Rogers (1962) defined adoption as a process which is the mental process through which an individual passes from hearing about an innovation to final adoption.

The adoption is a kind of decision making and has been conceptualised as actually trying or using an innovation or technology. The technological gap which is a dependent variable in this study is a difference between recommended technologies or practices of major crops and technologies or practices actually used by the tribal farmers. The technological gap can be determined by measuring difference between recommended practices and practices actually utilised.

Adoption of innovation is a kind of human action. Human action can be analysed on the basis of the means ends scheme of behaviour. Accordingly, human action is always goal oriented. The goal may be immediate or distant and the individuals' efforts
are directed towards the attainment of the desired ends with the means at his disposal. A complete separation of means from end is actually impossible. The difference between goals and means is relative and situational (Supe and Singh 1974).

As Dewey (1930) pointed out "The 'end' is merely a series of acts viewed at a remote stage; and 'means' are merely the series viewed at an earlier one," and that "means and ends are two names for the same". Parsons and Shils (1965) proposed a theory of action which assumes that the actor strives to achieve goals. The theory of action is a conceptual scheme for the analysis of behaviour of living organisms. There are four points to be noted in this conceptualisation of behaviour (1) behaviour is oriented to the attainment of ends or goals or other anticipated states of affairs, (2) it takes place in situation, (3) it is normatively regulated, and (4) it involves expenditure of energy or efforts or motivation. This means that any behaviour of a living organism might be called "action", but to be so called, it must be analysed in terms of the anticipated states of affairs towards which it is directed.

According to Krech and Crutchfield (1948) the selection of goals as well as means depends on the following three criteria:

1. Cultural norms and values
2. Biological capacity
Weber (1947) includes all subjective behaviour. Behaviour may be overt or covert. Farmers' behaviour to adopt a particular innovation is an example of both overt and covert behaviour. Ramsey et al. (1959) contended that the adoption behaviour involves two components: behavioural and cognitive.

Behavioural adoption (overt) involves an actual use of the practices and cognitive adoption (covert) includes obtaining knowledge and critical evaluation of the practices in terms of individual situation. Situational factors also influence adoption behaviour of farmers. Thus adoption behaviour of farmers is the result of interplay on many variables.

In the light of the above frame of reference, it is postulated that adoption behaviour of a farmer is a special kind of action and is the function of the situation in which he lives, his sociological system and his exposure to different sources of information.

Concept of Transfer of Technology:

Transfer:

The term 'transfer' was defined differently. According to Chatterjee (1974), transfer means some sort of change of position, usually from one location or system to another location.
or system. The second definition given to 'transfer' by Chatterjee was in terms of an interaction between learning or performance across different tasks. Varying across one or more dimensions.

The third definition given by him was more apt to the derived term 'transference' which has special relevance in the clint-therapist interactional situation dealt in psychological literature.

Samantha and Kishore (1984) said that transfer may be conceived as equivalent to teaching. Transfer is therefore defined as the successful creation of opportunities or situations in which people gain the abilities and the situation necessary for successfully meeting their needs and interest in such a way as to attain continuous improvement and self-satisfaction.

The authors further argued that the task of change agents was to keep in mind not only the transfer of knowledge and skills but also fruitful application of these knowledge which include technological development, application, marketing and management of these technologies.

Technology:

Schumacher (1973) opined that any technology developed to the scale appropriate to the human needs and satisfying to them
may be called as appropriate technology.

Koontz et al. (1980) defined technology as the sum total of knowledge of ways of doing things. It includes inventions, techniques and the vast store of organised knowledge of how to do things.

According to Rogers (1983), technology is a design for instrumental action that reduces the uncertainty in the cause effect relationship involved in achieving a desired outcome. A technology has two components (a) hardware aspect consisting of the tool that embodies the technology as material or physical objects and (b) software aspects, consisting of the information base for the tool.

A technology cluster, again, according to Rogers, consists one or more distinguishable elements of technology that are perceived as closely interrelated some change agencies promote a cluster of package of innovations because they found that the innovations are thus adopted more rapidly.

Thus technology is a means of uncertainty reduction for individuals that is made possible by the information about cause-effect relationship on which the technology is based.

Transfer of Technology:

Dwarakinath and Channegowda (1974) pointed out three
transfer deficiencies. Firstly, not all the available technology is transmitted to the field. It appears that only those elements that make a conspicuous impact on application are taken care of. Secondly, not all potential adopters get exposed to the new information to the same degree. Thirdly, even among the adopters of new technology all the elements of technology are not adopted.

Verma (1974) defined transfer of technology as shifting a technology from one person to another and from one place to another place.

Jaiswal and Arya (1981) defined transfer of technology as a process by which the recommended practices produced by research and development agencies are transmitted through extension agents to producers. Therefore, transfer of technology starts after its perfection and ends in its utilisation by the target consumers.

Reddy (1981) expressed the view that effective transfer of technology take place when the maximum number of potential adopters understand, accept and actually put into practice the major part of an item of technology with the minimum time lag and with the maximum possible material and financial benefits.
3.2 THE PARADIGM:

The conceptual framework given in the preceding section may be presented paradigmatically which has been developed during the course of study. The models shown in Figure 1 and 2 are tentative and generalised. The final forms of such models will be suggested at the end of this dissertation in the chapter of 'summary and conclusions', when the investigation will yield information on tribal farmers' characteristics, relationship of tribal farmers' technological gap with their characteristics, extent of variation caused by significant variables and direct and indirect effect of independent variables on the technological gap.

The tentative model given in Figure 1 shows that there are 27 characteristics of the tribal farmers. They may differ in their characteristics. In the tentative model, presented in Figure 2, there are 27 independent variables of the tribal farmers which may be associated with the technological gap.

3.3 DEFINITIONS OF SOME COMMON TERMS:

3.3.1 Tribal

The term has been referred as territorial communities, living in relative isolation of hills and forest.
KEY TO FIGURE: 1

\( X_1 \) = Age
\( X_2 \) = Education
\( X_3 \) = Social participation
\( X_4 \) = Occupation
\( X_5 \) = Type of family
\( X_6 \) = Size of family
\( X_7 \) = Type of houses
\( X_8 \) = Number of houses
\( X_9 \) = Farm power possessed
\( X_{10} \) = Material possession
\( X_{11} \) = Socio-economic status
\( X_{12} \) = Migration habit
\( X_{13} \) = Cosmopolite-localiteness
\( X_{14} \) = Economic motivation
\( X_{15} \) = Scientific orientation
\( X_{16} \) = Risk preference
\( X_{17} \) = Attitude towards HYVs.
\( X_{18} \) = Attitude towards chemical fertilisers
\( X_{19} \) = Knowledge level - Maize crop
\( X_{20} \) = Knowledge level - Paddy crop
\( X_{21} \) = Knowledge level - Tur (arhar) crop
\( X_{22} \) = Knowledge level - Black gram crop
\( X_{23} \) = Land holding
\( X_{24} \) = Annual income
\( X_{25} \) = Indebtedness
\( X_{26} \) = Cropping intensity
\( X_{27} \) = Sources of information
FIG. 1: FACTORS RELATED WITH THE TECHNOLOGICAL GAP OF THE TRIBAL FARMERS, EXTENT OF VARIATION CAUSED BY INDEPENDENT VARIABLES ON THE TECHNOLOGICAL GAP
FIG. 2: CONCEPTUAL MODEL

INDIVIDUAL CHARACTERISTICS
* Age
* Education
* Social participation
* Family Type and Size
* Type and Number of houses
* Knowledge level of major crops
* Attitude towards HYVs
* Attitude towards chemical fertilizers
* Occupation
* Farm power
* Material possession
* Migration habit
* Cosmopolite localiteness
* Economic motivation
* Scientific orientation
* Risk preference
* Socio-economic status

PERSONAL AND SOCIO-PSYCHOLOGICAL
* Sources of information
* Source credibility

COMMUNICATION

SITUATIONAL CHARACTERISTICS
* Land holding
* Cropping intensity
* Annual income
* Indebtedness

CONRAINTS
* Technological
* Socio-psychological
* Socio-economic
* Communication
* Information transfer

HIGH TECHNOLOGICAL GAP
LOW
3.3.2 Transfer:

Some sort of change of position, usually from one location or system to another location or system.

3.3.3 Agricultural technology:

Scientifically derived practices viz. components of biological i.e. HYV etc. chemical i.e. fertilisers and mechanical technology which can jointly be called agricultural technologies.

3.3.4 Technological gap:

It is the difference between the level of recommendation and the level of adoption.

3.3.5 Respondent:

The tribal farmer who has been interviewed for the study.

3.3.6 Cosmopoliteness:

It refers to the tendency of the individual to be in contact with outside his community, based on the belief that one's all needs can not be satisfied within his own community.

3.3.7 Localiteness:

It refers to the tendency of the individual to limit contacts within his own community based on the belief that one's all needs can be satisfied within his community.
3.3.8 Socio-economic status:

It is the occupational success in terms of profit maximisation and the relative value placed by tribal farmer on economic needs.

3.3.9 Nuclear family:

A nuclear family consists of husband, wife and children.

3.3.10 Joint family:

A joint family consists of more than one primary family on the basis of close blood relation and common residence.

3.3.11 Annual income:

Annual income includes quantum of money obtained or earned during a year by a tribal farmer.

3.3.12 Recommended technology:

Scientifically derived cultivation practices for successful cultivation of crops as recommended by the agricultural university or by the state department of agriculture.

3.3.13 Economic motivation:

It refers to a drive that is based on consideration of wealth-getting adopting the scientific practices as means of achieving status or survival by the individual.

3.3.14 Scientific orientation:

It refers to the orientation of the individual towards
the scientific approach and methods.

3.3.15 Risk-preference:

It refers to the degree to which an individual is oriented towards the risk and uncertainties.

3.3.16 Attitude:

It is the positive or negative thinking towards some psychological object.

3.3.17 Knowledge:

It is the body of understood facts by the individual.

3.3.18 Constraints:

It refers to the items of difficulties faced by the tribal farmers in actual adoption of recommended technologies causing technological gap.

3.4 DERIVED HYPOTHESES

Based on the literature reviewed and theoretical orientation of the study, the following hypotheses pertaining to the specific objectives were developed.

H₁:1.1 There will be high overall technological gap among the tribal farmers for the major crops.

H₂:1.1 There will be change in the cropping pattern of tribal farmers.

H₃:1.1 The attitude of the tribal farmers towards high yielding varieties will be favourable.
H₃:1.2 The attitude of the tribal farmers towards chemical fertilisers will be favourable.

H₄:1.1 The yield level of major crops on tribal farms will be very low.

H₅:1.1 There will be relationship between age of the tribal farmers and their overall technological gap.

H₅:1.2 There will be relationship between education of the tribal farmers and their overall technological gap.

H₅:1.3 There will be relationship between social participation of the tribal farmers and their overall technological gap.

H₅:1.4 There will be relationship between occupation of the tribal farmers and their overall technological gap.

H₅:1.5 There will be relationship between type of family of the tribal farmers and their overall technological gap.

H₅:1.6 There will be relationship between size of family of the tribal farmers and their overall technological gap.

H₅:1.7 There will be relationship between type of houses of the tribal farmers and their overall technological gap.

H₅:1.8 There will be relationship between number of houses of the tribal farmers and their overall technological gap.

H₅:1.9 There will be relationship between farm power possessed by the tribal farmers and their overall technological gap.

H₅:1.10 There will be relationship between material possession by the tribal farmers and their overall technological gap.
H₅:1.11 There will be relationship between socio-economic status of the tribal farmers and their overall technological gap.

H₅:1.12 There will be relationship between migration habit of the tribal farmers and their overall technological gap.

H₅:1.13 There will be relationship between cosmopolite-localiteness of the tribal farmers and their overall technological gap.

H₅:1.14 There will be relationship between economic motivation of the tribal farmers and their overall technological gap.

H₅:1.15 There will be relationship between scientific orientation of the tribal farmers and their overall technological gap.

H₅:1.16 There will be relationship between risk preference of the tribal farmers and their overall technological gap.

H₅:1.17 There will be relationship between attitude of the tribal farmers towards high yielding varieties and their overall technological gap.

H₅:1.18 There will be relationship between attitude of the tribal farmers towards chemical fertilisers and their overall technological gap.

H₅:1.19 There will be relationship between knowledge level of the tribal farmers about maize crop and their overall technological gap.

H₅:1.20 There will be relationship between knowledge level of the tribal farmers about paddy crop and their overall
technological gap.

H₅:1.21 There will be relationship between knowledge level of the tribal farmers about tur crop and their overall technological gap.

H₅:1.22 There will be relationship between knowledge level of the tribal farmers about black-gram crop and their overall technological gap.

H₅:1.23 There will be relationship between land holding of the tribal farmers and their overall technological gap.

H₅:1.24 There will be relationship between annual income of the tribal farmers and their overall technological gap.

H₅:1.25 There will be relationship between indebtedness of the tribal farmers and their overall technological gap.

H₅:1.26 There will be relationship between cropping intensity of the tribal farmers and their overall technological gap.

H₅:1.27 There will be relationship between sources of information used by the tribal farmers and their overall technological gap.

- o o o -
Methodology
CHAPTER – IV
METHODOLOGY

This chapter deals with methods and procedures followed in the various phases of this study and they are given under following sub-heads.

4.1 Area of the study
4.2 Sampling procedure
4.3 Selection of variables
4.4 Operationalisation and measurement of independent variables.
4.5 Operationalisation and measurement of dependent variables.
4.6 Constraints associated with technological gap.
4.7 Suggestions to overcome the constraints.
4.8 Method of data collection
4.9 Statistical tools used.
4.10 Research hypotheses (null form).

4.1 AREA OF THE STUDY:

In social research involving farmers as the respondents of the study direct two way communication between the researcher and the respondents is a must to build up good rapport and to ensure free and frank dialogue and get satisfactory responses. With this basic consideration in view, Gujarat state from where the researcher hails, was purposively selected for the study, so that familiarity with the area, people and language would be
helpful to the researcher in collecting needed data for this study.

As against the 7.54 per cent schedule tribes population in the country, schedule tribes in Gujarat state accounts for 14.92 per cent of the total population in the state. The tribal population is concentrated mainly in eight districts of the state which are situated mainly on the eastern hilly belt of the state viz: Dangs, Valsad, Surat, Bharuch, Vadodara, Sabarkantha, Banaskantha and Panchmahals.

The present study was conducted in the tribal areas of Vadodara district of the Gujarat state. The district comprises of 12 talukas, out of which 5 talukas were covered under tribal sub plan. Tribal areas being hilly, rocky and land being undulating shallow having inferior type and very less awareness of agriculture resulting in backwardness. The tribal agriculture is mostly of subsistence nature and characterised by the production of food grains just sufficient to meet their requirements generally at low level of living. In Vadodara district 25.35 per cent tribal population, among them 89 percent tribes are agriculturist. The main crops of the tribal area are maize, drill paddy, tur & black-gram.

The geographical features as well as population characteristics of the five tribal talukas of Vadodara district (Gujarat state) covered under ITDP-Chhotaudepur, has been given in Table 1:
TABLE - 1
COMPARISON OF GEOGRAPHICAL FEATURES AND POPULATION CHARACTERISTICS
OF TRIBAL TALUKAS OF VADODARA DISTRICT (GUJARAT STATE)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Item</th>
<th>Chhotaudepur</th>
<th>Naswadi (pocket)</th>
<th>Pavi-Jetpur (pocket)</th>
<th>Tilakpur</th>
<th>Sankheda (pocket)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total number of villages (as per 1981)</td>
<td>278</td>
<td>219</td>
<td>213</td>
<td>97</td>
<td>114</td>
<td>921</td>
</tr>
<tr>
<td>2</td>
<td>Total area (sq. km.)</td>
<td>1,373</td>
<td>535</td>
<td>805</td>
<td>245</td>
<td>432</td>
<td>3,390</td>
</tr>
<tr>
<td>3</td>
<td>Total population (as per 1981)</td>
<td>2,40,699</td>
<td>89,263</td>
<td>1,67,473</td>
<td>48,661</td>
<td>69,654</td>
<td>6,15,750</td>
</tr>
<tr>
<td>4</td>
<td>Schedule tribe population</td>
<td>1,97,222</td>
<td>72,736</td>
<td>1,20,057</td>
<td>23,231</td>
<td>37,588</td>
<td>4,50,834</td>
</tr>
<tr>
<td>5</td>
<td>Percentage of S.T. population</td>
<td>82.00</td>
<td>81.00</td>
<td>72.00</td>
<td>48.00</td>
<td>54.00</td>
<td>73.00</td>
</tr>
<tr>
<td>6</td>
<td>Total geographical area (Ha)</td>
<td>1,37,316</td>
<td>53,518</td>
<td>80,515</td>
<td>24,452</td>
<td>39,400</td>
<td>3,35,201</td>
</tr>
<tr>
<td>7</td>
<td>Forest area (Ha)</td>
<td>40.222</td>
<td>15.049</td>
<td>10.144</td>
<td>1.041</td>
<td>4.274</td>
<td>70.730</td>
</tr>
<tr>
<td>8</td>
<td>Fallow land (Ha)</td>
<td>8.979</td>
<td>4.968</td>
<td>7.057</td>
<td>2.589</td>
<td>706</td>
<td>24,299</td>
</tr>
<tr>
<td>9</td>
<td>Cultivable fallow land (Ha)</td>
<td>7.862</td>
<td>2.506</td>
<td>675</td>
<td>488</td>
<td>125</td>
<td>11,656</td>
</tr>
<tr>
<td>10</td>
<td>Grazing land (Ha)</td>
<td>4.966</td>
<td>1.476</td>
<td>3.519</td>
<td>1.236</td>
<td>1.746</td>
<td>12.943</td>
</tr>
<tr>
<td>11</td>
<td>Area under agriculture (Ha)</td>
<td>65.225</td>
<td>30.003</td>
<td>53.803</td>
<td>19.197</td>
<td>31.388</td>
<td>1.99,636</td>
</tr>
<tr>
<td>12</td>
<td>Numbers of land holders</td>
<td>23,185</td>
<td>15.104</td>
<td>34.367</td>
<td>8.308</td>
<td>17,618</td>
<td>98,582</td>
</tr>
<tr>
<td>13</td>
<td>Net irrigated area (Ha.)</td>
<td>4.062</td>
<td>1.081</td>
<td>8.547</td>
<td>1.016</td>
<td>1.850</td>
<td>16.556</td>
</tr>
<tr>
<td>14</td>
<td>Percentage of irrigated area</td>
<td>6.6</td>
<td>3.6</td>
<td>15.8</td>
<td>3.9</td>
<td>5.9</td>
<td>7.2</td>
</tr>
</tbody>
</table>
4.2 SAMPLING PROCEDURE:

4.2.1 Selection of talukas:

In pursuance of the directives of the Planning Commission, Government of India, five talukas having tribal concentration round about 50.00 per cent were identified for the tribal sub-plan projected in the Vadodara district of Gujarat State. These talukas are Chhotaudepur, Naswadi, Pavi-Jetpur, Tilkwada and Sankheda situated in eastern part of the district. The geographical features as well as population characteristics of these talukas has been given in Table 1.

Out of the five talukas of the tribal sub-plan project, three talukas viz. Chhotaudepur, Naswadi and Pavi-Jetpur were selected purposively for this study. While selecting these three talukas the criteria viz. rural population, total geographical area, net cultivated area and total cropped area etc. were taken into account.

4.2.2 selection of villages:

The villages in each selected taluka were classified based on communication facilities. The communication facilities score developed by Murthy and Singh (1974) was used for this purpose which has been given in Appendix - I. The villages were alphabetically arranged in each group.
Afterwards, two villages from each group were selected randomly. By this procedure, six villages were selected from each talukas representing the three levels of communication facilities viz: High, Medium and Low. In all 18 villages from three talukas were selected for this study.

4.2.3 Selection of respondents:

Eighteen villages were selected by the procedure described previously. From each village, the list of tribal cultivators was obtained and fifteen tribal farmers were selected randomly. By this procedure, 90 tribal farmers from each taluka were selected which constituted total sample of 270 tribal farmers for the study. Village wise distribution of the respondents selected and interviewed has been presented in Table 2 and Figure 3.
TABLE - 2
VILLAGE WISE DISTRIBUTION OF THE RESPONDENTS SELECTED AND INTERVIEWED.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the Village</th>
<th>Name of the taluka</th>
<th>Respondents selected</th>
<th>Respondents actually interviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Zoz</td>
<td>Chhotaudepur</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>Devaliya</td>
<td>&quot;</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Kevadi</td>
<td>&quot;</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>Odd</td>
<td>&quot;</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>Bopa</td>
<td>&quot;</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>6</td>
<td>Motitokari</td>
<td>&quot;</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>7</td>
<td>Suskal</td>
<td>Pavi-Jetpur</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>8</td>
<td>Dungarvant</td>
<td>&quot;</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>9</td>
<td>Ghuntanvad</td>
<td>&quot;</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>10</td>
<td>Chalamali</td>
<td>&quot;</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>11</td>
<td>Rajpur</td>
<td>&quot;</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>12</td>
<td>Gambhirpura</td>
<td>&quot;</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>13</td>
<td>Vaghach</td>
<td>Naswadi</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>14</td>
<td>Palasani</td>
<td>&quot;</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>15</td>
<td>Sodat</td>
<td>&quot;</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>16</td>
<td>Palsar</td>
<td>&quot;</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>17</td>
<td>Rampuri</td>
<td>&quot;</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>18</td>
<td>Bhagvanpura</td>
<td>&quot;</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>270</strong></td>
<td><strong>270</strong></td>
</tr>
</tbody>
</table>
FIG. 3: A MAP OF VADODARA DISTRICT SHOWING SELECTED TALUKAS AND VILLAGES FOR THE STUDY

REFERENCE:

- TALUKAS SELECTED FOR THE STUDY
- VILLAGES SELECTED FOR THE STUDY
- TALUKA HEAD QUARTER
- DISTRICT HEAD QUARTER

NAME OF VILLAGE:
1. Zoz
2. Devaliya
3. Kevadi
4. Odd
5. Bopa
6. Motitokari
7. Suskal
8. Dungarvani
9. Ghuntanvad
10. Chalamali
11. Rajpur
12. Ghambhirpura
13. Vaghach
14. Palasani
15. Sodat
16. Palsar
17. Rampuri
18. Bhagavanpura
4.3 SELECTION OF VARIABLES

The selection of variables included in the study was done on the basis of an extensive review of literature on the subject, consultation with experts and from previous studies taken up on the related subjects. Only those variables which were found having most relevance to the present investigation were finally selected for the study. The list of the selected variables is as under.

A. Dependent variable.
   1. Technological gap

B. Independent variables
   I. Personal and socio-psychological
      1. Age
      2. Education
      3. Social participation
      4. Socio-economic status
      5. Type and size of family
      6. Type and number of houses possessed
      7. Farm power possessed
      8. Material Possession
      9. Occupation
     10. Migration habit
     13. Cosmopolite-localiteness
     14. Economic motivation
     15. Scientific orientation
16 Risk-preference
17 Attitude towards high yielding varieties.
18 Attitude towards chemical fertilizers
19 Knowledge level

II. Situational
   ---------------
1 Land holding
2 Income level
3 Indebtedness
4 Cropping intensity

III. Communication
     ---------------
1 Sources of information
2 Source Credibility

4.4 OPERATIONALISATION AND MEASUREMENT OF INDEPENDENT VARIABLES:

4.4.1 Personal and socio-psychological variables:

4.4.1.1 Age:
   ------

   Age of the respondent was operationalised as the number of completed years at the time of interview. The respondents were classified into three groups viz young (upto 30 years), Middle (31 to 50 years) and old (above 50 years).

4.4.1.2 Education:
   ---------------

   It refers to the number of formal education years completed by the respondents. The scores assigned were zero for
illiterate, one for read and write, two for upto primary and	hree for above primary. The respondents were classified into
four groups viz., illiterate; can read and write; upto primary
and above primary. It was measured with the help of SES scale de-
veloped by Trivedi (1963) as appended in Appendix-II.

4.4.1.3 Social participation:
---------------

It refers to the degree of involvement of respondents in
formal organisation either as a member or office bearer. The
scores assigned were zero for no member, one for member in one
organisation, two for member in more than one organisation and
three for holding position. The respondents were classified into
four categories viz. No member, member in one organisation,
member in more than one organisation and holding position. It was
measured with the help of SES scale developed by Trivedi (1963).

4.4.1.4 Socio-economic status:
-----------------------------

The socio-economic status of the respondents was measured with the help of socio-economic status scale, especially
developed for rural families by Trivedi (1963).

4.4.1.5 Type and size of family:
-----------------------------

The type and size of family is most important among
social factors. It was measured with the help of SES scale de-
veloped by Trivedi (1963).
4.4.1.6 Type and number of houses possessed:

The information regarding type and number of houses possessed by the tribal farmers has been collected and grouped into the following categories:

Type: Kaccha, Mixed and Pacca.
Number: One, Two, Three and above

It was measured with the help of the SES scale developed by Trivedi (1963).

4.4.1.7 Occupation:

It refers to the occupation of the tribal farmers with a view to know whether the tribal farmer has one or more occupation. This has been included in this study and was determined with the help of the SES scale developed by Trivedi (1963) and categorised as under:

(i) Farming only
(ii) Farming + Labour work
(iii) Farming + Service
(iv) Farming + Other occupation

4.4.1.8 Farm power possessed:

This refers to the number of farm power i.e. bullocks possessed by the tribal farmers at the time of investigation and was determined with the help of the SES scale developed by Trivedi (1963).
4.4.1.9 Material possession:

This refers to the number of materials possessed by the tribal farmers which included traditional as well as improved implements. This was measured with the help of SES scale developed by Trivedi (1963).

4.4.1.10 Migration habit:

This refers to the migration of number of family member of the tribal farmers for getting extra income for their lively hood. This was measured by asking question to the respondents that Have anybody from your family migrated? Where and Why? It was categorised as under:

(i) No Migration
(ii) One member migrated
(iii) Two members migrated
(iv) Above two members migrated

4.4.1.11 Knowledge about recommended technologies:

One of the characteristics under this study was to measure the knowledge of the respondents in respect of recommended technologies of major crops. Here knowledge was defined in the words of Bloom et al. (1956), as "those behaviours and test situations which emphasized the remembering either by recognition or recall of ideas, material and phenomenon". Knowledge was measured with the help of a knowledge test developed by Jha and
Singh (1970) with due modifications to suit the local conditions of the area under study. They reported that the reliability of the knowledge test, as determined by test-retest technique and split half technique was +0.91 and +0.93 respectively. They considered the biserial correlation (r_bis) as a measure of validity of the test items. The knowledge score of the respondents was measured by asking them appropriate questions as included in the original test in view of recommended technologies of major crops included for this study. The scoring procedure was followed on the basis of the procedure prescribed in original test. The knowledge score obtained was converted into a knowledge index with the help of the following formula:

\[
\text{Knowledge index} = \frac{X_1 + X_2 + \ldots + X_n}{N} \times 100
\]

Where:

- \( K.I \) = Knowledge Index
- \( X_1, X_2, \ldots, X_n \) = Total number of "correct" and "yes" responses.
- \( N \) = Total number of item included.

The test with items has been appended in Appendix - II.

4.4.1.12 Attitude towards high yielding varieties:

Attitude was operationalized as individuals' degree of favourableness or unfavourableness towards the phenomena. This was measured with the help of an attitude scale developed by Nair.
The scale consisted of 10 items, out of which five were negative and five were positive. Statement number 1, 2, 4, 9 and 10 were negative while statement number 3, 5, 6, 7 and 8 were positive. The scale follows the likert scaling pattern and reliability of the scale was 0.77 by 'Test-Retest' method and 0.87 by 'Split-half' method as reported by Nair (1969). The scale has both construct and content validity. The scale has been appended in Appendix-II.

4.4.1.13 Attitude towards chemical fertilizers:

Attitude was operationalised as individuals' degree of favourableness or unfavourableness towards the phenomena. This was measured with the help of an attitude scale developed by Singh et al. (1968). The scale consisted of 12 items, out of which six were negative and six were positive. Statement number 1, 3, 5, 7, 9 and 11 were negative while statement number 2, 4, 6, 8, 10 and 12 were positive. The scale follows the likert scaling pattern. The scale has been appended in Appendix II.

4.4.1.14 Cosmopolite-localiteness:

According to Singh (1965) cosmopoliteness is the tendency of an individual to be in contact with the outside his own community based on the belief that an individual's all the needs can not be satisfied within his own community. Localiteness is the tendency to limit his contacts within his own community based
on the belief that all needs can be satisfied within the community. It was measured with the help of scale developed by Singh (1973). The scale consisted of six statements arranged against a four-point range from "strongly agree" at one end and "strongly disagree" at the other end. The scoring procedure was followed as per original scale. Statement number 1, 3 and 5 were negative while statement number 2, 4 and 5 were positive. The scale has been given in Appendix II. For positive statement scoring was 4, 3, 2 and 1 for strongly agree, agree, disagree and strongly disagree respectively. For negative statement scoring was reverse than positive.

4.4.1.15 Scientific orientation:

It is characterised by a belief in science and scientific approach to solve problems of farming. The scale was constructed to measure the degree to which farmers were oriented to use scientific methods in farming and decision making by Supe and Singh (1974). The scale also shows attitude of farmers towards science. The said scale has been adopted for this study. The scale consisted of the six statements, out of which only one i.e. statement number 2 is negative while rest were positive. The scoring procedure was adopted as in the original scale. The scale has been given in Appendix II. For positive statements 7.5, 4, 3 and 1 scale value for strongly agree, agree, undecided, disagree & strongly disagree respectively. For negative statements scoring was reverse than positive.
4.4.1.16 Economic motivation:

It means that an individual is oriented towards achievement of the maximum economic ends such as maximization of farm profits. The occupational success in terms of profit maximization and the relative value an individual places on economic ends is measured in the economic motivation scale. This was measured with economic motivation scale developed by Supe and Singh (1974). The scale consisted of the six statements, out of which the first five were positive and sixth was negative. The scoring procedure was adopted as in the original scale. For positive statements strongly agree, agree, undecided, disagree & strongly disagree, the scoring was 7, 5, 4, 3 and 1 respectively. For the negative statement scoring was reverse than positive.

4.4.1.17 Risk preference:

It refers to the degree to which an individual farmer is oriented towards the risk and uncertainty in cultivation of crops on his own farm. The risk preference scale was developed by Supe and Singh (1974) to measure the degree to which farmers were oriented towards risk and uncertainty and have a coverage to face problems in farming. The scale consisted of six statements, out of which first and fifth are negative and rest of the statements are positive. The scoring procedure adopted is as in the original scale. For positive statements scoring was 7, 5, 4, 3 and 1 for strongly agree, agree, undecided, disagree and strongly disagree.
respectively, while for negative statements, scoring was reverse than positive. The scale has been appended in the Appendix II.

4.4.2 Situational characteristics:

4.4.2.1 Land holding:

This is an important factor which determines economic status and potentiality of the farmers for adoption of new practices. This was measured by the number of acres owned and cultivated by the tribal farmers and categorised into five groups viz (i) upto 2.5 acres, (ii) 2.51 to 5.00 acres (iii) 5.01 to 7.50 acres (iv) 7.51 to 10.00 acres and (v) above 10.00 acres.

4.4.2.2 Cropping intensity:

This refers to the percentage of proportion of the total annual cropped area to the size of land holding possessed by the respondent and was calculated with the help of the following formula by Sinha (1973).

\[
\text{Cropping Intensity} = \frac{\text{Total cropped area}}{\text{Total area cultivated}} \times 100
\]

It was categorised as under:

(i) Upto 150 Cropping intensity.

(ii) 150.01 to 175 Cropping intensity.

(iii) Above 175 Cropping intensity.
4.4.2.3 Income level:

This refers to the annual income a tribal farmer getting from all sources. It was measured in terms of range and grouped into three categories as under.

(i) upto Rs.10,000=00 (ii) Rs.10,001 to Rs.20,000=00 and (iii) above Rs.20,000=00.

4.4.2.4 Indebtedness:

It refers to the total amount of loan outstanding (debt) in terms of money against the name of the respondents as reported by them in public or private organisations at the time of investigation. It was measured under four categories, (i) upto Rs. 10,000=00 (ii) from Rs. 10,001 to Rs. 20,000=00 (iii) above Rs. 20,000=00 (iv) no debt.

4.4.3 Communication characteristics:

4.4.3.1 Sources of information:

Sources of information play a major role in the diffusion and adoption of innovations or technologies. Communication sources are conceptualized as the sources through which farmers get information about improved method of farming. Use of sources was measured by taking into consideration all the possible sources available to the tribal farmers. Each respondent was asked to indicate from which source he got information for the
use of technologies. Number and percentages of the farmers for the each source was calculated.

4.4.3.2 Source credibility:

It refers to the degree of trust worthiness accorded to a source by its audience respondents at a given time. The source credibility in this study was measured with the help of "most-least credibility index" worked out by Sandhu (1975).

The relative credibility index was worked out with the following formula:

\[
\text{Relative Credibility index} = \frac{X}{Y} \times \frac{100}{N}
\]

Where, 
\(X\) = Number of persons who believed a source most Credible.
\(Y\) = Number of persons who believed a source least Credible.
\(N\) = Total number of the persons in the sample.

4.5 OPERATIONALISATION AND MEASUREMENT OF DEPENDENT VARIABLES:

4.5.1 Technological gap:

This has been operationalised as the gap between recommended agricultural technologies and its actual adoption by the tribal farmers. The notion of selectivity is always at work in the acceptance and rejection of innovations or technologies. An innovation or technology may be defined as any thought, behaviour or thing that is new because it is qualitatively different from
the existing forms. From the point of view of social consequences, the fate of innovation or technology is as important as its conception. Innovations or technologies are components of biological i.e. HYV etc. chemical i.e. fertilizers and mechanical technology which can jointly be called new agricultural technologies.

For the development of tribal communities variety of technologies recommended by extension agency in the field of agriculture. The tribals do not adopt it as desired level. The extent of adoption of these recommended technologies by the tribal farmers depends upon various factors. The non-adoption or partial adoption of technology is a gap. The technological gap which is dependent variable in this study, is a difference between recommended technologies or practices of major crops and practices or technologies actually used by the tribal farmers.

For the purpose of technology, four crops viz: Paddy (Drill), Maize, Tur and Black-gram were selected for the present study. These four crops are major crops of the area. The practices or the technologies for each crop included in the present study are as under:

1. Use of high yielding / hybrid/ improved seeds of varieties of Paddy, Maize, tur and Black-gram.
2. Farm yard manure use for major crops viz. Paddy, Maize,
tur and Black-gram.

3. Use of chemical fertilizers for all the four crops viz: Paddy, Maize, Tur and Black-gram.

4. Use of plant protection measures for all the four crops viz. Paddy, Maize, Tur and Black-gram.

These technologies or practices were selected on the basis of discussion with project staff, local extension staff and with farmers during pretesting of schedule. These practices were in use since a considerable period in the study area.

The technological gap was measured with the help of technological gap index developed by "All India Coordinated Research Program in Extension Education" I.A.R.I. New Delhi (1979). The formula adopted for measuring technological gap index is as under:

\[
\text{Technological gap Index} = \frac{R - A}{R} \times 100
\]

Where, \( R \) = Recommended practice

\( A \) = Practice actually adopted by the respondents.

Overall technological gap was calculated by considering technological gap in each of the practice selected for major crops in this study for studying its relationship with personal, socio-psychological, situational and communication characteristics of the tribal farmers.
4.5.2. **Yield**:

Yield per unit area motivates and influences adoption behaviour of farmers. Those farmers who obtain higher yields, develop confidence about the soundness of improved practices and therefore, more likely to continue the use of new practice. This acts as an incentive for farmers to adopt innovations or technologies.

In this study, an attempt has been made to know the present yield level of major crops viz: Paddy, Maize, Tur and Black-gram of tribal farmers. Yield figures of the respondents for the crop season 1993-94 were taken into consideration.

4.6 **CONSTRAINTS ASSOCIATED WITH TECHNOLOGICAL GAP**:


1. Technological constraints
2. Socio-psychological constraints
3. Socio-economic constraints
4. Communication constraints
5. Information transfer constraints

4.7 SUGGESTIONS TO OVERCOME THE CONSTRAINTS:

An attempt was also made to know the suggestions of the tribal farmers to overcome the constraints. The respondents were asked to suggest possible solutions in form of their suggestions to overcome the constraints associated with technological gaps among tribal farmers.

4.8 METHOD OF DATA COLLECTION:

Data were collected with the help of interview schedule along with the suitable scale for measurement of dependent and independent variables. The interview schedule was prepared keeping in view the objectives of the study. The interview schedule was translated into Gujarati language and pretested in the field on a separate 30 non-sampled respondents. On the basis of pretesting, necessary modifications were made in the final draft and was used as the instrument for data collection. The respondents were contacted personally at their work spot or at their residences in an informal way.

4.9 STATISTICAL TOOLS USED

The following statistics were used in the present study.
4.9.1 Percentage:

Simple comparisons were made on the basis of percentage.

4.9.2 Arithmetic mean and standard deviation:

These estimates were used for classification of the respondents into different categories.

1. The mean was obtained by dividing total score by the number of respondents.

2. The standard deviation was obtained by the square root of the average of the square deviation from mean.

4.9.3 Coefficient of correlation:

Coefficients of correlation were computed to find out the relationship between each of the independent variable and the dependent variable by employing following formula:

\[ r = \frac{N \times \Sigma XY - \Sigma X \times \Sigma Y}{\sqrt{[N \times \Sigma X^2 - (\Sigma X)^2] \times [N \times \Sigma Y^2 - (\Sigma Y)^2]}} \]

Where

- X = independent variable.
- Y = dependent variable.
- N = Number of observations.

4.9.4 Stepwise regression analysis:

The stepwise regression analysis was employed to predict
the technological gap by personal and socio-psychological, situational and communication variables.

In the stepwise method the regression analysis was started with regression Y and $X_1,\ldots, X_k$ taken singly. The variables giving the greatest reduction in sum of squares of $Y$ is first selected. Then the bivariate regression in which $X_1$ appeared were worked out. The variate which gives the greatest additional reduction in sum of square after fitting $X_1$ was selected. The trivariate regression that include both $X_1$ and $X_2$ were computed. The analysis was continued till the last variate of which additional contribution was the least of all variates. The prediction equation used as:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \cdots + b_kX_k$$

Where, $a$ = intercept

$b_1,\ldots,b_k$ = partial regression co-efficient of respective independent variables.

$X_1,\ldots,X_k$ = independent variables

$Y$ = predicted dependent variable.

4.9.5 Path analysis:

To know the direct and indirect effects of various independent variables on the dependent variable (Technological gap) the method of path co-efficient analysis (Wrights, 1921) was employed.
Path co-efficient technique is an extension of the technique of standard partial regression coefficient. Path effects were obtained by solving the simultaneous equations set up for the purpose using the correlation matrix. Considering $X_1$ independent variable to be influencing the dependent variable $Y$ the simultaneous equation would be:

$$r_{YX_1} = Py_{X_1} + \sum_{j=1}^{n} r_{X_1X_j} \times Py_{X_j}$$

For $i = 1, 2, 3, \ldots, n$

Where,

$r_{YX_1}$ is the correlation coefficient of $X_1$ with $Y$

$Py_{X_1}$ is the direct effect and each of the other term is the equation is an indirect effect.

4.10 RESEARCH HYPOTHESES (NULL FORM)

$H_1:1.1$ There is no high overall technological gap among the tribal farmers for the major crops.

$H_2:1.1$ There is no change in the cropping pattern of tribal farmers.

$H_3:1.1$ The attitude of the tribal farmers towards high yielding varieties is not favourable.

$H_3:1.2$ The attitude of the tribal farmers towards chemical fertilizers is not favourable.

$H_4:1.1$ The yield level of major crops on tribal farms is not very low.

$H_5:1.1$ There is no relationship between age of the tribal
farmers and their overall technological gap.

H5:1.2 There is no relationship between education of the tribal farmers and their overall technological gap.

H5:1.3 There is no relationship between social participation of the tribal farmers and their overall technological gap.

H5:1.4 There is no relationship between occupation of the tribal farmers and their overall technological gap.

H5:1.5 There is no relationship between type of family of the tribal farmers and their overall technological gap.

H5:1.6 There is no relationship between size of family of the tribal farmers and their overall technological gap.

H5:1.7 There is no relationship between type of houses of the tribal farmers and their overall technological gap.

H5:1.8 There is no relationship between number of houses of the tribal farmers and their overall technological gap.

H5:1.9 There is no relationship between farm power possessed by the tribal farmers and their overall technological gap.

H5:1.10 There is no relationship between material possession by the tribal farmers and their overall technological gap.

H5:1.11 There is no relationship between socio-economic status of the tribal farmers and their overall technological gap.

H5:1.12 There is no relationship between migration habit of the tribal farmers and their overall technological gap.
H₅:1.13 There is no relationship between cosmopolite-localiteness of the tribal farmers and their overall technological gap.

H₅:1.14 There is no relationship between economic motivation of the tribal farmers and their overall technological gap.

H₅:1.15 There is no relationship between scientific orientation of the tribal farmers and their overall technological gap.

H₅:1.16 There is no relationship between risk preference of the tribal farmers and their overall technological gap.

H₅:1.17 There is no relationship between attitude of the tribal farmers towards high yielding varieties of the major crops and their overall technological gap.

H₅:1.18 There is no relationship between attitude of the tribal farmers towards chemical fertilizers and their overall technological gap.

H₅:1.19 There is no relationship between knowledge level of the tribal farmers about maize crop and their overall technological gap.

H₅:1.20 There is no relationship between knowledge level of the tribal farmers about paddy crop and their overall technological gap.

H₅:1.21 There is no relationship between knowledge level of the tribal farmers about tur crop and their overall technological gap.

H₅:1.22 There is no relationship between knowledge level of the
tribal farmers about black gram crop and their overall technological gap.

H₅:1.23 There is no relationship between land holding of the tribal farmers and their overall technological gap.

H₅:1.24 There is no relationship between annual income of the tribal farmers and their overall technological gap.

H₅:1.25 There is no relationship between indebtedness of the tribal farmers and their overall technological gap.

H₅:1.26 There is no relationship between cropping intensity of the tribal farmers and their overall technological gap.

H₅:1.27 There is no relationship between sources of information used by the tribal farmers and their overall technological gap.

- o 0 o -
Findings and Discussion
CHAPTER - V
FINDINGS AND DISCUSSION

The information related to this study was collected from the tribal farmers by means of personal interview with the help of interview schedules. Collected information was classified, tabulated and analysed in light of the objectives of the study. The facts and findings derived after analysing the information have been presented in this chapter under following major heads:

5.1 Characteristics of the tribal farmers.
5.2 Cropping pattern followed by the tribal farmers.
5.3 Yield level of major crops on tribal farms.
5.4 Technological gap of major crops among the tribal farmers.
5.5 Relationship of overall technological gap of the tribal farmers with their selected characteristics.
5.6 Extent of variation in the overall technological gap of the tribal farmers caused by independent variables.
5.7 Direct, total indirect and substantial indirect effect of the selected independent variables on overall technological gap of the tribal farmers.
5.8 Constraints associated with overall technological gap among tribal farmers.
5.9 Suggestions of the tribal farmers to overcome the constraints associated with overall technological gap.
5.1 CHARACTERISTICS OF THE TRIBAL FARMERS

The overall technological gap is influenced by different characteristics of the tribal farmers. It was beyond the scope of the present study to include all the characteristics of the tribal farmers. However, some important characteristics of the tribal farmers were selected and the findings have been presented in the following pages.

5.1.1 Personal and socio-psychological characteristics

5.1.1.1 Age:

Age of the tribal farmer is an important factor in the process of transfer of technology. The tribal farmers were classified into three age groups (i) young age (up to 30 years) (ii) middle age (from 31 to 50 years) and (iii) old age (Above 50 years). The data with respect to age are presented in Table - 3 below.

The data presented in Table - 3 revealed that majority of the respondents were in middle age group (64.44 per cent) while 19.26 per cent and 16.30 per cent of the respondents were in young age group and old age group respectively.

It can be concluded from the Table - 3 that majority (64.44 per cent) of the respondents belonged to middle age group (31 to 50 years).
**TABLE - 3**

**DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR AGE**

\[N = 270\]

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Young age (Up to 30 years)</td>
<td>52</td>
<td>19.26</td>
</tr>
<tr>
<td>2</td>
<td>Middle age (31 to 50 years)</td>
<td>174</td>
<td>64.44</td>
</tr>
<tr>
<td>3</td>
<td>Old age (Above 50 years)</td>
<td>44</td>
<td>16.30</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>270</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Mean \(41.56\)  
S.D \(= 10.81\)

This finding was in conformity with those of Pandit (1981), Kanani (1982), Trivedi (1984), Bhatt (1990), Gamit (1993) and Nayak (1993).

5.1.1.2 **Education:**

Education is the process of producing the desired changes in the behaviour of the people. According to the level of education, the respondents were classified into four categories viz. (i) Illiterate (ii) Can read and write (iii) Up to primary and (iv) Above primary. The data in this regards are presented in Table - 4.
The data presented in Table - 4 revealed that majority of the respondents were illiterate (52.22 per cent) while 32.59 per cent of them had studied up to primary level. Whereas only 11.48 per cent of them were having the education above primary level. The remaining 3.71 per cent of them were able to read and write only.

It can be concluded that majority (52.22 per cent) of the respondents were illiterate. In other words slightly more than one half of the respondents were illiterate.

This finding was in conformity with those of Pandit (1981), Kanani (1982), Sinha (1982), Shukla (1985), Bhatt (1990), Gamit (1993) and Nayak (1993).
5.1.1.3 Social participation:

Social participation plays an important part in influencing adoption behaviour of farmers. The information regarding social participation was collected and the respondents were classified into four categories viz. (i) Non-members (ii) Member in one organisation (iii) Member in more than one organisation and (iv) Holding position. The data with respect to social participation are presented in Table - 5.

**TABLE - 5**

**DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR SOCIAL PARTICIPATION**

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Non-member</td>
<td>199</td>
<td>73.70</td>
</tr>
<tr>
<td>2</td>
<td>Member in one organisation</td>
<td>69</td>
<td>25.56</td>
</tr>
<tr>
<td>3</td>
<td>Member in more than one organisation</td>
<td>2</td>
<td>0.74</td>
</tr>
<tr>
<td>4</td>
<td>Holding position</td>
<td>14</td>
<td>5.19</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>270</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

The data presented in Table - 5 indicated that 199 (73.70 per cent) of the respondents have not taken part in any social organisation. While 25.56 per cent respondents were member in one organisation. Only 0.74 per cent were member in more than one organisation. Whereas 14 respondents (5.19 per cent) were holding position in the organisation.
It can be concluded that majority (73.70 per cent) of the respondents had no membership in any organisation.

This finding was in conformity with those of Shukla (1985), Bhatt (1990) and Nayak (1993).

5.1.1.4 Occupation:

The occupation of the respondents is an important factor contributing to the annual income of the respondents. For that purpose, data were collected and grouped into four categories viz. (i) Farming only (ii) Farming + Labour work (iii) Farming + Service and (iv) Farming + Other occupation. The data in this regards are presented in Table - 6.

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Farming only</td>
<td>107</td>
<td>39.63</td>
</tr>
<tr>
<td>2</td>
<td>Farming + Labour work</td>
<td>132</td>
<td>48.89</td>
</tr>
<tr>
<td>3</td>
<td>Farming + Service</td>
<td>18</td>
<td>6.67</td>
</tr>
<tr>
<td>4</td>
<td>Farming + Other occupation</td>
<td>13</td>
<td>4.81</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>270</td>
<td>100.00</td>
</tr>
</tbody>
</table>

The data presented in Table - 6 indicated that 132
respondents (48.89 per cent) were dependent on farming + labour work, while 107 respondents (39.63 per cent) were dependent on farming only. Whereas 18 (6.67 per cent) and 13 (4.81 per cent) were dependent on farming + service and farming + other occupation respectively.

It can be concluded that nearly half of the respondents (48.89 per cent) were dependent on farming + labour work.


5.1.1.5 Type of family:

The type of the family play an important role for taking a decision regarding adoption of an innovation. There are two types of family i.e. (i) Nuclear family and (ii) Joint family. The data in this regard are presented in Table - 7.

The data presented in Table - 7 indicated that majority (58.15 per cent) of the respondents belonged to joint family, while 113 respondents (41.85 per cent) belonged to nuclear family.

It can be concluded that majority (58.15 per cent) of the respondents belonged to joint family type.
TABLE - 7

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR TYPE OF FAMILY

\[ N = 270 \]

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nuclear family</td>
<td>113</td>
<td>41.85</td>
</tr>
<tr>
<td>2</td>
<td>Joint family</td>
<td>157</td>
<td>58.15</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>270</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

This finding was in conformity with those of Pandit (1981), Kanani (1982), Trivedi (1984), Shukla (1985), Gamit (1993) and Nayak (1993).

5.1.1.6 Size of family:

The size of family play an important role for taking a decision regarding adoption of an innovation. According to the size of family, the respondents were grouped into three categories viz. Small (up to 5 members), (ii) Medium (6 to 10 members) and (iii) Large (above 10 members). The data in this regards are presented in the Table - 8.

The data presented in Table - 8 indicated that 130 respondents (48.14 per cent) had medium size of family. whereas, 25.93 per cent of the respondents had large size of family. Seventy respondents (25.93 per cent) had small size of family.
The average family size of all the respondents was 8 members.

TABLE - 8
DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR SIZE OF FAMILY

\[ N = 270 \]

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Small (Up to 5)</td>
<td>70</td>
<td>25.93</td>
</tr>
<tr>
<td>2</td>
<td>Medium (6 to 10)</td>
<td>130</td>
<td>48.14</td>
</tr>
<tr>
<td>3</td>
<td>Large (Above 10)</td>
<td>70</td>
<td>25.93</td>
</tr>
</tbody>
</table>

\[ \text{Mean} = 8.0 \]
\[ \text{S.D} = 2.72 \]

It can be inferred that nearly half of the respondents (48.14 per cent) had medium size of family.

This finding was in conformity with those of Trivedi (1984), Gamit (1993) and Nayak (1993).

5.1.1.7 Type of houses:

The data regarding type of houses possessed by the respondents were collected and grouped into three categories viz. (i) Kachha, (ii) Mixed and (iii) Pacca houses. The data in this regards are presented in Table - 9.

The data presented in Table - 9 indicated that majority
(62.59 per cent) of the respondents were having kachha houses while 34.45 per cent of the respondents had mixed type of houses. Only 2.96 per cent of the respondents had pacca houses.

**TABLE - 9**

**DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR TYPE OF HOUSES**

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kachha</td>
<td>169</td>
<td>62.59</td>
</tr>
<tr>
<td>2</td>
<td>Mixed</td>
<td>93</td>
<td>34.45</td>
</tr>
<tr>
<td>3</td>
<td>Pacca</td>
<td>8</td>
<td>2.96</td>
</tr>
</tbody>
</table>

Total 270 100.00

It can be concluded that majority (62.59 per cent) of the respondents were having kachha houses.

This finding was in conformity with those of Tamboli (1979) and Pandit (1981).

5.1.1.8 Number of houses:

The data regarding the number of houses possessed by the respondents were collected and grouped into three categories viz. (i) One house (ii) Two houses and (iii) Three and more houses. The data in this regards are presented in the Table - 10.

The data presented in Table - 10 indicated that majority
(91.48 per cent) of the respondents had one house. Whereas, 22 (8.15 per cent) respondents had two houses. Only one (0.37 per cent) respondent had three and more houses.

**TABLE - 10**

**DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR NUMBER OF HOUSES**

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>One house</td>
<td>247</td>
<td>91.48</td>
</tr>
<tr>
<td>2</td>
<td>Two houses</td>
<td>22</td>
<td>8.15</td>
</tr>
<tr>
<td>3</td>
<td>Three and more houses</td>
<td>1</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>270</td>
<td>100.00</td>
</tr>
</tbody>
</table>

It can be concluded that majority (91.48 per cent) of the respondents had one house.

This finding was in confirmity with that of Trivedi (1984).

5.1.1.9 Farm power:

Farm power (bullocks) possessed by the farmer play an important role in adoption of certain farm practices. Collected information regarding farm power (bullocks) were grouped into four categories i.e. (i) Upto two bullocks (ii) 3 to 4 bullocks (iii) 5 to 6 bullocks and (iv) No bullock. The data in this regards are presented in the Table - 11.
The data presented in Table - 11 revealed that majority (31.11 per cent) of the respondents had two bullocks. While 11.46 per cent of the respondents reported that they had no bullocks. Only 7.04 per cent and 0.37 per cent of the respondents had 3 to 4 and 5 to 6 bullocks respectively.

TABLE - 11

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO FARM POWER (BULLOCKS) POSSESSED BY THEM

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Upto two bullocks</td>
<td>219</td>
<td>81.11</td>
</tr>
<tr>
<td>2</td>
<td>3 to 4 bullocks</td>
<td>19</td>
<td>7.04</td>
</tr>
<tr>
<td>3</td>
<td>5 to 6 bullocks</td>
<td>1</td>
<td>0.37</td>
</tr>
<tr>
<td>4</td>
<td>No bullocks</td>
<td>31</td>
<td>11.46</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>270</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Mean : 1.93       SD = 0.89

It can be concluded that majority (81.11 per cent) of the respondents had two bullocks.

This findings was in confirmity with that of Trivedi (1984).

5.1.1.10 Material possession :

An attempt has been made in this study to know the material possession i.e. local and improved implements possessed
by the tribal farmers. The data in this regards are presented in the Table - 12.

TABLE - 12

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR POSSESSION OF LOCAL AND IMPROVED IMPLEMENTS

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No implements</td>
<td>18</td>
<td>6.67</td>
</tr>
<tr>
<td>2</td>
<td>Local implements</td>
<td>251</td>
<td>92.96</td>
</tr>
<tr>
<td>3</td>
<td>Improved implements</td>
<td>1</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>270</td>
<td>100.00</td>
</tr>
</tbody>
</table>

The data presented in Table - 12 indicated that majority (92.96 per cent) of the respondents had possessed local implements. Whereas, 1 (0.37 per cent) respondent possessed improved implements. While 6.67 per cent of the respondents reported that they had no implements.

It can be concluded that majority (92.96 per cent) of the respondents had possessed local implements only.

This findings was in confirmity with those of agresco report (1973), Pawar (1972) and Trivedi (1984).

5.1.1.11 Socio - economic status :

Socio-economic status has been known to influence
individual behaviour in different ways of life. In this study an attempt has been made to study the socio-economic characteristics of the tribal farmers and thereby determine the socio-economic status of the tribal farmers. As discussed earlier the socio-economic status (SES) scale of Trivedi (1963) was used to determine the SES of the tribal farmers. All the respondents were grouped into three SES levels, viz. (i) Low socio-economic status (LSES) score range up to 13 (ii) Medium socio-economic status (MSES) score ranged from 14 to 21 and (iii) High socio-economic status (HSES) score 22 and above. The data in this regards are presented in Table - 13.

**TABLE - 13**

**DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR SOCIO-ECONOMIC STATUS**

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Score range</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low (LSES)</td>
<td>Upto 13</td>
<td>27</td>
<td>10.00</td>
</tr>
<tr>
<td>2</td>
<td>Medium (MSES)</td>
<td>14 to 21</td>
<td>193</td>
<td>71.48</td>
</tr>
<tr>
<td>3</td>
<td>High (HSES)</td>
<td>22 and above</td>
<td>50</td>
<td>18.52</td>
</tr>
</tbody>
</table>

**Total**

270 100.00

Mean = 18.15

SD = 4.41

The data presented in Table - 13 indicated that majority (71.48 per cent) of the respondents belonged to medium socio-economic status level. While 18.52 per cent of the respondents belonged to high socio-economic status level. Whereas, 10.00 per
cent of the respondents belonged to low socio-economic status level.

It can be concluded that majority (71.48 per cent) of the respondents belonged to medium socio-economic status level.

This finding was in confirmation with those of Pandit (1981) and Trivedi (1984).

5.1.1.12 Migration habit:

It is fact that tribals from Vadodara district have been migrating in search of any type of labour work. Migration habit of tribals has relation with the total annual income of tribal family. Here an attempt has been made to study the migration habit of the tribal families. Here the term "Migration" was defined as movement of the members of the tribal family to a place other than the place of their residence for searching any type of labour work and staying there for a time being. The information in this regards was collected and presented in Table - 14.

The data presented in Table - 14 clearly indicated that out of total 270 respondents, 162 (60.00 per cent) tribal families from which migration took place. Thus percentage of migration from sample families comes to 60.00 per cent. The total number of migrating persons was 368 and the average migrating
persons per house holds was 2.27. Out of total migrating persons, 70.65 per cent were engaged in agricultural labour work, while 29.35 per cent of them were found to be engaged in non-agricultural labour work.

**TABLE - 14**

**INFORMATION ABOUT MIGRATION HABIT OF THE RESPONDENTS**

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Particulars</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total number of sample house hold</td>
<td>270</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Number of house holds from which migration took place</td>
<td>162</td>
<td>60.00</td>
</tr>
<tr>
<td>3</td>
<td>No migration</td>
<td>108</td>
<td>40.00</td>
</tr>
<tr>
<td>4</td>
<td>Total number of migrating persons</td>
<td>368</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Average migrating persons per house holds.</td>
<td>2.27</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Migrated persons engaged in agricultural labour work</td>
<td>260</td>
<td>70.65</td>
</tr>
<tr>
<td>7</td>
<td>Migrated persons engaged in non-agricultural labour work</td>
<td>108</td>
<td>29.35</td>
</tr>
</tbody>
</table>

This finding was in confirmity with those of Nigra (1982) and Trivedi (1984).

5.1.1.13 **Cosmopolite localiteness**:  
Cosmopolite-localiteness scale was used which was developed by Singh (1965). The respondents were grouped into three
categories viz. (i) Low (Upto 18 score), (ii) Medium (19 to 21 score), and (iii) High (22 and above score). The data in this respect are presented in Table - 15.

**TABLE - 15**

**DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR COSMOPOLITE-LOCALITENESS**

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Score range</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low</td>
<td>Upto 18</td>
<td>32</td>
<td>11.85</td>
</tr>
<tr>
<td>2</td>
<td>Medium</td>
<td>19 to 21</td>
<td>211</td>
<td>78.15</td>
</tr>
<tr>
<td>3</td>
<td>High</td>
<td>22 and above</td>
<td>27</td>
<td>10.00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>270</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Mean = 19.96  
SD = 1.40

The data presented in Table - 15 indicated that majority (78.15 per cent) of the respondents were found to have medium cosmopolite-localiteness, followed by 11.85 per cent who had low and 10.00 per cent who had high cosmopolite-localiteness.

It can be concluded that majority (78.15 per cent) of the respondents were found to have medium cosmopolite-localiteness.

This finding was in conformity with that of Trivedi (1984).
5.1.1.14 Economic motivation:

Economic motivation means an individual is oriented towards achievement of the maximum economic ends such as maximization of the farm profits. This was measured with economic motivation scale developed by Supe and Singh (1974). The data regarding economic motivation are presented in Table - 16.

The data presented in Table - 16 indicated that majority (78.89 per cent) of the respondents had medium economic motivation. While 11.95 per cent had low economic motivation. Whereas, 9.26 per cent of the respondents had high economic motivation.

TABLE - 16
DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR ECONOMIC MOTIVATION

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Score range</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low</td>
<td>Upto 28</td>
<td>32</td>
<td>11.85</td>
</tr>
<tr>
<td>2</td>
<td>Medium</td>
<td>29 to 36</td>
<td>213</td>
<td>78.89</td>
</tr>
<tr>
<td>3</td>
<td>High</td>
<td>37 and above</td>
<td>25</td>
<td>9.26</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>270</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Mean = 32.47
SD = 3.41

It can be concluded that majority (78.89 per cent) of the respondents had medium economic motivation.
This finding was in conformity with those of Trivedi (1984), Patel (1985), Bhatt (1990) and Gamit (1993).

5.1.1.15 Scientific - orientation:

The respondents were grouped into three categories viz. (i) Low (upto 32 score), (ii) Medium (from 33 to 38 score) and (iii) High (39 and above score). The data in this respect are presented in Table - 17.

TABLE - 17

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR SCIENTIFIC ORIENTATION

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Score range</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low</td>
<td>Upto 32</td>
<td>38</td>
<td>14.07</td>
</tr>
<tr>
<td>2</td>
<td>Medium</td>
<td>33 to 38</td>
<td>192</td>
<td>71.11</td>
</tr>
<tr>
<td>3</td>
<td>High</td>
<td>39 and above</td>
<td>40</td>
<td>14.82</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>270</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Mean = 35.74  SD = 3.18

The data presented in Table - 17 indicated that majority (71.11 per cent) of the respondents had medium scientific orientation, followed by 14.82 per cent who had high scientific orientation. While 14.07 per cent of the respondents had low scientific orientation.
It can be concluded that majority (71.11 per cent) of the respondents had medium scientific orientation.

This finding was in conformity with those of Patel (1983), Trivedi (1984), Patel (1985) and Gamit (1993).

5.1.1.16 Risk - preference :

Risk-preference was measured with the help of risk-preference scale developed by Supe and Singh (1974). The data in this respect are presented in Table - 18.

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Score range</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low</td>
<td>Upto 23</td>
<td>46</td>
<td>17.04</td>
</tr>
<tr>
<td>2</td>
<td>Medium</td>
<td>24 to 32</td>
<td>206</td>
<td>76.30</td>
</tr>
<tr>
<td>3</td>
<td>High</td>
<td>33 and above</td>
<td>18</td>
<td>6.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>270</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Mean = 27.26
SD = 4.02

The data shown in Table - 18 revealed that majority (76.30 per cent) of the respondents had medium risk-preference while 17.04 per cent who had low risk-preference. Only 6.66 per cent of the respondents had high risk-preference.
It can be concluded that majority (76.30 per cent) of the respondents had medium risk-preference.

This finding was in conformity with those of Trivedi (1984), Patel (1985), Bhatt (1990) and Gamit (1993).

5.1.1.17 Attitude towards high yielding varieties (HYVs):

Attitude also affects adoption behaviour of the farmers. This was measured with the help of an attitude scale developed by Nair (1969). All the respondents were grouped into three categories viz. (i) Unfavourable (Upto 33 score), (ii) Neutral (from 34 to 41 score) and (iii) Favourable (42 and above score). The data in this respect are presented in Table - 19 and Figure - 4.

TABLE - 19

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR ATTITUDE TOWARDS HIGH YIELDING VARIETIES

N = 270

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Score range</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unfavourable</td>
<td>Upto 33</td>
<td>39</td>
<td>14.44</td>
</tr>
<tr>
<td>2</td>
<td>Neutral</td>
<td>34 to 41</td>
<td>192</td>
<td>71.12</td>
</tr>
<tr>
<td>3</td>
<td>Favourable</td>
<td>42 and above</td>
<td>39</td>
<td>14.44</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>270</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Mean = 37.62
SD = 4.31
Fig. 4: DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR ATTITUDE TOWARDS HIGH YIELDING VARIETIES
The data presented in Table - 19 and Figure - 4 indicated that majority (71.12 per cent) of the respondents had neutral attitude towards high yielding varieties. Whereas 14.44 per cent of the respondents had favourable and 14.44 per cent of the respondents had unfavourable attitude towards high yielding varieties.

It can be concluded that majority (71.12 per cent) of the respondents had neutral attitude towards high yielding varieties.

Thus the null hypothesis (H₃ : 1.1) that the attitude of the tribal farmers towards HYVs is not favourable was rejected.

This finding was in conformity with that of Trivedi (1984).

5.1.1.18 Attitude towards chemical fertilizers:

Attitude towards chemical fertilizers was measured with the help of attitude scale developed by Singh (1968). All the respondents were grouped into three categories viz. (i) Unfavourable (Upto 39 score) (ii) Neutral (From 40 to 47 score) and (iii) Favourable (48 and above score). The data in this respects are presented in Table - 20 and Figure - 5.

The data presented in Table - 20 and Figure - 5 revealed that majority (74.44 per cent) of the respondents had neutral
attitude towards chemical fertilizers. While 15.93 per cent of the respondents had unfavourable attitude towards chemical fertilizers. Whereas, only 9.63 per cent respondents had favourable attitude towards chemical fertilizers.

TABLE - 20

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR ATTITUDE TOWARDS CHEMICAL FERTILIZERS

\[ N = 270 \]

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Score range</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unfavourable</td>
<td>Upto 39</td>
<td>43</td>
<td>15.93</td>
</tr>
<tr>
<td>2</td>
<td>Neutral</td>
<td>40 to 47</td>
<td>201</td>
<td>74.44</td>
</tr>
<tr>
<td>3</td>
<td>Favourable</td>
<td>48 and above</td>
<td>26</td>
<td>9.63</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>270</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Mean = 43.26  
SD = 3.81

It can be concluded that majority (74.44 per cent) of the respondents had neutral attitude towards chemical fertilizers.

Thus in light of the above findings the null hypothesis \( H_3 : 1.2 \) that the attitude of the tribal farmers towards chemical fertilizers is not favourable was rejected.
Fig. 6: DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR ATTITUDE TOWARDS CHEMICAL FERTILIZERS
Knowledge plays an important role in overt behaviour as well as covert behaviour of an individual. Knowledge was measured with the help of a teacher made test based on knowledge test developed by Jha and Singh (1970), was administered in the present study. As discussed earlier the knowledge index for each respondent was calculated and the respondents were grouped into three categories viz. (i) Low level (Upto 56 index) (ii) Medium level (56.01 to 73.55 index) and (iii) High level (73.56 and above index). The data in this respects are presented in Table - 21 and Figure - 6.

The data presented in Table - 21 and Figure - 6 indicated that majority (64.81 per cent) of the respondents had possessed medium level knowledge, while 26.30 per cent of the respondents had high level of knowledge about recommended technology of maize crop. Only 8.89 per cent of the respondents had low level of knowledge about the recommended technology of maize crop.

It can be concluded that majority (64.81 per cent) of the respondents had medium level of knowledge about recommended technology of maize crop.
TABLE - 21

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO LEVEL OF KNOWLEDGE ABOUT RECOMMENDED TECHNOLOGY OF MAIZE CROP

\[ N = 270 \]

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Score range</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low level</td>
<td>Upto 56</td>
<td>24</td>
<td>8.89</td>
</tr>
<tr>
<td>2</td>
<td>Medium level</td>
<td>56.01 to 73.55</td>
<td>175</td>
<td>64.81</td>
</tr>
<tr>
<td>3</td>
<td>High level</td>
<td>83.56 and above</td>
<td>71</td>
<td>26.30</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>270</strong></td>
<td><strong>100.00</strong></td>
<td></td>
</tr>
</tbody>
</table>

Mean = 65.06  \quad SD = 8.77

This finding was in conformity with those of Pandit (1981), Trivedi (1984), Shukla (1985), Bhatt (1990), Gamit (1993) and Nayak (1993).

5.1.1.20 Knowledge level about recommended technology of paddy crop:

Knowledge was measured with the help of a teacher made test based on knowledge test developed by Jha and Singh (1970), was administered in the present study. As discussed earlier the knowledge index for each respondent was calculated and the respondents were grouped into three categories viz. (i) Low level (Upto 50.89 index) (ii) Medium level (50.90 to 74.61 index) and (iii) High level (74.62 and above index). The data in this respects are presented in Table - 22 and Figure - 6.
Fig. 6: DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR KNOWLEDGE LEVEL
TABLE - 22

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO LEVEL OF KNOWLEDGE ABOUT RECOMMENDED TECHNOLOGY OF PADDY CROP

\[ N = 270 \]

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Score range</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low level</td>
<td>Upto 50.89</td>
<td>31</td>
<td>11.48</td>
</tr>
<tr>
<td>2</td>
<td>Medium level</td>
<td>50.90 to 74.61</td>
<td>173</td>
<td>64.07</td>
</tr>
<tr>
<td>3</td>
<td>High level</td>
<td>74.62 and above</td>
<td>66</td>
<td>24.45</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>270</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Mean = 62.75 \hspace{1cm} SD = 11.86

The data presented in Table - 22 and Figure - 6 indicated that majority (64.07 per cent) of the respondents had medium level knowledge, while 24.45 per cent of the respondents had high level of knowledge about recommended technology of paddy crop. Only 11.48 per cent of the respondents had low level of knowledge about the recommended technology of paddy crop.

It can be concluded that majority (64.07 per cent) of the respondents had medium level of knowledge about recommended technology of paddy crop.

This finding was in confirmity with those of Pandit (1981), Trivedi (1984), Shukla (1985), Bhatt (1990), Gamit (1993) and Nayak (1993).
Knowledge level about recommended technology of tur crop:

Knowledge was measured with the help of a teacher made test based on knowledge test developed by Jha and Singh (1970), was administered in the present study. As discussed earlier the knowledge index for each respondent was calculated and the respondents were grouped into three categories viz. (i) Low level (Upto 35.28 index) (ii) Medium level (35.29 to 52.58 index) and (iii) High level (52.59 and above index). The data in this respects are presented in Table - 23 and Figure - 6.

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Score range</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low level</td>
<td>Upto 35.28</td>
<td>62</td>
<td>22.96</td>
</tr>
<tr>
<td>2</td>
<td>Medium level</td>
<td>35.29 to 52.58</td>
<td>176</td>
<td>65.19</td>
</tr>
<tr>
<td>3</td>
<td>High level</td>
<td>52.59 and above</td>
<td>32</td>
<td>11.85</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>270</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Mean = 43.93
SD = 8.65

The data presented in Table - 23 and Figure - 6 revealed that majority (65.19 per cent) of the respondents had medium level knowledge, while 22.96 per cent of the respondents had low
level of knowledge. Only 11.85 per cent of the respondents had high level of knowledge about the recommended technology of tur crop.

It can be concluded that majority (65.19 per cent) of the respondents had medium level of knowledge about recommended technology of tur crop.

This finding was in conformity with those of Pandit (1981), Trivedi (1984), Shukla (1985), Bhatt (1990), Gamit (1993) and Nayak (1993).

5.1.1.22 Knowledge level about recommended technology of black-gram crop:

Knowledge was measured with the help of a teacher made test based on knowledge test developed by Jha and Singh (1970), was administered in the present study. As discussed earlier the knowledge index for each respondent was calculated and the respondents were grouped into three categories viz. (i) Low level (Upto 35.07 index) (ii) Medium level (35.08 to 58.63 index) and (iii) High level (58.64 and above index). The data in this respect are presented in Table - 24 and Figure - 6.

The data presented in Table - 24 and Figure - 6 revealed that majority (63.70 per cent) of the respondents had medium level knowledge, while 22.96 per cent of the respondents had low
level of knowledge. Only 13.34 per cent of the respondents had high level of knowledge about the recommended technology of black-gram crop.

**TABLE - 24**

**DISTRIBUTION OF THE RESPONDENTS ACCORDING TO LEVEL OF KNOWLEDGE ABOUT RECOMMENDED TECHNOLOGY OF BLACK-GRAM CROP**

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Score range</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low level</td>
<td>Upto 35.07</td>
<td>62</td>
<td>22.96</td>
</tr>
<tr>
<td>2</td>
<td>Medium level</td>
<td>35.08 to 58.63</td>
<td>172</td>
<td>63.70</td>
</tr>
<tr>
<td>3</td>
<td>High level</td>
<td>58.64 and above</td>
<td>36</td>
<td>13.34</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>270</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Mean = 46.85, SD =11.78

It can be concluded that majority (63.70 per cent) of the respondents had medium level of knowledge about recommended technology of black-gram crop.

This finding was in conformity with those of Pandit (1981), Trivedi (1984), Shukla (1985), Bhatt (1990), Gamit (1993) and Nayak (1993).

5.1.2 Situational characteristics

5.1.2.23 Land holding:

Land holding is an important variable that determines
economic status and potentiality for adoption of new, agricultural practices. Land holding refers to the total area owned and cultivated by the tribal farmers. The respondents were grouped into five categories viz. (i) Upto 2.50 acres, (ii) 2.51 to 5.00 acres (iii) 5.01 to 7.50 acres, (iv) 7.51 to 10.00 acres and (v) Above 10.00 acres. The data in this respect are presented in Table - 25.

**TABLE - 25**

**DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR SIZE OF LAND HOLDINGS**

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Upto 2.50 acres</td>
<td>99</td>
<td>36.67</td>
</tr>
<tr>
<td>2</td>
<td>2.51 to 5.00 acres</td>
<td>105</td>
<td>38.89</td>
</tr>
<tr>
<td>3</td>
<td>5.01 to 7.50 acres</td>
<td>24</td>
<td>8.89</td>
</tr>
<tr>
<td>4</td>
<td>7.51 to 10.00 acres</td>
<td>17</td>
<td>6.30</td>
</tr>
<tr>
<td>5</td>
<td>Above 10.00 acres</td>
<td>25</td>
<td>9.25</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>270</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Mean = 4.92      SD = 5.00

The data presented in Table - 25 indicated that 105 (38.89 per cent) respondents were found to have 2.51 to 5.00 acres of land. Whereas 36.67 per cent of the respondents were having land upto 2.50 acres, while 8.89 per cent, 6.30 per cent and 9.25 per cent of the respondents were having 5.01 to 7.50 acres, 7.51 to 10.00 acres and above 10.00 acres of land respectively.
It can be inferred that majority of the respondents (75.66 per cent) were found to have land upto 5.00 acres.

This finding was in conformity with those of Trivedi (1984), Patel (1985), Bhatt (1990), Gamit (1993) and Nayak (1993).

5.1.2.24 Annual income:

According to the annual income of the respondents, they were grouped into five categories viz. (i) Upto Rs.5,000=00 (ii) Rs.5,001=00 to Rs.10,000=00, (iii) Rs.10,001=00 to Rs.15,000=00 (iv) Rs.15,001 to Rs.20,000=00 and (v) Above Rs.20,000=00. The data in this respect are presented in Table - 26.

**TABLE - 26**

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR ANNUAL INCOME

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Upto Rs.5,000=00</td>
<td>95</td>
<td>35.19</td>
</tr>
<tr>
<td>2</td>
<td>Rs.5,001=00 to Rs.10,000=00</td>
<td>100</td>
<td>37.04</td>
</tr>
<tr>
<td>3</td>
<td>Rs.10,001=00 to Rs.15,000=00</td>
<td>24</td>
<td>8.89</td>
</tr>
<tr>
<td>4</td>
<td>Rs.15,001=00 to Rs.20,000=00</td>
<td>17</td>
<td>6.29</td>
</tr>
<tr>
<td>5</td>
<td>Above Rs.20,000=00</td>
<td>34</td>
<td>12.59</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>270</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Mean = 12224=00

SD = 17935
The data presented in Table - 26 indicated that 100 (37.04 per cent) respondents were having annual income from Rs. 5,001=00 to Rs.10,000=00 while 35.15 per cent of the respondents had annual income upto Rs.5,000=00. Whereas 12.59 per cent of the respondents had annual income more than Rs.20,000=00. Only 8.29 per cent and 6.29 per cent of the respondents had annual income from Rs.10,001=00 to Rs.15,000=00 and Rs.15,001=00 to Rs. 20,000=00 respectively.

It can be concluded that majority (72.23 per cent) of the respondents had annual income upto Rs.10,000=00.

This finding was in conformity with those of Patel (1988), Bhatt (1990), Gamit (1993) and Nayak (1993).

5.1.2.25 Indebtedness :

It refers to the total amount of loan outstanding i.e. debt in terms of money against the name of the respondents as reported by them in public or private organisation at the time of investigation. The respondents were grouped into six categories according to their indebtedness viz. (i) Upto Rs.5,000=00 (ii) Rs.5,001=00 to Rs.10,000=00, (iii) Rs.10,001=00 to Rs.15,000=00 (iv) Rs.15,001 to Rs.20,000=00 and (v) Above Rs.20,000=00 (vi) No debt. The data in this respect are presented in Table - 27.

The data in Table - 27 revealed that half of the
respondents (50.74 per cent) had reported debt up to Rs. 5,000=00. While 22.96 per cent of the respondents had no debt. 12.96 per cent of the respondents had debt from Rs. 5,001=00 to Rs. 10,000=00. Whereas 3.34, 2.96 and 7.04 per cent of the respondents had debt from Rs. 10,001 to Rs. 15,000=00, Rs. 15,001 to Rs. 20,000=00 and above Rs. 20,000=00 respectively.

TABLE - 27
DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR INDEBTEDNESS

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Upto Rs. 5,000=00</td>
<td>137</td>
<td>50.74</td>
</tr>
<tr>
<td>2</td>
<td>Rs. 5,001=00 to Rs. 10,000=00</td>
<td>35</td>
<td>12.96</td>
</tr>
<tr>
<td>3</td>
<td>Rs. 10,001=00 to Rs. 15,000=00</td>
<td>9</td>
<td>3.34</td>
</tr>
<tr>
<td>4</td>
<td>Rs. 15,001=00 to Rs. 20,000=00</td>
<td>8</td>
<td>2.96</td>
</tr>
<tr>
<td>5</td>
<td>Above Rs. 20,000=00</td>
<td>19</td>
<td>7.04</td>
</tr>
<tr>
<td>6</td>
<td>No debt</td>
<td>62</td>
<td>22.96</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>270</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Mean = 8187.78  SD = 27796.61

It can be concluded that half (50.74 per cent) of the respondents had debt up to Rs. 5,000=00.

This finding was in conformity with those of Kulkarni (1979) and Nath (1993).
5.1.2.26 Cropping intensity:

Cropping intensity shows the intensity of land used by the farmers. The respondents were grouped into three categories on the basis of their cropping intensity viz. (i) Upto 150.00 (ii) 150.01 to 175.00 and (iii) Above 175.00. The data in this respect are presented in Table - 28.

TABLE - 28

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR CROPPING INTENSITY

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Category</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Upto 150 cropping intensity</td>
<td>196</td>
<td>72.59</td>
</tr>
<tr>
<td>2</td>
<td>150.01 to 175 cropping intensity</td>
<td>38</td>
<td>14.08</td>
</tr>
<tr>
<td>3</td>
<td>Above 175 cropping intensity</td>
<td>36</td>
<td>13.33</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>270</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Mean = 148.70

The data presented in Table - 28 revealed that majority (72.59 per cent) of the respondents had cropping intensity up to 150, followed by 14.08 per cent of the respondents who had cropping intensity from 150.01 to 175. Whereas 13.33 per cent of the respondents had cropping intensity more than 175.

It can be concluded that majority (72.59 per cent) of the respondents had cropping intensity up to 150.
This finding was in conformity with those of Patel (1978), Sadamate (1978) and Trivedi (1984).

5.1.3 Communication characteristics

5.1.3.27 Sources of information:

Sources of information play a major role in the diffusion and adoption of innovation. The respondents were asked to indicate from which sources they got information for the use of technologies. The information regarding sources of information used by the farmers is presented in Table - 29.

TABLE - 29

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO SOURCES OF INFORMATION USED BY THEM

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Sources of Information</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Neighbour</td>
<td>224</td>
<td>82.96</td>
</tr>
<tr>
<td>2</td>
<td>Relatives</td>
<td>182</td>
<td>67.41</td>
</tr>
<tr>
<td>3</td>
<td>Contact farmers</td>
<td>42</td>
<td>15.56</td>
</tr>
<tr>
<td>4</td>
<td>Village level worker</td>
<td>55</td>
<td>20.37</td>
</tr>
<tr>
<td>5</td>
<td>Staff of I.T.D.P.</td>
<td>98</td>
<td>36.30</td>
</tr>
<tr>
<td>6</td>
<td>Extension officer (Agriculture)</td>
<td>8</td>
<td>2.96</td>
</tr>
<tr>
<td>7</td>
<td>Staff of Bank</td>
<td>1</td>
<td>0.37</td>
</tr>
<tr>
<td>8</td>
<td>Staff of KVK/PTC</td>
<td>8</td>
<td>2.96</td>
</tr>
</tbody>
</table>

N = 270
The data presented in Table - 29 indicated that the tribal farmers mainly utilised neighbours (82.96 per cent) as a source of information, followed by relatives (67.41 per cent) and staff of I.T.D.P. (36.30 per cent) for obtaining information regarding use of technologies. Village level worker and contact farmers were used as source of information by 20.37 and 15.56 per cent of the tribal farmers respectively. Whereas 2.96 per cent of the tribal farmers used extension officer (Agril) and staff of KVK/FTC as source of information. Only 1 (0.37 per cent) respondent used staff of bank as source of information.

It can be concluded that majority of the tribal farmers had used neighbours (82.96 per cent) and relatives (67.41 per cent) as source of information about use of technologies. The probable reason might be that these sources are accessible easily by majority of the tribal farmers. Also due to their poor economic condition and high illiteracy does not permit them to utilise mass media sources.

This finding was in conformity with those of Pandit (1981), Patel and Sangle (1990-91) and Thakor and Waghmare (1991-92).

5.1.3.27A Source credibility:

It refers to the degree of trustworthiness accorded to a source by its audience respondents at a given time. For measuring
source credibility, most least credibility index method was used in this study. The respondents were asked to indicate only the most and the least credible source of information for the use of technologies. Thus, every respondents indicated two sources of information, one which he felt to be the most credible and the another which was least credible in his opinion. These responses were compiled and presented in Table - 30 and also diagrammatically presented in Figure - 7.

**TABLE - 30**

DIFFERENTIAL SOURCE CREDIBILITY AS PERCEIVED BY THE RESPONDENTS

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Source</th>
<th>Frequency</th>
<th>Relative Credibility Index</th>
<th>Deviation from total value</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Least</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Neighbour</td>
<td>93</td>
<td>4</td>
<td>0.0159</td>
<td>5.9858</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(34.45)</td>
<td>(1.48)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Relatives</td>
<td>81</td>
<td>6</td>
<td>0.0274</td>
<td>5.9743</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(30.00)</td>
<td>(2.22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Contact farmers</td>
<td>21</td>
<td>30</td>
<td>0.5291</td>
<td>5.4726</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(7.78)</td>
<td>(11.11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Village level worker</td>
<td>16</td>
<td>202</td>
<td>4.6759</td>
<td>1.3258</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5.93)</td>
<td>(74.82)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Staff of Bank</td>
<td>37</td>
<td>8</td>
<td>0.0800</td>
<td>5.9217</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(13.70)</td>
<td>(2.96)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Staff of KVK/FTC</td>
<td>11</td>
<td>12</td>
<td>0.4040</td>
<td>5.5977</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4.07)</td>
<td>(4.45)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Extension officer (Agri.)</td>
<td>11</td>
<td>8</td>
<td>0.2694</td>
<td>5.7323</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4.07)</td>
<td>(2.96)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>270</td>
<td>270</td>
<td>6.0017</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(100%)</td>
<td>(100%)</td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

(Figures in parenthesis indicate percentages).
Fig. 7: DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR MOST-LEAST CREDIBILITY OF THE DIFFERENT INFORMATION SOURCES PERCEIVED
The data presented in Table - 30 and Figure - 7 clearly indicated that village level workers ranked first on source credibility scale followed by contact farmers. Staff of KVK/FTC, Extension officer (Agril), Staff of Bank, relatives and neighbour were ranked 3rd, 4th, 5th, 6th and 7th rank as per source credibility perceived by the respondents.

Thus, it can be concluded that village level worker and contact farmers were most credible sources as perceived by tribal farmers. While they have reported less credibility in neighbours and relatives though they use most of them as source of information. The probable reason might be that village level worker is the key person at village level who provide technical guidance to the farmers. Also contact farmers are getting regular training from village level worker in training and visit system and hence tribal farmers has shown more credibility in contact farmers.

This finding was similar to these reported by Patel (1978) and Trivedi (1984).

Thus, in light of the above findings the hypothesis that the tribal farmers do not differ in their personal and socio-psychological, situational and communication characteristics was partly rejected and partly accepted.
5.2 CROPPING PATTERN FOLLOWED BY THE TRIBAL FARMERS

5.2.1 Cropping Pattern:

Cropping pattern followed by the tribal farmers is presented in Table - 31. The respondents were grouped according to the crop sown during the year viz. Single crop, Double crop and Triple crop.

**TABLE - 31**

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO CROPPING PATTERN FOLLOWED

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Cropping Pattern</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Single Crop</td>
<td>270</td>
<td>100.00</td>
</tr>
<tr>
<td>2</td>
<td>Double Crop</td>
<td>89</td>
<td>32.96</td>
</tr>
<tr>
<td>3</td>
<td>Triple Crop</td>
<td>87</td>
<td>32.22</td>
</tr>
</tbody>
</table>

Average Cropping intensity = 148.70

It can be observed from the Table - 31 that almost all the respondents followed single cropping pattern, while 32.96 per cent of the respondents followed double cropping and 32.22 per cent of them had followed triple crop in their cropping pattern. The average cropping intensity was 148.70 per cent which indicates only 48.70 per cent of the total area was under double cropped area. The probable reason for single cropping might be poor economic condition, small land holding, lack of irrigation...
It can be concluded that majority (100.00 per cent) of the respondents had followed single cropping pattern.

Thus, in light of the above findings the null hypothesis \( H_2 : 1.1 \) that there is no change in the cropping pattern of the tribal farmers over time was accepted.

This finding was in conformity with those of Bose (1975), Patel (1978), Shridharan (1978) and Trivedi (1984).

5.3 YIELD LEVEL OF MAJOR CROPS ON TRIBAL FARMS

Yield per unit area motivates and influences adoption behaviour of farmers. Those farmers who obtain higher yields, develop confidence about the soundness of improved practices and therefore more likely to continue the use of new or recommended practices. This acts as an incentive for farmers to adopt recommended innovations or technologies and thereby reducing or lowering the technological gap. In this study, an attempt has been made to know the present yield level of major crops viz. Maize, Paddy, Tur, Black-gram, Groundnut, Wheat, Cotton etc. of tribal farmers. Yield of these different crops have been compared with the district average yield of the above crops. For present study the yield figures of the respondents for the crop year
1992-93 were taken into consideration. The data regarding yield of different crops on tribal farms are presented in Table - 32.

### TABLE - 32

**YIELD OF DIFFERENT CROPS ON TRIBAL FARMS**

<table>
<thead>
<tr>
<th>Crop</th>
<th>Average yield of the crop (Kg/ha)</th>
<th>District average (Kg/ha)</th>
<th>Difference between district average and average of tribal farms (Kg/ha)</th>
<th>Percentage increase(+) or decrease(-)</th>
<th>Ratio of District average on tribal farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>627</td>
<td>1424</td>
<td>- 797</td>
<td>- 55.97</td>
<td>0.4403</td>
</tr>
<tr>
<td>Paddy</td>
<td>450</td>
<td>712</td>
<td>- 262</td>
<td>- 36.80</td>
<td>0.6320</td>
</tr>
<tr>
<td>Tur</td>
<td>232</td>
<td>764</td>
<td>- 532</td>
<td>- 69.63</td>
<td>0.3037</td>
</tr>
<tr>
<td>Black-gram</td>
<td>127</td>
<td>383</td>
<td>- 256</td>
<td>- 66.84</td>
<td>0.3316</td>
</tr>
<tr>
<td>Summer groundnut</td>
<td>413 . 1005</td>
<td></td>
<td>- 592</td>
<td>- 58.91</td>
<td>0.4109</td>
</tr>
<tr>
<td>Cotton</td>
<td>315</td>
<td>363</td>
<td>- 48</td>
<td>- 13.22</td>
<td>0.8678</td>
</tr>
</tbody>
</table>

Source: * Districtwise area, production and yield per hectare of important food and non food crops in Gujarat state, "MARGDARSHIKA" for the year 1990-91 to 1992-93 based on final forecast report - Directorate of agriculture, Gujarat state, Ahmedabad.

The data presented in Table - 32 clearly indicated that the average yield on tribal farms for all the crops was low per hectare yield as compared to the district (Vadodara) average yield, resulting in low farm income. Average yield of the crops
Maize, Paddy, Tur, Black-gram, Summer groundnut and Cotton were lower than the district average yields. The decrease in yield varies from 13 per cent to 69 per cent.

It can be concluded that yield level on tribal farms was low.

The null hypothesis \( H_4 : 1.1 \) that the yield level on tribal farms is not very low was rejected.

The probable reason for this might be use of traditional farming, poor economic condition, poor soil fertility, lack of irrigation facility, lack of adequate and timely inputs, lack of finance facility as well as lack of knowledge regarding the recommended technology.

This finding was in conformity with those of Pawar (1972), Sadamate (1978) and Trivedi (1984).

5.4 TECHNOLOGICAL GAP OF MAJOR CROPS

The technological gap which is dependent variable in this study, is a difference between recommended technologies or practices of crops and the practices or technologies which is actually used by the tribal farmers. In this study four major crops viz. (i) Maize, (ii) Paddy, (iii) Tur and (iv) Black-gram were selected for the purpose of technology. The selection of the crops as well as the practices or technologies have been given in
detail in chapter - 3. It was hypothesised that the level of technological gap is high among the tribal farmers. The findings of the technological gap of major crops and overall technological gap are presented in this section:

5.4.1 Extent of technological gap in high yielding, hybrid and improved seeds of varieties of major crops:

The data for the extent of technological gap in use of high yielding, hybrids and improved seeds of varieties of major crops (Maize, Paddy, Tur and Black-gram) are presented in Table - 33. The respondents were classified and grouped into three gap levels viz. (i) Low level (Upto 33 index), (ii) Medium level (34 to 66 index) and (iii) High level (Above 67 index)

**TABLE - 33**

**EXTENT OF TECHNOLOGICAL GAP IN HIGH YIELDING, HYBRID AND IMPROVED SEEDS OF VARIETIES OF MAJOR CROPS**

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Level of technological gap</th>
<th>Index range</th>
<th>Maize</th>
<th>Paddy</th>
<th>Tur</th>
<th>Black gram</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low level</td>
<td>Upto 33</td>
<td>196</td>
<td>181</td>
<td>143</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(72.59)</td>
<td>(67.04)</td>
<td>(52.96)</td>
<td>(9.63)</td>
</tr>
<tr>
<td>2</td>
<td>Medium level</td>
<td>34 to 66</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>High level</td>
<td>67 and Above</td>
<td>74</td>
<td>89</td>
<td>127</td>
<td>244</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(27.41)</td>
<td>(32.96)</td>
<td>(47.04)</td>
<td>(90.37)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>270</td>
<td>270</td>
<td>270</td>
<td>270</td>
<td>270</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(100%.)</td>
<td>(100%)</td>
<td>(100%)</td>
<td>(100%)</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>27.41</td>
<td>32.96</td>
<td>47.04</td>
<td>90.37</td>
<td></td>
</tr>
</tbody>
</table>

(Figures in parenthesis represent percentages).
The data presented in Table - 33 clearly indicated that majority (72.59, 67.04 and 52.96 per cent) of the respondents were placed in low level of technological gap for maize, paddy and tur crop respectively. In case of black-gram crop majority (90.37 per cent) of the respondents were placed in high technological gap. The mean technological gap for maize, paddy, tur and black-gram crop was 27.41, 32.96, 47.04 and 90.37 respectively.

It can be concluded that majority (72.59, 67.04 and 52.96 per cent) of the respondents had placed in low level of technological gap for maize, paddy and tur crop respectively. While in case of black-gram crop majority (90.37 per cent) of the respondents had placed in high level of technological gap in respect of high yielding, hybrids and improved seeds is concerned.

The probable reasons might be that majority of the tribal farmers migrated in search of agril. labour work in the forward areas of the Vadodara district as well as in the forward areas of the Gujarat state where the progressive farming for maize, paddy and tur crop had been done by the non-tribal farmers. Tribal farmers might have heard about the different name of the high yielding varieties of the crops and also they might heared and seen the bumper yield of the different high yielding varieties of the different crops by their naked eyes. Hence, they adopted high yielding varieties so the technological gap in
respect of high yielding, hybrids and improved seeds of the different crop was low.

5.4.2 Extent of technological gap in use of farm yard manure in major crops:

The data for the extent of technological gap in use of farm yard manure in major crops (Maize, Paddy, Tur and Black-gram crops) are presented in Table - 34. The respondents were grouped into three categories viz. (i) Low level (Upto 33 index), (ii) Medium level (from 34 to 66 index) and (iii) High level (67 and above index).

**TABLE - 34**

**EXTENT OF TECHNOLOGICAL GAP IN USE OF FARM YARD MANURE IN MAJOR CROPS**

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Level of technological gap</th>
<th>Index range</th>
<th>Maize</th>
<th>Paddy</th>
<th>Tur</th>
<th>Black gram</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Low level</td>
<td>Upto 33</td>
<td>213</td>
<td>182</td>
<td>52</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(78.89)</td>
<td>(67.41)</td>
<td>(19.26)</td>
<td>(24.07)</td>
</tr>
<tr>
<td>2</td>
<td>medium level</td>
<td>34 to 66</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.74)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>High level</td>
<td>67 and Above</td>
<td>55</td>
<td>88</td>
<td>218</td>
<td>205</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(20.37)</td>
<td>(32.59)</td>
<td>(80.74)</td>
<td>(75.93)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>270</th>
<th>270</th>
<th>270</th>
<th>270</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
</tr>
</tbody>
</table>

Mean 20.56 32.59 80.74 75.93

(Figures in parenthesis represent percentages).

The data in Table - 34 revealed that majority (78.89 and
67.41 per cent) of the respondents had used farm yard manure in maize and paddy crop respectively. That means it showed low level of technological gap in respect of farm yard manure for maize and paddy crop while majority (80.74 and 75.93 per cent) of the respondents were in high level of technological gap for tur and black-gram crop respectively. The mean technological gap for maize, paddy, tur and black-gram crop was 20.56, 32.59, 80.74 and 75.93 respectively.

It can be concluded that majority (78.89 and 67.41 per cent) of the respondents were in low level of technological gap for maize and paddy crop respectively. While majority of the respondents (80.74 and 75.93 per cent) were in high level of technological gap for tur and black-gram crop respectively.

Tribal farmers had used very less farm yard manure so far tur and black-gram crops are concerned. The probable reasons might be due to less number of farm power possessed by the tribal farmers. Hence they are not in position to produce required quantity of farm yard manure. Thus whatever farm yard manure they produced had used in maize and paddy crops only. They had used FYM in maize and paddy crops only because both are the food grain crops and they might be fulfilling their food grain requirements. The other reason might be that, tribal farmers might be giving less important to tur and black gram crops as compared to maize and tur crop.
5.4.3 Extent of technological gap in use of chemical fertilizers in major crops:

The respondents were grouped into three categories in respect of their extent of technological gap in use of chemical fertilizers in major crops viz. (i) Low level (Upto 33 index), (ii) Medium level (from 34 to 66 index) and (iii) High level (67 and above index). The data in this respect are presented in Table - 35.

**TABLE - 35**

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Level of technological gap</th>
<th>Index range</th>
<th>Maize</th>
<th>Paddy</th>
<th>Tur</th>
<th>Black gram</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low level</td>
<td>Upto 33</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(18.52)</td>
</tr>
<tr>
<td>2</td>
<td>medium level</td>
<td>34 to 66</td>
<td>64</td>
<td>1</td>
<td>1</td>
<td>144</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(23.70)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.37)</td>
</tr>
<tr>
<td>3</td>
<td>High level</td>
<td>67 and Above</td>
<td>156</td>
<td>269</td>
<td>269</td>
<td>118</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(57.78)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(99.63)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(99.63)</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>(43.70)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>270</td>
<td>270</td>
<td>270</td>
<td>270</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(100%)</td>
<td>(100%)</td>
<td>(100%)</td>
<td>(100%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>69.63</td>
<td>99.81</td>
<td>99.81</td>
<td>88.89</td>
<td></td>
</tr>
</tbody>
</table>

(Figures in parenthesis represent percentages).

The data in Table - 35 revealed that almost all (above 81 per cent) of the respondents were found to have medium to high level gap in respect of use of chemical fertilizers for all the
four major crops. In case of maize crop, 64 (23.70 per cent) respondents were in medium level gap while 57.78 per cent of the respondents were in high level of gap. In case of paddy and tur crop majority (99.63 and 99.63 per cent) of the respondents were in high level of technological gap respectively. In case of black-gram crop majority (53.34 per cent) of the respondents were in medium level gap while 43.70 per cent of the respondents were in high level of technological gap. The mean technological gap for maize, paddy, tur and black-gram crop was 69.63, 99.81, 99.81 and 88.89 respectively.

It can be concluded that majority (57.78, 99.63 and 99.63 per cent) of the respondents had high level of technological gap for maize, paddy and tur crop respectively. While majority (53.34 per cent) of the respondents had medium level of technological gap, followed by high (43.70 per cent) technological gap for black-gram crop. Thus majority of the respondents were found to have medium to high level of technological gap in respect of use of chemical fertilizers for all the four major crops.

The probable reasons might be that due to medium to low level of knowledge regarding use of technology among tribal farmers, neutral to unfavourable attitude of the tribal farmers towards the use of chemical fertilizers as well as their poor economic condition etc.
The data in this connection are presented in Table - 36. The respondents were classified and grouped into three levels of gaps viz. (i) Low level (Upto 33 index), (ii) Medium level (from 34 to 66 index) and (iii) High level (67 and above index).

**TABLE - 36**

EXTENT OF TECHNOLOGICAL GAP IN USE OF PLANT PROTECTION MEASURES IN MAJOR CROPS

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Level of technological gap</th>
<th>Index range</th>
<th>Maize</th>
<th>Paddy</th>
<th>Tur</th>
<th>Black gram</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low level</td>
<td>Upto 33</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.74) (0.37)</td>
</tr>
<tr>
<td>2</td>
<td>medium level</td>
<td>34 to 66</td>
<td>270</td>
<td>267</td>
<td>268</td>
<td>269</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(100.00) (98.89) (99.26) (99.63)</td>
</tr>
<tr>
<td>3</td>
<td>High level</td>
<td>67 and Above</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.37) (0.37) (0.37)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>270</th>
<th>270</th>
<th>270</th>
<th>270</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
</tr>
</tbody>
</table>

Mean 50.00 49.81 50.00 50.56

(Figures in parenthesis represent percentages).

The data in Table - 36 indicated that majority (100.00, 98.89, 99.26 and 99.63 per cent) of the respondents were having medium level gap so far use of plant protection is concerned for all the four major crops - maize, paddy, tur and black-gram respectively. Very few (0, 0.74, 0.37 and 0 per cent) of the
respondents were having low level gap for all the four major crops - maize, paddy, tur and black-gram respectively. In case of high level of gap, very few (0.0, 0.37, 0.37 and 0.37 per cent) of the respondents were having high level of gap so far plant protection is concerned for all the four major crops - maize, paddy, tur and black-gram respectively. The mean technological gap for maize, paddy, tur and black-gram crop was 50.00, 49.81, 50.00 and 50.56 respectively.

It can be concluded that majority (100.00, 98.89, 99.26 and 99.63 per cent) of the respondents had medium level of technological gap so far use of plant protection is concerned for all the four major crops - maize, paddy, tur and black-gram respectively.

The probable reasons might be that due to poor economic condition of the tribal farmers, medium level of knowledge about the recommended plant protection measures as well as low tendency to invest more in agriculture.

5.4.5 Overall technological gap:

Overall technological gap was calculated by considering technological gap in each of the practice selected for major crops in this study for studying its relationship with personal and socio-psychological, situational and communication
characteristics of the tribal farmers. The respondents were grouped into three categories on the basis of overall technological gap as (i) Low level (Upto 33 index), (ii) Medium level (from 34 to 66 index) and (iii) High level (67 and above index). The data regarding overall technological gap are presented in table - 37 and Figure - 8.

**TABLE - 37**

**DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR OVERALL TECHNOLOGICAL GAP**

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Level of technological gap</th>
<th>Index range</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low level</td>
<td>Upto 33</td>
<td>1</td>
<td>0.37</td>
</tr>
<tr>
<td>2</td>
<td>Medium level</td>
<td>33 to 66</td>
<td>191</td>
<td>70.74</td>
</tr>
<tr>
<td>3</td>
<td>High level</td>
<td>67 and above</td>
<td>78</td>
<td>28.89</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>270</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Mean = 60.44  
SD = 10.64

The data presented in Table - 37 and Figure - 8 revealed that majority (70.74 per cent) of the respondents were in medium level of overall technological gap while 28.89 per cent of the respondents were in high level of overall technological gap. Only 0.37 per cent were in low level of overall technological gap.

It can be concluded that majority (70.74 per cent) of the respondents were in medium level of overall technological gap.
Fig. 8: DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR OVERALL TECHNOLOGICAL GAP
The probable reasons might be that there is no irrigation facility, majority of the illiterate farmers, poor economic condition, medium knowledge level of recommended package of practices for different crops, medium economic motivation, medium scientific orientation, medium risk preference and medium cosmopolite-localiteness. So that tribal farmers follow or adopt the traditional farming and possess low tendency to invest more in agriculture.

The findings on extent of gap in respect of selected practices of major crops conclusively proved that overall technological gap was medium among tribal farmers. Thus, in light of the above findings the null hypothesis \( H_0 : 1.1 \) that there is no high overall technological gap among the tribal farmers was accepted.

The results on extent of gap in respect of use of high yielding, hybrid and improved seeds of varieties of major crops, use of farm yard manure, chemical fertilizers and plant protection measures in major crops as well findings on overall technological gap presented above were in confirmity with the findings reported by Sadamate (1978), Kulkarni (1979), Pandit (1981), Trivedi (1984), Jaiswal (1985) and Waghdhare (1986).

5.5 RELATIONSHIP OF OVERALL TECHNOLOGICAL GAP OF THE TRIBAL FARMERS WITH THEIR SELECTED CHARACTERISTICS

To ascertain the relationship between independent and
dependent variables, the correlation co-efficient was applied. On the basis of the operational measures developed for the variables, null hypotheses were stated for testing the relationship and their significance on zero order correlation. The zero order correlations are given in Table - 38. The observed relationship is discussed under subtitles as follows :

**TABLE - 38**

ZERO ORDER CORRELATION COEFFICIENT BETWEEN SELECTED INDEPENDENT VARIABLES OF THE RESPONDENTS AND THEIR OVERALL TECHNOLOGICAL GAP

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Name of variables</th>
<th>r Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age</td>
<td>0.19392</td>
</tr>
<tr>
<td>2</td>
<td>Education</td>
<td>-0.03066</td>
</tr>
<tr>
<td>3</td>
<td>Social participation</td>
<td>0.09886</td>
</tr>
<tr>
<td>4</td>
<td>Occupation</td>
<td>-0.18053</td>
</tr>
<tr>
<td>5</td>
<td>Type of family</td>
<td>0.01208</td>
</tr>
<tr>
<td>6</td>
<td>Size of family</td>
<td>0.04401</td>
</tr>
<tr>
<td>7</td>
<td>Type of houses</td>
<td>-0.24091</td>
</tr>
<tr>
<td>8</td>
<td>Number of houses</td>
<td>-0.16554</td>
</tr>
<tr>
<td>9</td>
<td>Farm power possessed</td>
<td>0.03033</td>
</tr>
<tr>
<td>10</td>
<td>Material possession</td>
<td>0.04139</td>
</tr>
<tr>
<td>11</td>
<td>Socio-economic status</td>
<td>-0.10901</td>
</tr>
<tr>
<td>12</td>
<td>Migration habit</td>
<td>-0.21383</td>
</tr>
<tr>
<td>13</td>
<td>Cosmopolite localitiness</td>
<td>0.11452</td>
</tr>
<tr>
<td>14</td>
<td>Economic motivation</td>
<td>-0.15014</td>
</tr>
<tr>
<td>15</td>
<td>Scientific orientation</td>
<td>-0.14948</td>
</tr>
<tr>
<td>16</td>
<td>Risk preference</td>
<td>0.01447</td>
</tr>
<tr>
<td>17</td>
<td>Attitude towards high yielding varieties</td>
<td>-0.06658</td>
</tr>
<tr>
<td>18</td>
<td>Attitude towards chemical fertilizers</td>
<td>0.03219</td>
</tr>
<tr>
<td>19</td>
<td>Knowledge level about maize crop</td>
<td>-0.36549</td>
</tr>
<tr>
<td>20</td>
<td>Knowledge level about paddy crop</td>
<td>-0.44825</td>
</tr>
<tr>
<td>21</td>
<td>Knowledge level about tur crop</td>
<td>-0.51344</td>
</tr>
<tr>
<td>22</td>
<td>Knowledge level about black-gram crop</td>
<td>-0.53752</td>
</tr>
<tr>
<td>23</td>
<td>Land holding</td>
<td>0.19012</td>
</tr>
<tr>
<td>24</td>
<td>Annual income</td>
<td>0.14128</td>
</tr>
<tr>
<td>25</td>
<td>Indebtedness</td>
<td>-0.01587</td>
</tr>
<tr>
<td>26</td>
<td>Cropping intensity</td>
<td>0.15582</td>
</tr>
<tr>
<td>27</td>
<td>Sources of information</td>
<td>0.15347</td>
</tr>
</tbody>
</table>

* Significant at 0.05 level  
NS=Non-significant
5.5.1 Relationship between independent variables and overall technological gap:

Overall technological gap was the dependent variable in the present study. Overall technological gap of the major crops viz. paddy, maize, tur and black-gram were considered as the major crops and relationship with the different independent variables was established.

5.5.1.1 Age and overall technological gap:

The data in Table - 38 were used to test the null hypothesis \((H_0 : 1.1)\) that there is no relationship between the age of the tribal farmers and their overall technological gap.

The calculated correlation co-efficient value of \(r=0.19392\) was significant at 0.05 level. Hence, the null hypothesis was rejected.

It can be concluded that age of the tribal farmers had positive and significant relationship with the overall technological gap. It implies that as age increases, the overall technological gap increases. It means that older farmers might be not adopting the recommended crop cultivation technologies, while younger farmers adopted the cultivation technologies. This might be because of the older farmers were orthodox and did not wish to leave the traditional cultivation practices.
This finding was in conformity with the findings of Singh et al (1991) and Nath (1993).

5.5.1.2 Education and overall technological gap:

The data in Table - 38 were used to test the null hypothesis (H₅ : 1.2) that there is no relationship between the education of the tribal farmers and their overall technological gap.

The calculated correlation co-efficient value of $r = -0.03066$ was nonsignificant at 0.05 level. Hence, the null hypothesis was accepted.

It can be concluded that education of the tribal farmers had negatively nonsignificant relationship with the overall technological gap. Though the finding was negatively nonsignificant, it indicated that as the level of education of the tribal farmers increases, the overall technological gap decreases. The probable reasons might be that majority of the tribal farmers (80.74 per cent) were found to be in old age group (above 31 years of age). Hence older tribal farmers might have not attended the school in the past due to lack of educational facilities in the villages.

This finding was in conformity with the findings of

5.5.1.3 Social participation and overall technological gap:

The data in Table - 38 were used to test the null hypothesis \( H_5 : 1.3 \) that there is no relationship between social participation of the tribal farmers and their overall technological gap.

The calculated correlation coefficient value of \( r=0.09886 \) was nonsignificant at 0.05 level. Hence, the null hypothesis was accepted.

It can be concluded that the social participation of the tribal farmers had positive but nonsignificant relationship with the overall technological gap.

This finding was in conformity with the findings of Trivedi (1984), Tyagi and Tyagi (1988) and Kher (1992).

5.5.1.4 Occupation and overall technological gap:

The data in Table - 38 were used to test the null hypothesis \( H_5 : 1.4 \) that there is no relationship between occupation of the tribal farmers and their overall technological gap.
The calculated correlation co-efficient value of $r=-0.18053$ was significant at 0.05 level. Hence, the null hypothesis was rejected.

It can be concluded that the occupation of the tribal farmers had negative and significant relationship with the overall technological gap.

It implies that as the number of occupation increases the overall technological gap decreases. It means when tribal farmers engaged in more occupations, the total income of them might be increased and therefore the technological gap decreased.

This finding was in conformity with those of Tyagi and Sohal (1984), Patel (1990) and Kher (1991).

5.5.1.5 Type of family and overall technological gap:

The data in Table - 38 were used to test the null hypothesis ($H_5 : 1.5$) that there is no relationship between the type of the family of the tribal farmers and their overall technological gap.

The calculated correlation co-efficient value of $r=0.01208$ was nonsignificant at 0.05 level. Hence, the null hypothesis was accepted.
It can be concluded that the type of family had positive and nonsignificant relationship with the overall technological gap.

This finding was in conformity with those of Trivedi (1984), Tyagi and Tyagi (1988), Nagpal and Yadav (1991), Patel and Sangle (1991-92) and Gamit (1993).

5.5.1.6 Size of family and overall technological gap:

The data in Table - 38 were used to test the null hypothesis ($H_5 : 1.6$) that there is no relationship between size of the family and overall technological gap.

The calculated correlation co-efficient value of $r=0.04401$ was nonsignificant at 0.05 level. Hence, the null hypothesis was accepted.

It can be concluded that size of family had positive and nonsignificant relationship with the overall technological gap.

This finding was in conformity with those of Saxena et al (1990), Nagpal and Yadav (1991), Patel and Sagle (1991-92), Gamit (1993) and Nayak (1993).
5.5.1.7 Type of houses and overall technological gap:

The data in Table - 38 were used to test the null hypothesis (H₀ : 1.7) that there is no relationship between type of houses of the tribal farmers and their overall technological gap.

The calculated correlation co-efficient value of \( r = -0.24091 \) was significant at 0.05 level. Hence, the null hypothesis was rejected.

It can be concluded that the type of houses of the tribal farmers had negative and significant relationship with their overall technological gap. It implies that as the tribal farmers improve their houses, that means built pucca houses, the overall technological gap decreases. Pッcca houses requires more investment as compared to kaccha houses. In this area there was limited irrigation facility. So tribal farmers might be not in a position to increase their income on their own farms. So they have to be migrated in the forward areas in search of agril. labour works. They might be coming in contact with the progressive farmers and gain the knowledge regarding the recommended package of practices of the different crops. After getting the knowledge about latest crop technology, they might be adopted the latest and low cost practices of the different crops on their own farms with the hidden wishes to increase their farm income and built pacco houses.
5.5.1.8 Number of houses and overall technological gap:

The data in Table - 38 were used to test the null hypothesis (H₅ : 1.8) that there is no relationship between the number of houses and their overall technological gap.

The calculated correlation co-efficient value of \( r = -0.16554 \) was significant at 0.05 level. Hence, the null hypothesis was rejected.

It can be concluded that the number of houses had negative but significant relationship with the overall technological gap. It implies that as the number of houses increases, the overall technological gap decreases.

It is fact that number of houses increases, the investment for house is also increases. For more investment tribal farmers might be increased their annual income by adopting scientific methods of farming, by taking risk in farming by migrating in forward areas for seasonal agril. labour work, etc. When the tribal farmers migrated in the forward areas, they might be coming in the contact with so many progressive farmers. They might heard and seen the different HYVs of the crops and bumper yields of that varieties. They might be also learned the different no cost and low cost technologies of the crops and these practices might be adopted on their own farms.
5.5.1.9 Farm power and overall technological gap:

The data in Table - 38 were used to test the null hypothesis ($H_5 : 1.9$) that there is no relationship between farm power (bullocks) and their overall technological gap.

The calculated correlation co-efficient value of $r=0.03033$ was nonsignificant at 0.05 level. Hence, the null hypothesis was accepted.

It can be concluded that the farm power (bullocks) of the tribal farmers had positive and nonsignificant relationship with the technological gap.

This finding was in confirmity with those of Trivedi (1984), Nagpal and Yadav (1991) and Nayak (1993).

5.5.1.10 Material possession and overall technological gap:

The data in Table - 38 were used to test the null hypothesis ($H_5 : 1.10$) that there is no relationship between material possession (implements) by the tribal farmers and their overall technological gap.

The calculated correlation co-efficient value of $r=0.04139$ was nonsignificant at 0.05 level. Hence, the null hypothesis was accepted.
It can be concluded that material possession had positive and nonsignificant relationship with the overall technological gap.

This finding was in conformity with that of Nagpal and Yadav (1991).

5.5.1.11 Socio-economic status and overall technological gap:

The data in Table - 38 were used to test the null hypothesis (H5 : 1.11) that there is no relationship between socio-economic status of the tribal farmers and their overall technological gap.

The calculated correlation coefficient value of \( r = -0.10901 \) was nonsignificant at 0.05 level. Hence, the null hypothesis was accepted.

It can be concluded that the socio-economic status of the tribal farmers had negative and nonsignificant relationship with the overall technological gap. Though the finding was negatively nonsignificant, it indicated that as the socio-economic status increases, the overall technological gap decreases.

This finding was in conformity with those of Trivedi (1984) and Wangiker et al (1991).
5.5.1.12 Migration habit and overall technological gap:

The data in Table - 38 were used to test the null hypothesis (H5 : 1.12) that there is no relationship between migration habit and their overall technological gap.

The calculated correlation coefficient value of $r = -0.21383$ was significant at 0.05 level. Hence, the null hypothesis was rejected. It implies that as the migration habit increases, the overall technological gap decreases.

The probable reasons might be that the economic conditions of the tribal farmers was poor. They followed the single cropping pattern because there was limited irrigation facility. They have to be migrated in search of seasonal agricultural labour work in the forward areas where assured irrigation facilities is available. At the time of migration, the tribal farmers might come in contact with the progressive farmers and they might have heard and seen the different high yielding varieties and their bumper yields. They might be adopted the different no cost as well as low cost technologies of the various crops and increased their knowledge level regarding the recommended technologies of various crops. When they come back from the migrated place, they might be adopted these new technologies on their own farms. So the migration habit increases, the overall technological gap decreases.

5.5.1.13 Cosmopolite-localiteness and overall technological gap:

The data in Table - 38 were used to test the null
hypothesis (H5 : 1.13) that there is no relationship between cosmopolite-localiteness and their overall technological gap.

The calculated correlation co-efficient value of $r=0.11452$ was nonsignificant at 0.05 level. Hence, the null hypothesis was accepted.

It can be concluded that cosmopolite-localiteness of the tribal farmers had positive but nonsignificant relationship with the overall technological gap.

This finding was in conformity with that of Trivedi (1984) and Nagpal and Yadav (1991).

5.5.1.14 Economic motivation and overall technological gap :

The data in Table - 38 were used to test the null hypothesis (H5 : 1.14) that there is no relationship between economic motivation of the tribal farmers and their overall technological gap.

The calculated correlation coefficient value of $r=-0.15014$ was significant at 0.05 level. Hence, the null hypothesis was rejected.

It can be concluded that the economic motivation of the
tribal farmers had negative and significant relationship with the overall technological gap. It implies that as the economic motivation increases, the overall technological gap decreases. When tribal farmers became economic oriented, they desired to produce more by adopting recommended crop technologies. Therefore the economic motivation increases, the overall technological gap decreases.

This finding was in confirmity with those of Trivedi (1984), Wangiker et al (1991) and Nath (1993).

5.5.1.15 Scientific orientation and overall technological gap:

The data in Table - 38 were used to test the null hypothesis ($H_0 : 1.15$) that there is no relationship between scientific orientation and overall technological gap.

The calculated correlation coefficient value of $r=-0.14948$ was significant at 0.05 level. Hence, the null hypothesis was rejected.

It can be concluded that the scientific orientation of the tribal farmers had negatively significant relationship with the overall technological gap. It implies that as the scientific orientation increases the overall technological gap decreases.
This might be due to the medium level scientific orientation of the tribal farmers. Tribal farmers come in contact with so many progressive farmers and experienced the latest package of practices of the various crops during their migration period. When they come back from the migrated place, they might be adopting the low cost and no cost technologies as well as recommended practices of various crops on their own farms for better production. Therefore, the scientific orientation increases the overall technological gap decreases.

This finding was in confirmity with those of Supe and Singh (1974), Wangiker et al (1991) and Nath (1993).

5.5.1.16 Risk preferences and overall technological gap:

The data in Table - 38 were used to test the null hypothesis (H5 : 1.16) that there is no relationship between risk-preference of the tribal farmers and their overall technological gap.

The calculated correlation co-efficient value of r=0.01447 was nonsignificant at 0.05 level. Hence, the null hypothesis was accepted.

It can be concluded that risk-preference of the tribal farmers had positive but nonsignificant relationship with the overall technological gap.
This finding was in conformity with that of Sinha and Kolte (1974).

5.5.1.17 Attitude towards HYVs and overall technological gap:

The data in Table - 38 were used to test the null hypothesis ($H_5 : 1.17$) that there is no relationship between attitude towards high yielding varieties and their overall technological gap.

The calculated correlation coefficient value of $r=-0.06657$ was nonsignificant at 0.05 level. Hence, the null hypothesis was accepted.

It can be concluded that the farmers attitude towards high yielding varieties had negative and nonsignificant relationship with their overall technological gap. Though the finding was negatively nonsignificant, it indicated that as the more favourable attitude towards high yielding varieties, the overall technological gap decreases.

This finding was in conformity with that of Trivedi (1984).

5.5.1.18 Attitude towards chemical fertilizers and overall technological gap:

The data in Table - 38 were used to test the null
hypothesis (H5 : 1.18) that there is no relationship between farmers attitude towards chemical fertilizers and their overall technological gap.

The calculated correlation coefficient value of \( r = 0.03219 \) was nonsignificant at 0.05 level. Hence, the null hypothesis was accepted.

It can be concluded that the farmers attitude towards chemical fertilizers had positive and nonsignificant relationship with their overall technological gap. The positive and nonsignificant correlation coefficient value indicated that the more favourable attitude towards the chemical fertilizers, increase the technological gap. The probable reasons might be that the economic condition of the tribal farmers was poor and they had limited irrigation facilities. So they have to take only rainfed kharif crop on their farm. They apply the inadequate quantity of fertilizers because cash might be not on hand or poor economic condition. Thus they might be not in position to adopt the total technologies.

5.5.1.19 Knowledge level about maize crop cultivation and overall technological gap:

The data in Table - 38 were used to test the null hypothesis (H5 : 1.19) that there is no relationship between the knowledge level about maize crop cultivation and their overall
technological gap.

The calculated correlation coefficient value of \( r=-0.36549 \) was significant at 0.05 level. Hence, the null hypothesis was rejected.

It can be concluded that the knowledge level of the tribal farmers about maize crop technology had negative but significant relationship with the overall technological gap. It implies that as the knowledge level increases, the overall technological gap decreases.

The probable reasons might be that in tribal area the soil is slopy, hilly, rocky and relatively low fertile. There was limited irrigation facilities. Tribal farmers followed single cropping pattern. The economic condition of the tribal farmers was poor. The tribal farmers were living in isolated places and majority of them were illiterate. They have to be migrated in search of seasonal agricultural labour work in the Gujarat state where the assured irrigation facility is available. During their migration period, they might come in contact with the progressive farmers and heard and seen the different varieties, bumper yields of the varieties and latest package of practices of different crops. Thus their knowledge might be increased due to the contact with progressive farmers. Improved practices might be adopted by the tribal farmers on their own farms after coming back from the migrated places.

This finding was in confirmity with those of Trivedi.
Knowledge level about paddy crop and overall technological gap:

The data in Table - 38 were used to test the null hypothesis \( H_0 : \beta = 1.20 \) that there is no relationship between the knowledge level about paddy crop and overall technological gap.

The calculated correlation coefficient value of \( r = -0.44825 \) was significant at 0.05 level. Hence, the null hypothesis was rejected.

It can be concluded that the knowledge level about paddy crop had negative and significant relationship with the overall technological gap. It indicated that as the knowledge level about paddy crop increases, the overall technological gap decreases. This might be due to the reasons that tribal farmers have to migrate for more income. They migrated in different talukas of Vadodara district as well as in Gujarat state. In Dabhoi and Sankheda talukas, the area under paddy crop is more as compared to other crops. Tribal farmers may be migrated in these talukas at the time of paddy transplanting and at the time of harvesting. They might be coming in contact with other farmers. They might have heard and seen the different names of the paddy varieties and bumper yields of the paddy varieties. Thus they might have
increased their knowledge level about paddy crop cultivation technologies. Therefore the level of knowledge about paddy cultivation technologies increased, a technological gap decreases.

This finding was in conformity with those of Trivedi (1984), Sethy et al. (1984) and Nath (1993).

5.5.1.21 Knowledge level about tur crop and overall technological gap:

The data in Table - 38 were used to test the null hypothesis (H5 : 1.21) that there is no relationship between the knowledge level about tur crop and overall technological gap.

The calculated correlation coefficient value of $r = -0.51344$ was significant at 0.05 level. Hence, the null hypothesis was rejected.

It can be concluded that the knowledge level about tur crop had negative and significant relationship with the overall technological gap. It implies that as the knowledge level about tur crop increases, the overall technological gap decreases. This might be due to the reasons that tribal farmers have limited irrigation facilities and their economic condition is poor so they might be dependent upon rainfall and take only kharif crops. Tribal farmers have slopy and relatively low fertile soil. They might have seen the tur crop in such type of land. They
migrated in search of agricultural labour work in the different talukas of Vadodara district. Due to more cosmopolite-localiteness, they might be aware about different package of practices of tur crop. Thus they might be increased their knowledge and adopt the low cost and no cost technologies on their own farms.

This finding was in conformity with those of Trivedi (1984), Sethy et al. (1984) and Nath (1993).

5.5.1.22 Knowledge level about black-gram crop and overall technological gap:

The data in Table - 38 were used to test the null hypothesis ($H_5 : 1.22$) that there is no relationship between the knowledge level about black-gram crop and overall technological gap.

The calculated correlation coefficient value of $r = -0.53752$ was significant at 0.05 level. Hence, the null hypothesis was rejected.

It can be concluded that the knowledge level about black-gram crop had negative and significant relationship with the overall technological gap. It implies that as the knowledge level about black-gram crop increases, the overall technological gap decreases. This might be due to the reasons that in tribal
areas there was limited irrigation facilities and the soil is slopy, rocky and relatively low fertile. Tribal farmers cultivated the black gram crop in such type of land with very less care. The economic condition of the tribal farmers was poor. Tribal farmers had migrated in search of seasonal agricultural labour work in the forward areas where assured irrigation facilities is available. At the time of migration, the tribal farmers might come in the contact with the progressive farmers. Thus cosmopolite localiteness might increased and their knowledge about black-gram crop cultivation technology also be increased. They might be adopted the low cost and no cost technologies on their own farm when they comming back from the migrated places.

This finding was in confirmity with those of Trivedi (1984), Sethy et al. (1984) and Nath (1993).

5.5.1.23 Land holding and overall technological gap:

The data in Table - 38 were used to test the null hypothesis \( H_5 : 1.23 \) that there is no relationship between land holding of the tribal farmers and their overall technological gap.

The calculated correlation coefficient value of \( r=0.19012 \) was significant at 0.05 level. Hence, the null hypothesis was rejected.

It can be concluded that the land holding of the tribal
farmers had positive and significant relationship with the overall technological gap. It indicated that as the land holding increases, the overall technological gap also increases. The probable reasons might be that the economic condition of the tribal farmers was poor as well as limited irrigation facilities, slopy and relatively low fertile land so that the land holding was there but they might have not spend enough money to adopt latest crop technologies.

This finding was in confirmity with those of Pandit (1981), Singh (1990) and Singh and Rajendra (1990).

5.5.1.24 Annual income and overall technological gap:

The data in Table - 38 were used to test the null hypothesis \( H_0 : 1.24 \) that there is no relationship between the annual income of the tribal farmers and their overall technological gap.

The calculated correlation coefficient value of \( r=0.14128 \) was significant at 0.05 level. Hence, the null hypothesis was rejected.

It can be concluded that the annual income of the tribal farmers had positive and significant relationship with the
overall technological gap. It indicated that as the annual income increases, the overall technological gap also increases. The probable reasons might be that the economic condition of the tribal farmers was poor and there was no other source of income than farming. So they spend the major part of their income for purchasing cloths, for food and for social ceremony. Therefore the annual income of the tribal farmers increases and the overall technological gap also increases.

This finding was in confirmity with those of Kumari Sushama et al. (1981), Katarya (1989) and Patel and Sangle (1991-92).

5.5.1.25 Indebtedness and overall technological gap:

The data in Table - 38 were used to test the null hypothesis (H₅ : 1.25) that there is no relationship between the indebtedness of the tribal farmers and their overall technological gap.

The calculated correlation coefficient value of r = -0.01587 was nonsignificant at 0.05 level. Hence, the null hypothesis was accepted.

It can be concluded that the indebtedness of the tribal farmers had negative and nonsignificant relationship with the overall technological gap. Though the finding was negatively
nonsignificant, it indicated that as the indebtedness increases, the overall technological gap decreases.

This finding was in conformity with that of Trivedi (1984).

5.5.1.26 Cropping intensity and overall technological gap:

The data in Table - 38 were used to test the null hypothesis \( H_5 : 1.26 \) that there is no relationship between cropping intensity of the tribal farmers and their overall technological gap.

The calculated correlation coefficient value of \( r=0.15582 \) was significant at 0.05 level. Hence, the null hypothesis was rejected.

It can be concluded that the cropping intensity of the tribal farmers had positive and significant relationship with the overall technological gap. It implies that as the cropping intensity increases, the overall technological gap increases.

The probable reasons might be that in tribal area, the soil is slopy, rocky and relatively low fertile. There was limited irrigation facilities. The economic condition of the tribal farmers was poor, and majority of them were debtors. If
the tribal farmers increase the cropping intensity they might not spend the enough money for the adoption of new technologies. So the cropping intensity increase, the overall technological gap was also increases.

This finding was in confirmity with those of Pathak and Mazumdar (1978) and Trivedi (1984).

5.5.1.27 Sources of information and overall technological gap:

The data in Table - 38 were used to test the null hypothesis \( H_5 : 1.27 \) that there is no relationship between the sources of information used by the tribal farmers and their overall technological gap.

The calculated correlation coefficient value of \( r=0.15347 \) was significant at 0.05 level. Hence, the null hypothesis was rejected.

It can be concluded that the sources of information used by the tribal farmers had positive and significant relationship with their overall technological gap. It implies that as the sources of information increases, the technological gap also increases. This might be low literacy level and low level of knowledge of the tribal farmers regarding the recommended crop technologies. In this tribal areas, very few knowledgable sources might be available for tribal farmers. Information might be
insufficient and not timely so the sources of information was there, still the overall technological gap increases.

This finding was in conformity with those of Kumari Sushama et al (1981), Trivedi (1984), Singh and Rajendra (1990), Bavalatti and Sundraswamy (1990), Saxena et al (1990) and Patel and Sangle (1991-92).

5.6 EXTENT OF VARIATION IN THE OVERALL TECHNOLOGICAL GAP OF THE TRIBAL FARMERS CAUSED BY INDEPENDENT VARIABLES

In the previous sub-section the relationship between variables was expressed in terms of correlation coefficients (r). However, generally, in behavioural sciences no dependent variables can be influenced by any single independent variable. As such the overall technological gap index is in reality, not influenced by any of the independent variables singly. It is bound to be influenced by more than one of these independent attributes jointly through their interactive relationships. In order to assess the amount of contribution (influence) of each independent variable to the dependent variable, the effect of other was held constant. Efroymsons (1962) stated that stepwise regression is one such method which has been widely adopted in multiple regression analysis now a days. It has got the added advantage that at each stage of analysis every variable is subjected to an examination for its predictive value. The stepwise regression was carried out with the help of computer.
The multiple regression coefficient (R) represents the zero order correlation between the dependent variable's actual score and the predicted score obtained from the fitted multiple regression equation. The coefficient of multiple determination ($R^2$) gives the total amount of variation accounts in dependent variable when all independent variables were taken together and was tested 'F' test for its significance.

The partial regression coefficient ($b_{Y_i.j.}$) represents the change in dependent variable ($Y$) for a unit change in independent variable ($X_i$) keeping other variables constant and it was tested with student's 't' test for its significance.

The various independent variables had their own units of measurement, which did not permit a comparison of the partial ($b_{Y_i.j.}$) values. To facilitate comparison the partial ($b_{Y_i.j.}$) values were converted into standard partial ($b_{Y_i.j.}$) values which were free from the units of measurements as per the method suggested by Ezekiel and Fox.

The independent variables were then ranked on the basis of standard Partial ($b_{Y_i.j.}$) values, to find out their relative importance in predicting the dependent variable.
5.6.1 Stepwise regression analysis of the independent variables on the overall technological gap of the tribal farmers:

Stepwise regression analysis with overall technological gap as dependent variable and 27 independent variables was carried out and results are presented in Table - 39.

It is clear from the Table - 39 that $57.42\%$ ($R^2 = 0.5742$) percent of the total variation in dependent variable (overall technological gap) was accounted by seven independent variables i.e. (i) number of houses (2) migration habit (3) attitude towards high yielding varieties (4) knowledge level about maize crop technology (5) knowledge level about tur crop technology (6) knowledge level about black-gram crop technology and (7) cropping intensity put together.

The data also show that all the seven $b_{yi.j}$ values were significant making one to conclude that overall technological gap can be predicted by seven selected independent variable mentioned in the Table - 39.

As a result of stepwise regression analysis following regression model was obtained:

$$Y = a + b_8X_8 + b_{12}X_{12} + b_{17}X_{17} + b_{19}X_{19} + b_{21}X_{21} + b_{22}X_{22} + b_{26}X_{26}.$$
**TABLE - 39**

**STEPWISE MULTIPLE REGRESSION ANALYSIS OF THE OVERALL TECHNOLOGICAL GAP**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the variable</th>
<th>Partial regression coefficient (bYi.j.)</th>
<th>Standard error of regression coefficient (S.E. of bYi.j.)</th>
<th>t value</th>
<th>F Value</th>
<th>Standard partial regression coefficient (bYi.j.)</th>
<th>Rank</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of houses</td>
<td>-4.9070</td>
<td>1.5640</td>
<td>3.137</td>
<td>9.843</td>
<td>0.0362</td>
<td>VI</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Migration habit</td>
<td>-4.3653</td>
<td>0.9374</td>
<td>4.657</td>
<td>21.683</td>
<td>0.0764</td>
<td>IV</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Attitude towards high yielding varieties</td>
<td>-0.2853</td>
<td>0.1041</td>
<td>2.741</td>
<td>7.507</td>
<td>0.0279</td>
<td>VII</td>
<td>0.5742</td>
</tr>
<tr>
<td>4</td>
<td>Knowledge level (Maize crop)</td>
<td>-0.3093</td>
<td>0.0506</td>
<td>6.113</td>
<td>37.397</td>
<td>0.1249</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Knowledge level (Tur crop)</td>
<td>-0.5015</td>
<td>0.0525</td>
<td>9.552</td>
<td>91.088</td>
<td>0.2580</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Knowledge level (Black-gram crop)</td>
<td>-0.2897</td>
<td>0.0397</td>
<td>7.297</td>
<td>53.235</td>
<td>0.1689</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Cropping intensity</td>
<td>0.0075</td>
<td>0.0018</td>
<td>4.167</td>
<td>16.441</td>
<td>0.0590</td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>

**CONSTANT** 133.7491

* = Significant at 5 per cent level
** = Significant at 1 per cent level

Multiple R = 0.7578
Where,

\[ Y = \text{Overall technological gap.} \]
\[ a = \text{The intercept i.e. 133.7491.} \]
\[ b_8 = \text{Coefficient of partial regression of } y \text{ on } X_8 \text{ i.e. } -4.9070. \]
\[ b_{12} = \text{Coefficient of partial regression of } y \text{ on } X_{12} \text{ i.e. } -4.3653. \]
\[ b_{17} = \text{Coefficient of partial regression of } y \text{ on } X_{17} \text{ i.e. } -0.2853. \]
\[ b_{19} = \text{Coefficient of partial regression of } y \text{ on } X_{19} \text{ i.e. } -0.3093. \]
\[ b_{21} = \text{Coefficient of partial regression of } y \text{ on } X_{21} \text{ i.e. } -0.5015. \]
\[ b_{22} = \text{Coefficient of partial regression of } y \text{ on } X_{22} \text{ i.e. } -0.2897. \]
\[ b_{26} = \text{Coefficient of partial regression of } y \text{ on } X_{26} \text{ i.e. } 0.0075. \]

\[ X_8 = \text{Number of houses} \]
\[ X_{12} = \text{Migration habit} \]
\[ X_{17} = \text{Attitude towards high yielding varieties} \]
\[ X_{19} = \text{Knowledge level about maize crop technology} \]
\[ X_{21} = \text{Knowledge level about tur crop technology} \]
\[ X_{22} = \text{Knowledge level about black-gram crop technology} \]
\[ X_{26} = \text{Cropping intensity} \]
Therefore, the fitted equation is as under:

\[ Y = 133.7491 + (-4.9070)X_8 + (-4.3653)X_{12} + (-0.2853)X_{17} \\
+ (-0.3093)X_{19} + (-0.5015)X_{21} + (-0.2897)X_{22} + \\
(0.0075)X_{26}. \]

The partial $b_{Yi,j}$ values of these seven variables were converted into standard partial $b_{Yi,j}$ values. It can be inferred on the basis of standard partial $b_{Yi,j}$ values given in Table - 39 that the order of contribution of these seven variables from highest to lowest was as under.

<table>
<thead>
<tr>
<th>Standard partial values $b_{Yi,j}$</th>
<th>Name of the variables</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2580</td>
<td>Knowledge level about tur crop technology - $X_{21}$</td>
<td>I</td>
</tr>
<tr>
<td>0.1689</td>
<td>Knowledge level about black-gram crop technology - $X_{22}$</td>
<td>II</td>
</tr>
<tr>
<td>0.1249</td>
<td>Knowledge level about maize crop technology - $X_{19}$</td>
<td>III</td>
</tr>
<tr>
<td>0.0764</td>
<td>Migration habit - $X_{12}$</td>
<td>IV</td>
</tr>
<tr>
<td>0.0590</td>
<td>Cropping intensity - $X_{26}$</td>
<td>V</td>
</tr>
<tr>
<td>0.0362</td>
<td>Number of houses - $X_8$</td>
<td>VI</td>
</tr>
<tr>
<td>0.0279</td>
<td>Attitude towards high yielding varieties - $X_{17}$</td>
<td>VII</td>
</tr>
</tbody>
</table>
### TABLE - 40

**STEPWISE VARIATION ACCOUNTED FOR DIFFERENT INDEPENDENT VARIABLES**

N=270

<table>
<thead>
<tr>
<th>Step number</th>
<th>Variables included</th>
<th>Multiple (R)</th>
<th>Total variation accounted (R^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step-I</td>
<td>Knowledge level about black-gram crop (X_{22})</td>
<td>0.5375</td>
<td>0.2889 (28.89%)</td>
</tr>
<tr>
<td>Step-II</td>
<td>(X_{22} + ) Knowledge level about tur crop ((X_{21}))</td>
<td>0.6514</td>
<td>0.4244 (42.44%)</td>
</tr>
<tr>
<td>Step-III</td>
<td>(X_{22} + X_{21} +) Knowledge level about maize crop ((X_{19}))</td>
<td>0.7077</td>
<td>0.5009 (50.09%)</td>
</tr>
<tr>
<td>Step-IV</td>
<td>(X_{22} + X_{21} + X_{19} +) Migration habit ((X_{12}))</td>
<td>0.7238</td>
<td>0.5240 (52.40%)</td>
</tr>
<tr>
<td>Step-V</td>
<td>(X_{22} + X_{21} + X_{19} + X_{12} +) Cropping intensity ((X_{26}))</td>
<td>0.7367</td>
<td>0.5427 (54.27%)</td>
</tr>
<tr>
<td>Step-VI</td>
<td>(X_{22} + X_{21} + X_{19} + X_{12} + X_{26} +) Number of houses ((X_{8}))</td>
<td>0.7497</td>
<td>0.5620 (56.20%)</td>
</tr>
<tr>
<td>Step-VII</td>
<td>(X_{22} + X_{21} + X_{19} + X_{12} + X_{26} +) (X_{8} +) Attitude towards high yielding varieties ((X_{17}))</td>
<td>0.7578</td>
<td>0.5742 (57.42%)</td>
</tr>
</tbody>
</table>
Key to figure:

\[ Y = \text{Overall technological gap} \]
\[ X_{22} = \text{Knowledge level about black-gram crop} \]
\[ X_{21} = \text{Knowledge level about tur crop} \]
\[ X_{19} = \text{Knowledge level about maize crop} \]
\[ X_{12} = \text{Migration habit} \]
\[ X_{26} = \text{Cropping intensity} \]
\[ X_8 = \text{Number of houses} \]
\[ X_{17} = \text{Attitude towards high yielding varieties}. \]
Fig. 9: EXTENT OF VARIATION ACCOUNTED BY INDEPENDENT VARIABLES ON OVERALL TECHNOLOGICAL GAP
It is clear from the Table - 40 and Figure - 9 that the knowledge level of the tribal farmers according to the recommended technologies for black-gram crop alone accounted 28.89 percent of the variation in the overall technological gap. (dependent variable) followed by knowledge level about black-gram crop + knowledge level about tur crop 42.44 percent, knowledge level about black-gram, tur and maize crop 50.09 percent, the earlier three variables + migration habit 52.40 percent, the earlier four variables + cropping intensity 54.27 percent, the earlier five variables + number of houses 56.20 percent, the earlier six variables + attitude towards high yielding varieties contributing for 57.42 percent change in the overall technological gap (dependent variable).

5.7 DIRECT, TOTAL INDIRECT AND SUBSTANTIAL INDIRECT EFFECT OF THE SELECTED INDEPENDENT VARIABLES ON OVERALL TECHNOLOGICAL GAP.

The correlation analysis of the data reported earlier indicated relationship between variables in presence of all other variables which normally operate in a life situation. The relationship revealed by correlation study may undergo change in different situations where some of the independent variables may not exist in the environment or they may be latent.

The correlation coefficient values (r) were found to be significant in respect of fifteen independent variables with
overall technological gap. In stepwise regression analysis only seven variables were significant with technological gap. The data thus indicated that the observed relationship between dependent and independent variables is only partially absolute and partially relative and a portion of observed relationship is the contribution made by other independent variables, through which the independent variables exercise their influence jointly.

It is therefore, necessary to study the influence of independent variables on the dependent variable both directly as well as through other variables present in the situation. Hence, the significant independent variables were subjected to path analysis. The result of path analysis are presented in Table - 41 and diagrammatically depicted in Figure - 10.

5.7.1 Direct effect

From the Table - 41 of path analysis, it was revealed that the variables viz. occupation, type of houses, number of houses, migration habit, economic motivation, scientific orientation, knowledge level about maize crop, knowledge level about paddy crop, knowledge level about tur crop, knowledge level about black-gram crop, land holding and sources of information exhibited negative direct effect while age, annual income and cropping intensity exhibited positive direct effect on overall technological gap.
KEY TO FIGURE : 10

Direct effect

Total indirect effect

First order Substantial effect

VARIABLES

\[ X_1 = \text{Age} \]
\[ X_4 = \text{Occupation} \]
\[ X_7 = \text{Type of houses} \]
\[ X_8 = \text{Number of houses} \]
\[ X_{12} = \text{Migration habit} \]
\[ X_{14} = \text{Economic motivation} \]
\[ X_{15} = \text{Scientific orientation} \]
\[ X_{19} = \text{Knowledge level about maize crop} \]
\[ X_{20} = \text{Knowledge level about paddy crop} \]
\[ X_{21} = \text{Knowledge level about tur crop} \]
\[ X_{22} = \text{Knowledge level about black-gram crop} \]
\[ X_{23} = \text{Land holding} \]
\[ X_{24} = \text{Annual income} \]
\[ X_{26} = \text{Cropping intensity} \]
\[ X_{27} = \text{Sources of information} \]
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Variables</th>
<th>Direct effect</th>
<th>Total indirect effect</th>
<th>Substantial indirect effect through first order</th>
<th>Second order</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age</td>
<td>0.0242</td>
<td>0.16972</td>
<td>0.0678 (X_{21})</td>
<td>0.0447 (X_{22})</td>
</tr>
<tr>
<td>2</td>
<td>Occupation</td>
<td>-0.0240</td>
<td>-0.15653</td>
<td>0.0185 (X_{23})</td>
<td>0.0047 (X_{27})</td>
</tr>
<tr>
<td>3</td>
<td>Type of houses</td>
<td>-0.0459</td>
<td>-0.19501</td>
<td>0.0148 (X_{12})</td>
<td>0.0129 (X_{24})</td>
</tr>
<tr>
<td>4</td>
<td>Number of houses</td>
<td>-0.1411</td>
<td>-0.02444</td>
<td>0.0537 (X_{26})</td>
<td>0.0485 (X_{12})</td>
</tr>
<tr>
<td>5</td>
<td>Migration habit</td>
<td>-0.1672</td>
<td>-0.04663</td>
<td>0.0409 (X_{8})</td>
<td>0.0402 (X_{23})</td>
</tr>
<tr>
<td>6</td>
<td>Economic motivation</td>
<td>-0.0708</td>
<td>-0.07934</td>
<td>0.0260 (X_{26})</td>
<td>0.0101 (X_{23})</td>
</tr>
<tr>
<td>7</td>
<td>Scientific orientation</td>
<td>-0.0601</td>
<td>-0.08938</td>
<td>0.0117 (X_{23})</td>
<td>0.0036 (X_{21})</td>
</tr>
<tr>
<td>8</td>
<td>Knowledge level about maize crop</td>
<td>-0.2418</td>
<td>-0.12365</td>
<td>0.0045 (X_{27})</td>
<td>0.0031 (X_{23})</td>
</tr>
<tr>
<td>9</td>
<td>Knowledge level about paddy crop</td>
<td>-0.0316</td>
<td>-0.04166</td>
<td>0.0268 (X_{23})</td>
<td>0.0043 (X_{26})</td>
</tr>
<tr>
<td>10</td>
<td>Knowledge level about tur crop</td>
<td>-0.3891</td>
<td>-0.12434</td>
<td>0.0102 (X_{26})</td>
<td>0.0041 (X_{23})</td>
</tr>
<tr>
<td>11</td>
<td>Knowledge level about black-gram crop</td>
<td>-0.2833</td>
<td>-0.25422</td>
<td>0.0163 (X_{23})</td>
<td>0.0026 (X_{27})</td>
</tr>
<tr>
<td>12</td>
<td>Land holding</td>
<td>-0.1034</td>
<td>0.29352</td>
<td>0.1762 (X_{26})</td>
<td>0.0650 (X_{12})</td>
</tr>
<tr>
<td>13</td>
<td>Annual income</td>
<td>0.0820</td>
<td>0.05928</td>
<td>0.0673 (X_{12})</td>
<td>0.0316 (X_{22})</td>
</tr>
<tr>
<td>14</td>
<td>Cropping intensity</td>
<td>0.3019</td>
<td>-0.14608</td>
<td>0.0171 (X_{12})</td>
<td>0.0087 (X_{19})</td>
</tr>
<tr>
<td>15</td>
<td>Sources of information</td>
<td>-0.0764</td>
<td>0.22987</td>
<td>0.2962 (X_{26})</td>
<td>0.0167 (X_{12})</td>
</tr>
</tbody>
</table>
Knowledge level about tur crop exerted the highest direct effect on overall technological gap as the path coefficient value was -0.3891 followed by cropping intensity (0.3019), knowledge level about black-gram crop (-0.2833), knowledge level about maize crop (-0.2418), migration habit (-0.1672), number of houses (-0.1411), land holding (-0.1034), Annual income (0.0820), Sources of information (-0.0764), economic motivation (-0.0708), Scientific orientation (-0.0601), type of houses (-0.0459), Knowledge level about paddy crop (-0.0316), Age (0.0242), Occupation (-0.0240) etc.

It can be inferred that the major variables contributing the maximum direct and negative effect on overall technological gap were, knowledge level about tur crop, cropping intensity, knowledge level about black-gram crop, knowledge level about maize crop, migration habit, number of houses and land holding. Whereas the variable cropping intensity contributing maximum positive direct effect on overall technological gap.

5.7.2 Total indirect effect

The Table - 41 revealed that knowledge level about paddy crop had maximum total indirect effect (-0.41665) followed by land holding (0.20352), knowledge level about black-gram crop (-0.25422), sources of information (0.22987), type of houses (-0.19501), age (0.16972), occupation (-0.15653), cropping
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intensity (-0.14608), knowledge level about tur crop (-0.12434), knowledge level about maize crop (-0.12365), scientific orientation (-0.08938), economic motivation (-0.07934), annual income (0.05928), migration habit (-0.04663), number of houses (-0.02444) etc.

It can be inferred that the major variables viz. knowledge level about paddy crop, land holding, knowledge level about black-gram crop, sources of information, type of houses, age and occupation contributed maximum to the overall technological gap indirectly.

The remaining eight variables such as cropping intensity, knowledge level about tur crop, knowledge level about maize crop, scientific orientation, economic motivation, annual income, migration habit and number of houses had contributed minimum total indirect effect on overall technological gap.

5.7.3 Substantial indirect effect

It can be seen from the Table - 41, two types of substantial indirect effect i.e. (i) 1st order and (ii) 2nd order. The results of each given as under.

5.7.3.1 1st order substantial indirect effect:

Sources of information exerted highest substantial
indirect effect (0.2962) on overall technological gap through the variable cropping intensity. The next important variable exerting substantial indirect effect through sources of information was land holding (0.1762). Another substantial indirect effect on overall technological gap was exerted by age (0.0678) acting through knowledge level about tur crop. The remaining variables such as annual income (0.0673), number of houses (0.0537), migration habit (0.0409), knowledge level about paddy crop (0.0268), economic motivation (0.0260), occupation (0.0185), cropping intensity (0.0171), knowledge level about black-gram crop (0.0163), type of houses (0.0148), scientific orientation (0.0117), knowledge level about tur crop (0.0102) and knowledge level about maize crop (0.0045), exerting positive substantial indirect effect through migration habit, cropping intensity, number of houses, land holding, cropping intensity, land holding, migration habit, land holding, migration habit, land holding, cropping intensity and sources of information respectively on overall technological gap.

It can be concluded that 5 out of 15 independent variables had their first largest substantial indirect effect through cropping intensity. Whereas through the variable land holding four independent variables had exerted substantial indirect effect on overall technological gap. Through the variable migration habit three independent variables had exerted substantial indirect effect on overall technological gap. The remaining
three variables out of them one had its substantial indirect effect through knowledge level about tur crop and second had number of houses and third one had sources of information.

5.7.3.2 2nd order substantial indirect effect:

Land holding exerted highest positive substantial indirect effect (0.0650) on overall technological gap through migration habit. The next important variable exerting positive substantial indirect effect through migration habit was number of houses (0.0485). Another positive substantial indirect effect on overall technological gap was age (0.0447) acting through knowledge level about black-gram crop. The remaining variables such as migration habit (0.0402), annual income (0.0316), sources of information (0.0167), type of houses (0.0129), economic motivation (0.0101), cropping intensity (0.0087), occupation (0.0047), knowledge level about paddy crop (0.0043), knowledge level about tur crop (0.0041), scientific orientation (0.0036), knowledge level about maize crop (0.0031) and knowledge level about black-gram crop (0.0026) exerting positive substantial indirect effect through land holding, knowledge level about black-gram crop, migration habit, annual income, land holding, knowledge level about maize crop, sources of information, cropping intensity, land holding, knowledge level about tur crop, land holding and sources of information respectively on overall technological gap.

It can be concluded that out of 15 independent
variables, the four variables through land holding, three variables through migration habit, two variables through knowledge level about black-gram crop, two variables through sources of information had their positive second substantial indirect effect on overall technological gap. The remaining four variables one had its second substantial indirect effect through annual income, second had its second substantial indirect effect through knowledge level about tur crop, third had its second substantial indirect effect through cropping intensity and fourth had its second substantial indirect effect through knowledge level about maize crop.

In general, it can be concluded that the variable knowledge level about tur crop had maximum direct effect followed by cropping intensity, knowledge level about black-gram crop, knowledge level about maize crop and migration habit in descending order, whereas knowledge level about paddy crop, had maximum total indirect effect followed by land holding, knowledge level about black-gram crop and sources of information in descending order. In case of 1st order substantial indirect effect the variable sources of information had maximum effect, followed by land holding, age and annual income in descending order, whereas in second order land holding had maximum substantial indirect effect followed by number of houses, age and migration habit in descending order on overall technological gap. Knowledge level of the major crops (Maize, Paddy, Tur and Black-gram),
migration habit, land holding, sources of information, age and annual income were the key variables providing a way for all the variables in exerting their indirect substantial effect on overall technological gap.

5.8 CONSTRAINTS ASSOCIATED WITH OVERALL TECHNOLOGICAL GAP AMONG TRIBAL FARMERS

Constraints refers to the items of difficulties faced by the tribal farmers in actual adoption of recommended technologies causing technological gap. It also play an important role in adoption of recommended agricultural technologies. During the investigation the respondents expressed many constraints which were grouped into three categories viz. (i) Technological constraints (ii) Information transfer and (iii) Socio-economic constraints. The data in this respect are presented in Table - 42.

The data presented in Table - 42 clearly indicated that among technological constraints, "Poor soil condition of tribal area", Lack of irrigation facility and Inadequate crop protection were perceived as main technological constraints by 100.00, 99.63 and 99.26 per cent of the respondents respectively. While lack of technical guidance and lack of information about new agricultural technology were reported by 98.15 and 97.04 per cent of the respondents respectively. As regards socio-economic constraints, major constraints perceived by 95.93 per cent of the respondents
was lack of finance needed. This was followed by irregular market and market prices as perceived by 62.96 per cent of the respondents. Half of the respondents (51.11 per cent) reported lack of inputs needed as socio-economic constraints.

**TABLE - 42**

**CONSTRAINTS CAUSING TECHNOLOGICAL GAP AS PERCEIVED BY THE RESPONDENTS**

\[ N = 270 \]

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Constraints</th>
<th>Frequency</th>
<th>Per cent Overall</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I. Technological constraints</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Poor soil condition of tribal area</td>
<td>270</td>
<td>100</td>
<td>I</td>
</tr>
<tr>
<td>2</td>
<td>Inadequate crop protection</td>
<td>268</td>
<td>99.26</td>
<td>III</td>
</tr>
<tr>
<td>3</td>
<td>Inadequate tillage and farming methods</td>
<td>211</td>
<td>78.15</td>
<td>VII</td>
</tr>
<tr>
<td>4</td>
<td>Lack of irrigation facilities</td>
<td>269</td>
<td>99.63</td>
<td>II</td>
</tr>
<tr>
<td></td>
<td>II. Information transfer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Lack of information about new agricultural technology</td>
<td>262</td>
<td>97.04</td>
<td>V</td>
</tr>
<tr>
<td>2</td>
<td>Lack of technical guidance</td>
<td>265</td>
<td>98.15</td>
<td>IV</td>
</tr>
<tr>
<td></td>
<td>III. Socio-economic constraints</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Lack of inputs needed</td>
<td>138</td>
<td>51.11</td>
<td>IX</td>
</tr>
<tr>
<td>2</td>
<td>Lack of finance needed</td>
<td>259</td>
<td>95.93</td>
<td>VI</td>
</tr>
<tr>
<td>3</td>
<td>Irregular market and market prices</td>
<td>170</td>
<td>62.96</td>
<td>VIII</td>
</tr>
</tbody>
</table>
It can be concluded that among all the constraints perceived by the tribal farmers, poor soil condition of tribal area, lack of irrigation facility, inadequate crop protection, lack of technical guidance, lack of information about new agricultural technology, lack of finance needed and inadequate tillage and farming methods were reported by majority of the tribal farmers and ranked as first, second, third, fourth, fifth, sixth and seventh respectively.

The probable reasons about this might be that in tribal area the soil is slopy, hilly, rocky and relatively low fertile. There was limited irrigation facilities so the tribal farmers followed the single cropping pattern. The economic condition of the tribal farmers was poor. Majority of the tribal farmers was illiterate and living in the isolated places. There was limited communication sources. Majority of them were using traditional farming methods.

This finding was in conformance with those of Pant (1976), Bhilegaonkar (1977-78), Kulkarni (1979), Pandit (1981) and Trivedi (1984).

5.9 SUGGESTIONS OF THE TRIBAL FARMERS TO OVERCOME THE CONSTRAINTS ASSOCIATED WITH OVERALL TECHNOLOGICAL GAP

An attempt was also made in this study to know the suggestions of the tribal farmers to overcome the constraints. The respondents were asked to suggest possible solutions in form of their suggestions to overcome the constraints associated with the overall technological gap among the tribal farmers. The data in this respect are presented in Table - 43.
TABLE - 43

SUGGESTIONS TO OVERCOME CONSTRAINTS AS PERCEIVED BY THE RESPONDENTS

N = 270

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Suggestions</th>
<th>Frequency</th>
<th>Per cent</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Information regarding new agricultural technology should be provided</td>
<td>131</td>
<td>48.52</td>
<td>V</td>
</tr>
<tr>
<td>2</td>
<td>Arrangement for easy availability of inputs should be made</td>
<td>157</td>
<td>58.15</td>
<td>IV</td>
</tr>
<tr>
<td>3</td>
<td>Provision for sufficient finance for crop loan should be made</td>
<td>225</td>
<td>83.33</td>
<td>III</td>
</tr>
<tr>
<td>4</td>
<td>Provision for long term loan for creating irrigation facilities should be made</td>
<td>245</td>
<td>90.74</td>
<td>II</td>
</tr>
<tr>
<td>5</td>
<td>Training for new agricultural technology should be arranged</td>
<td>255</td>
<td>94.44</td>
<td>I</td>
</tr>
</tbody>
</table>

The data presented in Table - 43 revealed that more than ninety per cent (94.44 and 90.74 per cent) of the respondents had suggested "training for new agricultural technology should be arranged" and "provision for long term loan for creating irrigation facilities should be made" respectively. While 83.33 per cent and 58.15 per cent of the respondents had suggested "provision for sufficient finance for crop loan should be made" and "arrangement for easy availability of inputs should be made" respectively. "Information regarding new agricultural technology
should 'be provided' was suggested by 48.52 per cent of the respondents.

It can be concluded that more than eighty three per cent of the respondents had suggested three suggestions viz. training for new agril. technology should be arranged, provision for long term loan for creating irrigation facilities should be made and provision for sufficient finance for crop loan should be made.

This finding was in conformity with those of Bhilegaon-kar (1977-78), Pandit (1981) and Trivedi (1984).
Summary and Conclusions
CHAPTER VI
SUMMARY AND CONCLUSIONS

As against the 7.54 per cent schedule tribes population in the country, schedule tribes in Gujarat state accounts for 14.92 per cent of the total population in the state. In Gujarat 92.68 per cent tribes are living in rural areas and 86.00 per cent are agriculturist and agricultural labourers. Bawa committee recommended that "Tribal people requires a packages of services, the main components of which are credit, supply of seeds and other agricultural inputs, supply of consumer goods and marketing to produce both agricultural and minor forest. These activities constitute the major area of exploitation of tribals. The co-operative structure should, therefore, provide integrated credit and other services to the tribals". Dry farming programmes should be given highest priority than the other normal programmes in tribal areas. In this background, Integrated Tribal sub-plan Development Project (I.T.D.P) has to play leading and challenging role. Now it is clear that not only capital or finance is the barrier of the tribal farmers but their ignorance towards new agricultural technology and conservativeness are also the obstacles in their progress.

Jaiswal and Kolte (1975) noted that the barriers in the way of the diffusion of farm innovations among the tribal people are lack of compatibility, communication and profitability, difficulties of initial cost of farm innovations, absence of target and budget oriented programmes, poor knowledge of
extension worker, ineffective use of extension methods, lack of dedication and missionary zeal among the extension workers. Therefore, only to ensure viability to the tribal farmers by providing institutional credit and state assistance can not be rationalised. The ignorance of tribal farmers never persuades them to adopt the modern technology.

Sinha (1973) stated that the "GARIBI HATAO" from the tribals can not be done without taking a drastic step of excluding those who are economically better off among them. So equal attention must be provided to educate the tribal farmers and communicate the new technology to the door of farmers who are lying at the grass root of the society.

As compared to rural population, literacy percentage is very low and agriculture is traditional among tribals which pose problems in adoption of new agricultural technologies among tribals. Stable agriculture seems to be the main source of income for the tribals in our country. Use of modern agricultural technologies, inputs and high yielding varieties have not percolated among tribals to any appreciable extent. Agriculture practiced by them is characterised by low productivity as it is mostly dependent on the vagaries of monsoons. All these factors resulted in very low yield of principal crops in the tribal areas.

In view of above facts, it was considered as worth to
carry out the study "Transfer of agricultural technology among tribal farmers of I.T.D.P. Chhotaurdepur, dist. Vadodara."

6.1 OBJECTIVES OF THE STUDY:

The overall objectives of this study was to study transfer of agricultural technology among tribal farmers of I.T.D.P. Chhotaurdepur dist. Vadodara. The specific objectives of the study were as under:
1. To study the personal and socio-psychological, situational and communication characteristics of the tribal farmers.
2. To study the cropping pattern followed by the tribal farmers.
3. To study the attitude of tribal farmers towards agricultural recommended technology (chemical fertilizers and high yielding varieties) for the major crops.
4. To identify and study the overall technological gap as against recommended technologies of major crops among the tribal farmers.
5. To study the level of yield of major crops on tribal farms.
6. To analyse and study the constraints associated with technological gap and ascertain the suggestions of tribal farmers to overcome the constraints associated with technological gap.
6.2 REVIEW OF LITERATURE AND THEORETICAL ORIENTATION:

A comprehensive review of literature having direct or indirect bearing on the problem was reviewed. On the basis of review of literature, a theoretical orientation was developed for the study. Based on assumption, tentative paradigm was laid down. Taking the help from theoretical orientation, the null hypothesis also formulated in view of the above objectives.

6.3 RESEARCH METHODOLOGY:

The present study was carried out in tribal areas of Vadodara district of Gujarat state. The methodological procedures consisted of dependent (overall technological gap) and selected independent variables, setting and selection of the respondents, analysis of data and various statistical measures used to test the hypothesis. The statistical measures such as percentage, mean score, standard deviation, co-efficient of correlation, stepwise multiple regression, standard partial regression coefficient and path coefficient analysis were used.

The scales such as socio-economic status scale developed by Trivedi (1963), teacher made knowledge test developed based on the knowledge scale of Jha and Singh (1970), attitude scale for high yielding varieties developed by Nair (1969), attitude scale for chemical fertilizers developed by Singh _et al_ (1968), cosmopolitaneness scale developed by Singh (1973), economic motivation scale developed by Supe and Singh (1974), credibility
index worked out by Sandhu (1975) and technological gap index developed by All India Co-ordinated Research Programme in extension education I.A.R.I., New Delhi (1979) were used. The independent variables such as age, education, social participation, occupation, type of family, size of family, type of houses, farm power possessed, material possession, socio-economic status, migration habit, cosmopolite-localiteness, economic motivation, scientific orientation, risk-preference, attitude towards high yielding varieties, attitude towards chemical fertilizers, knowledge level about maize crop, knowledge level about paddy crop, knowledge level about tur crop, knowledge level about black-gram crop, land holding, annual income, indebtedness, cropping intensity, sources of information and source credibility were measured with the help of response to appropriate questions.

Out of twelve talukas of Vadodara district, three talukas namely (1) Chhotaudepur (2) Naswadi and (3) Pavi-Jetpur were purposively selected. These talukas possess more than fifty percent of the tribal population and I.T.D.P. - Chhotaudepur is also operating in these talukas. The villages in each selected talukas were classified into three groups viz. (i) High (ii) Medium and (iii) Low communication facilities score developed by Murthy and Singh (1974) and two villages from each group were selected randomly. Thus six villages from each taluka were selected. In all 18 villages were selected from the above three talukas for the present study. From each village 15 tribal
farmers were selected randomly. Thus the total sample constitutes of 270 tribal farmers.

The interview schedule (questionnaire) was prepared keeping in view the objectives of the study. The interview schedule was translated into Gujarati language and pretested in the field on a separate 30 non-sampled respondents. On the basis of pre-testing, necessary modifications were made in the final format and was used as the instrument for data collection. The respondents were contacted personally at their work spot or at their residences in an informal way. The following important conclusions were summarised based on the findings of the study.

6.4 FINDINGS OF THE STUDY:

6.4.1 Characteristics (independent variables) of the tribal farmers:

1. It was observed that majority (64.44 per cent) tribal farmers were in middle age group and were illiterate (52.22 per cent).

2. Majority (73.70 per cent) of the tribal farmers had no membership in any social organisation and most of them (48.89 per cent) were dependent on farming + labour work.

3. In case of type and size of family, majority of the tribal farmers belonged to joint family (58.15 per cent) and having medium (48.14 per cent) to large size (25.93 per cent) of family.
4. In case of type and number of houses, majority of the tribal farmers had one (91.48 per cent) kachha type house (62.59 per cent).

5. Majority (81.11 per cent) of the tribal farmers were possessed minimum farm power i.e. upto two bullocks and majority (92.96 per cent) of them having local implements only.

6. Majority (71.48 per cent) of the tribal farmers belonged to medium socio-economic status level.

7. The migration for work was observed to the tune of 60.00 per cent among sample tribal farmers.

8. Majority of the tribal farmers were found to have medium level cosmopolite-localiteness (78.15 per cent), medium economic motivation (78.89 per cent), medium scientific orientation (71.11 per cent) and medium level risk preference (76.30 per cent).

9. Majority (71.12 per cent) of the tribal farmers had neutral attitude towards high yielding varieties and neutral attitude towards chemical fertilizers (74.44 per cent).

10. Majority of the tribal farmers (64.81 per cent, 64.07 per cent, 65.19 per cent and 63.70 per cent) were found to have medium level knowledge about recommended technologies of maize, paddy, tur and black-gram crop respectively.

11. More than one fourth of the tribal farmers (36.67 and
38.89 per cent) possessed upto 2.5 acres and 2.51 to 5.00 acres of land respectively with cropping intensity upto 150 per cent (72.59 per cent).

12. Majority (72.23 per cent) of the tribal farmers had annual income upto Rs.10,000=00 with debt of Rs.5000=00 (50.74 per cent).

13. Majority of the tribal farmers (82.96 per cent and 67.41 per cent) mainly utilized neighbour and relatives as a source of information respectively. Both the sources were ranked seventh and sixth on source credibility index respectively. Village level worker and contact farmers were used by 20.37 and 15.56 per cent of the tribal farmers but they ranked First and Second on source credibility index respectively. The staff of I.T.D.P was used as source of information by 36.30 per cent of the tribal farmers.

6.4.2 Cropping pattern followed by the tribal farmers:

There is no change over time in the cropping pattern of the tribal farmers. All most all (100.00 per cent) respondents had followed single cropping pattern, and predominantly food grains oriented and especially kharif cereals oriented.

6.4.3 Yield level of major crops on the tribal farms:

The average yields on the tribal farms for crops viz. maize, paddy, tur, black-gram, summer groundnut and cotton were
lower than the district average yields. The decrease in yield varies from 13.00 per cent to 65.00 per cent.

6.4.4 Technological gaps of major crops among the tribal farmers:

1. Majority of the tribal farmers (above 52.00 per cent) were having low level gap for maize, paddy and tur crops so far gap in respect of high yielding, hybrids and improved seeds is concerned, while for black-gram crop majority of the sample farmers (90.37 per cent) were having high level gap.

2. As regards gap in use of farm yard manure, majority of the tribal farmers (above 67.00 per cent) were found to have low level of gap in maize and paddy crop. While majority of the tribal farmers (above 75.00 per cent) were found to have high level of gap in tur and black-gram crops.

3. More than eighty one per cent of the tribal farmers were found to have medium to high gap so far use of chemical fertilizers are concerned for maize, paddy, tur and black-gram crops.

4. Almost all (above 98.00 per cent) tribal farmers were having medium level gap in case of use of plant protection measures in four major crops.

5. Majority of the tribal farmers (70.74 per cent medium
and 28.89 per cent high level gap) were found to have in medium to high level of overall technological gap.

6.4.5 Relationship between independent and dependent variables:

In all 27 personal and socio-psychological, situational and communication characteristics of the tribal farmers selected for the study were tested to determine relationship if any with overall technological gap.

1. There was significant relationship between age of the tribal farmers and their overall technological gap.
2. There was negative significant relationship between occupation of the tribal farmers and their overall technological gap.
3. There was negative significant relationship between type and number of houses of the tribal farmers and their overall technological gap.
4. There was negative significant relationship between migration habit of the tribal farmers and their overall technological gap.
5. Economic motivation and scientific orientation both had negative significant relationship with overall technological gap of the tribal farmers.
6. There was negative significant relationship between knowledge level of major crops (maize, paddy, tur and black-gram
7. Land holding and cropping intensity of the tribal farmers both had positive significant relationship with overall technological gap.

8. There was significant relationship between annual income of the tribal farmers and their overall technological gap.

9. There was significant relationship between sources of information used by the tribal farmers and their overall technological gap.

10. Education, attitude towards high yielding varieties, and indebtedness of the tribal farmers had negative but non-significant relationship with their overall technological gap.

11. Social participation, type and size of family, farm power possessed, material possession, cosmopolite-localiteness, risk-preference and attitude towards chemical fertilizers had positive but non-significant relationship with their overall technological gap.

12. About 57.42 per cent \( (R^2 = 0.5742) \) contribution of the variation in dependent variable (overall technological gap) was accounted by below said seven variables from highest to lowest.
(i) Knowledge level about tur crop
(ii) Knowledge level about black-gram crop
(iii) Knowledge level about maize crop
(iv) Migration habit
(v) Cropping intensity.
(vi) Number of houses
(vii) Attitude towards high yielding varieties.

13. The major variables contributing the maximum direct and negative effect on overall technological gap of the tribal farmers were occupation, type of houses, number of houses, migration habit, economic motivation, scientific orientation, knowledge level about maize crop, knowledge level about paddy crop, knowledge level about tur crop, knowledge level about black-gram crop, land holding and source of information, whereas the variable age, annual income and cropping intensity contributing maximum positive direct effect on overall technological gap.

14. The variables knowledge level about paddy crop, land holding, knowledge level about black-gram crop, source of information, type of houses, age and occupation contributed maximum to the overall technological gap indirectly in descending order whereas the variables cropping intensity, knowledge level about tur crop, knowledge level about maize crop, scientific orientation, economic motivation, annual income, migration habit and number of houses had contributed minimum total indirect
effect on overall technological gap.

15. In case of 1st order substantial indirect effect the variable, source of information had maximum effect, followed by land holding, age and annual income in descending order, whereas in second order, land holding had maximum substantial indirect effect followed by number of houses, age and migration habit in descending order. Knowledge level of major crops, migration habit, land holding, sources of information, age and annual income were the key variables providing a way for all the variables in exerting their indirect substantial effect on overall technological gap.

6.4.6 Constraints associated with overall technological gap among tribal farmers:

Among all the constraints perceived by the tribal farmers, poor soil condition of tribal area (100.00 per cent), lack of irrigation facilities (99.63 per cent), inadequate crop protection (99.26 per cent), lack of technical guidance (98.15 per cent), lack of information about new agricultural technology (97.04 per cent), lack of finance needed (95.93 per cent), and inadequate tillage and farming methods (78.15 per cent) were reported by majority of the tribal farmers and ranked in descending order.
6.4.7 Suggestions of the tribal farmers to overcome constraints related with overall technological gap:

Majority of the tribal farmers (above 58.00 per cent) had suggested that "Training for new agricultural technology should be arranged", "provision for long term loan for creating irrigation facilities should be made", "provision for sufficient finance for crop loan should be made" and "arrangement for easy availability of inputs should be made".

6.5 CONCLUSIONS:

In light of the findings, the following conclusions can be drawn:

1. Majority of the tribal farmers were illiterate, belonged to medium socio-economic status, middle age group, had no membership in any social organisation and dependent on farming + labour work.

2. Majority of the tribal farmers belonged to joint family with medium to large size of family and they possess one kachha type house.

3. Majority of the tribal farmers possessed minimum farm power (upto two bullocks) and possess local implements only.

4. About 60.00 per cent migration was observed in sample tribal farmers.
5. Majority of the tribal farmers had up to 5.00 acres of land, up to Rs.10,000=00 annual income and debt up to Rs.5000=00.

6. Majority of the tribal farmers were found to have medium level cosmopolite - localiteness, medium economic motivation, medium scientific orientation and medium level risk preference.

7. Majority of the tribal farmers had neutral attitude towards HYVs and chemical fertilizers, while medium level knowledge about recommended technologies of major crops of that area.

8. Among different sources of information majority of the tribal farmers used neighbours and relatives as a source of information. In source credibility index village level worker and contact farmers ranked first and second respectively.

9. Majority of the tribal farmers had followed single cropping pattern and predominantly kharif cereals with up to 150 per cent cropping intensity without change overtime.

10. The average yields on tribal farms for major crops were lower than the district average yields.

11. The extent of technological gap in use of high yielding, hybrid and improved seeds of varieties, use of farm yard manure, use of chemical fertilizers and use of plant protection measures
in major crops viz. maize, paddy, tur and black-gram was found to have medium to high gap level among tribal farmers.

12. Among various personal, socio-psychological, situational and communication characteristics of the tribal farmers, occupation, type and number of houses, migration habit, economic motivation, scientific orientation and knowledge level of major crops viz. maize, paddy, tur and black-gram were found negative and significant relationship whereas age, land holding, annual income, cropping intensity and sources of information were positive and significant relationship with overall technological gap.

13. Seven variables viz. knowledge level about tur crop, knowledge level about black-gram crop, knowledge level about maize crop, migration habit, cropping intensity, number of houses and attitude towards high yielding varieties contributed 57.42 per cent variation in dependent variable (overall technological gap).

14. The major variables contributing the maximum direct and negative effect on overall technological gap of the tribal farmers were occupation, type of houses, number of houses, migration habit, economic motivation, scientific orientation, knowledge level about maize crop, knowledge level about paddy crop, knowledge level about tur crop, knowledge level about black-gram crop, land holding and source of information, whereas the variable age,
annual income and cropping intensity contributing maximum positive direct effect on overall technological gap.

15. The variables knowledge level about paddy crop, land holding, knowledge level about black-gram crop, source of information, type of houses, age and occupation contributed maximum to the overall technological gap indirectly in descending order, whereas the variables cropping intensity, knowledge level about tur crop, knowledge level about maize crop, scientific orientation, economic motivation, annual income, migration habit and number of houses had contributed minimum total indirect effect on overall technological gap.

16. In case of 1st order substantial indirect effect the variable source of information had maximum effect followed by land holding, age and annual income in descending order, whereas in second order land holding had maximum substantial indirect effect followed by number of houses, age and migration habit in descending order.

Knowledge level of major crops, migration habit, land holding, sources of information, age and annual income were the key variables providing a way for all the variables in exerting their indirect substantial effect on overall technological gap.

17. Among all the constraints related with overall
technological gap as perceived by the tribal farmers, poor soil condition, lack of irrigation facility, inadequate crop protection, lack of technical guidance, lack of information about new agricultural technology, lack of finance and inadequate tillage and farming methods were the major constraints reported by them.

18. Majority of the tribal farmers had suggested that training for new agricultural technology should be arranged, provision for long term loan for creating irrigation facilities should be made, provision for sufficient finance for crop loan should be made and arrangement for easy availability of inputs should be made to overcome the constraints.

19. Among various personal, socio-psychological, situational and communication characteristics of the tribal farmers, age, education, type of houses, number of houses, migration habit, economic motivation, scientific orientation, knowledge level of major crops, land holding, annual income, cropping intensity and source of information used by the tribal farmers were found significantly related with overall technological gap.

The tentative paradigms were developed in the beginning of this dissertation while arriving at the conceptual frame of the study (Figure 1 and 2). Now final form of paradigm shows only those variables that had significant relationship. Figure - 12 shows those characteristics of the tribal farmers which had
Fig. 11: EXTENT OF VARIATION CAUSED BY DIFFERENT INDEPENDENT VARIABLES (THE FINAL PARADIGM)
Fig. 12: EMPIRICAL MODEL
significant relationship with overall technological gap in zero-order correlation analysis. Figure - 11 shows extent of variation caused by independent variables on overall technological gap.

6.6 IMPLICATION

Based upon the major findings of the present investigation, the following operational implications could be suggested for actions for transfer of agricultural technology among the tribal farmers as follow.

1. The findings of this study revealed that majority of the tribal farmers were illiterate, belonged to middle age group and having medium socio-economic status with no membership in any social organisation. Hence, different programmes should be promoted on these aspects. Young age farmers may be given priority in farming programmes. Efforts should be made for more participation of tribal farmers in development programmes.

2. The study also revealed that majority of the tribal farmers were dependent on farming + labour work, with small to medium farm power i.e. upto two bullocks and local implements. Hence, efforts should be made to supply inputs to small tribal farmers. They should be given adequate facilities for farming.

3. The findings with regards to knowledge of tribal farmers
about recommended technology of major crops and attitude towards high yielding varieties and chemical fertilizers indicated that they had medium level knowledge and neutral attitude. Hence, systematic efforts should be made to give skill oriented practical training to tribal farmers to increase knowledge and develop favourable attitude towards high yielding varieties as well as favourable attitude towards chemical fertilizers.

4. The findings on source of information used by the tribal farmers largely depend on neighbour, relatives, staff of I.T.D.P, village level worker and contact farmers. There are also other sources available viz. Demonstrations, radio, television, field trips, exhibitions, agricultural fair, farmers' day, film show etc. Hence efforts should be made to use combination of these sources in tribal areas for effective communication of technologies.

5. The findings on cropping pattern of tribal farmers indicated that majority of the tribal farmers follow single cropping with upto 150.00 per cent cropping intensity. The cropping pattern was predominantly foodgrains oriented and there is no change overtime in cropping pattern of the tribal farmers. Hence efforts should be made by extension agencies to popularise other productive crops as well as dry farming technologies in tribal areas. For increasing cropping intensity, irrigation facility should be increased by constructing small check dams and
by digging open wells in the tribal areas. The cooperative irrigation societies should be started for large scale farming.

6. The findings on extent of technological gap indicated that majority of the tribal farmers were having medium to high gap in all the practices of major crops. Hence, efforts should be made by field agencies to popularise technologies through demonstrations and thereby lowering the gap among tribal farmers. Demonstrations will help in reducing technological gaps in all the practices.

7. Among various constraints related with overall technological gap as perceived by the tribal farmers technological, information transfer and socio-economic were the major constraints. Hence, the extension agencies should give priority to solve these constraints and help them in providing facilities like crop protection, input supply, credit needed and increase irrigation facilities in tribal areas.

8. The findings on suggestions of tribal farmers to overcome constraints suggest that training for new agricultural technology should be arranged, provision for long term loan for creating irrigation facilities should be made, provision for sufficient finance for crop loan should be made and arrangement for easy availability of inputs should be made available to tribal farmers. Tribal sub plan should pay more attention on these aspects.
9. Among all the characteristics age, occupation, type of houses, number of houses, migration habit, economic motivation, scientific orientation, knowledge level of the major crops, land holding, annual income, cropping intensity and sources of information used by the tribal farmers were found correlated with overall technological gap in correlation or stepwise regression analysis. Therefore all the government, non-government agencies which are working in tribal areas in different tribal development programmes should made the efforts to get the favourable effects of the said characteristics to reduce the overall technological gap.

6.7 SUGGESTIONS FOR FUTURE RESEARCH

The present study has thrown light on the new areas in which future research work needs to be carried out. Some of the new areas in which research work may be undertaken are as under:

1. To strengthen the findings of this study, similar study may be carried out in other areas of similar type.
2. A critical analysis of functioning of tribal development agencies could be another area for future research.
3. A deep study into inter-tribal variation in respect of technological gap could also be made.
4. Impact of tribal leadership on agricultural development in tribal area is also a major area for future research.
5. For solving co-ordination problems among various
development agencies working in tribal areas, a study may be conducted for their functioning in tribal areas.

6. A detailed study of traditional tribal institutions influencing the agricultural decisions of the tribal farmers could also be studied.

7. Some variables other than those included in this study might be affecting the overall technological gap among the tribal farmers. Hence, such variables be identified and included in the studies to be conducted in future.

8. Similar type of study may be made with more number of crops and with more variables.
Bibliography
BIBLIOGRAPHY


Sub-plan Area of Marathawada", Department of Agricultural Extension, Marathawada Krishi Vidyapeeth, Parbhani.


Singh, Baldeo (1990). "Socio-personal Correlates of Adoption Behaviour and Information Needs of Tribal Farmers in


* Original not seen.
Appendices
APPENDIX - I

Communication Facilities Score

The following weightage was given to the component item of the communication score developed for this study for selection of villages.

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Population :</td>
<td></td>
</tr>
<tr>
<td>(a) Upto 2000</td>
<td>1</td>
</tr>
<tr>
<td>(b) Upto 5000</td>
<td>2</td>
</tr>
<tr>
<td>(c) Upto 10000</td>
<td>3</td>
</tr>
<tr>
<td>(d) Over 10000</td>
<td>4</td>
</tr>
<tr>
<td>2. Length of pucca or semi-pucca road in the village :</td>
<td></td>
</tr>
<tr>
<td>(a) Upto 3 km</td>
<td>1</td>
</tr>
<tr>
<td>(b) Upto 5 km</td>
<td>2</td>
</tr>
<tr>
<td>(c) Over 5 km</td>
<td>3</td>
</tr>
<tr>
<td>3. Facility of bus service :</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes</td>
<td>1</td>
</tr>
<tr>
<td>4. Railway Station :</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes</td>
<td>1</td>
</tr>
<tr>
<td>5. Inland water communication :</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes</td>
<td>1</td>
</tr>
<tr>
<td>Particulars</td>
<td>Weightage</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>6. Supply of electricity :</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes</td>
<td>1</td>
</tr>
<tr>
<td>7. Postal facilities :</td>
<td></td>
</tr>
<tr>
<td>(a) No</td>
<td>0</td>
</tr>
<tr>
<td>(b) P.O. outside but within 5 km.</td>
<td>1</td>
</tr>
<tr>
<td>(c) P.O. within the village</td>
<td>2</td>
</tr>
<tr>
<td>(d) Post and telegraph facilities</td>
<td>3</td>
</tr>
<tr>
<td>8. Telephone :</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes</td>
<td>1</td>
</tr>
<tr>
<td>9. Community radio sets :</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes (Actual Number)</td>
<td>$X_1$</td>
</tr>
<tr>
<td>10. Reading room / Library</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes (Actual Number)</td>
<td>$X_1$</td>
</tr>
<tr>
<td>11. Youth clubs :</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes (Actual Number)</td>
<td>$X_1$</td>
</tr>
<tr>
<td>12. Farmers union :</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes (Actual Number)</td>
<td>$X_1$</td>
</tr>
<tr>
<td>Particulars</td>
<td>Weightage</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>13. VLW Headquarter within the village:</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes</td>
<td>1</td>
</tr>
<tr>
<td>14. Distance from block head-quarters:</td>
<td></td>
</tr>
<tr>
<td>(a) Upto 5 km</td>
<td>3</td>
</tr>
<tr>
<td>(b) Upto 10 km</td>
<td>2</td>
</tr>
<tr>
<td>(c) Upto 15 km</td>
<td>1</td>
</tr>
<tr>
<td>(d) Over 15 km</td>
<td>0</td>
</tr>
<tr>
<td>15. Primary/Jr. Basic Schools:</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes (Actual Number)</td>
<td>$X_1$</td>
</tr>
<tr>
<td>16. Middle Schools:</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes (Actual Number)</td>
<td>$X_2$</td>
</tr>
<tr>
<td>17. High Schools:</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes (Actual Number)</td>
<td>$X_3$</td>
</tr>
<tr>
<td>18. Health facilities:</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes (Actual Number)</td>
<td>$X_4$</td>
</tr>
<tr>
<td>19. Village Panchayat:</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes</td>
<td>1</td>
</tr>
<tr>
<td>Particulars</td>
<td>Weightage</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>20. Seed-cum-fertilizer depots (Cooperative and/or private):</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes (Actual Number)</td>
<td>$X_1$</td>
</tr>
<tr>
<td>21. Demonstration plots laid during the previous year:</td>
<td></td>
</tr>
<tr>
<td>(a) Nil</td>
<td>0</td>
</tr>
<tr>
<td>(b) Yes (Actual Number)</td>
<td>$X_1$</td>
</tr>
</tbody>
</table>

- o o o -
APPENDIX - II
TRANSFER OF AGRICULTURAL TECHNOLOGY AMONG TRIBAL FARMERS
OF I.T.D.P. CHHOTAUNDEPUR DIST. VADODARA

INTERVIEW SCHEDULE
******************

Respondent No. : _______ Date of Interview : _______
Name of the farmer : ____________________________________________
Village : _________ Taluka : _______ Subtribe : _______
(Note : mark wherever applicable).

PART - I

1. Age : _______ years

2. Education : Score
   (a) Illiterate 0
   (b) Can read only 1
   (c) Can read and write 2
   (d) Primary 3
   (e) Middle 4
   (f) High school 5
   (g) Graduate and above 6

3. Social Participation :
   (a) No member 0
   (b) Member in one organisation 1
   (c) Member in more than one organisation 2
   (d) Office holder 3
4. **Occupation**:  
   (a) Farming only 1  
   (b) Farming + Labour work 2  
   (c) Farming + Service 3  
   (d) Farming + Other Occupation 4

5. **Type of family**:  
   (a) Nuclear 1  
   (b) Joint 2

6. **Size of family**:  
   (a) Upto 5 members 1  
   (b) From 5 to 10 members 2  
   (c) Above 10 members 3

7. **Type of houses**:  
   (a) Kachha 1  
   (b) Mixed 2  
   (c) Pacca 3

8. **Number of houses**:  
   (a) One 1  
   (b) Two 2  
   (c) Three 3

9. **Farm Power (Bullocks) possessed**:  
   (a) Nil 0  
   (b) One or two 2  
   (c) Three to four 4  
   (d) Five to six 6
10. Material possession:
(a) Bullock cart 1
(b) Cycle 1
(c) Radio 1
(d) Chairs 1
(e) Improved agricultural implements 2
(f) Local implements 1

Score

11. Migration habit:
(1) Are any tribal farmers left your village? Yes/No
   -If "Yes" Why? ________________________________

(2) Do you like to migrate from your village? Yes/No
   -If "Yes" Why? ________________________________
   -If "No" Why? ________________________________

12. Land holding (in acres):

<table>
<thead>
<tr>
<th>Category</th>
<th>Irrigated</th>
<th>Unirrigated</th>
<th>Fellow</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Own land</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) Leased in</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) Leased out</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total operated and cultivated

13. Income level:

<table>
<thead>
<tr>
<th>Source</th>
<th>Income in Rupees (Annual)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td></td>
</tr>
<tr>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td>(5)</td>
<td></td>
</tr>
</tbody>
</table>
14. Indebtedness:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Source</th>
<th>Purpose</th>
<th>Amount borrowed</th>
<th>Terms if any</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td></td>
<td></td>
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<tr>
<td>(3)</td>
<td></td>
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<tr>
<td>(4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. Cosmopolite-localiteness:

<table>
<thead>
<tr>
<th>(1)</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A farmer can learn every thing from the experiences of his own villages.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A man can escape number of troubles and barriers, if he consults friends and neighbours.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A farmer can fulfil all his needs with the help of his village folks.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Many things that a farmer ought to know are not only confined in his village but are alike in other villages.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>These days when communication has so much advanced, a farmer should know more of outside life.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>He who does not consult others can act better.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
16. Economic motivation:

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) A farmer should work towards larger yields and economic profits.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) A most successful farmer is the one who makes the most profit.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) A farmer should try any new farming idea which may earn him more money.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) A farmer should grow cash crops to increase monetary profits in comparison to growing of food crops for home consumption.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) It is difficult for the farmers' children to make good start unless he provides them with economic assistance.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6) A farmer must earn his living but the most important thing in life can not be defined in economic terms.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17. Scientific orientation:

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) New methods of farming give better results to a farmer than the old methods.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Even a farmer with lots of experience should use new methods of farming.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Though it takes time for a farmer to learn new methods in farming it is worth the efforts.

A good farmer experiments with new ideas in farming.

Traditional methods of farming have to be changed in order to raise the level of living of a farmer.

The way of farmers' forefathers farmed is still the best way to farm today.

18. Risk-preference:

A farmer should rather take more of a chance in making a big profit than to be content with a smaller, profit but less risky.

A farmer who is willing to take greater risks than the average farmer, usually do better financially.

It is good for a farmer to take risks when he knows his chance of success is fairly high.

Trying an entirely new method in farming by a farmer involves risk, but it is worth.
(5) A farmer should grow large number of crops to avoid greater risks involved in growing one or two crops.

(6) It is better for a farmer not to try new farming methods unless most others have asked them with success.

19. Attitude towards high yielding varieties (HYVs):

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

(1) Cultivation of HYV of crops is very complex for the farmers to follow.

(2) High doses of fertilizers recommended for HYV will reduce the fertility and structure of soil.

(3) Cultivation of HYV will solve the food problem of our state.

(4) It is very difficult to cultivate HYV of crops.

(5) HYV is better than local variety.

(6) It is profitable to cultivate HYV of crops.

(7) After introduction of HYV there has been a significant improvement in the economic conditions of farmers.
If we want to produce enough, the best way is to cultivate HYV of crops.

HYV should be intensively cultivated by the farmers.

All types of farmers will be equally benefitted by HYV of crops cultivation.

20. Attitude towards chemical fertilizers:

The use of chemical fertilizers make the soil poor.

The use of chemical fertilizers is the easiest way to increase the crop yield.

The use of chemical fertilizers in food crops is harmful for health.

The use of chemical fertilizers improves the quality of grains which fetch more price in the market.

The use of chemical fertilizers is less profitable in relation to the cost involved.

As no adequate farm yard manure is available, the use of chemical fertilizers is essential.
(7) The use of chemical fertilizers deteriorates the taste of food.

(8) The yield of crop is very much increased by the use of chemical fertilizers.

(9) The crops fertilized become more susceptible to diseases and insect-pests.

(10) It is good to use chemical fertilizers because as compared to farm yard manure, they act more quickly.

(11) Chemical fertilizers are useless because their effects are confined to the crop to which they are applied.

(12) The use of chemical fertilizers is essential for better crop yield.

---

**PART - II**

21. Cropping pattern and crop intensity:

<table>
<thead>
<tr>
<th>Season</th>
<th>Crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kharif</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>
PART - III

22. Cropped area: 

Area in acres __________

(1) Single Cropped
(2) Double Cropped
(3) Tripple Cropped

Cropping intensity = \[ \frac{\text{Total Cropped area}}{\text{Size of holding}} \times 100 \] %

PART - III

23. Knowledge of tribal farmers about recommended agricultural technology for different crops:

Yes / No
Correct / Incorrect (1) / (0)

(1) Please say the details about preparatory tillage of _______ crop.

Crop ----
1
2
3
4
(2) Please say the name of recommended varieties for _______ crop.

1
2
3
4

(3) Which is the best method of sowing _______ crop.

1
2
3
4

(4) What is the recommended seed rate for _______ crop?

1
2
3
4

(5) What is the recommended dose of NPK fertilizers for _______ crop?

1
2
3

(6) Please say the method followed by you for the application of NPK fertilizers for _______ crop.

(7) Please say the irrigation requirement of _______ crop.
(8) What common pests do you observe in _____ crop?
   1  
   2
   3

(9) What measures do you follow to control them?
   1
   2
   3

(10) What common disease do you observe in _____ crop?
     1
     2
     3

(11) What measures do you follow to control them?
     1
     2
     3

(12) In your opinion, which is the best method of harvesting _____ crop?
     1
     2
     3
PART - IV

24. Sources of Information and source credibility:

Please indicate the source and relative credibility of the sources out of the following:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Source</th>
<th>Against the used</th>
<th>Most Credible</th>
<th>Least Credible</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Friends</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>Relatives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>Neighbours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4)</td>
<td>Tribal Leader</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5)</td>
<td>Progressive farmers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6)</td>
<td>Village level workers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7)</td>
<td>Agricultural Ext. Officer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(8)</td>
<td>Taluka Development officer and his staff</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(9)</td>
<td>Cooporative personnel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10)</td>
<td>Bank personnel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(11)</td>
<td>Voluntary agency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(12)</td>
<td>Staff of Tribal Development project</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(13)</td>
<td>Staff of FTC/KVK etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(14)</td>
<td>News paper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(15)</td>
<td>Radio</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(16)</td>
<td>Demonstrations</td>
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<td>(17)</td>
<td>Training camps</td>
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<tr>
<td>(18)</td>
<td>District Agricultural officer and his staff</td>
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<td>(19)</td>
<td>Agricultural fair and exhibitions.</td>
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<td>(20)</td>
<td>Any other (specify).</td>
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</tbody>
</table>
PART - V

25. Technological gap for different crops:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Package of practices</th>
<th>Adoption as recommendation against recommendation (A)</th>
</tr>
</thead>
</table>

(1) Variety:
   (a) Local
   (b) Improved
   (c) HYV

(2) Fertilizers application:
   (a) Nitrogenous fertilizers
   (b) Phosphatic fertilizers
   (c) Potashic fertilizers

(3) Organic manures:
   (a) FYM cart load
   (b) Compost

(4) Plant Protection:
   (a) For pest
   (b) For diseases

PART - VI

26. Average yield per hectare of different crops:

Please mention the average yield per hectare produced on your farm of the different crops.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Crops</th>
<th>Av. yield (Kg/hectare)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<td>2</td>
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<tr>
<td>5</td>
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</tbody>
</table>
27. Constraints for technological gap:

Please give information about constraints for technological gap from the following:

(1) Improper tillage and agronomic practices
(2) Poor soil conditions of tribal farms
(3) Improper water management
(4) Inadequate plant protection
(5) Poor post harvest technology
(6) Absence of irrigation facility
(7) Uncontrollable wild animal and birds
(8) Lack of credit
(9) Deficiency in input supply
(10) Uncertain markets and unremunerative price
(11) Lack of necessary institutional infrastructure
(12) Labour problems
(13) Uneconomic land holding
(14) No incentives for adoption of technology
(15) Not willing to take risk
(16) Non cooperation of neighbour farmers
(17) Lack of knowledge about agricultural technology
(18) Conservative nature
(19) No technical guidance
(20) Any other (specify)
28. Suggestions to overcome the constraints:

Please suggest the solutions to overcome the constraints:

(1) More information about new agricultural technology should be provided.

(2) Arrangements for easy availability of inputs

(3) Provision for adequate financial help

(4) Provision for long term loan for creating irrigation facilities.

(5) Training about new agricultural technology should be provided

(6) Any other (specify)