INTRODUCTION

.

~

•

1

۶ ۱

.

.

-

Agriculture is man's most important activity. Although very few persons in the more developed countries are directly concerned with agriculture in their every day life. It is still the most important economic activity, for all have to eat. As the population of the world increases, food output has to increase and this involves increasing the productivity of land. For productivity to increase, the farmers have to find and accept new farming practices. The spatial spread of new farming practices, or innovations, is therefore of vital importance in the world as well as of great interest to geographers.

Agriculture forms the backbone of Indian economy where more than 70% of the population of the country depends on this sector for it's livelihood. The country is so vast that there is considerable regional variation and every region has it's own peculiar characteristics. Because of vast population food is the most important problem faced by the country today, eventhough the entire country is still agricultural. The development of Indian agriculture depends on its technological change, a change in the parameter of production function resulting directly from the use of new knowledge (Thomas,T.S. and <u>et al.,1958</u>). Infact the technological change in agriculture consists of adoption of farming techniques developed through research and calculated to bring out diversification and increase in production and greater economic return to farmers. The use of fertilizers, improved varities of seed, pesticides and fungicides, improved irrigation

2

facilities, new agricultural implements and contour bunding for the conservation of moisture and soil are some of the examples of such techniques.

3

Improved tools and machinery are important inputs in modern agriculture. Implements in traditional agriculture are crude, inefficient and inadequate. They must be replaced by improved agricultural machinery and implements.

Farm mechanisation in India is of recent origin. It is only after independence that serious efforts were made to introduce modern agricultural machinery and implements in the cultivation of land. The majority of Indian farming communities are conservative and their farm implements are so closely adjusted to their environment, that there is little possibility of change in the attitude of tradition oriented farmer unless the whole babric of farm economy is shaken (Singh, 1974).

Tractor plays an important role in the farm technology. Tractor is used for several operations in agriculture. It is used for deep ploughing and preperation of furrow required for better cultivation of crops. Tractor is very much popular in sugarcane cultivated areas due to its multiple uses. It is also an important vehicle for the transportation. Tractors which are obviously beyond the means of most individual farmers, but can perhaps be made available by co-operatives. A shift from tradition oriented farm operations towards mechanization is evident from the additions

μ

in the number of tractors and its spatio-temporal diffusion is one of the indicators of a agricultural development in a region.

## Previous work done :

The nature and process of diffusion of use of fertilizers, improved varieties of seeds, pesticides, and fungicides, improved irrigation facilities, new agricultural implements and contour bunding for the conservation of moisture and soil, these innovations together with other ideas and materials have been studied by geographers for several decades (Griliches, 1957; Tiedmann and Van Doren, 1964; Moore, 1966; Mayfield, 1967; Morill and Pitts, 1967; Ramachandran, 1973; and Mohammad, 1976). Since the spread of a phenomena idea or technique throughout population or region incorporates basic geographic elements of distance, direction and spatial variation (Brown and Moore, 1969). The fundamental work of Hagerstrand on Monte Carlo simulations models of spatial diffusion of innovation (Hagerstrand, 1952, 1957) served as catalyst for large number of studies. Since then a number of studies have been done dealing with diffusion problems at macro, meso and micro levels (Stanfield, et al., 1965; Bowden, 1965; Harlan and Tohary, 1966; Shome, 1967; Roy, et al., 1968; Bill and Zusman, 1976; Roy and Ullman, 1979; Mohammad and Majid, 1979). A review of these studies indicates that it is characterized by two distinct approaches. The first approach is generated within the context of cultural



geography whose research goal is to identify environmental features characteristics of a given culture and if possible to discover what role human action has played in creating and maintaining given geographic features. It distinguishes, describes and clarifies the typical complex of environmental features including the man made ones that coincide with each cultural community (Wangner and Mikesell, 1962). In the second approach attention turns to the identification of generative process by which the observed locational pattern of a given phenomena comes into existence.

# Choice of the region and topic :

The choice of the area and topic under investigation are influenced by many considerations such as i) Kolhapur district occupying sourthern part of Maharashtra plateau is regarded as one of the most fertile and well watered agricultural areas of the state (Dikshit, 1971). The valleys of Warana Panchganga and their tributaries have fertile and productive land. ii) The transitional geographical location of the district between Konkan coastal lowland to the west and Deccan plateau to the east presents a variety in the geographical environment. iii) There is a very limited scope for further increase in the land under agriculture, hence intensification of agriculture through modernization is inevitable. iv) Development of agro-based industries specifically, sugar factories have come up as a growth points,

5

(-,

which provide the financial assistant to the peasants for agricultural inputs. v) There is a marked increase in the land under cash crops like sugarcane, which is responsible for changing the agricultural patterns and has influenced the adoption of tractor to a considerable extent. It has resulted into high concentration of tractors in Kolhapur district, which alone shares about 11% of the states total tractors.

All these considerations have motivated to study the "Diffusion of Agricultural Innovations in Kolhapur District : A case study of spread of Tractors".

# **Objectives** :

Kolhapur district is one of the agriculturally prosperous districts in Maharashtra. It is always ahead in innovating and adopting a technological aspects: The percentage of net irrigated area to net sown area (13.9) shows significant increase in respect of all tahsils, in this district. This is due to tendency of Agriculturists to grow more sugarcane a cash crop and also due to increase in irrigation facilities. The objectives of the study are i) to study the spatio-temporal growth of tractors in Kolhapur district, ii) to study the socio-economic characteristics of the farmers as a carrier and barrier in diffusion process, iii) to apply Hagerstrand's simulated and Realistic model based on Monte Carlo technique, for understanding the diffusion pattern of tractors in the region.

### Sources of data :

The data used in this study is collected from two sources, viz. primary and secondary sources.

# Primary sources

The statistics regarding the name of the tractor adopter farmer, name of the village and tahsil, date and year of purchasing a tractor etc. are collected personally. These informations for the period of 1957 to 1960 were collected from the Regional Transport office, Kolhapur and from 1961 onwards informations are collected from the following tractor agencies.

- i) Navhind Tractor Agency; Laxmipuri, Kolhapur.
- 11) M/S. S.S.Mirje and Company; Udyam Chambers, Rajaram Road, Kolhapur.
- iii) M/S. Ghatage and Patil; Near Sangam Talkies, Kolhapur.
  - iv) Unique Automoboiles; Near S.T.Stand, Kolhapur.
    - v) M/S. Ghatage S.M. and Sons, Ruikar Colony, Kolhapur.
  - vi) Maharashtra Agro Industries Development Corporation, Kavala Naka, Kolhapur.

The socio-economic characteristics of the farmers were collected by conducting personal interviews by filling the questionnaire.

### Secondary sources

The data regarding the demographic aspects and agricultural

aspects etc. are abstracted from published records such as district census hand book, socio-economic review, and district statistical abstracts, census of livestock of Maharashtra state. These sources of data provide very comprehensive, integrated and mappable information using the village, tahsil and district as unit of reference. The trinnial averages for the year 1960 to 1963 and 1977 to 1980 are computed for all the aspects of study to avoid the climatic hazzards.

S.

8

### Sampling design

There are about 103 villages in Karveer tahsil, which are selected for case study. Out of these villages, adoption of tractor has taken place in 79 villages. The stratified purposive random sampling design is adopted for the selection of villages, whereas the random sampling design is adopted for the selection of farmers. Interviews of the selected 121 farmers (responded and non responded) were taken from 25% sampled villages. The sample villages and the farmers analysed on the basis of the number of adoption of tractors are categorised as below.

Categories	I	II	III	IV	v
Number of tractors	Above 16	11 to 15	6 to 10	Below 5	Total
Total`villages in each category	10	9	15	45	79
Sample villages in each category	6	5	3	8	22
Total number of tractors in each category	280	127	112	115	634
Sample farmers in each category	35	29	13	23	100

### Questionnaire design

A questionnaire schedule containing different aspects, was prepared for detail investigation. It includes biographical set like age, education, size of family, formal social participation, agricultural knowledge, and income. The resources set include irrigated area, area under sugarcane, and size of the farms. Whereas the communications set, such as cosmopoliteness, the information seeking through agricultural training, participation, observation and through mass media. The date of purchasing of tractor was included in it (vide appendix I). The field work was arranged to collect the data in person in the month of November 1983.

## Methodology

The data collected through primary and secondary sources were processed and presented in the tables, graphs, and maps. Choropleth technique is used for showing the real differences in the importance of particular elements. It is shown by the density of shading. Nonlinear regression namely second degree curve is used to show the correlation, and the Chi square test, Person's correlation co-efficient, and significance test of correlation co-efficient (t) are used to test various hypothesis; which are formulated regarding the adoption score of tractor and different socio-economic characteristics of the farmers. Haggerstrand's

simulated model and Realistic model based on Monte Carlo technique is used to study the distributional patterns over space through various time intervals.

## Design of the work :

The entire study comprising two parts, is arranged into seven chapters. The first part deals with the Regional Structure for the diffusion of tractors. The opening chapter of this part includes the analysis of relief, climate, soil, population, electricity and transport facilities. The second chapter includes the agricultural aspects namely general landuse, size of holdings, irrigation, cropping pattern, and mechanisation of agriculture.

The second part deals with the process and trends of diffusion. The diffusion process is discussed in third chapter. Whereas the fourth chapter deals with the trends of diffusion of tractors in different tahsils of Kolhapur district. The case study of Karveer tahsil for detail analysis of trends and process of diffusion based on socio-economic characteristics of the individual farmers is studied in chapter five. An attempt is made to develop a diffusion model in chapter six. The last chapter attempts to summarise the findings.

### REFERENCES

- Bowden, L.W. (1965) : Diffusion of Decision to Irrigate, Department of Geography, Research paper No.97, University of Chicago.
- 2. Brown, L.A. and Moore, E.G. (1969) : Diffusion Research in Geography. A perspective in Board, C. <u>et al.</u>, Progress in Geography International Review of <u>Current Research</u> Vol.I., pp.121.
- Bell,C. and Zusman (1976) : 'A Bargaining Theoretic Approach to crop sharing correlates'. <u>American Economic Review</u>., 66,4. pp.78-87.
- 4. Dikshit,K.R. (1971) : Maharashtra Region, India. A Regional Geography, Singh,R.L.(Ed.),N.G.S.I. Varanasi.pp.700.
- 5. Griliches, Z. (1957) : Hybrid corn. An explanation in the economics technical changes, <u>Econometrica</u>, Vol.XXV. pp.501-522.
- Hagerstrand, T. (1952) : The propagation of Innovation Waves Lund Studies in Geography Series B. Human Geography.
- 7. Harlan, J.R. and Zohary, D. (1966) : Distribution of wild wheats and Barley. <u>Science</u>, 153, pp.1074-1080.
- 8. Moore, E.G. (1966) : 'Models of migration and the Intra-Urban case'. The Australian and New Zealand <u>Journal of</u> <u>Sociology</u>, Vol.II, pp.16-37.

9. Mayfield,R.C. (1967) : The spatial structure of selected Interpersonal contact. A regional comparision of marriage distances in India. Spatial Diffusion Study. Technical Report 6.

- 10. Morill, R.L. and Pitts, F.R. (1967) : 'Marriage, migration and the mean information field'. Annals of the Association of <u>American Geographer</u>, Vol.57, pp.401-422.
- 11. Mohammad, N. (1976) : 'Technological change and Diffusion of Agricultural Innovations'. <u>The Geographer</u>., Vol.XXIII. pp.414.
- 12. Mohammad and Majeed, A. (1979) : 'Impact of Socio-Economic factors on Diffusion of Agricultural Innovations' in Mohammed, A. (Ed.). Dymanics of Agricultural Development, Delhi. pp.151-174.
- Roy, P. <u>et al.</u>, (1968) : Agricultural Innovations Among Indian Farmers, Hydrabad.
- 14. Ramchandran, R. (1975) : Spatial Diffusion of Innovations in Rural India, Mysore.
- 15. Roy and Ullman (1979) : The Innovation process in the energy Industries, London.
- 16. Stanfield, D. <u>et al.</u>, (1965) : Computer simulation of Innovation Diffusion. An Illustration from a Latin American Village.

- 17. Singh, Jasbir (1974) : An Agricultural Atlas of India. A Geographical Analysis. Vishal Publications, Kurukshetra, India.
- 18. Tiedmann, C.E. and Van. Doren (1964) : "The Diffusion of Hybrid seed corn in Iowa. A spatial simulation
  Model. <u>Technical Bulletin</u>, B-44, M, S.U., pp. 348.
- 19. Wanger, P.L. and Mikesell (1962) : Readings in Cultural Geography.