COMMUNICATION LINKAGE MECHANISM FOR GENERATION, TRANSFER AND ADOPTION OF FARM TECHNOLOGY

By

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Dissertation submitted to the Chaudhary Charan Singh Haryana Agricultural University in partial fulfilment of the requirements for the degree of:

DOCTOR OF PHILOSOPHY

in

EXTENSION EDUCATION

College of Agriculture
Chaudhary Charan Singh
Haryana Agricultural University
HISAR

1998

Dedicated to
My sister Roshani

CERTIFICATE I

This is to certify that this dissertation entitled, "**Communication linkage mechanism for generation, transfer and adoption of farm technology**", submitted for the degree of **Doctor of Philosophy** in the subject of **Extension Education** of Chaudhary Charan Singh Haryana Agricultural University, Hisar, is a bonafide research work carried out by **Mr. Bharat Singh** under my supervision and that no part of this dissertation has been submitted for any other degree.

The assistance and help received during the course of investigation have been fully acknowledged.

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CERTIFICATE II

This is to certify that this dissertation entitled, "**Communication linkage mechanism for generation, transfer and adoption of farm technology**", submitted by **Mr. Bharat Singh** to the Chaudhary Charan Singh Haryana Agricultural University, Hisar, in partial fulfilment of the requirements for the degree of **Doctor of Philosophy**, in the subject of **Extension Education** has been approved by the Student's Advisory Committee after an oral examination on the same, in collaboration with an External Examiner.

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ACKNOWLEDGEMENTS

I feel great pleasure in expressing profound sense of gratitude to Dr. R.S. Narwal, Associate Director(Extension) and former Head, Department of Extension Education, my Major Advisor, for his able guidance and unending help in the pursuit of this study. His critical comments and learned suggestions will always remain a beacon light for me in future also. I will always remain highly indebted to him for his prudent admonitions, affectionate behaviour, constant encouragement and very cordial treatment which have been fountain of great inspiration to me.

I feel highly esteemed to thank Dr. V.P. Chahal, Training Associate cum Junior Scientist (Extension), KVK, Sonepat, Dr. R.K. Punia, Professor, Rural Sociology, Dr. K.K. Saxena, Senior Scientist (Statistics) and Dr. M.R. Dalal, Professor, Nematology, the scholars of my advisory committee for their unlimited help, constructive criticism and constant encouragement during the course of this study.

I am thankful to the Department of Extension Education for providing necessary facilities for conducting the present study.

I acknowledge the help received from the faculty memebrs and postgraduate students of the department of Extension Education.

I am highly grateful and indebted to my parents who nurtured and cherished the seedlings of my education, without whose perseverance and affection, it would not have been possible for me to achieve this distant goal. I wish to express my thanks to my brothers Charat Singh, Wazir Singh and Sister Raj Bala whose love always inspired me to get this endeavour a success.

My all friends deserve special thanks for the help they extended by them during the course of this study.

The financial assistance provided by CCS Haryana Agricultural University in the form of merit stipend is thankfully acknowledged.

It gives me an immense pleasure in acknowledging my wife Bharti for her selfless sacrifices during the course of this investigation. My long thanks are due to my son Ankit, nephews Subham, Kulbir, Amit and Vikas and niece Monika and Sonu for providing comic relief at appropriate times.

The study owes its existence from the data provided by the respondents who deserve my incalculable thanks for their cooperation and accommodating nature throughout the collection of data.

My thanks are also due to Mr. M.G. Cherian for typing this manuscript nicely and accurately.

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July, 17, 1998

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APPREVIATIONS

SDAO	-	Sub-Divisional Agricultural Officer
CAO	-	Circle Agricultural Officer
SMS	-	Subject matter specialist
ADO	-	Agricultural Development Officer
T & V	-	Training and Visit System of Agricultural Extension
KGK	-	Krishi Gyan Kendra
KVK	-	Krishi Vigyan Kendra
CCS HAU	-	Chaudhary Charan Singh Haryana Agricultural University

1. INTRODUCTION

The developing countries of the globe including our are engaged in gigantic task of societal development. Societal development involves adoption and the integration of innovations so that new ways of thinking and doing become a part of the life of the people. This is particularly so, in India where majority of people are engaged in agriculture. So in context of our country it means particularly development of agriculture sector. Since agriculture contributes 29.4 per cent of GDP and also employing 64 per cent of country's working force. As agriculture shifts from traditional to modern one the farmers have to depend upon the information sources which lie outside their community. Agriculture in India is developing very fast, large number of farm innovations are being developed and released for adoption by users through a net work of agricultural research organisations, institutions and

agencies. Of these, State Agricultural Universities play a very significant role being regional research specific in nature. Haryana is also one of privileged state having Chaudhary Charan Singh Haryana Agricultural University established in February, 1970 with its headquarter at Hisar. However, the University has its establishment as one of the campuses since 1962 when it was part of erstwhile Punjab Agricultural University, Ludhiana. Presently, there is no dearth of technology but what worries is the transfer of technology from its point of generation to point of its utilisation. However, the farmers are not keeping pace with constantly fast changing technologies. So there exists a yawning communication gap between two levels, i.e. technology generation and technology utilization. Guba (1968) observed that there is tremendous gap between knowledge production and knowledge utilization.

Singh (1983) and Verma (1985) reported that a wide gap exists with regard to recommended technology and knowledge level of farmers. Yadav (1991) also reported a wider communication gap between extension personnel and contact farmers. One of the main reasons for low agricultural productivity in India has been the lack of integration of innovations into farming on the part of the client system. To achieve a high level of production, it is not enough to develop farm innovations, but it is also necessary to transfer the farm technology from research system to ultimate users-farmers. Emphasising the need of transfer of technology the late Prime Minister Mrs. Indira Gandhi (1976) stated that unless there was mutual concern between the scientists

and villagers for each other, full use of science could not be made for uplift of villages and all over plans would remain a castle in the air.

Myren (1964) stated that the results of agricultural research would be sterile without adequate ways for disseminating the knowledge derived from the efforts of researchers.

Effective and efficient communication of farm information is an important prerequisite for affecting adoption of agricultural innovations and practices. To achieve this, an effective extension system is required which would accelerate the process of diffusion and adoption of farm innovations among the client system. The extension workers as communicators of farm information became an indispensable element in the process of communication in implementing and securing desired change in agriculture. Pye (1963) has rightly stated that it was the pressure of communication which brought about the downfall of traditional societies.

Since independence, several extension approaches and strategies including those ranging from area specific to clientele specific have been followed to meet the requirements of technology. Instead of meeting the requirements of transfer of farm technology, the extension approaches followed from time to time resulted in a number of problems related to the organisation, administration and coordination. The multiplicity of extension education programmes in an area created the problems of duplication of work, confusion about roles, functions and areas of operation among extension functionaries. The latest extension education approach mostly followed in

the country happens to be the 'Training and visit system of agricultural extension'.

THE TRAINING AND VISIT SYSTEM

Benor (1974) an Israeli Agronomist and an extension service expert, innovated a new extension system for rural development popularly known in short the ' T & V system'. He emphasised upon a time bound schedule of farm visits and personal contacts with the farmers; and a single line of command for technical guidance and supervision of extension workers as main aspects of effective extension service. The crucial element of this system was periodic training of extension workers and farmers. This extension approach highly depends upon interpersonal communication. The concept of 'contact farmers' as opinion leaders is used in this system to deliver farm messages to the entire farming community. It is believed that, if we reach 10 per cent farmers in a village community in a systematic way, the others will be reached and communicated indirectly by observing farm innovations in fields or hearing about them

Benor envisaged that extension system should not be clientele and area specific. It should be viable enough to benefit all socio-economic sections of farming community and all agro-climatic conditions. Keeping this in view and considering the limited financial but sufficient manpower resources in the developing countries, he set on to formulate such an extension approach which would increase agricultural production with all categories of farmers in all agro-climatic conditions. This was to be done step by step in a sustained

way starting from the adoption of simplest to more sophisticated agricultural technology.

The T & V system has so far been adopted by some 40 developing countries in Asia, Africa, Europe and Central and South America. In India, this system was first introduced on a limited basis in Rajasthan canal and Chambal command area in Rajasthan and Madhya Pradesh respectively in the year 1974 with the assistance of World Bank, and has since been extended to thirteen states of the country. In Haryana, it was introduced in the year 1978..

IMPORTANCE OF LINKAGE

The research, extension and client system, of course are closely interwoven with each other and considered inseparable, if agricultural development has to take place. Their close relationship shall be meaning, provided there exists a strong linkage between these systems. Of course, each system has its own characteristics and role to play but they cannot work in isolation and have to depend on each other for bringing about development in the field of agriculture which is livelihood of more than 70 per cent of country's inhabitants.

Efficiency in communication has always been a matter of concern in all walks of life and more so far agricultural and rural development which is so vulnerable and so vital. Since long research system, extension system and client system have been operating for agricultural modernisation in terms of production and productivity with extension system charged with ultimate

responsibility of communication efficiency. Effective communication of innovations generated from agricultural research system to multitude farmers in the rural areas helps to achieve planned change on agricultural front. This speaks the importance of linkages between these systems and therefore, it was thought to ascertain the existing communication linkages between these systems, so that suggestions for making efficient and functional linkages can be brought to surface.

STATEMENT OF THE PROBLEM

The communication problem of researchers, extension personnel and farmers have generally been studied by behavioural scientists under two research traditions namely diffusion of innovations and scientific communication. In tradition of diffusion research, more than 3,000 studies all over the world have been completed and a comprehensive review of these researches was done by Rogers (1983) in his book named 'Diffusion of Innovations'. India alone, has contributed to the tune of 300 studies in this area (Singh *et al.*, 1974). Since then, a number of studies in this area were added. The studies on communication behaviour of farmers in India were undertaken by Singh (1965), Radhukar (1967), Murthy (1969), Shankariah (1969), Singh (1970), Lal (1972), Jha (1974), Appa Rao and Rogers (1980), Vijayaragavan and Subramanyan (1980), Gogoi (1984) and Hooda (1987). The studies related to communication behaviour of extension personnel were few. Akhouri (1973), Shete (1974), Sanoria (1977), Reddy and Singh (1977) and Singh (1988), studied the communication pattern of extension personnel.

Ambastha (1974) studied the communication pattern in the research, extension and client systems. Singh (1982) and Varma (1987) also studied communication patterns in Innovation Development, innovations transfer and innovations utilization systems. Pandey (1979) and Bhople (1985) in both extension and client systems. The communication scientists like Cougheneour (1968) and Havelock (1968) have suggested for further research in communication patterns of researchers and extension personnel. Due to close interdependence of research, extension and client systems, the piecemeal approach cannot solve the problem. Rogers with Svenning (1969) strongly emphasised the need to analyse agricultural communication from the origin of the innovation to its final adoption by the farmers. An elaborate study of the flow of farm information from its development to integration for modernising agriculture was undertaken by Lionberger and Chang (1970) in Taiwan. For modernization of agriculture, the flow of farm information from innovation development system to client system is to be accelerated. This provided an insight for studying the communication linkage mechanism for generation, transfer and adoption of farm technology to provide an answer to a number of research questions pertaining to modernisation of agriculture. So this study have been planned to find out communication linkage mechanism used for generation, transfer and adoption of farm technology with following specific objectives:

OBJECTIVES OF THE STUDY

1. Communication linkage mechanism as modes and as sources used by researchers for generation of farm technology.
2. Communication linkage mechanism of researchers for transfer of technology to extension personnel and farmers.
3. Communication linkages between extension personnel and farmers for transfer of technology.
4. Communication linkages used by farmers for acquisition of technology.
5. To suggest a suitable strategy for effective communication linkages between three systems.

SCOPE OF THE STUDY

The present study is an attempt to explore scientifically the communication linkage mechanism used for generation, transfer and adoption of farm technology. More specifically it will analyse, the different communication modes and sources used by researcher for generation of farm technology, i.e. wheat and cotton crops, different communication methods and media used by them for transfer of technology to extension personnel and farmers. The study will also find out the different modes and sources used by extension personnel for acquisition of farm technology and also different methods or media used by them in transfer of technology to farmers. The study will also indicate differential use of mode and sources by the farmers for acquisition of technology along with their credibility. The facts about the relationship of various situational and socio-psychological

characteristics of researchers, extension personnel and farmers will help to identify the key factors affecting the communication efficiency, suitable steps, thus can be taken to inculcate the desirable values by organising appropriate trainings. Some of them may be considered at the time of recruitment of persons also.

The study may be of much practical significance in developing a suitable strategy for effective communication linkages between the three systems, viz. researchers, extension personnel and farmers, which will be of great value and use to the planner, policy makers and administrators responsible for extension activities. Similarly the findings of the study shall be great help to professionals and students of extension education in their day to day teaching and research programmes.

LIMITATIONS OF THE STUDY

Being a student research project, the study had to be carried out with the following limitations, usual in such cases.

(a) Since the population of study was confined to researchers, extension personnel and farmers of one district (Hisar) of Haryana State. So generalisations based on the findings may at best be applicable to this area or the one with identical conditions.

(b) The study was confined to agricultural innovations related to wheat and cotton crops.

(c) The data on different aspects of study were based on the ability of respondents to recall and the opinions expressed by them. Hence, the

objectivity of the study is limited to their ability to recall and also their honesty in furnishing the required information. Although instruments of data collection were developed after discussion with members of advisory committee and pretested for their accuracy, there could remain a scope for improvement in data collection instruments of this nature through further refinement.

(d) This being a student's research project, time, money and other resources did not permit a larger sample than one taken for the purpose of study.

2. REVIEW OF LITERATURE

A review of past theory and practice is necessary while conducting any research. Throughout this treatise, reference is made to the literature which is relevant to the area under consideration. It is integrated at the places in the body of the report where it was found to be logically meaningful.

The review of researches in the present section was presented in the following sequence

2.1 Communication linkage mechanism of researchers

2.2 Communication linkage mechanism of extension personnel

2.3 Communication linkage mechanism of farmers

2.1 COMMUNICATION LINKAGE MECHANISM OF RESEARCHERS

The review of past researches connected with the communication linkage mechanism of researchers is presented in four parts as under:

2.1.1 Communication linkages used by researchers for generation of farm technology

2.1.2 Communication linkages used by researchers for transfer of technology to extension personnel

2.1.3 Communication linkages used by researchers for transfer of technology to farmers

2.1.4 Studies related to characteristics of researchers

2.1.1 Communication linkages used by researchers for generation of farm technology

Ambastha and Singh (1977) reported in their studies that professional meetings, farmers and immediate superiors emerged as most frequently used sources for information input by researchers, whereas self observation, research journals, extension personnel, farm radio broadcast and discussion with colleagues were moderately used sources/channels. Similar observations have been revealed by Jain (1970), Lingwood (1969), Arnon (1968) and Hirsch *et al.* (1968).

Subhash Chandra and Channegowada (1985) observed that self observations, immediate supervisors, farmers, visit to other research stations, discussion with colleagues, professional meetings, research seminars/workshops, research journals, farm broadcast, abstracts and bibliography were the important

communication methods used by researchers. Rogers and Shoemaker (1971), also reported similar findings.

Ojaimbo (1990) found that research scientists used both formal and informal sources of information to acquire agricultural information. Personal communication with immediate colleagues was most frequently used source. However, agricultural scientific literature and farmers were the information sources and channels considered as most important in decision making and problem solving.

Daivadeenam and Satyanarayana (1991) found that 16 modes used by researchers for generation of dry land agro-technology were self observation, research material, professional meetings, superior officers, colleagues, farmers, extension personnel, farmers' meetings etc. Among all these self observation was most used whereas, farm telecast was least used mode. They also reported that researchers used 8 sources which were research institutes of different levels such as state, national, regional, local, international, other states research institutes followed by voluntary organisations and private organisations. The findings are in agreement with the past research conducted by Reddy (1984), Ganorkar and Khonde (1979), Ambastha (1974) and Sanoria (1974).

Veeraswamy *et al.* (1992) reported that scientists used research journals to a fairly high degree to acquire scientific knowledge followed by attending professional meetings, seminars and discussion with colleagues. The other sources used were discussion with superiors, discussion with extension personnel, personal

experience, farm radio broadcast, discussion with farmers, members of professional society were least used sources to acquire scientific knowledge.

Baldwin and Haymond (1994) reported that commonest information sources for scientists were other scientists, meetings and journals.

2.1.2 Communication linkages used by researchers for transfer of technology to extension personnel

Ambastha and Singh (1976) found that among personal contact methods office call by extension personnel, telephone calls, advisory letters and farm visits were most used methods. Though group contact methods and media were less frequently used by scientists. Professional meeting appeared to be most used group contact method among specialists and assistant specialists. Similar observations have been revealed by Lionberger and Chang (1970), Pelze and Andrew (1966) and Vickrey (1963).

Hunter (1970) observed that methods and media used by researchers for technical information with extension personnel were publications, radio talks, farmers' fairs and exhibitions.

Reddy (1984) found that personal contacts, publications and radio were common methods used by researchers to communicate with extension personnel.

Daivadeenam and Satyanarayana (1991) reported that 9 communication linkages used by researchers for transfer of farm technology to extension personnel, i.e. professional meetings, training programmes, office calls, personal contacts, demonstrations, publications, farm broadcast, advisory letters and

telephone calls. The findings are in agreement with past researches conducted by Ganorkar and Khonde (1979), Ambastha (1974) and Lionberger and Chang (1970),

Veeraswamy *et al.* (1992) reported that the most used methods by scientists were lectures in training camps and professional meetings closely followed by demonstrations. The next important methods were field day lectures, farm visits followed by farm broadcast, publications and advisory letters. The least used method was office call by extension personnel.

2.1.3 Communication linkages used by researchers for transfer of technology to farmers

Lionberger and Chang (1970) in their study concluded that the most important methods for communicating farm information to farmers were personal contacts, trainings, meetings, extension activities, demonstrations/tours, pamphlets/leaflets, radio, general meetings and farm magazine in that order.

Ambastha and Singh (1976) concluded that various methods and media used by researchers of various subsystems for information output were farm and home visits, letters, office calls, telephone calls and demonstrations.

Ambastha and Singh (1977) observed that among personal contact methods office call by farmers were most used methods followed by advisory letters to farmers, and farm visit in descending order. Though group contact methods and media were less frequently used by scientists, professional meetings appeared to be most used group contact method. Out of mass contact methods farmers' fair

was used by scientist of all subsystems besides publication, folders and radio broadcast were also used. Similar observations have been reported by Lionberger and Chang (1970), Pelze and Andrew (1966) and Vickery (1963),

Ganorkar and Khonde (1979) reported that the methods used by researchers for communication with farmers were demonstrations, exhibitions, literature, trainings, meetings, lectures and radio.

Channegowda (1983) found that observation of demonstration plots, method demonstrations, field days and office calls were important methods used by researchers to communicate farm information to farmers.

Reddy (1984) found that meetings, personal visits, telephone calls, training programmes were used by researchers for communicating with farmers.

Reddy and Reddy (1987) reported that personal visits and telephone calls were most used methods by researchers to communicate with farmers followed by trainings, publications, film shows, field days, kisan melas, cattle shows, etc.

Daivadeenam and Satyanarayana (1991) reported that communication linkage mechanism by researchers for transfer of technology to farmers were personal contacts, demonstrations, farmers meetings, training programmes, farmers tours, extension publications, office calls, farm broadcast, advisory letters in descending order.

Veeraswamy *et al.* (1992) found that most used methods by scientists were lectures in training camps and professional meetings closely followed by demonstrations. The next important methods were filed day lectures, farm visits followed by farm broadcast, publications and advisory letters. The least used method was office call by farmers.

Nawab and Lawrence (1994) reported that (94%) researchers have sometimes or often interpreted research results and seminars, meetings and demonstrations directly involving the farmers and 70 per cent of researchers claimed that they 'sometimes' or 'often seek' suggestions from farmers regarding agricultural problems needing research solutions.

2.1.4 Studies related to characteristics of researchers

Education

In general effectiveness of worker was found to have either positive association or no association with their level of education. Sanoria and Singh (1979) reported positive association between education and communication efficiency of the scientists/ researchers. Similar observations have been revealed by Lionberger and Chang (1970), Pelze *et al.* (1966), Lingwood (1959) and Hirsch (1958). Daivadeenam and Satyanarayana (1991) also found significant positive relation of education with the researchers information input and output. Similar findings were reported by Ambastha and Singh (1980).

Experience

Experience refers to the numbers of complete years an employee has put in service in an organisation. It is commonly felt that a person with more experience of working on the job performs better than those having comparatively less experience. Daivadeenam and Satyanarayana (1991) established positive and significant association between experience and communication behaviour of researchers. Similar findings were reported by Ambastha (1980) and Sanoria and Singh (1979). Rani *et al.* (1989) reported that experience exerted a larger total indirect effect on the scientific productivity of agricultural scientists.

Rural-urban background

Few studies have reported the relationship of rural-urban background with communication pattern of researchers. Sanoria (1978) reported significant positive association with communication behaviour of researchers. Similar observations have been revealed by Lionberger and Chang (1970), Parker and Paisley (1968), Pelze *et al.* (1966). Sanoria and Singh (1979) reported positive significant association between the rural-urban background and information output behaviour of researchers.

Trainings attended

An efficient training is one of the essential requirements for an effective agricultural organisation. Proper training enable the employees to develop appropriate attitude and gain confidence in their field of work, which in turn results in better job performance. Sanoria and Singh (1979) and Ambastha (1980) established significant positive relationship between the training and communication pattern of researchers. Rani *et al.* (1989) revealed the training had direct effect on scientific productivity of agricultural scientists.

Job commitment

Daivadeenam and Satyanarayana (1991) has reported positive and significant association between the job commitment and information input and information output of researchers. Findings got strength from the past studies of Ambastha and Singh (1980), Sanoria and Singh (1979) and Lionberger and Chang (1970).

Communication facilities

Ambastha and Singh (1977) established significant positive relationship between facilities and communicate behaviour of researcher for generation, transfer of farm technology. Daivadeenam and Satayanarain (1991) also reported significant association of communication facilities with communication behaviour of researchers. Similar observations have been revealed by Reddy (1984), Lionberger and Chang (1970), Jain (1970), Lingwood (1969), Arnon (1968) and Hirsch *et al.* (1958).

Job satisfaction

Job satisfaction is viewed to play a significant role in increasing the performance of employees of an organisation. There seems to be a general tendency that higher the job-satisfaction, more will be the work output. The positive and significant association of job satisfaction of employees with their performance have been demonstrated by several past researchers (Lingwood, 1959; Pelze *et al.*, 1966; Parker and Pelsey, 1968; Lionberger and Chang, 1970; Sanoria and Singh, 1979). Whereas, Ambastha (1980) reported positive and significant association between job satisfaction of researchers and their information output behaviour to extension personnel and farmers.

2.2 COMMUNICATION LINKAGE MECHANISM OF EXTENSION PERSONNEL

The review of past researches available in this subject area is presented as under:

2.2.1 Communication linkages used by extension personnel for acquisition of farm technology

2.2.2 Communication linkages used by extension personnel for transfer of technology to farmers

2.2.3 Studies related to characteristics of extension personnel

2.2.1 Communication linkages used by extension personnel for acquisition of farm technology

Lionberger and Chang (1970) reported that fewer extension personnel used radio as channel for obtaining farm information Sanoria and Singh (1976) stated that most commonly used sources/channel for information input by extension personnel were: extension publications, visit to experimental/research farms, departmental meetings, and consultation with specialists. The moderately used sources/channels were : training camps and lectures by specialists. Whereas, professional affiliations and research publications were least used by extension personnel for the acquisition of farm technology. They have also reported that radio broadcast was least used as source of information. Similar findings were reported by Ambastha (1974), Shete (1974) and Akhouri (1973).

Ray (1975) showed that extension officers in West Bengal were mostly in contact with farm information with the help of official letters, leaflets, pamphlets, folders, agricultural magazines and official meetings. They sometimes got the agricultural information from books and radio. The extension officers were rarely in contact with trainings, tours, visits, newspapers, commercial agents and educational films for obtaining agricultural information.

Balasubramanium and Menon (1977) reported that the important sources of information about high yielding varieties of paddy for extension personnel in

Tamil Nadu were: State Department of Agriculture, University Publications and Journals, personal visit to researchers; correspondence with scientists, visit to research stations, and researchers visit to extension personnel in descending order.

Sridhar and Reddy (1977) concluded that most used sources for information input by extension personnel were immediate technical supervisors, package of practice booklets, radio, fellow workers, demonstrations, magazines and newspapers, technical meeting and publications in descending order.

Pandey (1979) observed that extension workers (AEOs and VEWs) under T & V system of extension in Rajasthan, mostly used only two sources for acquisition of scientific farm information. These were in-service trainings which were concluded on regular basis every fortnight by SMSs and handouts containing pinpointed recommendations discussed in such training sessions. Consultation with SMS and the superior extension workers were moderately used but they occupied respectively third and fourth position among information sources. Radio, visit to research centres, newspapers and extension publications were least used sources. The sources/channels like professional societies, research publications, campaign meetings, lectures/seminars/symposia/workshops and consultation with scientists were not at all used by extension workers.

Babu and Sinha (1985) reported ıt extension personnel have obtained information about rice technology mainly om four sources, i.e., superior officers, extension literature, scientists and All In ı Radio. Among these superior officers ranked first, followed by extension literature. The other two sources, i.e. scientists and radio were scarcely used by extension personnel.

Natikar and Jayaramiah (1988) reported that first five important sources consulted by extension personnel were superior officers (99.09%), followed by package practices booklet (98.18%), monthly meetings (95.45%), demonstrations (93.64%) and newspapers (90.94%), followed by radio (90.91%), experimental plots (83.64%), departmental publications (82.73%), progressive farmers (77.27%), master trainers (73.64%), etc.

Ojaimbo (1990) found that extension personnel most frequently utilised informal oral sources and channels in obtaining farm information. Of these, communication with superiors ranked as the most important source of information in decision making and problem solving. He also found that a negative attitude exist between research scientists and extension personnel which in turn causes infrequent communication between two.

2.2.2 Communication linkages used by extension personnel for transfer of technology to farmers

Lionberger and Chang (1970) observed that the most frequently used methods for information output by extension personnel were farm and home visits, group meetings, demonstrations and tours, training local leaders, pamphlet, leaflets and circular letters in descending order.

Patel (1972) reported that individual and group contacts were first used channels by both groups of 'most effective' and 'less effective' VLWs. But a greater percentage of 'most effective' group used individual contacts, while a relatively greater proportion of 'less effective' VLWs used group contacts. In addition, 17 per cent of the 'most effective' VLWs used mass media, while none of the 'less

effective' VLWs used mass media as the second channel for dissemination of farm information.

Reddy and Patel (1973) observed that individual contact and group contact methods were mostly used and mass media were least used by AEOs for imparting farm knowledge to farmers.

Sanoria and Singh (1976) pointed out that among personal contact methods, office calls and farm and home visits were most commonly used methods by extension personnel for affecting information output. However, increase in number of office calls and decrease in number of farm and home visits were observed with rise in cadre of extension personnel. Among the group contact methods, general meetings were mostly used by the extension personnels, highest use being in case of village level extension personnel. Among mass contact methods extension publications were considerably and commonly used. The methods like writing circular letters, articles, success stories, preparing leaflets and giving radio talks were mostly used by high cadre extension personnel. The lower level extension personnel arranged film shows but the annual average was found to be very low. Similar findings were reported by Ambastha (1974) and Shete (1974) and Akhouri (1973).

Reddy and Singh (1977) observed that more than 50 per cent of VLWs used farm and home visits (99%), group meetings (95%), method demonstrations (83%), result demonstrations (75%) and farmers training camps (60%) for dissemination of farm information. The methods like exhibitions, tours, campaigns, film shows, crop competitions, field days, and field visits were used by less than

50 per cent VLWs. Further they reported that the frequency of use of farm and home visit was highest followed by group meetings, method demonstrations, posters, result demonstrations, farmers trainings camps and field visits in descending order. The frequency of use was very low in respect of exhibitions, tours, campaigns, film shows and crop competitions.

Sridhar and Reddy (1977) concluded that farm and home visits, leaflets, office calls, group meetings, method demonstrations and result demonstrations were important methods of communication with farmers in descending order.

Ganorkar and Khonde (1979) observed that farm and home visits, meetings, circular letters and demonstrations were most frequently used for information output by extension personnel.

Sangha (1979) reported that AEOs of the Punjab used farm and home visits, method demonstrations and training camps with high frequency. The extension methods like campaigns, leaflets, booklets, field days, posters and tours of farmers were used with medium frequency. Farmers fairs, exhibitions, office calls, circular letters radio talks and agricultural films were employed with a low frequency.

Pandey (1979) noticed that out of 18 methods/media for disseminating farm information only six, that is, conducting mini kit trials, organising field days, making farm and home visits and contacts with farmers, entertaining farmers' call at office, conducting group meetings and organising agro-films were used by extension workers. Out of these six, the first two were most commonly used. Farm visits and making contacts with farmers were used to moderate extent. The other three media were performed to poor extent.

Reddy (1984) found that extension personnel were communicating with farmers through farm and home visits, group meetings, method demonstrations, result demonstrations and farmers training camps.

Babu and Sinha (1985) reported that information dissemination was done through 7 channels which were as personal contacts, group meetings and leaflets were used by all respondents and these were followed by demonstrations, field days, radio broadcast.

Lakashminarayana and Veerabhadraiah (1992) found that farm visit, home visit, office call, method demonstrations, result demonstrations, block demonstrations, general meetings, group discussion, poster, wall newspaper, leaflets and package of practices booklet were the important extension methods and aids used by more number of agricultural assistants of both T & V and TV & D systems which was followed by exhibition, film shows, campaign and educational tours.

2.2.3 Studies related to characteristics of extension personnel

Education

There is a general belief that higher the educational level more effective the person is. But past researchers have concluded positive as well as no association of education with performance of workers.

Talukdar (1984) reported positive association between education and performance of field extension workers. Similar findings were reported by Radhukar (1962) and Salvi and Dudhani (1967). However, no association between

education and effectiveness was reported by Sengupta (1963), Kherde and Sahaya (1972), Bhatia and Sandhu (1975) and Veerabhadriah (1981).

In general effectiveness of workers was found to have either positive association or no association with their level of education as evidenced by researchers carried out.

Experience

Experience refers to the number of complete years an employee has put in service in an organisation. It is commonly felt that a person with more experience of working on job performs better than those comparatively less experience. The studies of Patel and Legans (1968), Bhatia (1974), Janardhan (1984) established positive and significant association between experience and performance of field extension workers. However, Dhillon and Sandhu (1977) reported negative association between experience and job performance. Contrary to this, non-significant association between experience and performance of field extension workers have obtained by researches of Perumal and Rai (1976, 1978) and Veerabhadriah (1981). Hence, due to contradictory trend shown by past researches, no definite conclusion could be drawn.

Rural-urban background

Few studies have reported the relationship of rural-urban background with communication behaviour of extension personnel. Parshad (1973) reported that rural-urban status of the VLW was one of important predictor of their communication effectiveness. Sanoria (1977) also found that rural/urban background of agricultural extension personnel was significantly related to their

communication effectiveness. Malik *et al.* (1990) reported that rural-urban background of family directly effected the communication pattern of extension personnel.

Parental occupation

Sanoria (1977) and Sangha (1979) concluded that family occupation had a significant positive correlation with communication efficiency and extension competencies of agricultural extension personnel. However, Sengupta (1963) noted that VLWs coming from farming families were not effective.

Trainings attended

Ambastha (1974) and Shete (1974) observed a significant positive relationship between in-service training received and information input, processing and output of extension personnel. Malik *et al.* (1990) observed that training directly effected communication pattern of extension personnel. Pandey (1979) from his studies in the area of T&V system reported somewhat contradictory findings of extension personnel. He observed a non-significant relationship of in-service trainings received by extension personnels with their information input behaviour, a positive and significant relationship with information processing and a negative and significant relationship with information output behaviour of extension personnel.

Job satisfaction

Job satisfaction is viewed to play a significant role in increasing the performance of extension workers. There seems to be a general tendency that higher the job satisfaction, more will be work output. The positive and significant association of job satisfaction of employees with their performance have been

demonstrated by several research studies (Kolte, 1972; Dhillon, 1975; Dhillon and Sandhu, 1977; Talukdar, 1984). However, Varoom (1964) found weak relationship between job satisfaction and job performance of employees. Khcrde and Sahaya (1972), Perumal and Rai (1976, 1978) obtained no relationship between job satisfaction and job performance.

Communication facilities

Malik *et al.* (1990) found that infrastructural facilities for communication have direct effect on communication pattern of extension personal. Similar findings were reported by Jhamthani and Singh (1985) and Babu and Sinha (1985).

Job commitment

Sanoria (1977) reported positive and significant association between the job commitment and communication efficiency of agricultural extension personal. Whereas, Malik *et al.* (1990) reported that information input amount is directly or indirectly influenced by job commitment. The findings are in agreement with studies of Babu and Sinha (1985) and Jhamthani and Singh (1985).

2.3 COMMUNICATION LINKAGE MECHANISM OF FARMERS

The review of past researches related to communication linkage mechanism of farmers is presented in two parts as under:

2.3.1 Communication linkages used by farmers for acquisition of farm technology

2.3.2 Studies related to characteristics of farmers

2.3.1 Communication linkages used by farmers for acquisition of farm technology

Farmers in general use different sources of information for acquisition of farm technology. The review of studies connected with farmers' communication linkage mechanism are presented as under:

Wilkening (1950) made the observation that information about long established innovations was obtained from non-institutionalized sources such as other farmers and local leaders, and about newly introduced innovations from institutionalised sources such as agricultural agencies and mass media.

Radhukar (1958) concluded that high adopters used mostly impersonal and institutional sources, while others relied on personal acquaintances as sources of information.

Shankariah (1969) reported that comparative credibility rank of different sources of information as scientists, village level workers, progressive farmers and next door neighbours. He also found that farmers showed upward communication preferences.

Lionberger and Chang (1970) stated that important sources of information input of farmers were other farmers, extension advisors, radio dealers and pamphlets and leaflets.

Singh and Singh (1972) observed that farmers' exposure to agricultural institution and progressive farmers were directly preferred as most credible sources of information in progressive and non-progressive villages, respectively. The farmers of progressive village indicated their preferences for source credibility

in following order: Scientists, demonstration, progressive farmers, relatives, block extension agency, radio, tours/visits and bulletins. Farmers of non-progressive villages indicated their source credibility in order of progressive farmers, relatives, scientist, block extension agency, demonstrations, tours/visits, radio and bulletins.

Ambastha (1974) reported that for obtaining information input the most commonly used sources/channels by package block, non-package block and garden land farmers were: from radio broadcast, block officials, VLWs and progressive farmers. The moderately used sources were: friends and neighbours, leaflets and bulletins, demonstrations and agro-input dealers. The farmers' training lectures, agricultural scientists, film shows, popular farm magazines and field days were least used sources/channels by the farmers.

Chole and Radhukar (1978) reported that personal formal sources had been accorded mere credibility by big farmers, while small farmers accorded more trust worthiness to personal informal sources and utilised localised sources. Mass media were perceived to be less credible by both, but they gave more credibility to demonstrations.

Pandey (1979), Vijayaragavan and Subramanyan (1980) observed that the contact and non-contact farmers and dryland farmers most commonly used neighbours, friends, family members and VLWs for seeking farm information. Radio broadcast, agro-films, exhibitions, high level of extension personnel, handouts, leaflets and bulletins, agro-input dealers, demonstrations, mini kit trials and field days were moderately used. The agricultural scientists, farmers training camps, visit to research centres and newspapers were least used for receiving farm information by them.

Mathur and Pandey (1983) reported that farmers were mainly using personal local sources for farm information, the extension workers were found to maintain no interaction with research institution within and outside the project area and the interaction of project level SMS was also confined to project research centre. Significant information gaps in all the important messages related to paddy were observed at different levels of extension and client system.

Amalraj and Prasad (1984) reported that major sources of information utilised by farmers were Agricultural Extension Officers, other farmers, farmers' union and Gram Sewak and that fertilizers, pesticide dealer was one of the important source of information used by farmers.

Gogoi (1984) found that majority of farmers of both progressive and non-progressive villages sought information and advice within their village and a small proportion particularly the high adoption category farmers went outside the village to contact more competent sources. He further reported a non-linear relationship between farmers' extent of adoption and information seeking behaviour.

Kamble and Shinde (1988) found that personal sources of information are mostly sought by farmers at different stages of adoption. Only at integration stage use of literature was made as source of information. In fact mass media need to be effectively used at awareness stage to speed up process of adoption.

Ojaimbo (1990) reported that farmers for acquiring agricultural information prefer informal oral sources and channels, mainly with extension personnel,

through farm demonstrations, communication with fellow farmers and visit to other farmers. Radio programmes were also frequently utilised.

Daivadeenam and Satyanarayana (1991) found that there were 16 communication linkages used by farmers for acquisition of dry land technology, which were as demonstrations, progressive farmers, extension personnel, farm broadcast, group discussions, extension publications, farmers meetings, trainings, ICAR schemes, research scientists, visit to research stations, farmers tours, exhibitions, advisory letters, farm telecasts in descending order.

Sherif *et al.* (1993) reported that majority of respondents ere found to have received most of their technical information on rice cultivation from other non contact farmers.

Vekaria *et al.* (1993) reported in case of tribal VLW was most utilised source of information (1.63) and got first rank followed by neighbours (1.29), radio (1.24), cooperative societies and television (0.46) whereas non-tribal rice growers also considered VLW as most effective source of information for improved rice technology with (1.77) mean score and got first rank followed by television (1.57), farm literature (1.42), progressive farmers (1.20) and neighbours (0.90).

Bhople and Thakre (1994) concluded by and large farmers have utilised the personal sources namely neighbours, friends and other village farmers, progressive farmers and extension workers at village level and impersonal sources like group discussion, demonstration and field visits for obtaining farm information.

Vekaria and Pandaya (1995) found that among sources of information used by paddy growers majority of them considered VLW (43.66) as their major source of information, followed by friends (42.00), neighbours (33.33), relatives (31.00), progressive farmers (30.17), agricultural literature (24.83), newspapers (22.67), cooperative personnel (20.17), Agricultural extension officers (19.83) and radio (16.83).

Patel *et al.* (1995) reported that among all sources of information VLW was most credible and referred as many as 60.95 per cent and 72.39 per cent of tribal and non-tribal farmers for water resource management. The second ranking source was progressive farmers (46.67%) as information source of information in tribal areas and newspapers (60.95%) as mass media source of information in non-tribal area and progressive farmers (45.72%) in tribal areas as informal source of information. The study also revealed that formal sources ranked first and next in order were informal sources.

Sharma and Khan (1997) reported that majority of respondents (77.78%) were using radio as an information source among different mass media of communication. Magazines and films (3.33% each) were found to be least important in information dissemination whereas television (58.85%) and newspapers (23.33%) were found as important sources being utilised by farmers. Rural agricultural extension officers (42.22%) were most important personal cosmopolite sources of information in comparison to other extension personnel and cooperative society. Among various personal localite sources neighbours (74.44%) and friends (66.44%) were most important sources of communication,

progressive farmers (46.6% and relatives (33.55%) ranked third and fourth respectively while private agencies were used by only 5.55 per cent of farmers.

2.3.2 Studies related to characteristics of farmers

Education

The number of years of schooling do have a bearing on communication behaviour of farmers. Lionberger (1951, 1955), Coop *et al.* (1958) and Wilkening (1950) reported that number of information sources being utilised were a function of educational level of farmers in the adoption of improved agricultural practices.

Vijayaragavan and Subramanyan (1981) reported a positive and significant relationship of education with information input and output behaviour of farmers. Findings are in agreement with studies of Ambastha (1974) and Pandey (1979).

Gogoi (1984) reported that education of the farmers is one of the important predictor variables influencing information seeking behaviour of farmers in the progressive and non-progressive village in Punjab.

Socio-economic status

Since long the socio-economic status of the farmers is to be a major variable which influences their communication behaviour. Wilkening (1950), Lionberger (1951) and Copp *et al.* (1958) reported that a number of information sources utilized have been found to be a function of socio-economic status of the farmers in the process of adoption of improved agricultural practices.

Dhaliwal and Sohal (1965) and Singh and Jha (1965) observed that economic status of the farmers was positively associated with the use of institutional sources of information and overall contact with extension agencies.

Parshad and Sinha (1971) found that economic status was significantly related with the use of information sources by farmers.

Murthy (1969) and Lal (1972) noticed that socio-economic status of farmers had a positive relationship with their communication behaviour.

Vijayaragavan and Subramanyan (1981) found a positive relationship of socio-economic status of the farmers with their information input and information output behaviour. Similar findings were reported by Pandey (1979) and Ambastha (1974).

Innovation proneness

Studies regarding propensity to change indicated that some people are more prone to change than others. Lionberger (1960) reported that farmers quickest to adopt new practice are inclined to use objective facts in their decisions, and to rely heavily on institutionalised sources of information.

Singh (1972) reported that innovativeness of the farmers was positively and significantly related to farm mechanisation. Grewal (1976) reported a significant relationship of innovation-patronage with adoption of high yielding varieties of wheat by the farmers in central zone of Punjab. Rogers (1983) generalised that earlier adopters had a more favourable attitude towards change than later adopters.

Lal (1972) observed that innovative proneness had a positive but non-significant relationship with the communication behaviour of farmers.

Vijayaragavan and Subramanyan (1981) from their studies concluded a positive and significant relationship of innovative-proneness with information

input and output behaviour of farmers. Similar findings were reported by Daivadeenam and Satyanarayana (1991).

Trainings attended

Ambastha (1974), Reddy (1984) and Reddy (1986) reported positive and significant relationship between trainings and communication behaviour of farmers. Daivadeenam and Satyanarayana (1991) observed that relationship between trainings attended by farmers and communication linkages used by them for acquisition of dryland technology was found to be positive and significant.

Knowledge

Majumdar and Majumdar (1967) concluded that knowledge level plays a significant role in the process of adoption. Choubey (1972) indicted a significant association of knowledge with adoption of animal husbandry practices. He also reported that higher the technological knowledge of farmers, more was the level of adoption of technology.

Social participation

Sohi and Kherde (1980) concluded that those farmers who participated in community activities, their knowledge and adoption of improved crops production practices was comparatively higher than those who did not participate at all.

Subramanyan (1981) reported positive correlation between social participation and communication behaviour of farmers.

Singh *et al.* (1994) found that social participation was highly correlated with communication behaviour of dairy farmers.

Family education

Nirwal (1982) reported that positive and significant association existed between family education and knowledge of crop production technology of farmers and similar results reported by Singh (1995), Sinha *et al.* (1988) and Sohal and Tyagi (1978).

Sethy *et al.* (1984) found education as main factor responsible for influencing the knowledge of farmers, and knowledge of technology ultimately resulted in promoting the farmers' adoption of recommended practices irrespective of their economic standing and resourcefulness.

Singh *et al.* (1994) found that family education status was highly correlated with communication behaviour and its information receiving (sources and channels) and information use behaviour (knowledge and adoption levels) components of dairy farmers.

Economic motivation

Economic motivation plays an influential role in affecting the communication behaviour of farmers. Supe (1969) observed that by manipulating the variable economic motivation one will probably affect maximum change in rational behaviour of farmers.

Lal (1972) in his study found a positive and significant relationship of economic motivation with the communication behaviour of farmers. Pandey (1979), Vijayaragavan and Subramanyan (1981), in their studies of communication behaviour of farmers found that economic motivation had a positive and significant relationship with information input and information output behaviour of farmers.

Gogoi (1984) concluded from his study that economic motivation is one of the important predictors in explaining information seeking behaviour of farmers. Bhople and Thakre (1994) have reported positive and significant relationship of economic motivation with farm information sources utilisation, adoption and transfer behaviour of farmers.

3. RESEARCH METHODOLOGY

This chapter as usual, deals with the methodological steps and details of overall research design adopted for this investigation have been described in the text below:

3.1. LOCALE OF THE STUDY

The study was conducted in Haryana. The Hisar district of Haryana was selected purposively because of following considerations:

i) CCS HAU, Headquarter at Hisar.

ii) Training centre for imparting monthly trainings to Subject Matter Specialists (SMSs) and Sub-divisional Agricultural Officers (SDAOs) working under T & V system of agricultural extension.

iii) Easy accessibility to the investigator.

iv) The study encompasses three types of respondents that is researchers (for generation of farm technology), extension personnel (for transfer of farm technology) and farmers (for adoption of farm technology). The former type of respondents, i.e. researchers were drawn from CCS HAU Hisar and moreover, the master trainers for training programmes of SMSs and SDAOs also belonged to CCS HAU, Hisar.

3.2 SAMPLING PLAN

The multistage stratified and purposive sampling techniques were adopted, i.e. the district and sub-divisions were selected purposively whereas, multistage stratified random in case of selection of blocks, villages and farmers as indicated in the following text:

3.2.1 Selection of district

The Hisar district was selected purposively since it fulfilled the requirement of all the three types of respondents selected for the present study, i.e. Researchers, Extension personnel and Farmers.

3.2.2 Selection of subdivisions

Two sub-divisions Hisar and Hansi were taken purposively because of easy accessibility to the investigator to the extension personnel taken for the study.

3.2.3 Selection of development blocks

One development block from each selected sub division was selected randomly. Accordingly, Hisar-I from Hisar subdivision and Hansi-1 from Hansi subdivision were selected for this study.

3.2.4 Selection of villages

One village from each selected block was selected randomly. Accordingly, the village Niyana from Hisar-1 and village Bhatla from Hansi-I were selected.

3.2.5 Selection of respondents

The objectives of the study envisaged three kinds of respondents - Researchers (for generation of farm technology), Extension personnel (for transfer of technology) and Farmers (for adoption of farm technology). Therefore, a suitable sampling procedure for selection of aforesaid categories of respondents as described below has been followed:

3.2.5.1 Researchers: For the present study all the scientists including master trainers working on wheat and cotton crops in the department of Plant Breeding at CCS HAU, Hisar were taken up. Accordingly, there were 15 researchers in wheat section and 9 scientists in cotton section, making thus total number of sampled scientists 24.

3.2.5.2 Extension personnel: For selection of extension personnel, all the SDAOs, SMSs, CAOs and ADOs working in selected subdivisions were taken. In all 65 extension workers of different ranks and file constituted sample of extension personnel for this study. There were total 44 extension personnel from Hisar subdivision i.e. 1 SDAO, 4 SMSs, 8 CAOs and 31 ADOs and 21 from Hansi subdivision, i.e. 1 SDAO, 3 SMSs, 6 CAOs and 11 ADOs.

3.2.5.3 Farmers: From each selected village one tenth, i.e. 1/10th respondents of self cultivating farmers were selected randomly, i.e. 40 farmers from each selected village were taken. Thus total number of sampled farmers were 80.

3.3 VARIABLES AND THEIR MEASUREMENT

3.3.1 Independent variables

3.3.1.1 Background variables of researchers and extension personnel

3.3.1.1.1 Education: It refers to the formal education, received by a researcher/scientist from an Agriculture College/University. It was measured by direct questioning. The minimum and maximum educational level was M.Sc. and Ph.D. respectively for researchers whereas B.Sc. Agri./B.Sc. (Hons) Agri. was minimum for extension personnel and maximum was Ph.D.

3.3.1.1.2 Experience: The length of service from date of joining the service to the date of interview was taken as experience. It was measured in years rounded off to a nearest year.

3.3.1.1.3 Rural-urban background: It refers to a respondent's place of birth and work. It was measured by direct questioning.

3.3.1.1.4 Parental occupation: It refers to the main source of livelihood of one's father. This was categorised as farming, service, business, and farming plus service. It was measured by direct questioning.

3.3.1.1.5 Trainings attended: It is the number of trainings attended by respondent during their service tenure in the discipline of agriculture. It was measured with the help of direct questions structured for the purpose.

3.3.1.1.6 Job satisfaction: Job satisfaction refers to the degree of satisfaction towards the job and factors directly affecting the role performance in the organisation. Laharia (1978) reviewed a large number of studies of job satisfaction and concluded that (i) it refers internal psychological state of heart

and head; (ii) it is perception based; (iii) it indicates the gap between one's expectations and achievements, lesser the gap higher is the job satisfaction; (iv) it is multidimensional in nature, i.e. it is resultant effect formed by different aspects associated with either job itself or performance of job.

In the present study job satisfaction has been operationalised as degree of satisfaction or dissatisfaction of researchers/extension personnel on various job related aspects. This was measured by a scale developed by Sarkar and Patnaik (1967) with slight modifications to suit the requirement of the study. The scale has got 5 point continuum ranging from highly satisfied to highly dissatisfied. The scores assigned were 5 to 1 from highly satisfied to highly dissatisfied. The job satisfaction score of any respondent ranged from 13 to 65.

3.3.1.1.7 Job commitment: It refers to the extent/amount of time devoted/ utilized by an employee to perform the assigned jobs. This was measured on the basis of time utilised by a respondent on different activities such as research work, innovation/ variety/technology developed, technical trainings attended and also imparted to others, dissemination of technology, extension activities for researchers and for extension personnel. It was measured on the basis of time utilised by a respondent on different extension activities like field visits, technical guidance to farmers/lower extension personnel, office work, conducting demonstrations/field trials, organising field days, exhibitions, arranging trainings for farmers/lower extension workers, etc.

The extent of time utilized in performance of activities assigned to the respondent was measured by using a scale having four response categories - much,

moderate, less and not at all and the scores given were 3, 2, 1 and 0, respectively. The individual scores, so obtained by a respondent in respect of items of the scale were added up in order to arrive at total score. Similarly, the scores of respondent were calculated. The job commitment scores were categorised into less, moderately and highly committed categories using cumulative weighted frequency method as given in Appendix III and VI.

3.3.1.1.8 Communication facilities: The facilities like audio-visual aids namely photography, artist facility, slide projector facility, slides and film strips, films exhibition unit, public address set demonstration equipment, printing, posters, video camera etc. and office facilities, viz. typing, cyclostyling, adequate office space, furniture, electricity, departmental conveyance etc., and inputs like chemicals and other ingredients with personnel's work organisation for quick and effective communication of useful messages by researchers and extension personnel to clientele were considered. The easy availability, availability with difficulty and nonavailability of facilities with organisation were assigned the scores of 2, 1 and 0, respectively. The scores of respondents were computed in accordance with above stated scoring pattern. The respondent's communication facilities scores so obtained were grouped into low, medium and high categories by using weighted cumulative frequency method (Appendix II and V).

3.3.1.2 Background variables of farmer and their measurement

3.3.1.2.1 Education: Education refers to the formal schooling one has undergone. Education is a level of literacy of farmers ranging from read and write to educated upto college level. The scale developed by Trivedi (1963) for measuring education was used.

3.3.1.2.2 Family education: It was operationally defined as the formal education received by the members of respondent's family (above six years of age). The level of family education was measured in terms of weighted mean family education score (WMFES) as given by Singh and Narwal (1974). The WMFES was based on pooled literacy status of all the members of a family. The WMFES was worked out according to the following formula:

$$\text{WMFES} = \frac{\text{Total education score of a family}}{\text{Number of family members above six years of age}}$$

The family education score so obtained was classified into low medium and high categories of family education by using weighted cumulative frequency method (Appendix VII).

3.3.1.2.3 Social participation: It refers to the participation of respondent in one or more than one organisation. It was measured with the help of socioeconomic status scale by Trivedi (1963).

3.3.1.2.4 Innovation proneness: It is the disposition of a person to accept or reject change(s). This may be perceived as an individual's orientation in continuity extending from the most willingness to accept changes to outright rejection of new ideas (Singh 1973). It was measured by self rating scale of Moulik (1965). The innovation proneness was divided into low, medium and high categories.

3.3.1.2.5 Socio-economic status (SES): It is the position of an individual or the family occupies with reference to prevailing standard of cultural position,

effective income, material possession and participation in group activities of community (Singh, 1973). It was measured with the help of SES scale (Rural) of Trivedi (1963) (Appendix VIII).

3.3.1.2.6 Trainings attended: It is the number of trainings attended by respondents on any aspect of agriculture. It was measured with the help of direct questioning.

3.3.1.2.7 Economic motivation: It refers to the occupational success interns of profit maximization and relative values placed by the farmers on the economic ends. This was measured with the help of rating scale of Supe (1969) with slight modifications to suit the requirements of the study. The scale consists of six items and scoring was done against five points continuum ranging from strongly agree, agree, neutral, disagree and strongly disagree and the weights assigned were 7, 5, 4, 3 and 1, respectively for positive statements and scoring was reversed for negative statements. The farmers were categorised into low, medium and high categories by using cumulative weighted frequency method (Appendix IX).

3.3.1.2.8 Knowledge: English and English (1961) defined knowledge as a body of understood information possessed by an individual or by a culture. The author further stated that knowledge is that part of person's information which is in accordance with established facts. The knowledge for the purpose of present study was operationalised as the amount of understood information possessed by the farmer as per recommendations of State Department of Agriculture, Haryana for wheat and cotton crops. This was measured with the help of schedule developed on the basis of impact points recommended by State Department of Agriculture,

Haryana for aforesaid crops and also in consultation with expert scientists of CCS HAU, Hisar. The score of 1 was assigned to correct reply and zero to incorrect reply of question or part thereof. The score obtained under various practices were summed up crop wise as well as respondent wise. The weighted cumulative frequency method was followed for computing low, medium and high knowledge level. The computation procedure is contained in Appendix - X.

3.3.2 Dependent variables

The effective use of farm technology is possible if these are percolated down from its source to receiver-user. This process of dissemination of technology needs interchange/interaction between the generator (research system) - mediator (extension system) and users (client system) of farm technology. The interaction between these systems is considered as linkage between researchers, extension workers and farmers for the purpose of this investigation. The interaction/linkages took place as a result of modes and sources used by researchers, extension personnel and farmers.

The researchers for developing technology were required to use different modes and sources which reflected the linkages. Similarly, extension personnel used modes and sources for receiving technology from research system reflected linkages and likewise, farmers gathered the knowledge from the extension system or research system or both through the modes and sources which reflected linkages. So, therefore, the linkages between these systems took place through modes and sources of information used by the researchers, extension personnel and the

farmers. Hence the operationalisation of communication modes and sources and linkage mechanism and credibility have been described as given under:

Communication mode: It has been operationalised as manner of doing a thing, talking or behaving for generation, acquisition and transfer of farm technology.

Communication source: It has been operationalised as a point from where the ideas flow. It may be an individual place, institution, organisation, etc. from where the receiver receives the message concerning his profession.

Channel: It is the avenue of communication over which message is sent or in which message is to appear.

Communication linkage mechanism: It has been operationalised as different communication modes and sources or channels/methods/media used by researchers respondents (for generation of technology), extension personnel - respondents (for transfer of technology) and farmer-respondents (for acquisition of farm technology).

Credibility: It is the degree to which a communication mode/source is perceived as trustworthy enough by the receiver.

Receiver: A person who receives information/messages through any communication mode or from a source and acts accordingly, i.e. adopts if useful and rejects if it is otherwise.

3.3.2.1 Researchers' communication linkage mechanism for generation of farm technology: This refers to different communication modes and or sources used by researchers for gathering information/material necessary for generation of farm technology. To find answer to this, a volume of questions

were administered on respondents of this study to elicit valid and reliable information. The communication modes included were self observation, journals, meetings, farmers, extension personnel, VIPs and administrators, trainings etc. whereas, the sources included were research institutes, voluntary organisations, private organisations, etc. The respondents were asked to indicate how frequently these modes and sources are used by them. The use frequency run through most frequently, frequently, and least frequently and the score assigned were 3, 2, and 1, respectively. Extent of information drawn from the modes and sources was also found out on three point continuum scale using the continuum of most information, somewhat information, and least information and scores assigned were 3, 2, and 1, respectively. Similarly, usefulness of communication modes and source was also found by using a three point continuum. The three points continuum were very useful, useful, and least useful. The scores assigned to these response categories were 3, 2 and 1, respectively. The credibility perception of respondents in terms most credible, credible and least credible was measured keeping in view the trustworthiness and the scores assigned were 3, 2, and 1, respectively. The scores with regards to different components concerning researchers communication linkage mechanism for generation of farm technology obtained by respondents were computed as the laid out scoring procedure as explained herein. The responses of respondents were multiplied by the weights given to response categories in order to work-out the choice/demand scores. The choice scores so obtained for an item were summed up to arrive at total choice score for that item and finally rank ordering to communication modes and sources

was done so as to decide their place/role in researchers communication linkage mechanism with regard to generation of farm technology.

3.3.2.2 Researchers' - Extension personnel communication linkages: Researchers'-extension personnel communication linkages refers to the degree to which scientists/researches communicated with extension personnel for disseminating the research results or solutions of various field problems related to agriculture. The researchers-extension personnel linkage was ascertained on the basis of frequency of use of methods/media or channels, such as personal contact, personal visit, office letters, office calls, telephone calls, trainings, workshops, seminars, conferences, campaigns, professional meetings, kisan melas, etc. by them for interaction. The use frequency categories were mostly used, sometimes used and never used and the scores allotted were 2, 1, and 0, respectively. The scores in respect of respondents were computed on the basis of aforesaid scoring procedure. The rank orders to different methods/media or channels were decided on the basis of total choice scores, which was obtained by multiplying the respondents response with their assigned weights.

3.3.2.3 Researchers'- farmers communication linkages: Researchers'-farmers communication linkages refers to the degree to which researchers directly communicated the farm technology to the farmers. The Researchers-farmers communication linkages was found out, based on the use frequency of methods/ media or channels namely personal visit, trainings, demonstrations, popular articles, radio and T.V. talks, letters, field days, field shows, kisan melas, office calls, telephone calls, rabi and kharif campaign meetings, professional meetings

etc. by them for interaction. The use frequency categories were mostly used, sometimes used and never used, and the scores assigned were 2, 1, and 0, respectively. The scores in respect of respondents were computed as per the adopted scoring procedure. The rank order to different channels were decided on the basis of total choice scores of respondents obtained after multiplying it with weights assigned to response categories and then it summed up.

3.3.2.4 Extension personnels' communication linkages for acquisition of farm technology: This refers to the different communication modes and sources used by an extension personnel for obtaining useful information regarding the farm technology. To find the solution to this aspect the respondents were exposed to inventory of questions to elicit objective information concerning modes and sources used and their frequency of use. The frequency of use run through most frequently, frequently and least frequently and the scores assigned were 3, 2, and 1, respectively. Extent of information drawn from modes and sources was also found out on three point continuum which included most information, somewhat information and least information response categories and the scores allotted were 3, 2, and 1, respectively. Similarly usefulness of communication modes and sources were ascertained by using three point continuum that is very useful, useful and least useful and the scores assigned were 3, 2, and 1, respectively. The credibility perception of respondents in terms of most credible, credible, and least credible was measured keeping in view trustworthiness of modes and sources and the scores assigned were 3, 2 and 1, respectively. The scores in respect of respondents were computed on the basis of adopted scoring procedures. The scores

of different response categories so obtained were summed up to arrive at final choice/demand scores of respondents. The rank orders to different modes and sources have been based on total choice scores.

3.3.2.5 Extension personnels'-farmers communication linkages: It refers to different methods/media or communication channels which an extension personnel used to communicate farm information to the members of cliental system. The methods/media or channels they used viz. farm and home visits, office calls, telephone calls, advisory letters, training of farmers, publications, demonstrations, campaigns, etc. and with what frequency the extension personnel used these media and same were rated through the four response categories namely, most frequently, frequently, rarely and never and the scores assigned were 3, 2, 1 and 0, respectively. The individual respondent scores were obtained on the basis of adopted scoring procedure and the scores of various response categories were added to work-out the final choice score of a respondent. Similarly, the scores of all the respondents were computed. The ranking of different channels was done in accordance with total choice scores.

3.3.2.6 Farmers' communication linkages for acquisition of farm technology: This refers to different communication modes and sources used by a farmer for obtaining useful information regarding the farm technology. To find out answer to this aspect the respondents were exposed to inventory of questions to elicit from them information concerning different modes and sources used. The communication modes included were scientists, extension personnel, progressive farmers, local leaders, neighbours, friends, relatives, radio and TV

farm literature, farmers fairs etc. Whereas sources included were market, cooperative society, agricultural university, fertilizer/seed store, agro-industry, insecticides/pesticides agency, farmers organisation etc. Their frequency of use run through most frequently used, frequently used and least frequently used and the scores assigned were 3, 2, and 1, respectively. The extent of information drawn from modes and sources was also found out by using a three point continuum namely most information, somewhat information and least information and the scores assigned were 3, 2, and 1, respectively. Similarly, usefulness of modes and sources was found out by using three point continuum that is very useful, useful and least useful. The numerical scores assigned were 3, 2, and 1, respectively. The credibility perception of farmers in terms of most credible, credible and least credible was measured keeping in view trustworthiness. The scores assigned were 3, 2, and 1, respectively. The scores in respect of respondents were computed on the basis of adopted scoring procedure. The responses were multiplied by weights given to response categories in order to work out choice or demand scores. The ranking of different communication modes and sources was done in accordance with total choice scores.

3.4 TOOL AND TECHNIQUES OF DATA COLLECTION

The data were collected with the help of well structured interview schedule and questionnaire developed for the purpose. The interview schedule for gathering information from farmers - respondents included questions which yielded basic information about the respondents and variables concerning communication linkage mechanism. While questionnaire meant for extension personnel and

researchers included questions which yielded basic information about the respondents and specific information regarding antecedent and communication variables. The construction of interview schedule and questionnaire was done strictly in accordance with the already planned objectives. These were pretested on a randomly selected sample of respondents other than the sampled respondents for this study and necessary modifications were made in the light of suggestions/ comments offered to make these data collection instruments appropriate and functional.

The researcher personally administered the interview schedule meaning thereby that each and every farmer-respondent was contacted personally so as to obtain objective, accurate and reliable information in order to arrive at valid generalization. In case of questionnaire, the researcher made personal contacts and also a letter from major advisor/Head of Dept. was attached with questionnaire sent to sample respondents, i.e. researchers and extension personnel for the purpose of eliciting objective information and that too in time. The significance of study was explained to respondents personally by researcher. Queries made and objections raised by the respondents were replied to their satisfaction so as to obtain objective responses.

3.5 TABULATION AND ANALYSIS OF DATA

Soon after the data collection work, tabulation of collected data was taken up. The inferences were drawn by using frequencies, percentages, weighted mean scores, total choice scores, and the statistical techniques to draw meaningful

conclusions. The details of statistical tools used in quantification of qualitative data has been described hereunder:

3.5.1 Coefficient of correlation

The Pearson's coefficient of correlation was used to measure the relationship between independent and dependent varieties. The formula used as under:

$$r = \frac{N \Sigma XY - (\Sigma X)\, X\, (\Sigma Y)}{\sqrt{(N\Sigma X^2 - (\Sigma X)^2)\,(N\Sigma Y)^2 - (\Sigma Y)^2)}}$$

Where N = Number of observations being correlated

ΣXY = Sum of products of X and Y

X and Y = *The variables being correlated*

ΣX = Summation of overall cell entries of the first variable

ΣY = Summation of overall cell entries of second variable

ΣX^2 = Sum of all squared values of each cell of first variable

ΣY^2 = Sum of all squared values of each cell of second variable

3.5.2 Multiple regression (R2)

The relationship between dependent variable (y) and the independent variables (X_1 ....X_8). Was obtained by fitting these into multiple regression equation

$$Y = a + b_1 x_1 + b_2 x_2 \text{ ----- } b_n x_n$$

where Y = Dependent variable, in the study of communication linkage mechanism as modes and as sources or channels used by researchers, extension personnel and farmers

a : constant

n : total number of independent variables

b_i : Partial regression coefficients of independent variables which represent the prediction of change in Y with one unit change in x_i with the remaining independent variables held constant.

Partial regression (b) was tested by using 't' test as

$$t = \frac{b_1}{S.E.(b_1)}$$

where b_1 = partial regression coefficient,

$S.E.(b_1)$ = standard error of partial regression coefficients

F-test

The significance of R was tested by calculating the values of 'F' as

$$F(K, N-K-1) = \frac{R^2}{1-R^2} \times \frac{N-K-1}{K}$$

where R = multiple regression coefficient

K = number of independent variables

N = number of respondents in the sample

The calculated values of 'F' were compared against its theoretical values of N_1= n-K-1 and N_2=K degrees of freedom (Snedecor and Cochran, 1967).

4. RESULTS AND DISCUSSION

The findings emanated from the study have been presented in this chapter. The logical discussion find place in this chapter so as to provide strength to findings and also to authenticate results achieved. The results of the study are presented under the following major heads:

4.1 Profile of respondents

4.2 Communication linkage mechanism of researchers

4.3 Communication linkage mechanism of extension personnel

4.4 Communication linkage mechanism of farmers

4.5 Respondents' antecedent variables influence on dependent variables (Communication linkages)

4.6 Suggested strategy for effective communication linkage mechanism for generation, transfer and adoption systems

4.1 PROFILE OF RESPONDENTS

Before discussing the research findings emanated from the study, it was considered necessary to give a brief account of respondents with regard to their antecedent variables. Accordingly, the profile of respondents - researchers, extension personnel and farmers have been furnished in the tables 4.1, 4.2 and 4.3, respectively.

4.1.1 Researchers

Education

It is obvious from the data in the table 4.1 that cent per cent respondents possessed the highest qualification that is Ph.D. degree in Agricultural Sciences. However, essential qualification for assistant scientist, which is the lowest position in the cadre, is master's degree in agricultural sciences in their respective field of specialisation and the desirable qualification is Ph.D., but for the positions higher than assistant scientists, the essential qualification is doctoral degree in agricultural sciences. Since cent per cent researcher respondents had Ph.D. qualification, therefore, it makes apparent that researchers and master trainers of this study belonged to the position of either Professor or Associate Professor ranks.

Service experience

It is evident from the data in the table 4.1 that 29.17 per cent respondents had 6-10 years experience on the present post followed by equal number of respondents (25%) having experience upto 5 years and 11-15 years and remaining 20.83 per cent possessed more than 15 years experience. It

Table 4.1: Profile of researchers

Sr. No.	Variables	Levels	Frequency (N=24)	Percentage
1.	Education			
		M.Sc. (Ag.)	-	-
		Ph.D. (Ag.)	24	100.00
2.	Service experience			
	Present	0-5 years	6	25.00
		6-10 years	7	29.17
		11-15 years	6	25.00
		> 15 years	5	20.83
	Past	0-5 years	15	62.50
		6-10 years	7	29.17
		11-15 years	2	8.33
		> 15 years	-	-
3.	Parental occupation			
		Farming	10	41.67
		Service	12	50.00
		Farming + service	2	8.33
4.	Rural-urban background			
		Rural	18	75.00
		Urban	2	8.33
		Ru-urban	4	16.67
5.	Trainings attended			
		Nil	7	29.17
		One	7	29.17
		Two	8	33.33
		Three	2	8.33

Sr. No.	Variables	Levels	Frequency (N=24)	Percentage
6.	Job satisfaction			
		Low (28-46)	9	37.51
		Medium (47-49)	5	20.83
		High (50-57)	10	41.66
7.	Communication facilities			
		Low (8-27)	10	41.66
		Medium (28-31)	7	29.17
		High (32-44)	7	29.17
8.	Job commitment			
		Less (13-19)	10	41.66
		Moderate (20-23)	7	29.17
		High (24-28)	7	29.17

may be concluded that three-fourth respondents had more than 5 years of service experience on the present post. It shows that they have rich and long service experience. So far as past experience was concerned, it was observed that 62.50 per cent respondents had experience upto 5 years followed by 29.17 per cent respondents with 6-10 years service experience while negligible percentage (8.33%) of respondents had experience of 11-15 years and none had more than 15 years of experience.

Parental occupation

The data in table 4.1 revealed that 50.00 per cent of respondents' parental occupation was service followed by farming (41.67%) and only 8.33 per cent respondents had farming plus service as their parental occupation.

Rural-urban background

It is apparent from the data in Table 4.1 that majority of respondents (75.00%) have come from rural areas followed by 16.67 per cent who belonged to ru-urban areas, while remaining 8.33 per cent were from urban areas. The interpretation can, therefore, be drawn that scientists engaged in production of farm technology belonged to rural areas and that too farming families who are quite aware of farming problems.

Trainings attended

As regards trainings, the data showed that 8.33, 33.33 and 29.17 per cent of respondents reported to have attended 3, 2 and 1, number of trainings respectively and around one-third did not receive any training. It can be concluded that about 70 per cent respondents had received trainings ranged

from one to three. So as to make the scientists abreast with latest 'know-how' and 'do-how' in their respective field of specialisation, they should be deputed to training programmes as and when organised. The organisation should also ensure deputing each and every scientists for trainings to keep them updated with recent advances in his/her field of specialisation.

Job satisfaction

The data in table 4.1 revealed that 62.50 per cent of respondents had medium to high level of job satisfaction followed by 37.50 per cent with low level of job satisfaction. Further perusal of data indicated that majority of (41.66%) respondents were having high level of job satisfaction. Although majority of respondents were satisfied with their job yet there are respondents whose satisfaction was of low level and thereby can affect the working efficiency. Therefore, there is a need to create such job related conditions which can satisfy almost all the employees of the organisation so that work culture can be created and maintained to its fullest extent.

Communication facilities

It is obvious from the table 4.1 that majority (41.66%) of respondents possessed low level of communication facilities and equal number of respondents i.e. 29.17 per cent each possessed communication facilities of medium and high levels. It suggests that respondents are handicapped of communication facilities which are very crucial and essential for generation and transfer of farm technology without which agricultural development in general and rural development in particular is difficult to achieve.

Job commitment

The data in the table 4.1 showed that respondents to the tune of 41.66 per cent were less committed to their job followed by equal number of respondents that is 29.17 per cent who were having moderate and high levels of job commitment. It can be concluded that majority of respondents that is about 70 per cent had low to moderate level of job commitment. It is certain that non or less committed employee cannot deliver goods. Therefore, conducive environment/conditions need to be created which can help to a larger extent in making the employees committed to their job so as to enhance the role perception and performance.

A cursory look at data led to conclude that respondents in majority possessed higher qualification, 6-10 years experience on the present and past job, service as their parental occupation, belonged to rural areas, had received two trainings, had moderate to high level of job satisfaction and low level of communication facilities and job commitment.

4.1.2 Extension personnel

Education

It is obvious from the table 4.2 that majority of respondents (89.23%) possessed the bachelor's degree in Agriculture, which is minimum and essential qualification for Agricultural Development Officer (ADO) and only 10.77 per cent of respondents possessed the Master's degree in agriculture (which is minimum and essential qualification for subject matter specialists). The Master's degree was mainly possessed by sampled respondents working

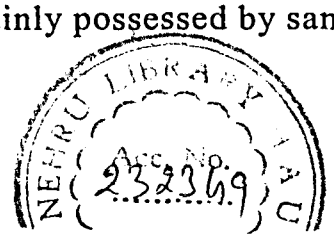


Table 4.2: Profile of extension personnel

Sr. No.	Variables	Levels	Frequency (N=65)	Percentage
1.	Education			
		B.Sc. (Agri.)	*58*	*89.23*
		M.Sc.(Agri.)	*7*	*10.77*
2.	Service experience			
	Present	0-5 years	20	30.77
		6-10 years	8	12.31
		11-15 years	17	26.15
		> 15 years	20	30.77
	Past	0-5 years	48	73.85
		6-10 years	9	13.85
		11-15 years	4	6.15
		> 15 years	4	6.15
3.	Rural-urban background			
		Rural	56	86.15
		Urban	3	4.62
		Ru-urban	6	9.23
4.	Parental occupation			
		Farming	40	61.54
		Service	23	35.38
		Farming + service	2	3.08
5.	Training attended			
		No training	9	13.85
		1-3 trainings	32	49.23
		4-6 trainings	24	36.92

Sr. No.	Variables	Levels	Frequency (N=65)	Percentage
6.	Job satisfaction			
		Low (17-39)	21	32.31
		Medium (40-46)	28	43.07
		High (47-65)	16	24.62
7.	Communication facilities			
		Low (2-12)	31	47.69
		Medium (14-18)	18	27.69
		High (20-36)	16	24.62
8.	Job commitment			
		Less (12-19)	15	23.08
		Moderate (20-23)	26	40.00
		High (24-33)	24	36.92

as subject matter specialists (SMSs) and only few ADOs did possess Master's degree in Agricultural Sciences.

Service experience

Regarding service experience of extension personnel the table 4.2 showed that 30.77 per cent of respondents possessed experience upto 5 years on the present position and the same percentage of respondents had more than 15 years of service experience followed by 26.15 per cent who have experience between 11-15 years and remaining 12.31 per cent had 6-10 years of experience on the present post. It may be concluded that around 70 per cent of extension personnel had more than 5 years of experience on the present post. It shows that they have rich and long service experience. So far as past experience was concerned it was observed that a large majority (73.85%) of respondents had less than 5 years of service experience followed by 13.85 per cent who had 6-10 years of past service experience whereas equal number of respondents that is 6.15 per cent each had 11-15 years experience and more than 15 years of past service experience.

Rural-urban background

The data in table 4.2 revealed that as high as 86.15 per cent of respondents belonged to rural areas followed by ru-urban areas (9.23%), while remaining 4.62 per cent of respondents belonged to urban areas. It can be interpreted that extension personnel engaged in the acquisition and transfer of farm technology belonged to rural areas and that too farming families who are quite aware of farming needs and problems.

Parental occupation

The data in table 4.2 showed that majority of respondents (61.54%) parental occupation was farming followed by 35.38 per cent with service as their parental occupation. While remaining 3.08 per cent of respondents belonged to the parents whose occupation was business.

Trainings attended

As regards trainings attended, the data in table 4.2 showed that 49.23 per cent of respondents had obtained 1-3 departmental trainings followed by 36.92 per cent of respondents who received 4-6 trainings while remaining 13.85 per cent respondents did not attend any training. It is concluded that about 85 per cent of respondents had undergone 1-6 trainings. The extension personnel should be deputed to training programmes as and when organised so as to make them abreast with latest knowledge and also about recent advances in agriculture.

Job satisfaction

The table 4.2 revealed that majority (75%) of respondents were found to have low to medium level of job satisfaction while about 25 per cent of respondents belonged to high level of job satisfaction category. It can be inferred that majority of respondents were having low to moderate level of job satisfaction which can affect the working efficiency. Therefore, there is a need to create such job related conditions/circumstances which can satisfy almost all employees of the organisation so that work culture can be created and maintained to its fullest extent.

Communication facilities

It is apparent from the table 4.2 that 47.69 per cent of respondents had low communication facilities followed by 27.69 per cent with medium and remaining 24.62 per cent of respondents were having high communication facilities. It can be interpreted that extension personnel were having low to moderate level of communication facilities category. It suggests that the respondents are handicapped of communication facilities which are very crucial and essential for acquisition and transfer of farm technology necessary for agricultural development.

Job commitment

Regarding the job commitment the table 4.2 revealed that 40.00 per cent of respondents were moderately committed followed by 36.92 per cent respondents who were highly committed to their job while remaining 23.08 per cent of respondents showed less commitment to their job. Conclusion can, therefore, be drawn that majority (76.92%) of respondents, had moderate to high level of job commitment. It is certain non or less committed employees can not deliver goods to the desired extent. Therefore, appropriate working conditions need to be created which can help to a larger extent in making the employees committed to their job so as to enhance the role perception and performance.

A cursory look at the data led to conclude that the extension personnel in majority possessed essential qualification, i.e., Bachelor's degree in agriculture, had more than 5 years service experience on the present post

and upto 5 years past service experience, belonged to rural areas, had farming as their parental occupation, had undergone 1-3 trainings, low to medium level of job satisfaction, low communication facilities and moderate job commitment.

4.1.3 Farmers

Education

The data in the table 4.3 revealed that 28.75 per cent of farmers were illiterate followed by 20.00 per cent who received formal education upto primary, whereas majority of farmers (41.35%) had education upto matriculation while only 10.00 per cent farmers had obtained education above matric or higher education. It is noted that nearly half of farmers had formal education upto matric, meaning thereby that their mental horizon was not as developed as it should be for the purpose of receiving, understanding, managing and applying recent advances in the field of agriculture.

Family education

The data in table 4.3 showed that majority of respondents (77.50%) were having low to medium level of family education while remaining 22.50 per cent of respondents belonged to high family education category. While interviewing it was found that illiterate farmers took help from their educated sons and daughters in matters of receiving, processing and using the information concerning agriculture. This speaks that family education play an important role in agriculture development. So government should concentrate more on programmes like adult education/non-formal education/

Table 4.3: Profile of farmers

Sr. No.	Variables	Levels	Frequency (N = 80)	Percentage
1.	Education			
		Illiterate	23	28.75
		Primary	16	20.00
		Upto matric	33	41.25
		Above matric	8	10.00
2.	Family education			
		Low (0-2.1)	28	35.00
		Medium (2.1-3.4)	34	42.50
		High (3.4-5.8)	18	22.50
3.	Social participation			
		Not participated	32	40.00
		Participated in one or more organisation	48	60.00
4.	Innovation proneness			
		Low (3-4)	12	15.00
		Medium (5-7)	50	62.50
		High (8-9)	18	22.50
5.	Socioeconomic status			
		Low (17-32)	29	36.25
		Medium (33-40)	30	37.50
		High (41-48)	21	26.25
6.	Training attended			
		No training	62	77.50
		One or more trainings attended	18	22.50

Sr. No.	Variables	Levels	Frequency (N = 80)	Percentage
7.	Economic motivation			
		Low (18-25)	21	26.25
		Medium (26-31)	36	45.00
		High (32-38)	23	28.75
8.	Knowledge of farmers			
	Cotton	Low (11-18)	33	41.25
		Medium (19-22)	27	33.75
		High (23-28)	20	25.00
	Wheat	Low (13-16)	24	30.00
		Medium (17-20)	27	33.75
		High (21-24)	29	36.25

continuing education to broaden the horizon of the farmers so that they can quickly receive understand and use the latest farm technology.

Social participation

Social participation indicates how prestigious, influential, cosmopolite an individual is. Looking at data in Table 4.3, it was found that majority of respondents (60%) were members of at least one or more organisations while social participation of 40 per cent of farmers was nil. While interviewing it was found majority of respondents were members of cooperative society or mini banks run by State Government followed by members of panchayats.

Innovative proneness

It is obvious from the table 4.3 that majority of respondents (62.50%) had medium level of innovative proneness followed by 22.50 per cent with high level of innovativeness while 15.00 per cent farmers belonged to low level of innovative proneness category. It is concluded that 75 per cent of farmers were having moderate to high innovative proneness meaning thereby that newer technology is readily acceptable to them.

Socio-economic status

The data in the table 4.3 revealed that 37.50 per cent of farmers belonged to medium socio-economic status category followed by 36.00 per cent to low socio-economic category while remaining 26.50 per cent farmers had high socio-economic status. It may be interpreted that majority of respondents, i.e. about three-fourth have low to medium level of socio-economic status.

Trainings attended

There is a network of training institutions in country at various levels which cater to varying needs of farmers related with agriculture. Regarding trainings it was found that a large majority of farmers (77.50%) have not attended any training related to agriculture. There were hardly 22.50 per cent farmers who attended one or more trainings in the field of agriculture. So it is alarming to note that more than 75 per cent of farmers have not obtained any training related with agriculture. So it is a matter of concern for State Government, Department of Agriculture and also for Agricultural Universities, which are responsible for development of agriculture in the State.

Economic motivation

It refers to occupational success in terms of profit maximisation and relative values placed by farmers on economic ends. It is apparent from the table 4.3 that majority of farmers (45%) had medium level of economic motivation followed by 28.75 per cent with high economic motivation while remaining 26.25 per cent farmers were having low economic motivation. It can be concluded that a large majority of farmers (73.75%) belonged to moderate to high level of economic motivation. It suggests that newer technology which is profitable is readily adopted by farmers.

Knowledge

The data in the table 4.3 revealed that in case of cotton crop a large majority of farmers (about 75%) had low to medium level of knowledge of

cotton production technology. Regarding wheat production technology 70.00 per cent respondents had medium to high level of knowledge and rest of farmers (30%) with low level of knowledge. Further perusal of the data showed that knowledge level of farmers was higher in case of wheat crop than cotton crop. It suggests that higher the knowledge higher will be the rate of adoption of crop production technology.

Majority (41.25%) of farmers had education upto matriculation, nearly half of the respondents possessed medium level of family education, 62.50 per cent had medium level of innovation proneness and 77.50 per cent of respondents have not attended any training while majority (74.75%) had low to medium level of socio-economic status and moderate to high economic motivation and majority possessed low to medium level of knowledge of cotton crop while moderate to high in case of wheat crop.

4.2 COMMUNICATION LINKAGE MECHANISM OF RESEARCHERS

Efficiency in communication has always been a matter of serious concern in all walks of life and more so for agricultural development which is so vulnerable and so vital. Since long research system, extension system and client system have been operating for agricultural modernisation in terms of both production and productivity and extension system charged with ultimate responsibility of communication efficiency. Consequently a lot of researches have been carried out about extension system. But as proverb goes 'No chain is stronger than its weakest link'. Neither of the systems is less important in contributing to the efficiency of farm communication in its entirety.

The research, extension and client systems, of course are closely interwoven with each other and considered inseparable if agricultural development has to take place. Their close relationship shall be meaning, provided there exists a strong linkage between these systems. Therefore, it is of great interest and strategic relevance to study the communication linkage mechanism of researchers where farm innovations get originated. The importance of use of communication linkages as modes and sources for receiving information, generation of farm technology and transfer of technology cannot be ruled out if the research system has to be effective. Keeping this in view an humble attempt has been made to identify the kinds of modes and sources used, extent to which information drawn along with their usefulness and credibility perception of researchers for generation of farm technology. An effort has also been made to find out the methods/media or channels used by researchers for transfer of farm technology to both extension personnel and farmers. It is well known fact that researchers use a variety of linkages for both getting details of recent advances in field of agriculture and transfer of these advances to extension and client system. However, the structural conditions and dependency syndrome prevent users from interacting with multiple linkages at the time of their application.

The data pertaining researchers' differential use frequency of linkages for generation of farm technology has been incorporated in the table 4.4

The farm technologies and their components necessary for bringing about the development of agriculture are received by researchers through a

Table 4.4: Differential use of modes and sources by researchers for generation of farm technology

Sr. No.	Modes and sources	Most frequently used (3)		Frequently used (2)		Least frequently used (1)		Total choice score	Rank order
		Frequency	Rank value	Frequency	Rank value	Frequency	Rank value		
A.	**Modes**								
1.	Self observation	11	33	13	26	-	-	59	I
2.	Research material/journals	8	24	14	28	2	2	54	II
3.	Professional meetings	6	18	8	16	10	10	44	VII
4.	Superior officers/immediate supervisors	5	15	14	28	5	5	48	IV
5.	Colleagues	4	12	15	30	5	5	47	V
6.	Farmers	5	15	11	22	8	8	45	VI
7.	Extension personnel (feed back)	1	3	9	18	14	14	35	X
8.	Farmer meetings	2	6	11	22	11	11	39	VIII
9.	Extension personnel meetings	4	12	7	14	13	13	39	VIII
10.	VIPs and administrators	1	3	5	10	18	18	31	XII
11.	Field surveys	2	6	8	16	14	14	36	IX
12.	Farmers tours	1	3	8	16	15	15	34	XI
13.	Demonstrations	7	21	10	20	7	7	48	IV
14.	Farm broadcasts	2	6	3	6	19	19	31	XII
15.	Farm telecasts	2	6	2	4	20	20	30	XIII
16.	Trainings	3	9	14	28	7	7	44	VII
17.	Research seminars/workshops/conferences	9	27	9	18	6	6	51	III
B.	**Sources**								
1.	Research institutes								
	a) International level	-	-	2	4	22	22	26	VII
	b) National level	2	6	11	22	11	11	39	IV
	c) Regional level	4	12	11	22	9	9	43	III
	d) State level	4	12	16	32	4	4	48	II
	e) Local	6	18	13	26	5	5	49	I
2.	Other state research institutes	-	-	10	20	14	14	34	V
3.	Voluntary organisations	-	-	4	8	20	20	28	VI
4.	Private organisations	-	-	4	8	20	20	28	VI

variety of modes and sources of communication. It is obvious from the data in the table 4.4 that researchers have used two types of linkages, i.e. modes and sources for generation of farm technology. Among modes self observation, research material/journals, research seminars/workshops/ conferences and superior officers or immediate superiors were the most frequently used whereas farm telecast, farm broadcast, VIPs and administrators and farmers' tours were least used modes. As regards sources, local research institutes, state agricultural research institutes followed by regional level research institutes were used mostly and frequently whereas least used sources were international research institutes, private organisations and voluntary organisations.

It is clear that researchers used most of the modes and sources such as self observation, literature, superior officers, professional meetings, and research institutes, whereas least used were farm telecast, farm broadcast, VIPs and administrators and voluntary and private organisations. So the findings of this investigation are in line with the findings of Ambastha and Singh (1977), Subhash Chandra and Channegowda (1985), Daivadeenam and Satyanarayana (1991) and Veeraswamy *et al.* (1992) and Baldwin and Haymond (1994) who reported that commonest information sources for scientists were other scientists, meetings and journals.

The data concerning researchers' differential extent of information drawn from modes and sources have been presented in table 4.5.

Table 4.5: Extent of information drawn from different modes and sources by researchers

Sr. No.	Modes and sources	Most of information drawn (3)		Somewhat information drawn (2)		Least information drawn (1)		Total choice score	Rank order
		Frequency	Rank value	Frequency	Rank value	Frequency	Rank value		
A.	**Modes**								
1.	Self observation	9	27	15	30	-	-	57	I
2.	Research material/journals	9	27	13	26	2	2	55	II
3.	Professional meetings	7	21	12	24	5	5	50	V
4.	Superior officers/immediate supervisors	5	15	13	26	6	6	47	VII
5.	Colleagues	5	15	14	28	5	5	48	VI
6.	Farmers	5	15	14	28	5	5	48	VI
7.	Extension personnel (feed back)	2	6	10	20	12	12	38	XII
8.	Farmer meetings	1	3	15	30	8	8	41	IX
9.	Extension personnel meetings	4	12	8	16	12	12	40	X
10.	VIPs and administrators	1	3	5	10	18	18	31	XVI
11.	Field surveys	2	6	9	18	13	13	37	XIII
12.	Farmers tours	1	3	10	20	13	13	36	XIV
13.	Demonstrations	10	30	9	18	5	5	53	IV
14.	Farm broadcasts	4	12	7	14	13	13	39	XI
15.	Farm telecasts	3	9	3	6	18	18	33	XV
16.	Trainings	2	6	16	32	6	6	44	VIII
17.	Research seminars/workshops/conferences	9	27	12	24	3	3	54	III
B.	**Sources**								
1.	Research institutes								
	a) International level	2	6	6	12	16	16	34	VI
	b) National level	5	15	10	20	9	9	44	IV
	c) Regional level	5	15	11	22	8	8	45	III
	d) State level	5	15	17	34	2	2	51	II
	e) Local	7	21	14	28	3	3	52	I
2.	Other state research institutes	2	6	12	24	10	10	40	V
3.	Voluntary organisations	1	3	6	12	17	17	32	VIII
4.	Private organisations	1	3	7	14	16	16	33	VII

It is apparent from the data in the table 4.5 that among modes, self observation, research material/journal, research seminar/workshops/ conferences and demonstrations were found to be the most used to draw most of the information for generation of farm technology whereas, VIPs and administrators, farm telecast, farmers tours and field surveys were least used and minimum information were drawn. The most of the information were drawn from the sources like local research institutes, state research institute and regional level research institute and the least information were drawn from voluntary organisation, private organisations and international level research institutes.

The findings are in agreement with the past studies of Subhash Chandra and Channegowda (1985) and Daivadeenam and Satyanarayana (1991).

The data regarding researchers' differential usefulness of linkages have been presented in the table 4.6.

The data in the table 4.6 revealed that two types of linkages have been used by respondents i.e., modes and sources of communication. Among modes research material/journals, self observation, professional meetings, farmers and superior officers/immediate superiors were found to be the most useful whereas VIPs and administrators, farm telecast, field surveys and extension personnel were least useful. As regards sources local research institutes, state research institutes and the regional level research institutes were the most useful whereas voluntary organisations, private organisations and international research institutes were considered the least useful by

Table 4.6: Differential usefulness of modes and sources perceived by researchers

Sr. No.	Modes and sources	Very useful (3)		Useful (2)		Least useful (1)		Total choice score	Rank order
		Frequency	Rank value	Frequency	Rank value	Frequency	Rank value		
A.	**Modes**								
1.	Self observation	11	33	13	26	-	-	59	I
2.	Research material/journals	12	36	11	22	1	1	59	I
3.	Professional meetings	10	30	10	20	4	4	54	II
4.	Superior officers/immediate supervisors	6	18	14	28	4	4	50	IV
5.	Colleagues	4	12	15	30	5	5	47	VI
6.	Farmers	7	21	15	30	2	2	53	III
7.	Extension personnel (feed back)	3	9	12	24	9	9	42	IX
8.	Farmer meetings	4	12	14	28	6	6	46	VII
9.	Extension personnel meetings	4	12	11	22	9	9	43	VIII
10.	VIPs and administrators	2	6	12	24	10	10	40	XI
11.	Field surveys	2	6	13	26	9	9	41	X
12.	Farmers tours	3	9	13	26	8	8	43	VIII
13.	Demonstrations	8	24	14	28	2	2	54	III
14.	Farm broadcasts	5	15	9	18	10	10	43	VIII
15.	Farm telecasts	3	9	10	20	11	11	40	XI
16.	Trainings	4	12	16	32	4	4	48	V
17.	Research seminars/workshops/conferences	7	21	12	24	5	5	50	IV
B.	**Sources**								
1.	Research institutes								
	a) International level	5	15	8	16	11	11	42	III
	b) National level	7	21	9	18	8	8	47	II
	c) Regional level	6	18	11	22	7	7	47	II
	d) State level	5	15	17	34	2	2	51	I
	e) Local	7	21	13	26	4	4	51	I
2.	Other state research institutes	2	6	14	28	8	8	42	III
3.	Voluntary organisations	2	6	8	16	14	14	36	V
4.	Private organisations	2	6	12	24	10	10	40	IV

researchers. The findings are in agreement with the findings of Veeraswamy *et al.* (1992) who reported that scientists utilised research journals to a fairly high degree followed by attending professional meetings, seminar and discussion with colleagues. Whereas, discussion with farmers, professional societies or organisations were least used.

The data pertaining to researchers' differential credibility of modes and sources have been incorporated in table 4.7.

The credibility of any mode or source of communication refers to trustworthiness of that mode or source. The computation of modes and sources credibility scores (Total choice scores) of respondents was done strictly in accordance with methodological steps already described in the chapter on methodology.

It is obvious from the data in table 4.7 that among modes self observation, research material/journal, professional meetings and demonstrations were considered more credible. While VIPs and administrators, farm telecast, farmers' tours and extension personnel meetings were considered least credible. As regards sources local/state level research institutes were considered most credible followed by regional and national research institutes, whereas, private organisations, voluntary organisation and international research institutes were considered least credible. These findings seem to be logical because modes likes self observation, research material, professional meetings and demonstrations have got high intensity of influence in matters of understanding the message and conviction leading

Table 4.7: Differential credibility of modes and sources perceived by researchers

Sr. No.	Modes and sources	Most credible (3)		Credible (2)		Least credible (1)		Total choice score	Rank order
		Frequency	Rank value	Frequency	Rank value	Frequency	Rank value		
A.	**Modes**								
1.	Self observation	9	27	15	30	-	-	57	I
2.	Research material/journals	10	30	12	24	2	2	56	II
3.	Professional meetings	10	30	10	20	4	4	54	III
4.	Superior officers/immediate supervisors	6	18	12	24	6	6	48	VI
5.	Colleagues	5	15	16	32	3	3	50	V
6.	Farmers	6	18	16	32	2	2	52	IV
7.	Extension personnel (feed back)	4	12	10	20	10	10	42	IX
8.	Farmer meetings	1	3	17	34	6	6	43	VIII
9.	Extension personnel meetings	3	9	12	24	9	9	42	IX
10.	VIPs and administrators	2	6	11	22	11	11	39	X
11.	Field surveys	5	15	10	20	9	9	44	VII
12.	Farmers tours	3	9	12	24	9	9	42	IX
13.	Demonstrations	10	30	10	20	4	4	54	III
14.	Farm broadcasts	6	18	8	16	10	10	44	VII
15.	Farm telecasts	4	12	10	20	10	10	42	IX
16.	Trainings	5	15	16	32	3	3	50	V
17.	Research seminars/workshops/conferences	8	24	14	28	2	2	54	III
B.	**Sources**								
1.	Research institutes								
	a) International level	3	9	9	18	12	12	39	V
	b) National level	5	15	11	22	8	8	45	III
	c) Regional level	6	18	12	24	6	6	48	II
	d) State level	6	18	16	32	2	2	52	I
	e) Local	7	21	14	28	3	3	52	I
2.	Other state research institutes	2	6	12	24	10	10	40	IV
3.	Voluntary organisations	3	9	9	18	12	12	39	V
4.	Private organisations	2	6	11	22	11	11	39	V

to acceptance of new ideas because of having the principles of 'seeing is believing' and 'learning by doing', whereas least credibility of modes like VIPs and administrators, farm telecast, farmers' tours and extension personnel meetings may probably be due to low potentiality and influence to large number of researchers, because of their being a non-regular feature owing to certain limitations. Among sources local/state research institutes were considered most credible followed by regional and national level research institute. This seems to be highly logical because they have to fulfil needs/ interests of the area under their jurisdiction on priority basis followed by regional and national interests and moreover, it is obligatory on their part to generate the area specific technology. The least credibility of sources like voluntary organisation, private organisations and international research institutes may be due to their low potentiality and influence because of their limited number. The findings are in conformity with past researches of Rogers and Shoemaker (1971), Subhash Chander and Channegowda (1985) and Daivadeenam and Satyanarayana (1991).

The data concerning researchers differential use of methods/media or channels of communication for transfer of technology to extension personnel have been presented in table 4.8

It is obvious from the data that among different methods/media or channels, farm darshan, kisan mela, research reports, group discussions, personal contacts and visits, trainings and workshops were most frequently utilized for transfer of technology to extension personnel whereas, farm

Table 4.8: Differential use of methods/media or channels of communication by researchers for transfer of technology to extension personnel

Sr. No.	Methods/Media or channels	Mostly (2)		Sometimes (1)		Never (0)		Total choice score	Rank order
		Frequency	Rank value	Frequency	Rank value	Frequency	Rank value		
1.	Personal contacts	10	20	14	14	-	-	34	III
2.	Personal visits	8	16	16	16	-	-	32	IV
3.	Office letters	4	8	16	16	4	-	24	X
4.	Office calls	3	6	16	16	5	-	22	XI
5.	Telephone calls	3	6	14	14	7	-	20	XII
6.	Trainings	8	16	15	15	1	-	31	V
7.	Workshops	8	16	15	15	1	-	31	V
8.	Seminars	7	14	16	16	1	-	30	VI
9.	Conferences	6	12	17	17	1	-	29	VII
10.	Compaigns	5	10	15	15	4	-	25	IX
11.	Professional meetings	5	10	14	14	5	-	24	X
12.	Group discussions	6	12	17	17	1	-	29	VII
13.	Kisan Mela	14	28	9	9	1	-	37	II
14.	Farm Darshan	16	32	7	7	1	-	39	I
15.	Publications								
	i) News letters	10	20	10	10	4	-	30	VI
	ii) Magazines	8	16	13	13	3	-	29	VII
	iii) Folders/handouts	8	16	12	12	4	-	28	VIII
16.	Personal letters	1	2	18	18	5	-	20	XII
17.	Advisory letters	1	2	14	14	9	-	16	XIV
18.	Radio talks	1	2	14	14	9	-	16	XIV
19.	Television talks	-	-	3	3	21	-	3	XV
20.	Newspapers	1	2	15	15	8	-	17	XIII
21.	Research report	13	26	11	11	-	-	37	II

telecast, farm broadcast, advisory letters, newspapers, personal letters, telephone calls were least used channels.

The study revealed that researchers have made use of group contact methods/media contact methods like farm darshan, kisan mela followed by personal contacts and personal visits. Whereas, use of mass media like TV and radio, newspapers were used to a limited extent or negligible extent. The methods or media of personal contacts like, advisory letters, personal letters and telephone calls were also least used by researchers. The findings of this study differ to some extent from past studies of Ambastha and Singh (1976), Reddy (1984) and Daivadeenam and Satyanarayana (1991) who reported that researchers have mostly used personal contact methods and group contact methods and media were less frequently used by scientists. However, the observations of least use of mass media like TV, radio and newspapers are in agreement with past researchers of Ambastha and Singh (1976), Reddy (1984) and Daivadeenam and Satyanarayana (1991).

The study brought to surface that researchers have made use of group contact methods or media like farm darshan, kisan mela and publication of researches for transfer of technology which are obligatory on them to provide scientific information.

Data pertaining to researchers' differential use of media/methods or channels for transfer of technology to farmers have been incorporated in table 4.9.

It is apparent from the data in the table 4.9 that among different methods/media or channels, publication of popular articles on campus

Table 4.9: Differential use of methods/media or channels used by researchers for transfer of farm technology to farmers

Sr. No.	Methods/Media or channels	Mostly (2)		Sometimes (1)		Never (0)		Total choice score	Rank order
		Frequency	Rank value	Frequency	Rank value	Frequency	Rank value		
1.	Personal visits/farm and home visits	8	16	15	15	1	-	31	V
2.	i) Trainings of farmers at CCS HAU	10	20	12	12	2	-	32	IV
	ii) Trainings of farmers at village	7	14	15	15	2	-	29	VII
3.	*i) Demonstrations at CCS HAU*	*13*	*26*	*10*	*10*	*1*	-	*36*	*II*
	ii) Demonstrations at village	7	14	14	14	3	-	28	VIII
4.	Publication/popular articles	17	34	6	6	1	-	40	I
5.	Radio talks/farm broadcasts	5	10	14	14	5	-	24	X
6.	T.V. talks/Telecast	-	-	3	3	21	-	3	XVII
7.	Advisory letters	2	4	9	9	13	-	13	XV
8.	Personal letters	4	8	14	14	6	-	22	XII
9.	Field days	11	22	8	8	5	-	30	VI
10.	Film shows	3	6	5	5	16	-	11	XVI
11.	Kisan mela	13	26	8	8	3	-	34	III
12.	Office calls	4	8	10	10	10	-	18	XIII
13.	Telephone calls	4	8	9	9	11	-	17	XIV
14.	Rabi and kharif compaign meetings	8	16	9	9	7	-	25	IX
15.	Professional meetings	7	14	9	9	8	-	23	XI

demonstrations, kisan mela, and on campus training of farmers followed by personal visits to farm and home were the most frequently utilised methods for transfer of technology to farmers. Whereas, television talks, film shows, advisory letters, telephone calls, office calls and personal letters were least used by researchers.

The study clearly revealed that researchers have used most frequently the publication of popular articles which is considered as their academic activity and similarly on campus demonstrations, kisan mela and on campus training are the assigned duties to them. The study revealed that personal contact methods were least used by most of the scientists to disseminate information to farmers. Though group contact methods such as on campus demonstrations, kisan mela, on campus trainings were used to a greater extent. Whereas, mass media/methods like television talks, educational film shows were used to negligible extent. The findings of the study differ to some extent from past researchers (Lionberger and Change, 1970; Ambastha and Singh, 1977; Reddy and Reddy, 1987), who reported that most important methods for communicating with farmers were personal contact methods. However, the findings are in line with the observations of Varma (1987) who reported that most of the scientists had not used personal contact methods to communicate with rural women. Group contact methods viz., trainings and demonstrations were used by quite a large percentage of scientists. Among mass contact methods, kisan mela and extension publications were mostly

used methods for dissemination of technology to rural women. Whereas, radio, television and films were used to negligible extent by scientists.

4.3 COMMUNICATION LINKAGE MECHANISM, OF EXTENSION PERSONNEL

Communication efficiency of extension personnel plays an important role not only for dissemination of information but also for persuasion leading to adoption of innovations which is prerequisite for agricultural development. Since long research system, extension system and client system have been in use so as to enhance the production and productivity of agriculture necessary for overall development of farmers. Effective communication of innovations generated from agricultural research system to multitude farmers helps to achieve planned change on agricultural front. Here lies the role of communication linkage mechanism of extension personnel that is linkages used for acquisition of farm technology and methods/media or channels used for transfer of latest technological 'know-how' and 'do-how' to farmers. The effectiveness of extension system depends upon magnitude of communication linkages. Hence, an humble attempt has been made to identify the kinds of modes and sources used, extent to which information related to farm technology have been drawn along with their usefulness and credibility perception of extension personnel. An effort had also been made to find out the kind of methods/media or channels used by extension personnel for transfer of farm technology to farmers.

The data related to extension personnels'-differential use frequency of linkages for acquisition of farm technology have been presented in the table 4.10.

It is apparent from the data in the table 4.10 that two types of linkages have been used by extension personnel, i.e. modes and sources of communication. Among modes, staff meetings, trainings, senior extension personnel, leaflets, pamphlets and folders, departmental circulars and subject matter specialists of the department were found to be the most used whereas scientists agro-industry, films/telecast/news reels, salesman of fertilizer, chemicals etc., research journals, extension journal, farm broadcasts and personal correspondence with researchers were the least used by extension personnel. As regards sources, the extension personnel most frequently used organisation such as state department of agriculture followed by Directorate of Extension Education of CCS HAU Hisar while voluntary organisations and professional organisations/extension organisations were either not used or to a very negligible extent by extension personnel.

It is clear from the findings of this study that important source of information for acquisition of farm technology was state department of agriculture and the important modes used by extension personnel were staff meetings, trainings, leaflets/pamphlets, departmental circulars and subject matter specialists while the least used modes were scientists of agro-industry, telecast/films/newsreels, journals, radio and personal correspondence with researchers. The findings of this study are in line with the findings of past

Table 4.10: Differential use frequency of modes and sources by extension personnel for acquisition of farm technology

Sr. No.	Modes and sources	Most frequently used (3)		Frequently used (2)		Least frequently used (1)		Total choice score	Rank order
		Frequency	Rank value	Frequency	Rank value	Frequency	Rank value		
A.	**Modes**								
1.	Radio/farm broadcasts	5	15	21	42	39	39	96	XVII
2.	Package of practices booklet	18	54	39	78	8	8	140	VIII
3.	Leaflets, pamphlets and folders	27	81	31	62	7	7	150	IV
4.	Magazines	12	36	29	58	24	24	118	XII
5.	Newspapers	11	33	9	18	45	45	96	XVII
6.	Specialists of Dept. of Agri./SMS Agri. Univ.	27	81	24	48	14	14	143	VI
7.	Staff meetings	48	144	12	24	5	5	173	I
8.	Trainings	41	123	18	36	6	6	165	II
9.	Professional/Extension journals	3	9	22	44	40	40	93	XVIII
10.	Films/Telecast/News reels etc.	4	12	12	24	49	49	85	XXI
11.	Kisan Mela	20	60	30	60	15	15	135	X
12.	Farm Darhsan	14	42	36	72	15	15	129	XI
13.	Field days	14	42	36	72	15	15	129	XI
14.	Departmental circulars	21	63	40	80	4	4	147	V
15.	Fellow extension personnel	16	48	44	88	5	5	141	VII
16.	Senior extension personnel	32	96	30	60	3	3	159	III
17.	Salesman of fertilizers, chemicals, etc.	6	18	12	24	47	47	89	XX
18.	Scientists agri. Univ.	11	33	20	40	34	34	107	XIII
19.	Scientists agro-industry	3	9	9	18	53	53	80	XXII
20	Progressive farmers	21	63	34	68	10	10	141	VII
21.	Research journals	5	15	16	32	44	44	91	XIX
22.	Demonstrations	19	57	34	68	12	12	137	IX
23.	Personal visit to researchers	10	30	20	40	35	35	105	XIV
24.	Personal correspondence with researchers	8	24	16	32	41	41	97	XVI
25.	Seminar/Conferences/Workshops	7	21	21	42	37	37	100	XV
B.	**Sources**								
1.	CCS HAU Hisar/Directorate of Extn. Edn.	17	51	28	56	20	20	127	II
2.	State Dept. of Agri.	54	162	8	16	3	3	181	I
3.	State Agro-ind./pvt.firms of insecti./pesticides	-	-	17	34	48	48	82	III
4.	Voluntary organisations	3	9	4	8	58	58	75	IV
5.	Professional organisations/Extn.organisations	-	-	4	8	61	61	69	V

researches of Ray (1975), Balasubramanian and Menon (1977), Pandey (1979) and Natikar and Jayaramiah (1988).

The data concerning extension personnel's differential extent of information drawn from modes and sources have been incorporated in the table 4.11.

It is clear from the table 4.11 that among modes staff meetings, trainings, senior extension personnel, leaflets/pamphlets and departmental circulars followed by subject matter specialists were found to be most used to draw most of the information. While scientists of agro-industry, films/ telecast/newsreels, salesman of fertilizers, chemical, etc., research journals, extension journals, broadcasts and personal correspondence with researchers were least used by extension personnel and minimum information was drawn from them. As regards sources the most of the information were drawn from state department of agriculture followed by Directorate of Extension Education of CCS HAU Hisar, whereas minimum or negligible information were drawn from the sources like voluntary organisation and professional organisations.

Data regarding extension personnels' differential usefulness of linkages have been presented in table 4.12.

The table 4.12 revealed that extension personnels have used two types of linkages, i.e., modes and sources of communication. Among modes staff meetings, trainings, senior extension personnel, leaflets/pamphlets/folders, departmental circulars and subject matter specialists were found to be the

Table 4.11: Differential extent of information drawn from modes and sources by extension personnel

Sr. No.	Modes and sources	Most of information drawn(3)		Somewhat information drawn (2)		Least information drawn (1)		Total choice score	Rank order
		Frequency	Rank value	Frequency	Rank value	Frequency	Rank value		
A.	**Modes**								
1.	Radio/farm broadcasts	6	18	18	36	41	41	95	XVII
2.	Package of practices booklet	18	54	39	78	8	8	140	VIII
3.	Leaflets, pamphlets and folders	27	81	31	62	7	7	150	IV
4.	Magazines	12	36	29	58	24	24	118	XII
5.	Newspapers	9	27	10	20	46	46	93	XIX
6.	Specialists of Dept. of Agri./SMS Agri. Univ.	27	81	23	46	15	15	142	VI
7.	Staff meetings	47	141	12	24	6	6	171	I
8.	Trainings	40	120	17	34	8	8	162	II
9.	Professional/Extension journals	3	9	23	46	39	39	94	XVIII
10.	Films/Telecast/News reels etc.	4	12	10	20	51	51	83	XXI
11.	Kisan Mela	20	60	30	60	15	15	135	X
12.	Farm Darhsan	17	51	29	58	19	19	128	XI
13.	Field days	17	51	29	58	19	19	128	XI
14.	Departmental circulars	22	66	38	76	5	5	147	V
15.	Fellow extension personnel	16	48	44	88	5	5	141	VII
16.	Senior extension personnel	29	87	33	66	3	3	156	III
17.	Salesman of fertilizers, chemicals, etc.	5	15	11	22	49	49	86	XX
18.	Scientists agri. Univ.	11	33	20	40	34	34	107	XIII
19.	Scientists agro-industry	3	9	10	20	52	52	81	XXII
20	Progressive farmers	21	63	34	68	10	10	141	VII
21.	Research journals	8	24	13	26	44	44	94	XVIII
22.	Demonstrations	21	63	32	64	12	12	139	IX
23.	Personal visit to researchers	11	33	17	34	37	37	104	XIV
24.	Personal correspondence with researchers	8	24	16	32	41	41	97	XVI
25.	Seminar/Conferences/Workshops	9	27	17	34	39	39	100	XV
B.	**Sources**								
1.	CCS HAU Hisar/Directorate of Extn. Edn.	17	51	28	56	20	20	127	II
2.	State Dept. of Agri.	54	162	8	16	3	3	181	I
3.	State Agro-ind./pvt.firms of insecti./pesticides	-	-	24	48	41	41	89	III
4.	Voluntary organisations	3	9	7	14	55	55	78	IV
5.	Professional organisations/Extn.organisations	-	-	8	16	57	57	73	V

Table 4.12: **Differential usefulness of modes and sources perceived by extension personnel**

Sr. No.	Modes and sources	Very useful (3)		Useful (2)		Least useful (1)		Total choice score	Rank order
		Frequency	Rank value	Frequency	Rank value	Frequency	Rank value		
A.	**Modes**								
1.	Radio/farm broadcasts	11	33	20	40	34	34	107	XVI
2.	Package of practices booklet	23	69	32	64	10	10	143	X
3.	Leaflets, pamphlets and folders	29	87	32	64	4	4	155	IV
4.	Magazines	13	39	33	66	19	19	124	XIII
5.	Newspapers	9	27	18	36	38	38	101	XIX
6.	Specialists of Dept. of Agri./SMS Agri. Univ.	23	69	37	74	5	5	148	VI
7.	Staff meetings	48	144	13	26	4	4	174	I
8.	Trainings	43	129	16	32	6	6	167	II
9.	Professional/Extension journals	8	24	21	42	36	36	102	XVIII
10.	Films/Telecast/News reels etc.	7	21	16	32	42	42	95	XXI
11.	Kisan Mela	26	78	26	52	13	13	143	X
12.	Farm Darhsan	21	63	27	54	17	17	134	XII
13.	Field days	23	69	30	60	12	12	141	XI
14.	Departmental circulars	29	87	30	60	6	6	153	V
15.	Fellow extension personnel	23	69	36	72	6	6	147	VII
16.	Senior extension personnel	32	96	30	60	3	3	159	III
17.	Salesman of fertilizers, chemicals, etc.	7	21	18	36	40	40	97	XX
18.	Scientists agri. Univ.	17	51	25	50	23	23	124	XIII
19.	Scientists agro-industry	7	21	15	30	43	43	94	XXII
20	Progressive farmers	26	78	29	58	10	10	146	VIII
21.	Research journals	3	9	26	52	36	36	97	XX
22.	Demonstrations	26	78	28	56	11	11	145	IX
23.	Personal visit to researchers	17	51	17	34	31	31	116	XIV
24.	Personal correspondence with researchers	9	27	21	42	35	35	104	XVII
25.	Seminar/Conferences/Workshops	11	33	24	48	30	30	111	XV
B.	**Sources**								
1.	CCS HAU Hisar/Directorate of Extn. Edn.	19	57	35	70	11	11	138	II
2.	State Dept. of Agri.	54	162	8	16	3	3	181	I
3.	State Agro-ind./pvt.firms of insecti./pesticides	-	-	24	48	41	41	89	III
4.	Voluntary organisations	3	9	7	14	55	55	78	IV
5.	Professional organisations/Extn.organisations	-	-	7	14	58	58	72	V

most useful whereas scientists of agro-industry, films/telecast/news reels, salesman of fertilizers, chemicals, etc., journals, farm broadcast and personal correspondence with researcher were considered the least useful for acquisition of farm technology by extension personnel. As regards sources State Department of Agriculture was considered very useful followed by Directorate of Extension Education of CCS HAU Hisar whereas voluntary organisations and professional organisations were considered least useful linkages for acquisition of farm technology.

A minute examination of data in tables 4.10, 4.11 and 4.12 led to conclude that extension personnel by and large have utilized modes likes staff meetings, trainings, senior extension personnel, leaflets/pamphlets, departmental circulars and subject matter specialists of department of agriculture, whereas least used modes were scientists of agro-industry; films/ telecast, salesman of fertilizers, chemicals, etc., radio, journals and personal correspondence with researchers. As regards sources state department of agriculture was utilized to a greater extent for acquisition of farm technology followed by Directorate of Extension Education of CCS HAU Hisar, whereas voluntary organisations and professional organisations were either not used or to a very negligible extent.

It is clear from the findings that wider use of group contact linkages, viz. staff meeting, trainings seems to be justifiable as extension personnel held regular meetings as well as they get training as their part of working schedule to abreast them with latest knowledge of farm innovations. Similar

findings have been reported by Ray (1975), Pandey (1979), Singh (1982) and Babu and Sinha (1985), Varma (1987) and Natikar and Jayaramiah (1988). The wider use of leaflets/pamphlets and departmental circulars than extension and research journals by extension personnel is understandable due to their easy availability and as well as simple language. The findings of this study re in line with the findings of past researches of Lionberger and Chang (1970), Akhouri (1973), Ambastha (1974), Sanoria (1974), Singh (1982) and Babu and Sinha (1985) and Varma (1987). The study also revealed the least use of telecast, extension and research journals and personal correspondence with researcher. Similar findings were reported by Babu and Sinha (1985) and Varma (1987).

Data pertaining to extension personnels' differential credibility of modes and sources have been presented in table 4.13.

The credibility of a mode or source refers to trustworthiness of that mode or source. The computation of modes and sources-credibility scores (Total choice scores) of respondents was done strictly in accordance with the methodological steps already described in methodology chapter.

It is obvious from the data in the table 4.13 that among modes staff meetings, trainings, subject matter specialist of Farm University, demonstrations, Kisan Mela and Senior extension personnel were considered the most credible whereas films/telecast, scientists of agro-industry, extension journal, newspaper, salesman of fertilizer-chemical etc. and personal correspondence with researchers were considered least credible. As regards

Table 4.13: Differential credibility of modes and sources perceived by extension personnel

Sr. No.	Modes and sources	Most credible (3)		Credible (2)		Least credible (1)		Total choice score	Rank order
		Frequency	Rank value	Frequency	Rank value	Frequency	Rank value		
A.	**Modes**								
1.	Radio/farm broadcasts	8	24	31	62	26	26	112	XV
2.	Package of practices booklet	20	60	37	74	8	8	142	VIII
3.	Leaflets, pamphlets and folders	25	75	32	64	8	8	147	V
4.	Magazines	14	42	30	60	21	21	123	XII
5.	Newspapers	11	33	16	32	38	38	103	XVIII
6.	Specialists of Dept. of Agri./SMS Agri. Univ.	30	90	32	64	3	3	157	III
7.	Staff meetings	47	141	11	22	7	7	170	I
8.	Trainings	44	132	14	28	7	7	167	II
9.	Professional/Extension journals	6	18	25	50	34	34	102	XIX
10.	Films/Telecast/News reels etc.	9	27	13	26	43	43	96	XXI
11.	Kisan Mela	28	84	26	52	11	11	147	V
12.	Farm Darhsan	22	66	29	58	14	14	138	X
13.	Field days	19	57	37	74	9	9	140	IX
14.	Departmental circulars	19	57	42	84	4	4	145	VII
15.	Fellow extension personnel	19	57	42	84	4	4	145	VII
16.	Senior extension personnel	26	78	29	58	10	10	146	VI
17.	Salesman of fertilizers, chemicals, etc.	9	27	20	40	36	36	103	XVIII
18.	Scientists agri. Univ.	20	60	29	58	16	16	134	XI
19.	Scientists agro-industry	9	27	18	36	38	38	101	XX
20	Progressive farmers	29	87	23	46	13	13	146	VI
21.	Research journals	11	33	17	34	37	37	104	XVII
22.	Demonstrations	30	90	27	54	8	8	152	IV
23.	Personal visit to researchers	19	57	15	30	31	31	118	XIII
24.	Personal correspondence with researchers	11	33	19	38	35	35	106	XVI
25.	Seminar/Conferences/Workshops	12	36	27	54	26	26	116	XIV
B.	**Sources**								
1.	CCS HAU Hisar/Directorate of Extn. Edn.	29	87	26	52	10	10	149	II
2.	State Dept. of Agri.	55	165	7	14	3	3	182	I
3.	State Agro-ind./pvt.firms of insecti./pesticides	-	-	20	40	45	45	85	III
4.	Voluntary organisations	3	9	4	8	58	58	75	IV
5.	Professional organisations/Extn.organisations	-	-	5	10	60	60	70	V

sources credibility, the state department of Agriculture was considered the most credible followed by Directorate of Extension Education of CCS HAU Hisar.

Further probing of data indicated that staff meetings, trainings, SMSs and senior extension personnel were found among most credible modes and these belonged to personal contact category of information modes. This is logical because past researches of Ramchand *et al.* (1979) and Singh (1988) advocated for their high intensity of influence in matter of understanding messages and conviction leading to acceptance of innovations. Therefore, the findings of this investigation also established contention similar to past researches. A close look at the data further pointed out demonstrations and kisan mela as most credible modes. These two modes belonged to group contact category of information linkages. These findings are again in line with already established contentions by several researches of Brunner and Young (1949), Vishnoi and Bose (1961), Radhukar (1958), Rao (1965) and Singh (1988). Moreover, this is again logical because group contact category of information are considered next to personal contact as per the intensity of influence. It is not worthy that mass contact modes like telecast/films, newspapers and journals were perceived less credible by extension personnel. The reasonable explanation for their least credibility may be that it did not seem neither feasible nor possible to provide these at the headquarters of extension personnel for obtaining information by them through these modes due to higher cost and low budget.

Table 4.14: Differential use of media/methods or channels by extension personnel for tranfer of farm technology to farmers

Sr. No.	Media/methods or channels	Most frequently used (3)		Frequently used (2)		Rarely used(1)		Never used (0)		Total choice score	Rank order
		Frequency	Rank value	Frequency	Rank value	Frequency	Rank value	Frequency	Rank value		
1.	Farm and home visits	57	171	5	10	3	3	-	-	184	I
2.	Office calls	15	45	26	52	21	21	3	-	118	VII
3.	Telephone calls	1	3	1	2	12	12	51	-	17	XVI
4.	Advisory letters	1	3	16	32	30	30	18	-	65	XIII
5.	Field days/trips	15	45	38	76	9	9	3	-	130	VI
6.	Trainings of farmers	30	90	30	60	4	4	1	-	154	III
7.	Demonstrations	31	93	28	56	4	4	2	-	153	IV
8.	Publications	6	18	14	28	14	14	31	-	60	XIV
9.	Leaflets, bulletins, pamphlets	15	45	26	52	16	16	8	-	113	VIII
10.	Farm magazines	10	30	12	24	27	27	16	-	81	XII
11.	Educational films/ film shows	3	9	10	20	10	10	42	-	39	XV
12.	Compaigns	16	48	19	38	24	24	6	-	110	IX
13.	Exhibitions	5	15	17	34	40	40	3	-	89	XI
14.	Crop competitions	29	87	28	56	8	8	-	-	151	V
15.	Farmers tours	9	27	17	34	28	28	11	-	89	XI
16.	Radio talks	1	3	5	10	3	3	56	-	16	XVII
17.	Television talks	1	3	4	8	4	4	56	-	15	XVIII
18.	Farm literature	8	24	17	34	32	32	8	-	90	X
19.	Group meetings	31	93	30	60	4	4	-	-	157	II

Data concerning extension personnels' differential use of methods/ media or channels have been presented in table 4.14.

It is clear from the data in the table 4.14 that farm and home visits, group meetings, trainings of farmers, demonstrations, crop competitions and field trips were most utilized methods/media by extension personnel for transfer of technology to farmers. Whereas, television talks, radio talks, telephone calls, educational films, publications, advisory letters and exhibitions were least used channels by extension personnel.

It may be concluded from the findings that extension personnel made maximum use of personal contact methods like farm and home visits followed by group contact methods like group meetings, demonstrations, crop competitions etc. While least used were mass contact methods/media such as television, radio, educational films, publications and exhibitions. The findings of this investigation seem to be logical because personal contact methods have high intensity of influence both for understanding of message and conviction leading to acceptance of innovations, followed by group contact and mass contact methods or media. Similar findings have been reported by past studies of Sanoria and Singh (1976), Sangha (1979), Reddy (1984) and Lakshminarayana and Veerabhadriah (1992).

4.4 COMMUNICATION LINKAGE MECHANISM OF FARMERS FOR ACQUISITION OF FARM TECHNOLOGY

The importance of modes and sources of communication is highly essential for reception of messages. The effectiveness of extension system

depend upon the magnitude of communication linkages. Hence, an humble attempt has been made to identify the kinds of modes and sources used, extent to which information related to farm technology has been drawn along with their usefulness and credibility. It is well established fact that farmers have to use a variety of modes and sources not only to keep themselves familiar but also convinced for adoption of farm technology. However, the structural conditions and dependency syndromes prevent users from interacting with multiple linkages at a time for receiving details of farm information. Farmers hesitate in providing return response, i.e. feed back as they are not skilled enough to understand the mechanism of exploitation of modes and sources.

The data concerning farmers' differential use frequency of linkages have been presented in Table 4.15.

It is obvious from the data in table 4.15 that two types of linkages have been used by respondents i.e. modes and sources. Among modes, progressive farmers, friends, neighbours, relatives and fellow farmers were found to be the most used whereas, advisory letters, farmers tours, agricultural exhibitions and demonstrations were least used by farmers. As regards use of sources, seed/fertilizer store, market and commercial agencies of insecticides-pesticides were the most used whereas voluntary organisations, farmers' organisations and research stations were the least used by the farmers for acquisition of farm technology. The informal linkages such as progressive farmers, friends, neighbours, relatives and fellow farmers occupied the highest place in terms of message reception seems to be highly logical probably

Table 4.15: Differential use frequency of modes and sources by the farmers for acquisition of farm technology

Sr. No.	Modes and sources	Most frequently used (3)		Frequently used (2)		Least frequently used (1)		Total choice score	Rank order
		Frequency	Rank value	Frequency	Rank value	Frequency	Rank value		
A.	**Modes**								
1.	Scientists	5	15	16	32	59	59	106	XIV
2.	Extensional personnel	9	27	26	52	45	45	124	X
3.	Progressive farmers	52	156	28	56	-	-	212	I
4.	Local leaders	7	21	17	34	56	56	111	XIII
5.	Neighbours	46	138	30	60	4	4	202	III
6.	Relatives	43	129	34	68	3	3	200	IV
7.	Friends	49	147	30	60	1	1	208	II
8.	Fellow farmers	39	117	40	80	1	1	198	V
9.	Farm broadcast/radio	9	27	36	72	35	35	134	IX
10.	Farm telecast/television	5	15	25	50	50	50	115	XII
11.	i) CCS HAU farm bulletins	2	6	8	16	70	70	92	XVI
	ii) Haryana kheti	15	45	13	26	52	52	123	XI
12.	Newspapers	3	9	15	30	62	62	101	XV
13.	Farmers fair/Farm darshan/field days	12	36	35	70	33	33	139	VIII
14.	Agricultural exhibitions	1	3	8	16	71	71	90	XVIII
15.	Demonstrations	1	3	9	18	70	70	91	XVII
16.	Group discussions/group meetings	26	78	22	44	32	32	154	VII
17.	Farmers tours	-	-	4	8	76	76	84	XIX
18.	Advisory letters	-	-	4	8	76	76	84	XIX
19.	Salesman/private dealers	33	99	39	78	8	8	185	VI
B.	**Sources**								
1.	Market	27	81	45	90	8	8	179	II
2.	Cooperative society/gramin bank	2	6	31	62	47	47	115	V
3.	Research stations	2	6	3	6	75	75	87	VII
4.	CCS HAU	9	27	34	68	37	37	132	IV
5.	Fertilizer/seed store	26	78	49	98	5	5	181	I
6.	Agroindustries	8	24	12	24	60	60	108	VI
7.	Comm. agencies of insecticides/pesticides	3	9	74	148	3	3	170	III
8.	Farmers organisations	-	-	-	-	80	80	80	VIII
9.	Voluntary organisations	-	-	-	-	80	80	80	VIII

because of the fact that they generally witness the innovations/new practices followed by the farmers of their own village or neighbouring village and principle of 'seeing is believing' led to maximum use of informal linkages by farmers. The probable reason for least use of modes like advisory letters, farmers tours, agricultural exhibitions and demonstrations may be the dependency of farmers on government or private agencies/institutions responsible for carrying out such activities which are not regular features due to certain limitations. The sources of information to farmers such as seed/fertilizer store, market, commercial agency of insecticides-pesticides were utilised to maximum extent. This seems to be logical enough as these are privately owned sources and as such emphasis is given to maximum and frequent contacts with clientele by providing latest technical 'know-how' to users in order to get their products through so as to earn maximum profit. Moreover, farmers inclination becomes more to such sources because such private enterprises also give their product on credit. Probably due to these reasons the farmers inclination towards such sources become natural.

Further probing of data indicated that institutions like CCS HAU, cooperative societies/gramin bank and research stations were also contacted with least frequency. The most probable reasons for least use of government/ semi-government agencies expressed by respondents were non-availability of scientists or extension workers when need arises, non availability of inputs on subsidised rates compared to private agencies, and lack of proper interest and guidance.

The data pertaining to farmers' differential extent of information drawn from modes and sources have been incorporated in the table 4.16.

It is obvious from the data in table 4.16 that among modes progressive farmers, friends, neighbours and fellow farmers were found to be the most used to draw the most of the information whereas advisory letters, farmers tours, agricultural exhibitions and demonstrations were least used and minimum information were drawn from these modes. As regards sources, the most of the information were drawn from the sources like seed/fertilizer store, market, commercial agencies of insecticides-pesticides and least information were drawn from voluntary organisations, farmers organisation and research stations.

The communication modes such as progressive farmers, friends, neighbours, and fellow farmers occupied highest place to draw the information because these being informal in nature and moreover, frequent and regular interactions for exchange of informations, close relations, mutual dependency and trust may be the probable considerations which led to maximum use of these informal linkages by farmers. Whereas, the probable reason for minimum information drawn from modes such as advisory letters, farmers tours, agricultural exhibitions may be that farmers depended heavily on Government/Semi-government and private agencies carrying out these activities which are not regular feature due to certain limitations. As regards sources most of the information were drawn by farmers from sources such as seed/fertilizer store, market and commercial agencies of insecticides-

Table 4.16: Differential extent of information drawn from the modes and sources by farmers

Sr. No.	Modes and sources	Most of information drawn(3)		Somewhat information drawn (2)		Least information drawn (1)		Total choice score	Rank order
		Frequency	Rank value	Frequency	Rank value	Frequency	Rank value		
A.	**Modes**								
1.	Scientists	5	15	16	32	59	59	106	XIV
2.	Extensional personnel	9	27	26	52	45	45	124	X
3.	Progressive farmers	52	156	28	56	-	-	212	I
4.	Local leaders	7	21	17	34	56	56	111	XIII
5.	Neighbours	46	138	30	60	4	4	202	III
6.	Relatives	43	129	34	68	3	3	200	IV
7.	Friends	49	147	30	60	1	1	208	II
8.	Fellow farmers	39	117	40	80	1	1	198	V
9.	Farm broadcast/radio	9	27	36	72	35	35	134	IX
10.	Farm telecast/television	5	15	25	50	50	50	115	XII
11.	i) CCS HAU farm bulletins	2	6	8	16	70	70	92	XVI
	ii) Haryana kheti	15	45	13	26	52	52	123	XI
12.	Newspapers	3	9	15	30	62	62	101	XV
13.	Farmers fair/Farm darshan/field days	12	36	35	70	33	33	139	VIII
14.	Agricultural exhibitions	1	3	8	16	71	71	90	XVIII
15.	Demonstrations	1	3	9	18	70	70	91	XVII
16.	Group discussions/group meetings	26	78	22	44	32	32	154	VII
17.	Farmers tours	-	-	4	8	76	76	84	XIX
18.	Advisory letters	-	-	4	8	76	76	84	XIX
19.	Salesman/private dealers	33	99	39	78	8	8	185	VI
B.	**Sources**								
1.	Market	27	81	45	90	8	8	179	II
2.	Cooperative society/gramin bank	2	6	31	62	47	47	115	V
3.	Research stations	2	6	3	6	75	75	87	VII
4.	CCS HAU	9	27	34	68	37	37	132	IV
5.	Fertilizer/seed store	26	78	49	98	5	5	181	I
6.	Agroindustries	8	24	12	24	60	60	108	VI
7.	Comm. agencies of insecticides/pesticides	3	9	74	148	3	3	170	III
8.	Farmers organisations	-	-	-	-	80	80	80	VIII
9.	Voluntary organisations	-	-	-	-	80	80	80	VIII

pesticides is logical enough as the motive of these agencies is commercial in nature. Hence, these agencies emphasised much on maximum and frequent contacts with clientele by providing latest technical 'know-how' to earn maximum profit by getting their product through both on cash and credit basis.

Further perusal of data indicated that the use of institutions like CCS HAU, cooperative societies and research stations were not upto desired level for drawing information. The probable reasons expressed by respondents were non availability of scientists/extension personnel when need arises, inputs on higher subsidised rates provided by private agencies and lack of proper interest and guidance.

Data concerning farmers' differential usefulness of linkages have been presented in table 4.17.

It is apparent from the data in table 4.17 that two types of linkages have been used by respondents, i.e. modes and sources. Among modes progressive farmers, friends, neighbours and fellow farmers were found to be the most useful whereas advisory letters, farmers tours, agricultural exhibitions and demonstrations were least useful. As regards sources, seed/ fertilizer store, market and commercial agencies of insecticides-pesticides were the most useful whereas voluntary organisations, farmers organisations and research stations were considered least useful by farmers. The informal modes such as progressive farmers, friends, neighbours, and fellow farmers were considered very useful in terms of message reception seems to be highly

Table 4.17: Differential usefulness of modes and sources perceived by the farmers

Sr. No.	Modes and sources	Very useful (3)		Useful (2)		Least useful (1)		Total choice score	Rank order
		Frequency	Rank value	Frequency	Rank value	Frequency	Rank value		
A.	**Modes**								
1.	Scientists	5	15	16	32	59	59	106	XIV
2.	Extensional personnel	9	27	26	52	45	45	124	X
3.	Progressive farmers	52	156	28	56	-	-	212	I
4.	Local leaders	7	21	17	34	56	56	111	XIII
5.	Neighbours	46	138	30	60	4	4	202	III
6.	Relatives	43	129	34	68	3	3	200	IV
7.	Friends	49	147	30	60	1	1	208	II
8.	Fellow farmers	39	117	40	80	1	1	198	V
9.	Farm broadcast/radio	9	27	36	72	35	35	134	IX
10.	Farm telecast/television	5	15	25	50	50	50	115	XII
11.	i) CCS HAU farm bulletins	2	6	8	16	70	70	92	XVI
	ii) Haryana kheti	15	45	13	26	52	52	123	XI
12.	Newspapers	3	9	15	30	62	62	101	XV
13.	Farmers fair/Farm darshan/field days	12	36	35	70	33	33	139	VIII
14.	Agricultural exhibitions	1	3	8	16	71	71	90	XVIII
15.	Demonstrations	1	3	9	18	70	70	91	XVII
16.	Group discussions/group meetings	26	78	22	44	32	32	154	VII
17.	Farmers tours	-	-	4	8	76	76	84	XIX
18.	Advisory letters	-	-	4	8	76	76	84	XIX
19.	Salesman/private dealers	33	99	39	78	8	8	185	VI
B.	**Sources**								
1.	Market	27	81	45	90	8	8	179	II
2.	Cooperative society/gramin bank	2	6	31	62	47	47	115	V
3.	Research stations	2	6	3	6	75	75	87	VII
4.	CCS HAU	9	27	34	68	37	37	132	IV
5.	Fertilizer/seed store	26	78	49	98	5	5	181	I
6.	Agroindustries	8	24	12	24	60	60	108	VI
7.	Comm. agencies of insecticides/pesticides	3	9	74	148	3	3	170	III
8.	Farmers organisations	-	-	-	-	80	80	80	VIII
9.	Voluntary organisations	-	-	-	-	80	80	80	VIII

logical because of the fact that they generally witness the innovations followed by progressive farmers of their own village or neighbouring villages and the principle of 'seeing is believing' led to maximum use of informal linkages by farmers. The probable reason for least usefulness of modes like advisory letters, farmers tours, agricultural exhibitions may be the dependency of farmers on government or private agencies carrying out such activities which are not regular features due to certain limitations. The sources such as seed/ fertilizer store, market, commercial agencies of insecticides pesticides were considered very useful by the farmers in terms of message reception seems to be logical enough as the motive of these agencies is commercial. Hence, these agencies emphasize much on maximum and frequent contacts with clientele by providing latest technical know-how to earn maximum profit by getting their product through both on cash and credit basis. Further probing of data indicated that the usefulness of institution like CCS HAU, cooperative societies and research stations were not up to desired level for discussing information by farmers. The probable reasons expressed by farmers were non-availability of researchers, extension personnel at the time of need, inputs on higher subsidised rates supplied by private agencies and lack of proper interest and guidance.

A minute examination of data in tables 4.15, 4.16 and 4.17 led to the conclusion that farmers by and large utilized personal communication linkages over mass communication and institutional linkages. The findings got strength from the studies of Pandey (1979), Vijayaraghavan and Subramanyan (1980), Mathur and Pandey (1983), Gogoi (1984) and Bhople and Thakre (1994).

Data pertaining to farmers' differential credibility of modes and sources have been furnished in table 4.18.

The credibility of any mode or source of communication refers to trustworthiness of that mode or source. The computation of modes and sources credibility scores (Total choice scores) of respondents was done strictly in accordance with methodological steps described in chapter on methodology.

It is obvious from the data in the table 4.18 that among modes progressive farmers, friends, relatives and neighbours were considered most credible whereas farmers tours, advisory letters, agricultural exhibitions and newspapers were considered as least credible. These findings seem to be logical because informal modes like progressive farmers, friends, relatives and neighbours have got high intensity of influence in matters of understanding the message and conviction leading to acceptance of new ideas/ innovations. Secondly, the strong linkage between clientele and informal modes is resultant of their sharing in joys and sorrows which have led to credibility of these modes. The least credibility of modes like farmers' tours, advisory letters and agricultural exhibitions may probably due to low potentiality and influence to large number of farmers, because of their being a non-regular feature owing to certain limitations. The high credibility perceived by farmers about informal modes may be due to their high use frequency coupled with correct and timely supply of information.

Among sources CCS HAU, research stations and seed/fertilizer store were considered most credible whereas farmers organisations, voluntary

Table 4.18: **Differential credibility of modes and sources perceived by farmers**

Sr. No.	Modes and sources	Most credible (3)		Credible (2)		Least credible (1)		Total choice score	Rank order
		Frequency	Rank value	Frequency	Rank value	Frequency	Rank value		
A.	**Modes**								
1.	Scientists	31	93	40	80	9	9	182	VI
2.	Extensional personnel	15	45	48	96	17	17	158	IX
3.	Progressive farmers	57	171	23	46	-	-	217	I
4.	Local leaders	6	18	16	32	58	58	108	XV
5.	Neighbours	49	147	28	56	3	3	206	IV
6.	Relatives	51	153	28	56	1	1	210	III
7.	Friends	55	165	25	50	-	-	215	II
8.	Fellow farmers	42	126	37	74	1	1	201	V
9.	Farm broadcast/radio	18	54	48	96	14	14	164	VIII
10.	Farm telecast/television	17	51	40	80	23	23	154	X
11.	i) CCS HAU farm bulletins	7	21	10	20	63	63	104	XVI
	ii) Haryana kheti	16	48	13	26	51	51	125	XIV
12.	Newspapers	3	9	13	26	64	64	99	XVII
13.	Farmers fair/Farm darshan/field days	14	42	42	84	24	24	150	XII
14.	Agricultural exhibitions	3	9	10	20	67	67	96	XVIII
15.	Demonstrations	16	48	24	48	40	40	136	XIII
16.	Group discussions/group meetings	21	63	30	60	29	29	152	XI
17.	Farmers tours	-	-	7	14	73	73	87	XX
18.	Advisory letters	1	3	7	14	72	72	89	XIX
19.	Salesman/private dealers	30	90	32	64	18	18	172	VII
B.	**Sources**								
1.	Market	18	54	45	90	17	17	161	IV
2.	Cooperative society/gramin bank	2	6	32	64	46	46	116	V
3.	Research stations	30	90	40	80	10	10	180	II
4.	CCS HAU	32	96	42	84	6	6	186	I
5.	Fertilizer/seed store	26	78	44	88	10	10	176	III
6.	Agroindustries	9	27	18	36	53	53	116	V
7.	Comm. agencies of insecticides/pesticides	3	9	29	58	48	48	115	VI
8.	Farmers organisations	-	-	-	-	80	80	80	VII
9.	Voluntary organisations	-	-	-	-	80	80	80	VII

organisations and commercial agencies of insecticides-pesticides were treated as least credible. High credibility of sources such as CCS HAU and research stations seems to be logical because they are responsible for technology generation and also conduct demonstrations on recommended technologies following the principle of 'seeing is believing' and moreover, it is obligatory for them to provide scientific information. Whereas, farmers organisations, voluntary organisations are considered least credible due to their low potentiality and influence being limited in number.

Although commercial agencies of insecticides-pesticides are being used to a greater-extent by the farmers for obtaining certain inputs along with information related to agriculture because they are primary source of insecticides and pesticides and also provide needed material on lower rates compared to government or semi-government agencies and also on credit basis, yet their credibility is low due to complaints of adulteration of insecticides-pesticides. Moreover, they being profit making bodies may not necessarily provide correct information and least bothered about quality product. They generally advocate about the product which is more remunerative to them.

It may be concluded that farmers by and large preferred personal informal linkages because of their credibility over media and institutional linkages. The credibility pattern is in line with the findings of Singh and Singh (1972) Chole and Radhukar (1978) and Singh (1989). Therefore, the findings of investigation established agreement with the contentions of past researches.

4.5 RESPONDENTS' ANTECEDENT VARIABLES INFLUENCE ON DEPENDENT VARIABLES (COMMUNICATION LINKAGES)

With a view to find out the relationship between communication linkage mechanism (dependent variables) of researchers, extension personnel and farmers and their antecedent variables (independent variables), the coefficient of correlation statistical technique was sued. This was done to work-out separately the influence of independent variables on dependent variables. Morcover, the extent of variation in dependent variablcs jointly caused by antecedent variables of researchers, extension personnel and farmers was also worked out by using multiple regression analysis. This was done to focus on the predictive ability of independent variables over dependent variables because correlation analysis does not provide this ability as it gives strength and direction of association. The predictive power was estimated with the help of coefficient of multiple determination (R^2).

Data pertaining to correlational and regressional analysis of researchers' antecedent variables on communication linkage mechanism for generation of farm technology have been presented in table 4.19.

The data in table 4.19 indicated that out of eight variables only three antecedents viz. job satisfaction (X_6), communication facilities (X_7) and job commitment (X_8) exhibited positive and significant association with communication linkage mechanism. However, non significant relationship of experience (X_2), rural urban background (X_3), parental occupation (X_4) and trainings (X_5) was found with communication linkages used for generation

KEY TO FIGURES: I — VII

X_1. EDUCATION

X_2. EXPERIENCE

X_3. RURAL-URBAN BACKGROUND

X_4. PARENTAL OCCUPATION

X_5. TRAININGS ATTENDED

X_6. JOBS SATISFACTION

X_7. COMMUNICATION FACILITIES

X_8. JOB COMMITMENT

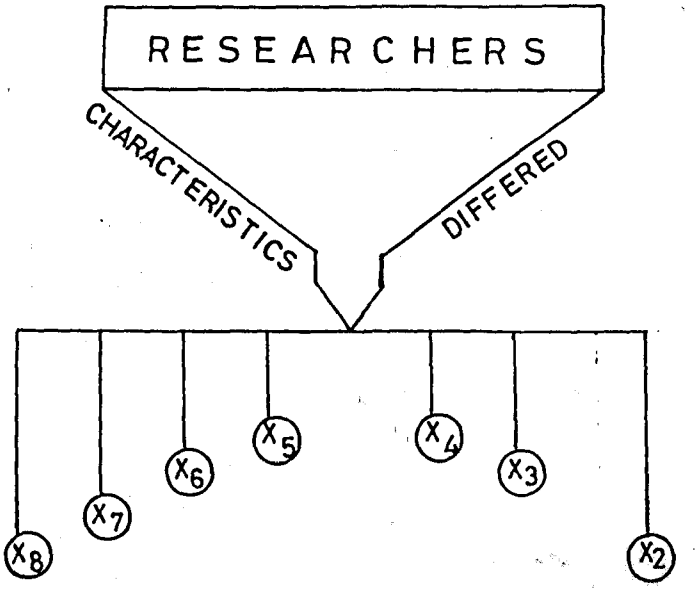
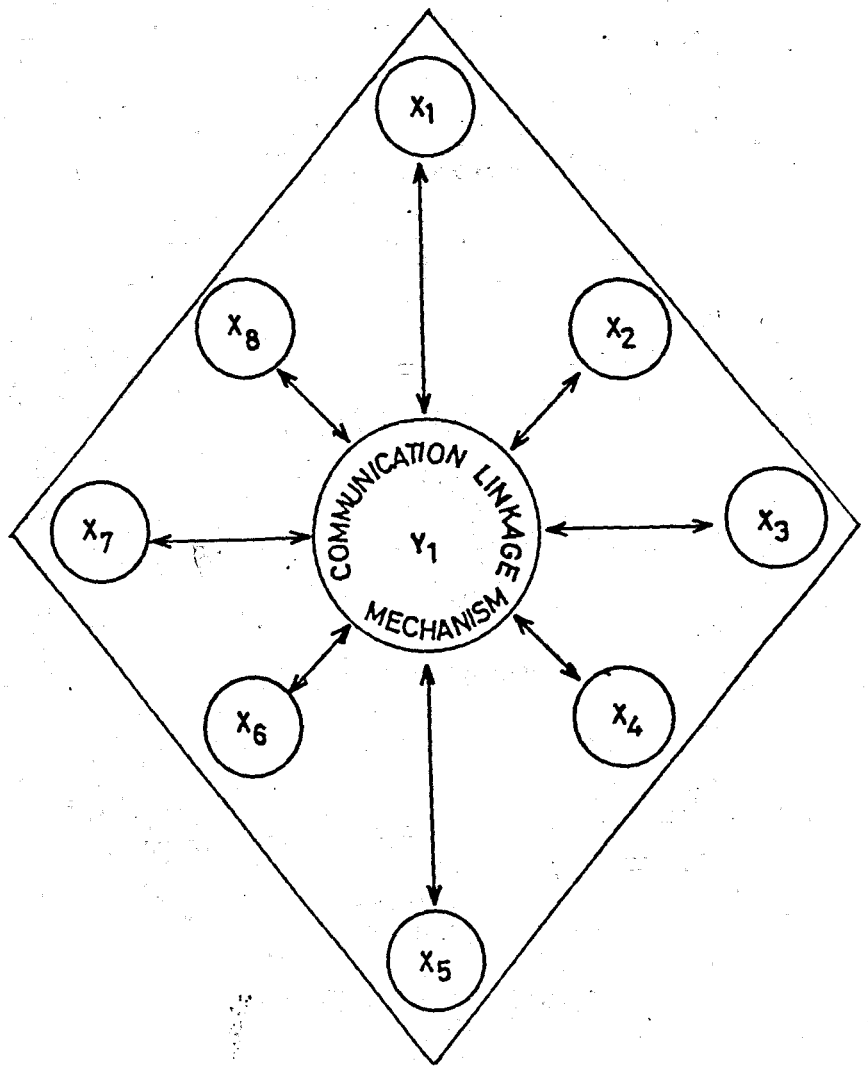


FIG. I CHARACTERISTICS OF RESEARCHERS (THE PARADIGM).



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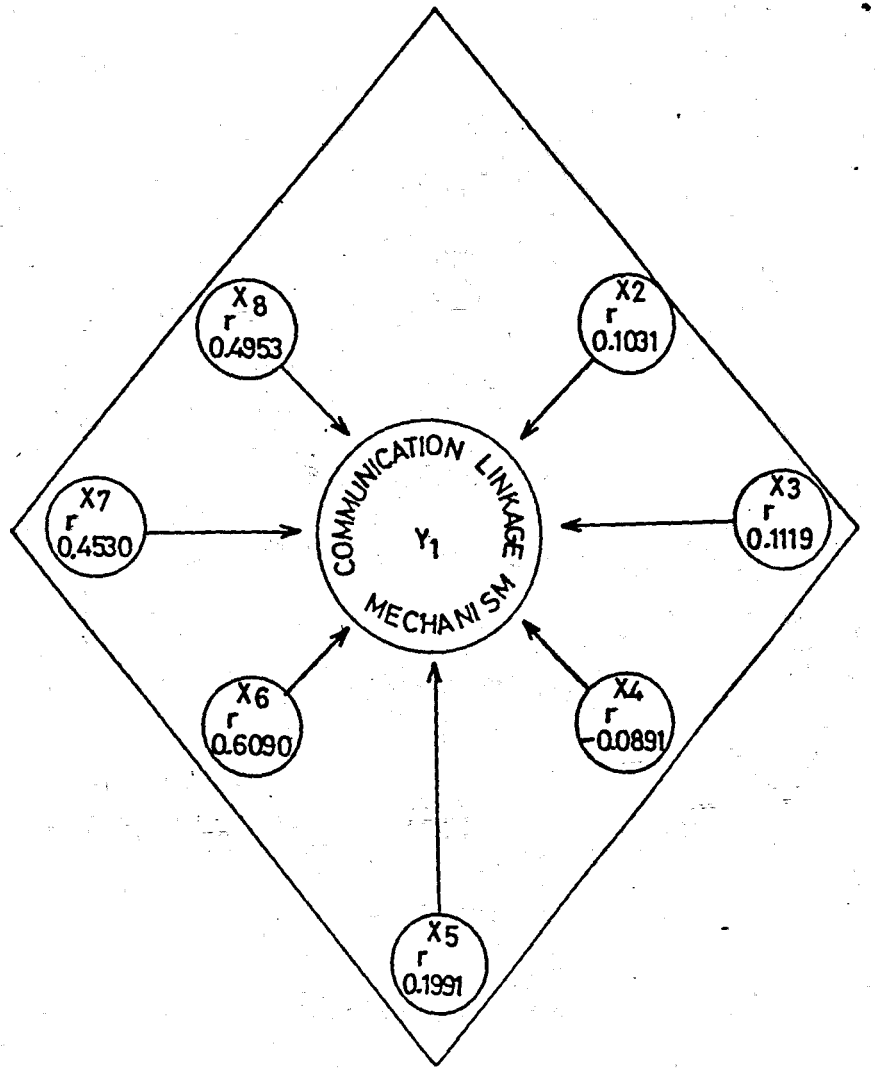
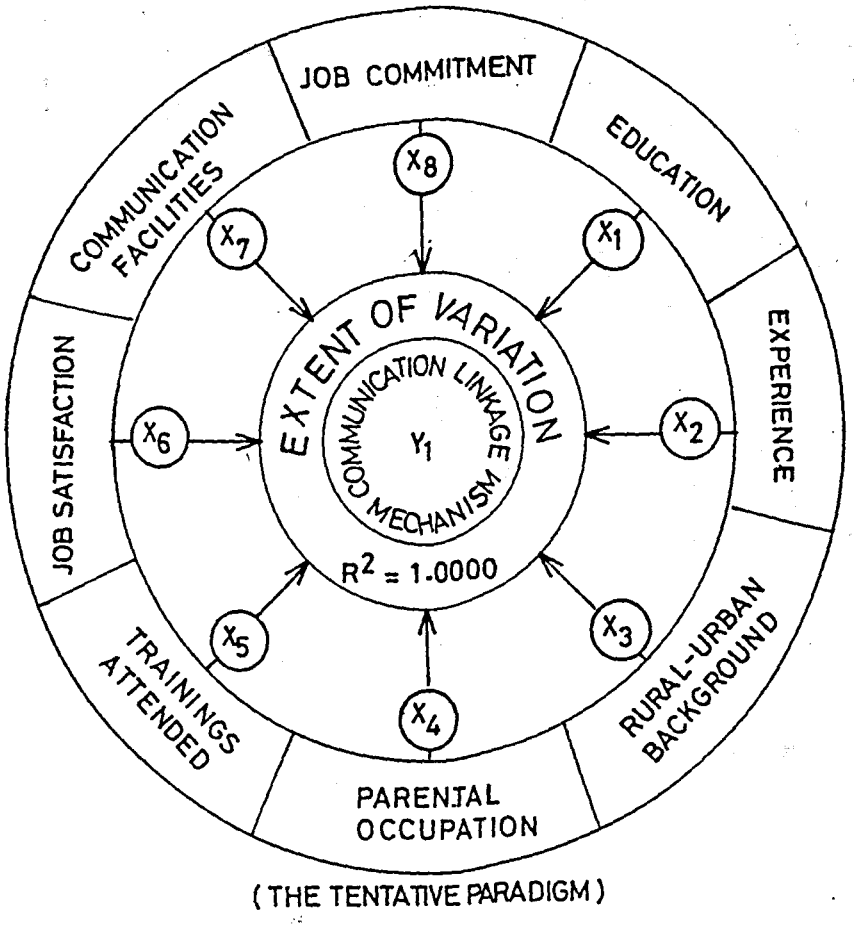


(THE FINAL PARADIGM)

FIG. II FACTORS ASSOCIATED WITH COMMUNICATION LINKAGE MECHANISM OF RESEARCHERS FOR GENERATION OF FARM TECHNOLOGY.



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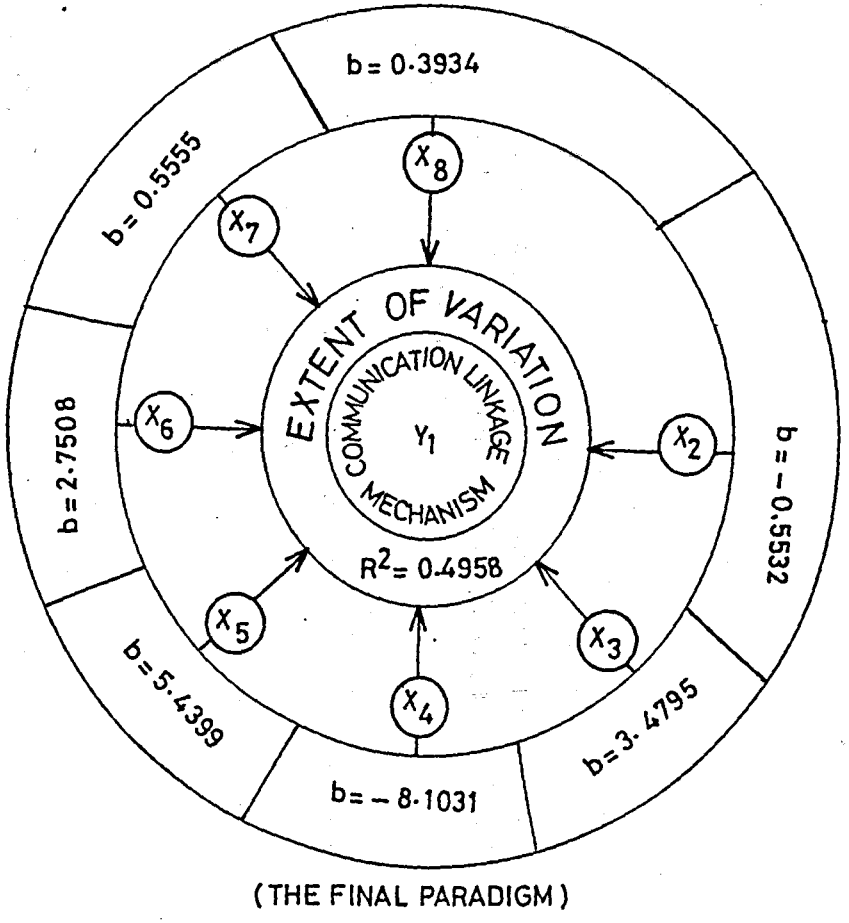

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FIG. III EXTENT OF VARIATION CAUSED BY SELECTED VARIABLES IN COMMUNICATION LINKAGE MECHANISM OF RESEARCHERS FOR GENERATION OF FARM TECHNOLOGY.

Table 4.19: Correlational and regressional analysis of researchers' antecedent variables on communication linkage mechanism for generation of farm technology

Code No.	Antecedent variables	Correlation coefficients	Regression coefficients	't' values
X_1	Education	0.0000	0.0000	0.0000
X_2	Experience	0.1031	-0.5532	-0.4941
X_3	Rural-urban background	0.1119	3.4795	0.3073
X_4	Parental occupation	-0.0891	-8.1031	-0.6601
X_5	Trainings attended	0.1991	5.4399	0.6389
X_6	Job satisfaction	0.6090**	2.7508	1.5971
X_7	Communication facilities	0.4530*	0.5555	0.4674
X_8	Job commitment	0.4953*	0.3934	0.1525

R^2 = 0.4958

F value = 2.6956*

* Significant at 0.05 level of probability

**Significant at 0.01 level of probability

of farm technology while education (X_1) did not establish relationship with communication linkage mechanism. This may be due to the fact that all the sampled researcher respondents did possess equal qualifications. The variable of parental occupation (X_4) had shown negative trend. However, experience (X_2), rural-urban background (X_3) and trainings (X_5) exhibited positive trend with communication linkage mechanism. This speaks that respondents in majority following occupation other than parental were found to have lower linkage mechanism for generation of farm technology. Looking back to the table 4.1 (profile of researchers) it was found that as high as 58.33 per cent of parents practised occupation other than agriculture. This provides a clue that researchers in majority do not belong to a farming community and as such may not be having as much interest in agricultural development as the researchers belonging to farming community. This may probably be one of the reasons for lower linkage use for generation of farm technology. The significant relationship of independent variables of job satisfaction (X_6), communication facilities (X_7) and job commitment (X_8) with communication linkage mechanism for generation of farm technology clearly pointed out that researchers communication linkage mechanism for generation of farm technology will be higher provided they are satisfied with their job, had better communication facilities and committed to their job. Therefore, to enhance the communication linkage mechanism of researchers in order to have appropriate and suitable generation of technology, these antecedent variables of the researchers need to be given due attention. The findings of this study

are in agreement with the findings of Lionberger and Chang (1970), Sanoria and Singh (1979) and Ambastha (1980) who reported positive and significant association of job satisfaction of employees with their performance. The findings are also in line with past researches of Sanoria and Singh (1979), Ambastha and Singh (1980) and Daivadeenam and Satyanarayana (1991) who observed positive and significant association between job commitment and information input behaviour of researchers. Positive and significant association of communication facilities with linkage use for generation of farm technology was reported by Reddy (1984) and Daivadeenam and Satyanarayana (1991).

Looking at the regression coefficients in table 4.19 it was found that amount of variation in communication linkage mechanism of researchers for generation of farm technology was jointly contributed by eight independent variables to the extent of 49.58 per cent. The calculated F-value of 2.6956 (8 and 15 d.f.) was found to be significant. However, regression coefficients of eight variables did not contribute significantly. The further perusal of data indicated that prominent regression coefficient values were of trainings (X_5), rural urban background (X_3), job satisfaction (X_6) and communication facilities (X_7). This suggests that an increase in trainings, rural background, job satisfaction and communication facilities by one unit would lead to increase in their linkage mechanism by 5.4399, 3.4795, 2.7508 and 0.5555 units, respectively when other factors are held constant. Whereas an increase

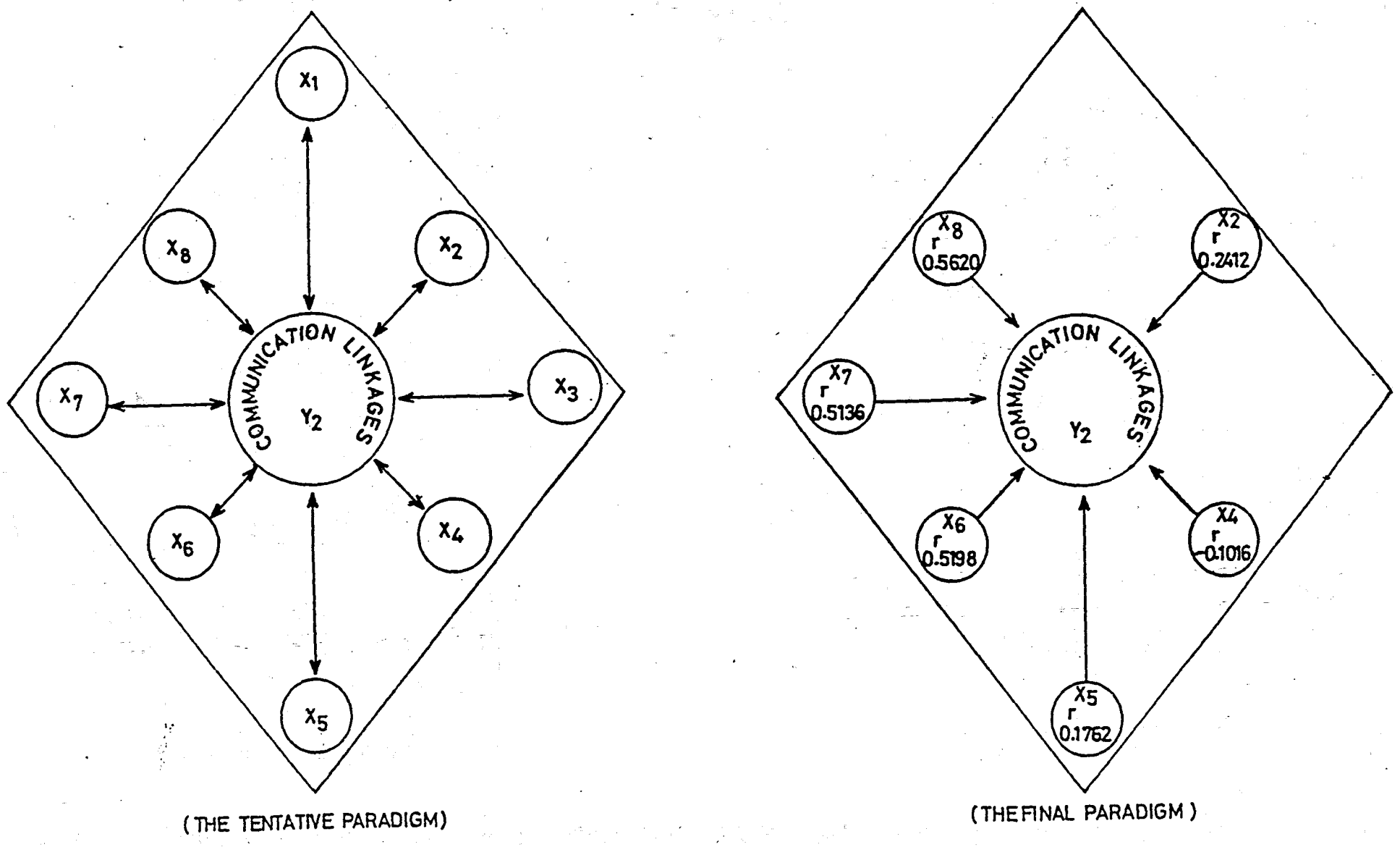
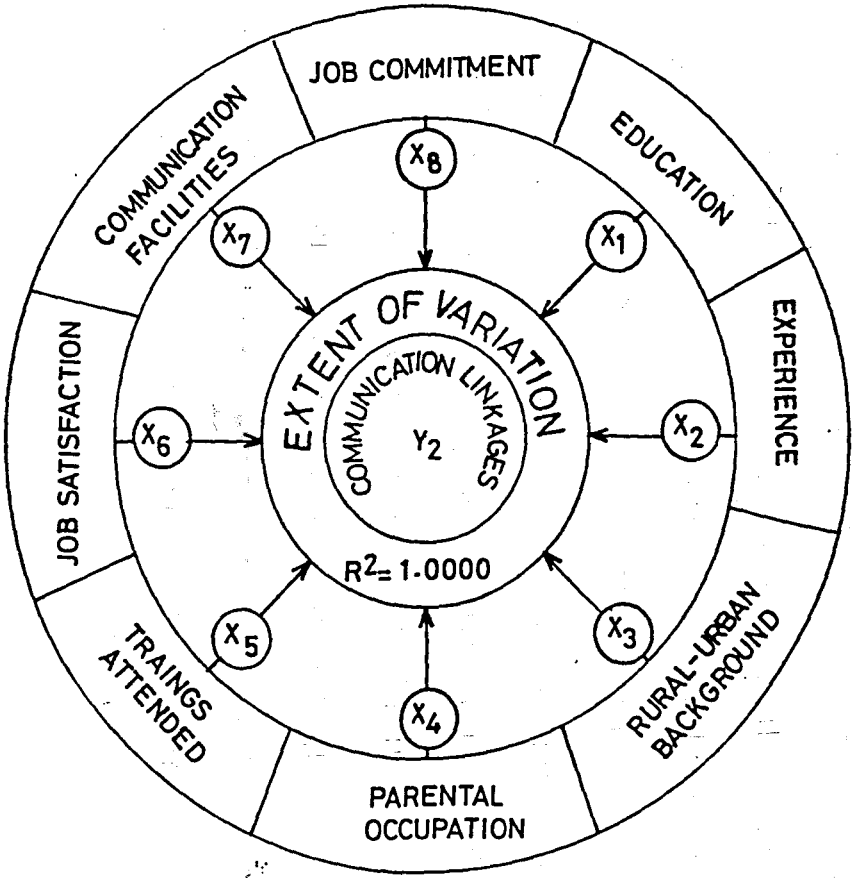


FIG. IV FACTORS ASSOCIATED WITH COMMUNICATION LINKAGES USED BY RESEARCHERS FOR TRANSFER OF TECHNOLOGY TO EXTENSION PERSONNEL.



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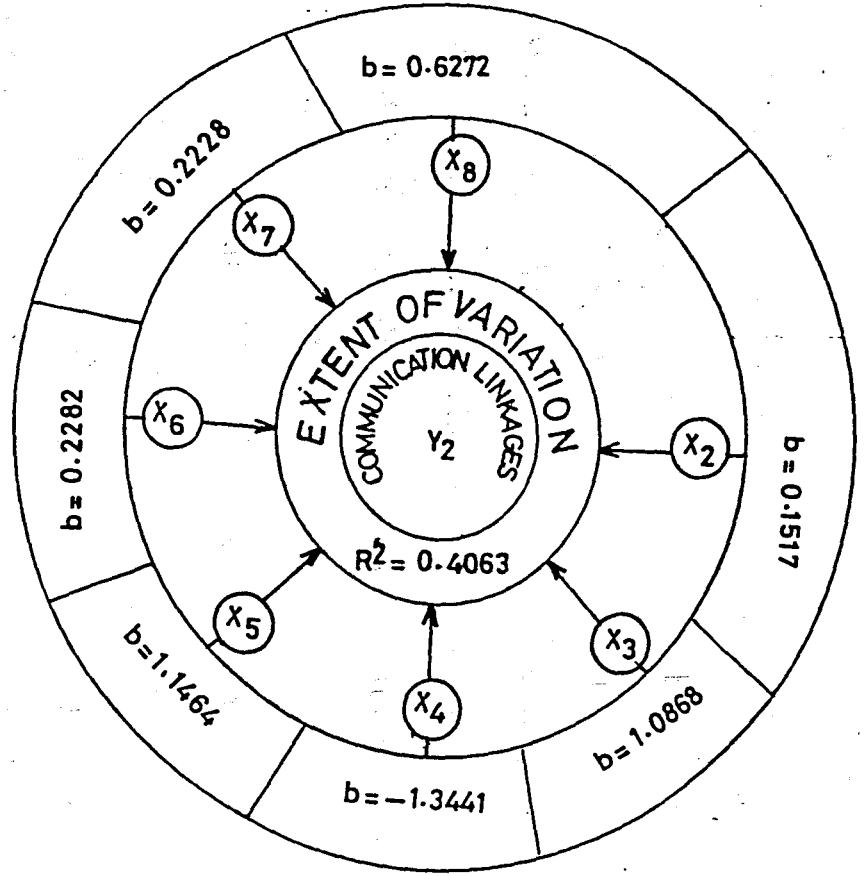


(THE FINAL PARADIGM)

FIG. V EXTENT OF VARIATION CAUSED BY SELECTED INDEPENDENT VARIABLES IN COMMUNICATION LINKAGES USED BY RESEARCHERS FOR TRANSFER OF TECHNOLOGY TO EXTENSION PERSONNEL.

in experience (X_2) and parental occupation (X_4) other than agriculture would lead to decrease in their linkage mechanism by 0.5532 and 8.1031 units, respectively when other factors are held constant.

Data regarding correlational and regression analysis of researcher's antecedent variables on communication linkage used for transfer of farm technology to extension personnel have been presented *in table 4.20.*

The data in the table 4.20 revealed that out of eight variables only three variables namely job satisfaction (X_6), communication facilities (X_7) and job commitment (X_8) exhibited positive and significant relationship with communication linkage use of researchers for transfer of technology to extension personnel. However, nonsignificant relationship of experience (X_2), parental occupation (X_4) and trainings (X_5) was established with the communication linkage use for transfer of technology. While education (X_1) and rural urban background (X_3) did not establish relationship with their technology transfer linkage mechanism. The variable of parental occupation have shown negative trend. This speaks that respondents in majority following other than farming as their parental occupations were found to have lower linkage use. This provides a clue that researchers in majority do not belong to farming community and such may not be having as much interest in agricultural development as the researchers belonging to farming community. This may be probable reason for low linkage use for transfer of technology to extension personnel. The significant relationship between the independent

Table 4.20: Correlational and regressional analysis of researchers' antecedent variables on communication linkages used for transfer of farm technology to extension personnel

Code 't' No.	Antecedent variables	Correlation coefficients	Regression coefficients	Regression values
X_1	Education	0.0000	0.0000	0.0000
X_2	Experience	0.2412	0.1517	0.4764
X_3	Rural-urban background	0.0000	1.0868	0.3375
X_4	Parental occupation	-0.1016	-1.3441	-0.3851
X_5	Trainings attended	0.1762	1.1464	0.4735
X_6	Job satisfaction	0.5198*	0.2282	0.4660
X_7	Communication facilities	0.5136*	0.2228	0.6593
X_8	Job commitment	0.5620*	0.6272	0.8552

R^2 = 0.4063

F value = 1.2829

* Significant at 0.01 level of probability

variables of job satisfaction (X_6), communication facilities (X_7) and job commitment (X_8) and communication linkage mechanism for transfer of technology to extension personnel clearly pointed out that the researchers' technology transfer linkage mechanism will be higher provided they are satisfied with their job, had better communication facilities and committed to their job. Therefore, to enhance the communication linkage use by researchers for transfer of latest 'know-how' and 'do how' to extension personnel, these antecedent variables of researchers need special attention.

The findings of the study are in line with the findings of Lionberger and Chang (1970), Sanoria and Singh (1979), and Ambastha (1980) who reported positive and significant association of job satisfaction of employees with their job performance. The findings are similar to the contentions of the past researches of Lionberger and Chang (1970) and Daivadeenam and Satyanarayana (1991) who found positive and significant association between variables of job commitment, communication facilities and communication linkage used by researchers for transfer of technology to extension personnel.

The table 4.20 depicts that amount of variation in communication linkage use of researchers for transfer of farm technology to extension personnel was jointly explained by eight antecedent variables to the extent of 40.63 per cent. The calculated F value of 1.2829 (8 and 15 d.f.) was found to be nonsignificant. However, regression coefficient of none of the variables contributed significantly. The further probing of the data indicated that prominent regression coefficient values were of trainings (X_5), rural-urban

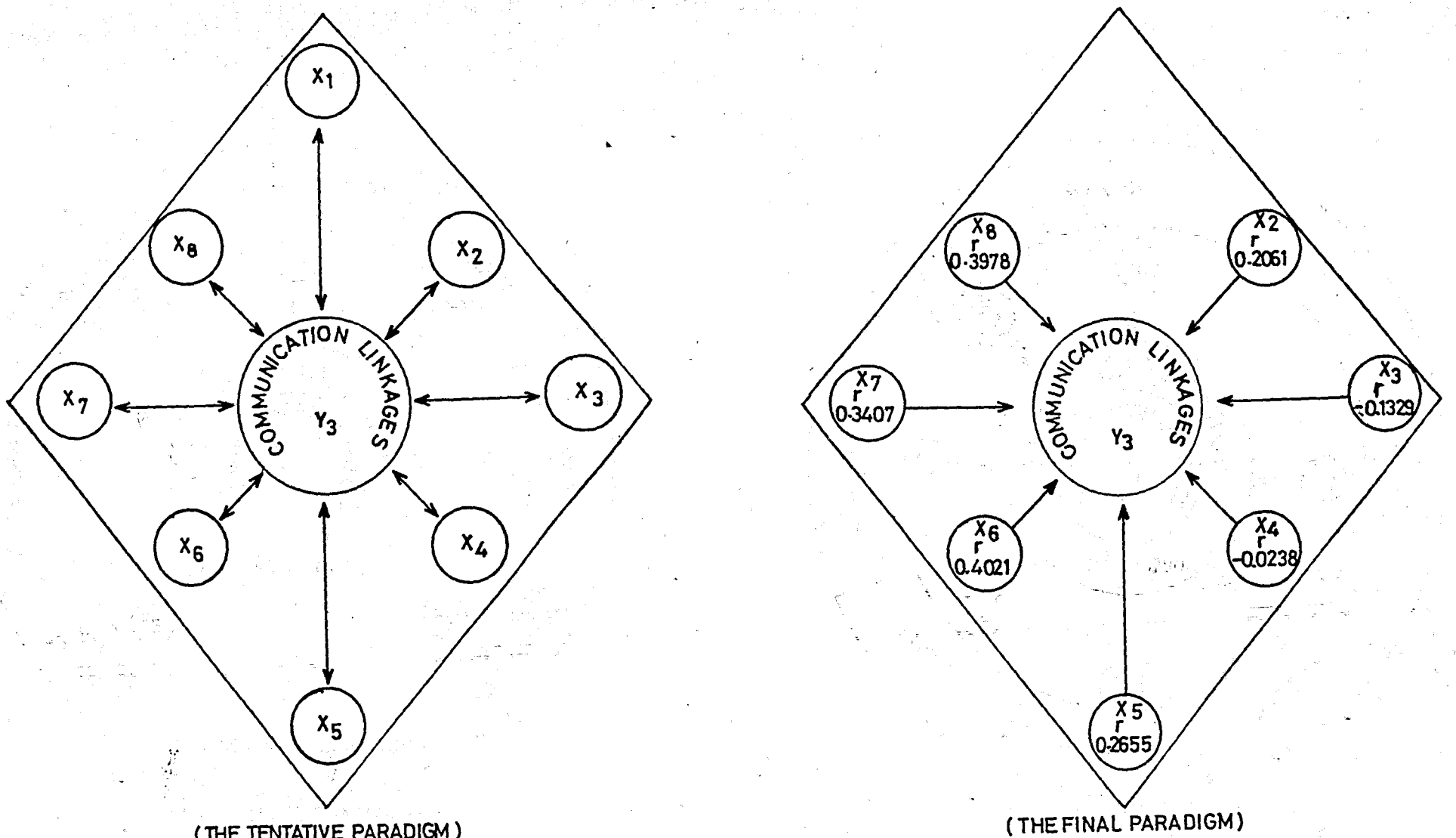
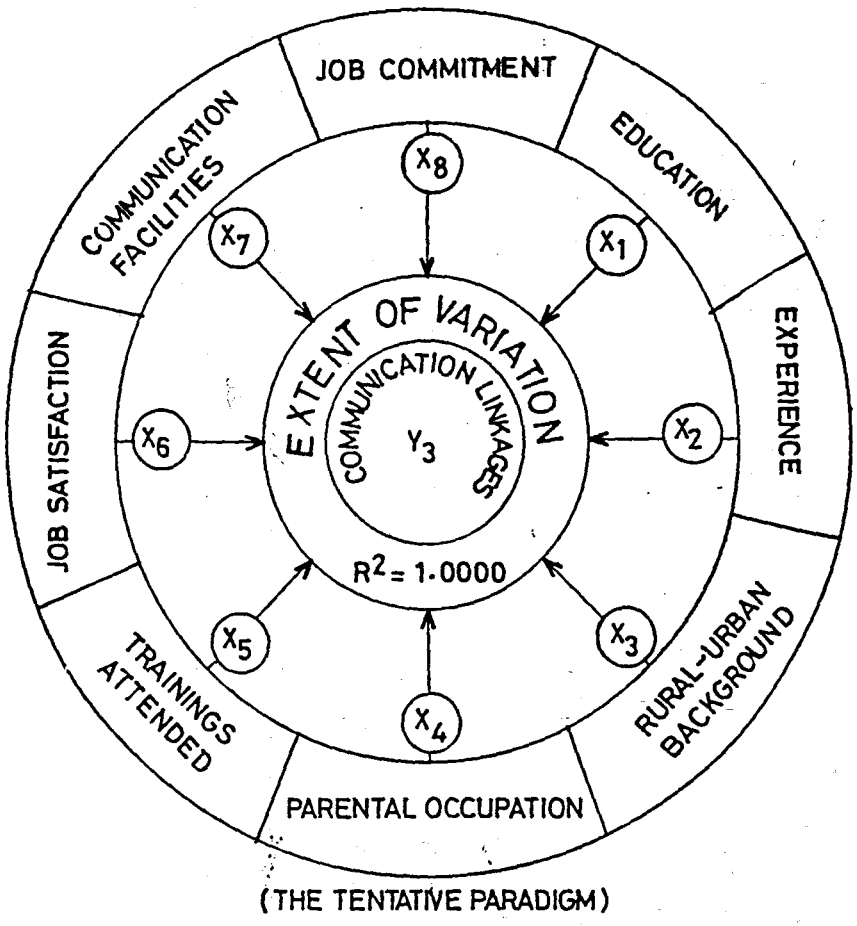


FIG. VI FACTORS ASSOCIATED WITH COMMUNICATION LINKAGES USED BY RESEARCHERS FOR TRANSFER OF TECHNOLOGY TO FARMERS.



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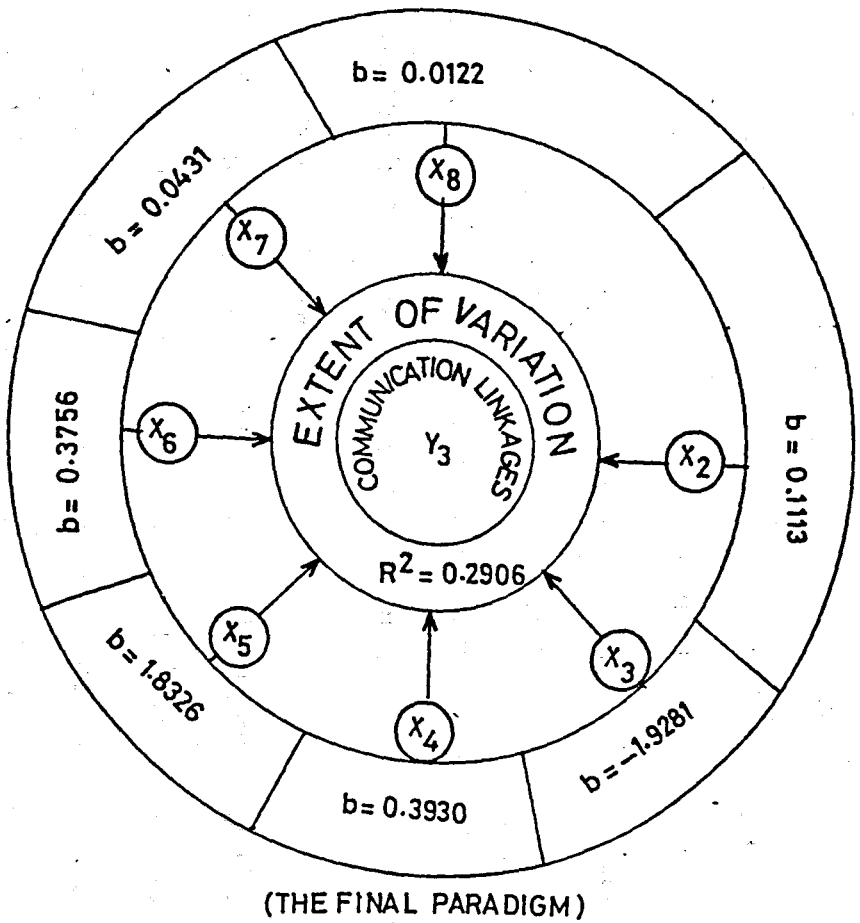

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FIG. VII EXTENT OF VARIATION CAUSED BY SELECTED INDEPENDENT VARIABLES IN COMMUNICATION LINKAGES USED BY RESEARCHERS FOR TRANSFER OF FARM TECHNOLOGY TO FARMERS.

background (X_3), job commitment (X_8), job satisfaction (X_6), communication facilities (X_7) and experience (X_2). This suggests that an increase in trainings (X_5), rural background (X_3), job commitment (X_8), job satisfaction (X_6) and communication facilities (X_7) and experience (X_2) by one unit would lead to increase in use of transfer linkage mechanism of researchers by 1.1464, 1.0868, 0.6272, 0.2282, 0.2228 and 0.1517 units, respectively when other factors are held constant.

Data regarding correlational and regressional analysis of researches antecedent variables on communication linkages used for transfer of technology to farmers have been presented in table 4.21.

Table 4.21 depicts that out of eight variables only one variable of job satisfaction (X_6) exhibited positive and significant relationship. This speaks that highly the researchers are satisfied with their job, higher will be use of communication linkage mechanism for transfer of technology to farmers. However, nonsignificant relationship of experience (X_2), rural urban background (X_3), parental occupation (X_4), trainings (X_5) communication facilities (X_7) and job commitment (X_8) was obtained. But parental occupation (X_4) and rural urban background (X_3) have shown negative trend with linkage use for transfer of technology to farmers while experience (X_2) trainings (X_5) communication facilities (X_7) and job commitment (X_8) indicated positive trend. This suggests that respondents with urban background and service or business as their parental occupation had lower communication linkage use for transfer of technology. This may probably be due to their least interest in

Table 4.21: Correlational and regressional analysis of researchers' antecedent variables on communication linkages used for transfer of farm technology to farmers

Code No.	Antecedent variables	*Correlation coefficients*	*Regression coefficients*	*'t' values*
X_1	Education	0.0000	0.0000	0.0000
X_2	Experience	0.2061	0.1113	0.4503
X_3	Rural-urban background	-0.1329	-1.9281	-0.7716
X_4	Parental occupation	-0.0238	0.3930	0.1451
X_5	Trainings attended	0.2655	1.8326	0.9754
X_6	Job satisfaction	0.4021*	0.3756	0.9884
X_7	Communication facilities	0.3407	0.0431	0.1643
X_8	Job commitment	0.3978	0.0122	0.0215

R^2 = 0.2906

F value = 0.7668

* Significant at 0.05 level of probability

agricultural development as compared to those researchers who belonged to farming community. Higher the experience, communication facilities and job commitment higher will be the linkage mechanism for transfer of technology to farmers by researchers. So these variables of researchers need to be looked into carefully. The findings got the strength from past studies of Lingwood (1959), Parker and Paisley (1968), Lionberger and Chang (1970), Sanoria and Singh (1979) and Ambastha (1980) who reported positive and significant association between job satisfaction of researchers and their information output behaviour.

Looking at the regression coefficients in table 4.21 it was found that amount of variation in communication linkage use of researchers for transfer of technology to farmers was jointly contributed by eight antecedent variables to the extent of 29.06 per cent. The calculated F value of 0.7668 (8 and 15 d.f.) was found to be nonsignificant. However, regression coefficient of none of the variable contributed significantly to the total variation in linkage use of researchers. The further probing of data indicated that prominent regression coefficient values were of trainings (X_5), parental occupation (X_4), job satisfaction (X_6) and experience (X_2). This suggests that an increase in trainings, parental occupation as farming, job satisfaction and experience by one unit would lead to increase in their transfer linkage mechanism for farmers by 1.8326, 0.3930, 0.3756 and 0.1113 units, respectively when other factors are held constant.

KEY TO FIGURES: VIII – XII

X_1. EDUCATION

X_2. EXPERIENCE

X_3. RURAL-URBAN BACKGROUND

X_4. PARENTAL OCCUPATION

X_5. TRAININGS ATTENDED

X_6. JOB SATISFACTION

X_7. JOB COMMITMENT

X_8. COMMUNICATION FACILITIES

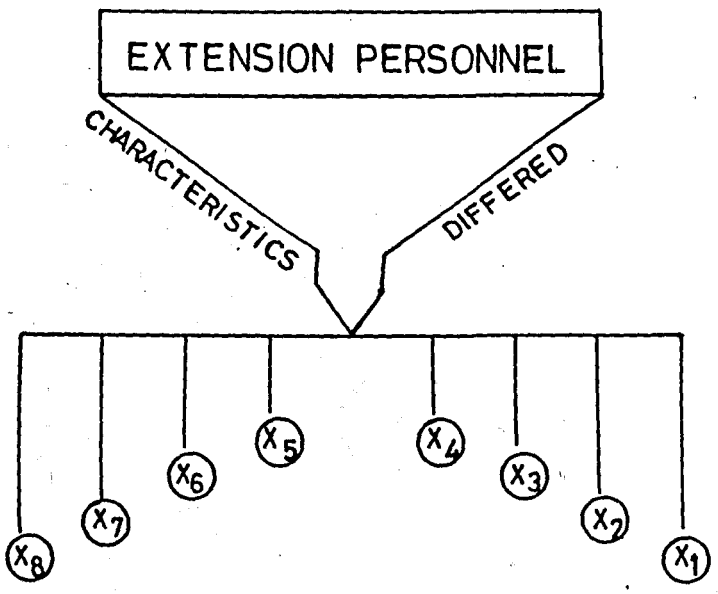
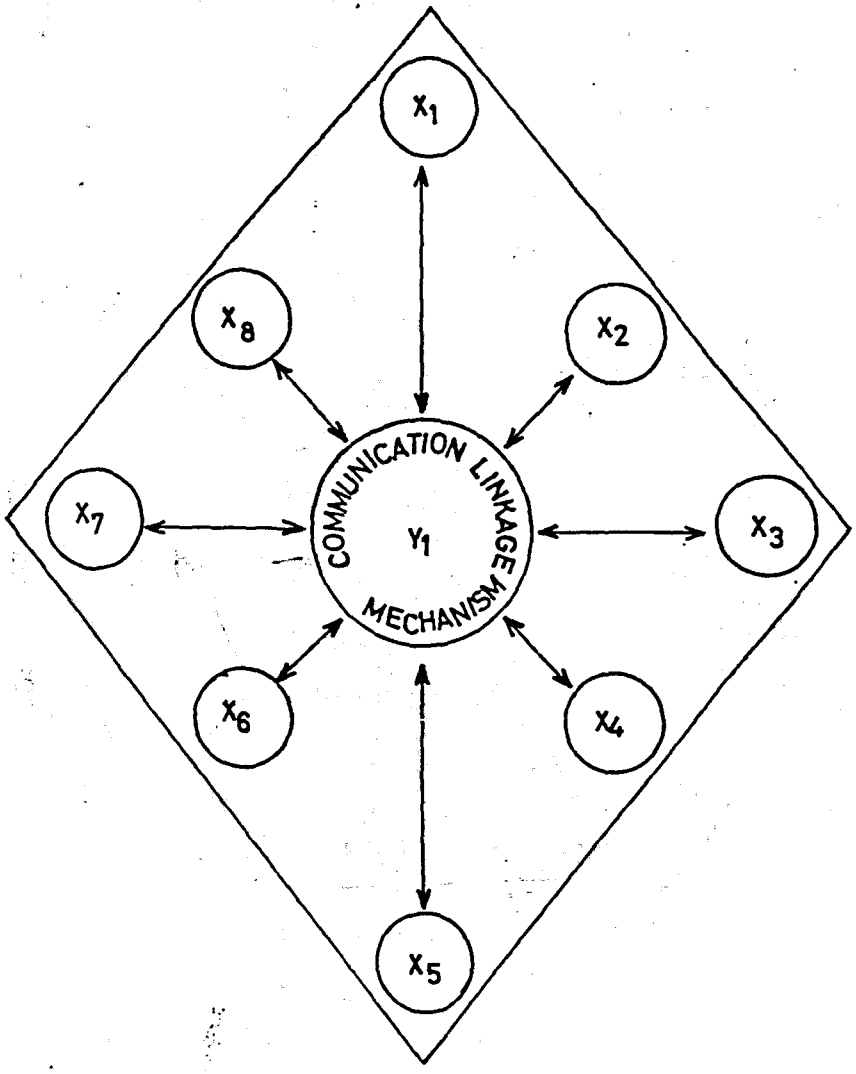


FIG. VIII CHARACTERISTICS OF EXTENSION PERSONNEL (THE PARADIGM).



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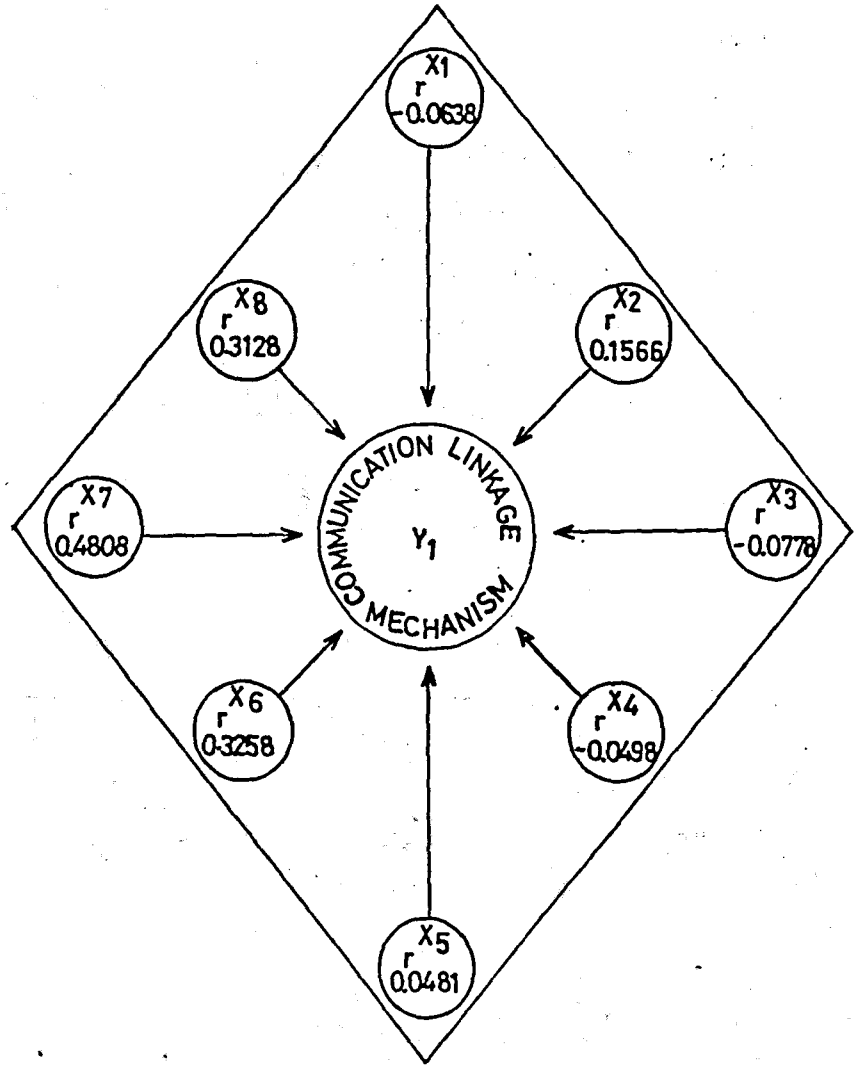

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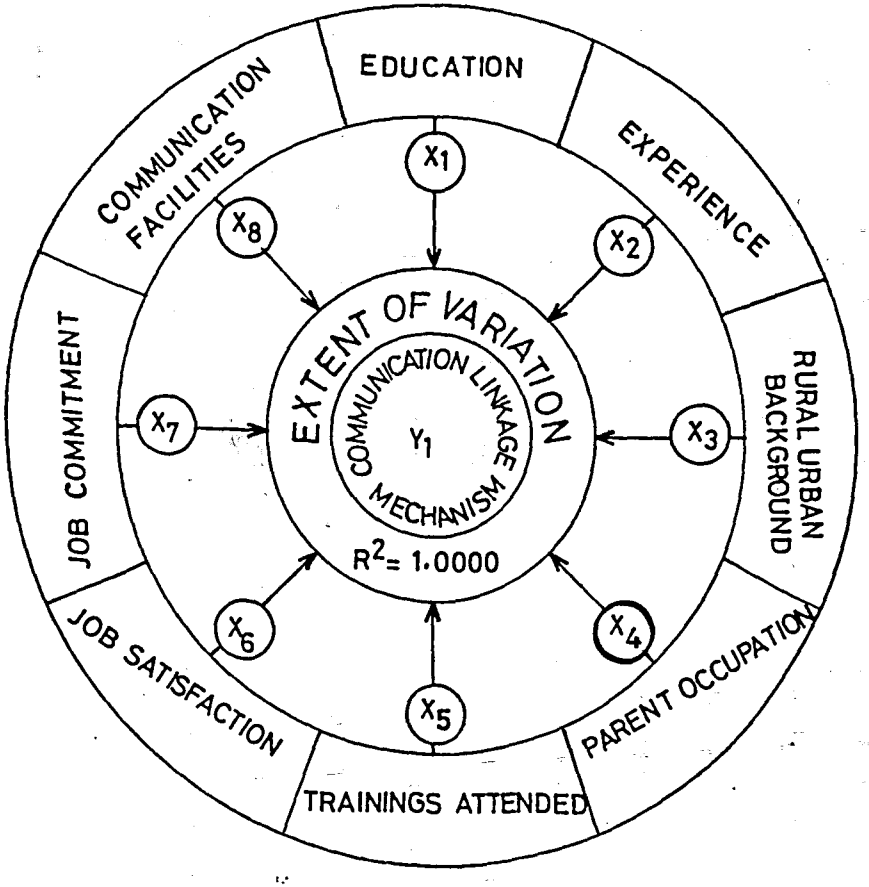
FIG. IX FACTORS ASSOCIATED WITH COMMUNICATION LINKAGE MECHANISM OF EXTENSION PERSONNEL EOR ACQUISITION OF FARM TECHNOLOGY.



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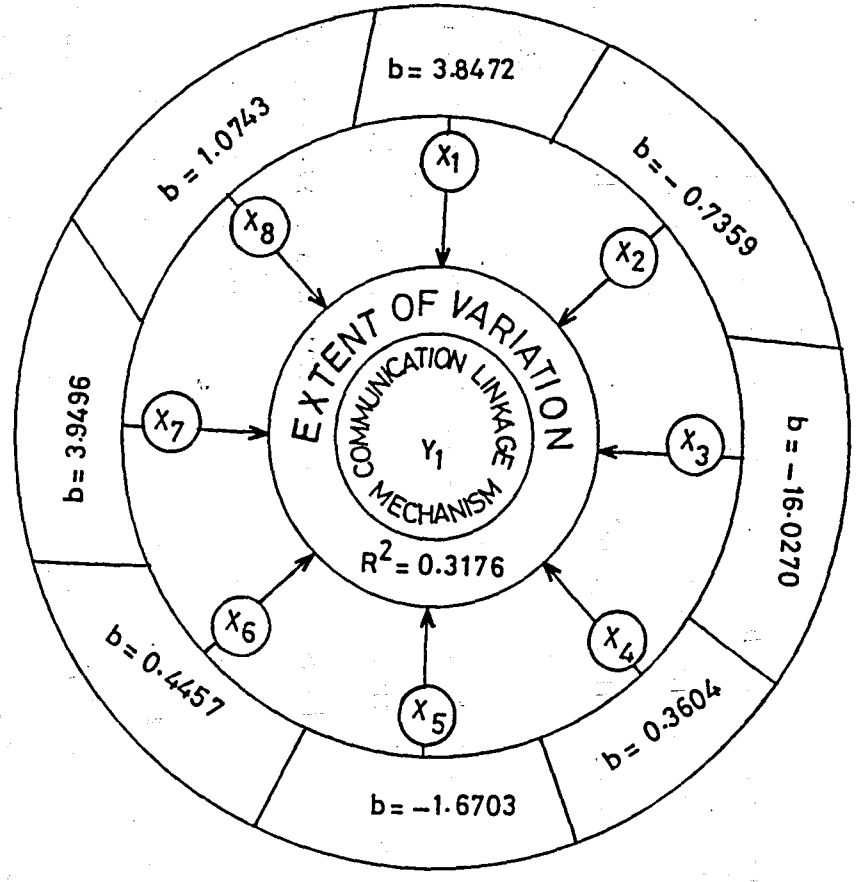

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FIG. X EXTENT OF VARIATION CAUSED BY SELECTED INDEPENDENT VARIABLES IN COMMUNICATION LINKAGE MECHANISM OF EXTENSION PERSONNEL FOR ACQUISITION OF FARM TECHNOLOGY.

Data pertaining to correlational and regressional analysis of extension personnels' antecedent variables on communication linkage mechanism used for acquisition of farm technology is incorporated in table 4.22.

The table 4.22 revealed that only three antecedent variables viz. job satisfaction (X_6), job commitment (X_7) and communication facilities (X_8) exhibited positive and significant relationship with communication linkage mechanism for acquisition of farm technology. However, nonsignificant relationship of education (X_1), experience (X_2), rural urban background (X_3), parental occupation (X_4) and trainings (X_5) was established with communication linkage mechanism. But, education, rural-urban background and parental occupation have shown negative trend while experience and trainings had shown positive trend with communication linkage mechanism for acquisition of technology. It implies that extension personnel with higher education will have lower linkage mechanism for acquisition of farm technology. This seems to be illogical but this may possibly because of the reasons that those who have higher education may aspire for better job and also may consider themselves misfit for extension work. Looking back to table 4.2 (Profile of extension personnel) it was found that majority of respondents belonged to rural areas and had farming as their parental occupation. This also speaks that extension personnel in majority having their rural background and farming as parental occupation will found to have lower use of linkage mechanism. This may probably be due to their confidence to

Table 4.22: Correlational and regressional analysis of extension personnels' antecedent variables on communication linkage mechanism used for acquisition of farm technology

Code No.	Antecedent variables	Correlation coefficients (r values)	Regression coefficients	't' values
X_1	Education	-0.0638	3.8472	0.2798
X_2	Experience	0.1566	-0.7359	-1.1139
X_3	Rural-urban background	-0.0778	16.0270	-1.1976
X_4	Parental occupation	-0.0498	0.3604	0.0457
X_5	Trainings attended	0.0481	-1.6703	-0.6153
X_6	Job satisfaction	0.3258**	0.4457	0.7137
X_7	Job commitment	0.4808**	3.9496**	3.4109**
X_8	Communication facilities	0.3128*	1.0743	1.6992

R^2 = 0.3176

F value = 3.2579**

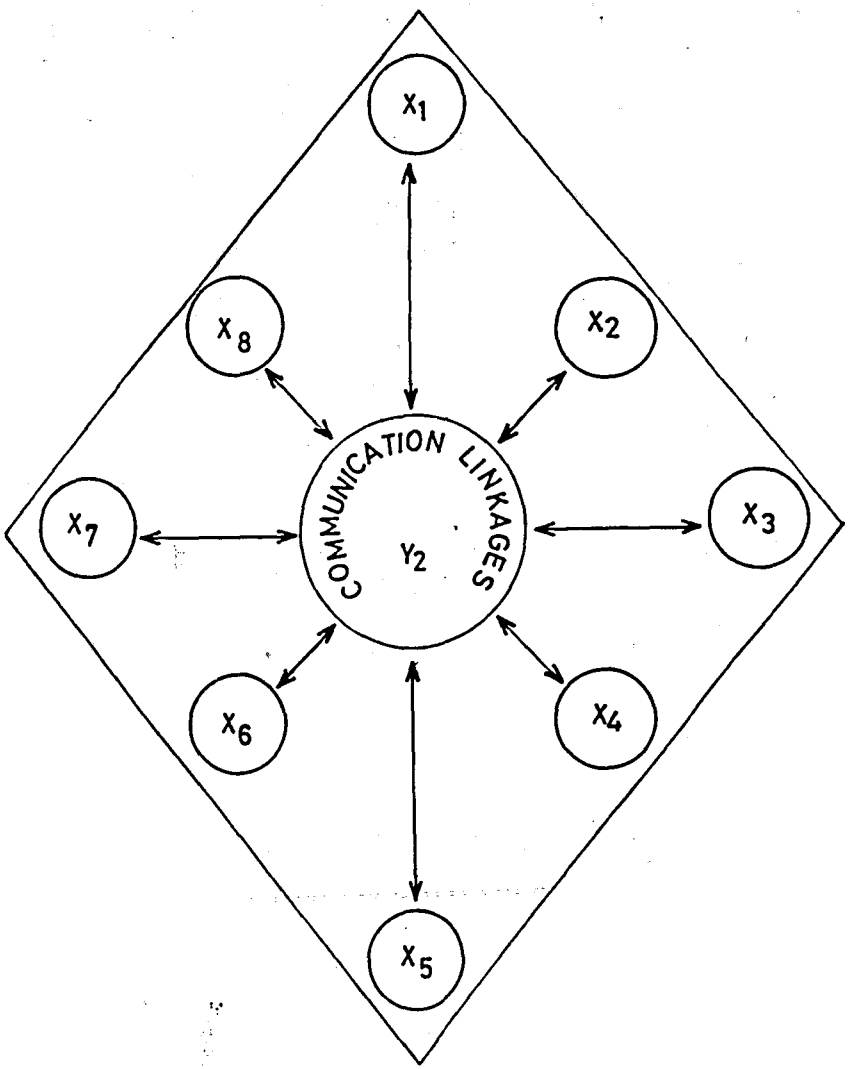
* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

be more competent enough with regard to 'know-how' and 'do how' of farm technology.

The positive and significant association between job satisfaction (X_6), job commitment (X_7) and communication facilities (X_8) variables and communication linkage mechanism of extension personnel for acquisition of farm technology suggests that extension personnel who were highly satisfied with their job, committed to job activities and sufficient communication facilities have made greater use of linkage mechanism for acquisition of farm technology. The findings of this study are in conformity with the past researches of Kolte (1972), Dhillon (1975), Dhillon and Sandhu (1977) and Talukdar (1984) who reported positive and significant association of job satisfaction with job performance of employees. The positive and significant association of job commitment and communication facilities with information input behaviour of extension personnel was reported by Jhamthani and Singh (1985), Babu and Sinha (1985) Malik *et al.* (1990). They also reported that both job commitment and communication facilities directly or indirectly affected the input behaviour of extension personnel.

The table 4.22 revealed that amount of variation in communication linkage mechanism used for acquisition of farm technology was jointly explained by eight variables to the extent of 31.76 per cent. The calculated F-value of 3.2579 (8 and 56 d.f) was found to be significant. The regression coefficient of job commitment (X_7) contributed significantly to total variation in communication linkage mechanism. The further probing of data indicated



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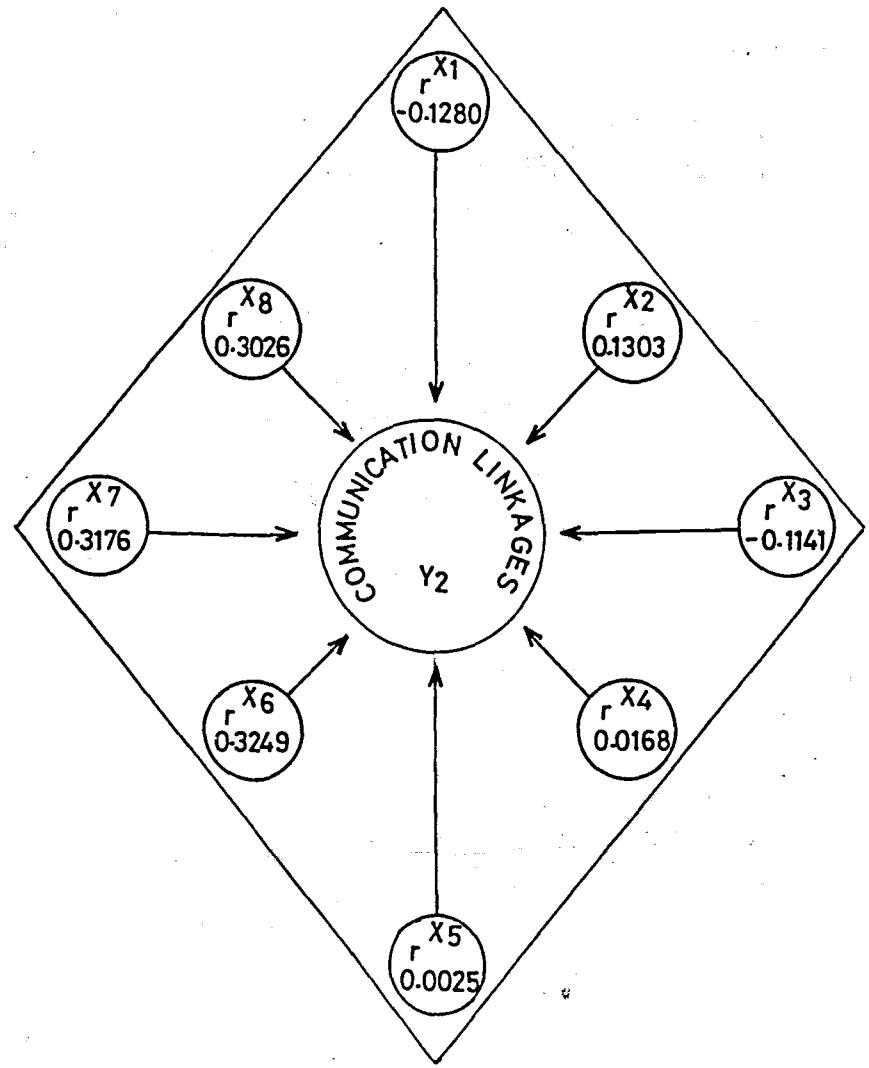

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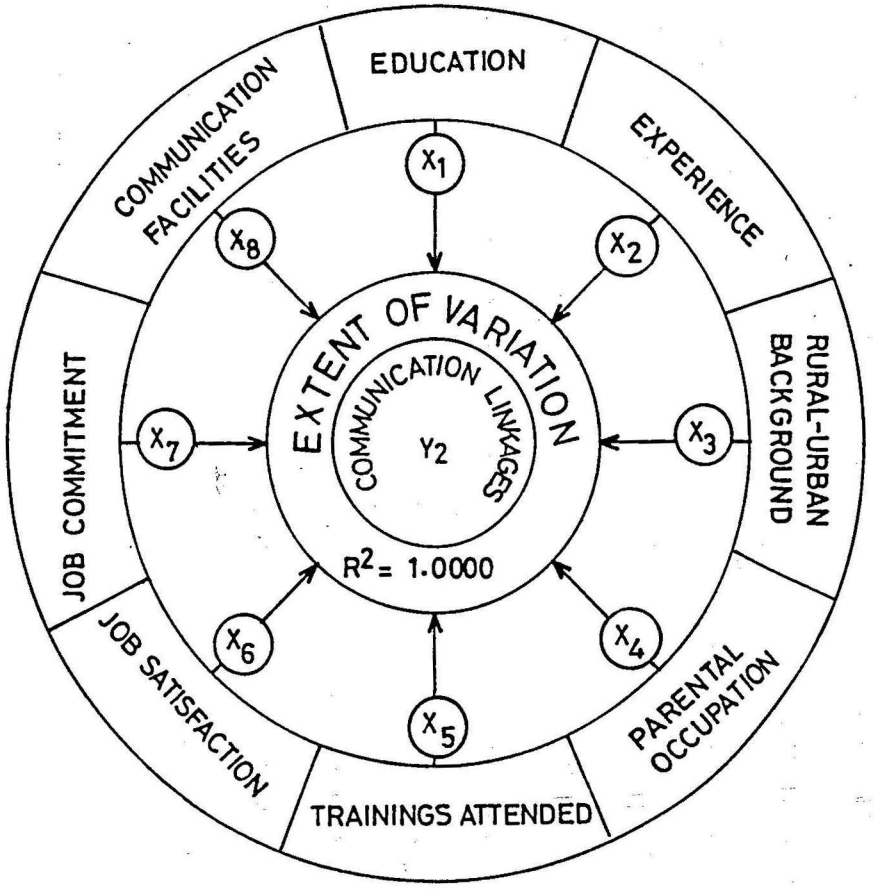
FIG. XI FACTORS ASSOCIATED WITH THE COMMUNICATION LINKAGES USED BY EXTENSION PERSONNEL FOR TRANSFER OF TECHNOLOGY TO FARMERS.



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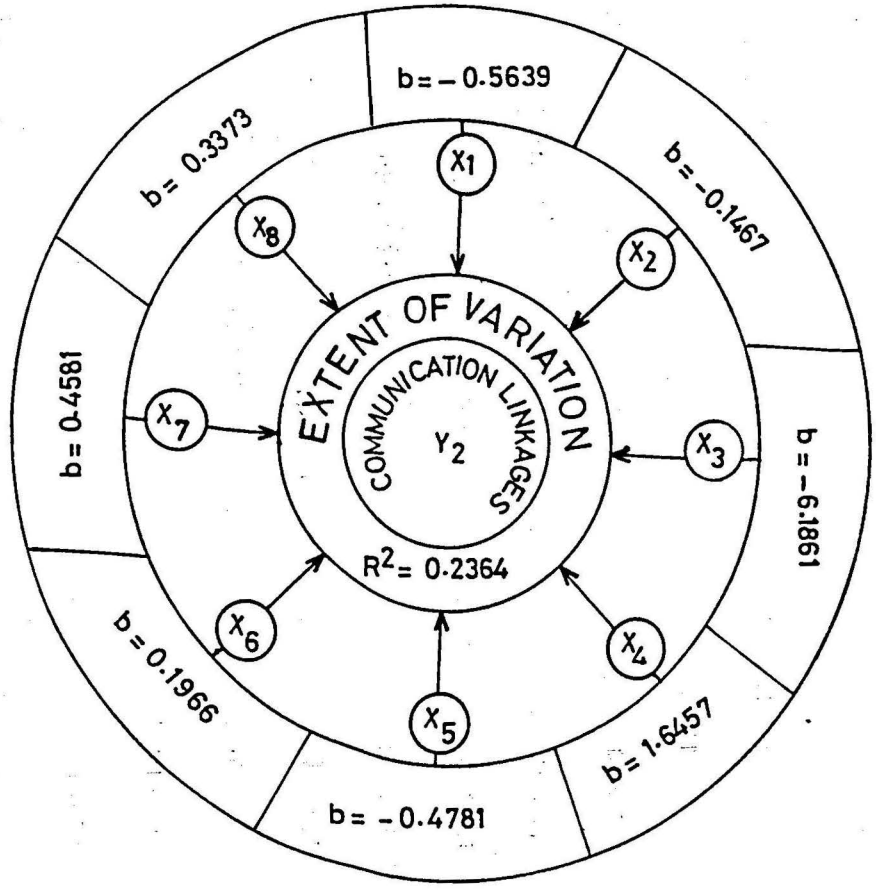


(THE FINAL PARADIGM)

FIG. XII EXTENT OF VARIATION CAUSED BY SELECTED INDEPENDENT VARIABLES IN COMMUNICATION LINKAGES USED BY EXTENSION PERSONNEL FOR TRANSFER OF TECHNOLOGY TO FARMERS.

that prominent regression coefficient values were of education (X_1), communication facilities (X_8) and job satisfaction (X_6). This suggests that an increase in education, communication facilities and job satisfaction would lead to increase in linkage mechanism use by 3.8472, 1.0743 and 0.4457 units, respectively when other factors are held constant. While increase in experience, and trainings by one unit would lead to decrease in their linkage mechanism use for acquisition of technology by 0.7359 and 1.6703 units, respectively when other variables are held constant.

Data concerning correlational and regressional analysis of extension personals' antecedent variables on communication linkages used for transfer of farm technology to farmers is presented in table 4.23.

It is apparent from data in the table 4.23 that only three variables namely job satisfaction (X_6), job commitment (X_7) and communication facilities (X_8) were positively and significantly correlated with linkages used for transfer of technology to farmers by extension personnel. However, nonsignificant relationship of education (X_1), experience (X_2), rural-urban background (X_3), parental occupation (X_4) and trainings (X_5) was established. But education and rural-urban background have exhibited negative trend while experience, parental occupation and trainings have got positive trend with linkage mechanism for transfer of technology to farmers. This speaks that extension personnel with higher education and also having urban background have lower linkage mechanism for transfer of technology to farmers. This seems to be illogical but probably may be due to reasons that these personnel

Table 4.23: Correlational and regressional analysis of extension personnels' antecedent variables on communication linkages used for transfer of farm technology to farmers

Code No.	Antecedent variables	Correlation coefficients (r values)	Regression coefficients	't' values
X_1	Education	-0.1280	-0.5639	-0.1572
X_2	Experience	0.1303	-0.1467	-0.8514
X_3	Rural-urban background	-0.1141	-6.1861	-1.7720
X_4	Parental occupation	0.0168	1.6457	0.7997
X_5	Trainings attended	0.0025	-0.4781	-0.6752
X_6	Job satisfaction	0.3249**	0.1966	1.2069
X_7	Job commitment	0.3176*	0.4581	1.5166
X_8	Communication facilities	0.3026*	0.3373*	2.0453*

R^2 = 0.2364

F value = 2.1671

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

have aspired for better job and consider themselves misfit for extension job. The positive and significant association of job satisfaction, job commitment and communication facilities suggests that extension personnel with higher job satisfaction, job commitment and also communication facilities have higher linkage mechanism for transfer of technology to farmers. These antecedent variables of extension personnel need to be given extraordinary attention. The similar findings have been reported by Kolte (1972), Dhillon (1975), Dhillon and Sandhu (1977), and Talukdar (1984), in case of job satisfaction while positive and significant association of job commitment and communication facilities were reported by Babu and Sinha (1985), whereas, Malik *et al.* (1990) have reported that both these variable have directly or indirectly affected the communication behaviour of extension personnel.

Further perusal of table 4.23 revealed that amount of variation in communication linkage use for transfer of technology to farmers was jointly explained by all the variables included in the study to the extent of 23.64 per cent. The calculated F value of 2.1671 (8 and 56 d.f.) was found to be nonsignificant. However, regression coefficients of communication facility (X_8) variable contributed significantly. But the prominent regression coefficient values were of parental occupation (X_4), job commitment (X_7) and job satisfaction (X_6). This suggests that an increase in parental occupation (i.e., farming), job commitment and job satisfaction by one unit would lead to increase in linkage use by 1.6457, 0.4581 and 0.1966 units, respectively when other factors are held constant.

KEY TO FIGURES: XIII – XV

X_1. EDUCATION

X_2. FAMILY EDUCATION

X_3. SOCIAL PARTICIPATION

X_4. INNOVATION PRONENESS

X_5. SOCIO-ECONOMIC STATUS

X_6. TRAININGS

X_7. ECONOMIC MOTIVATION

X_8. KNOWLEDGE

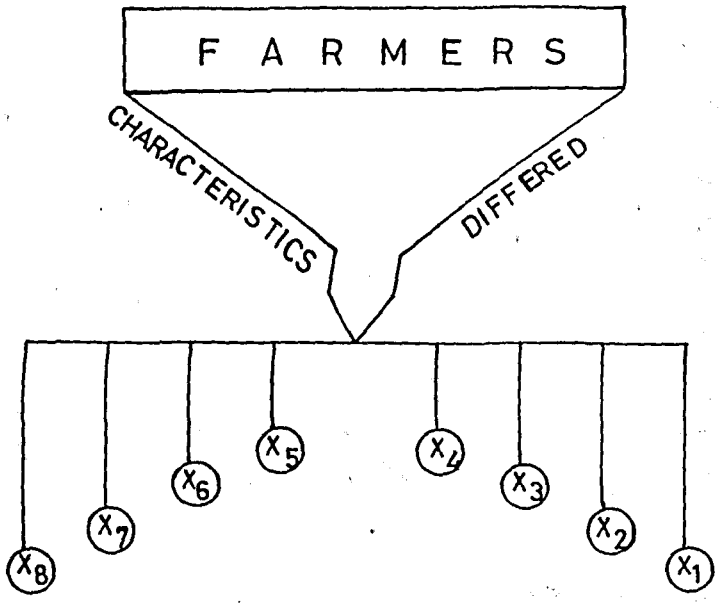
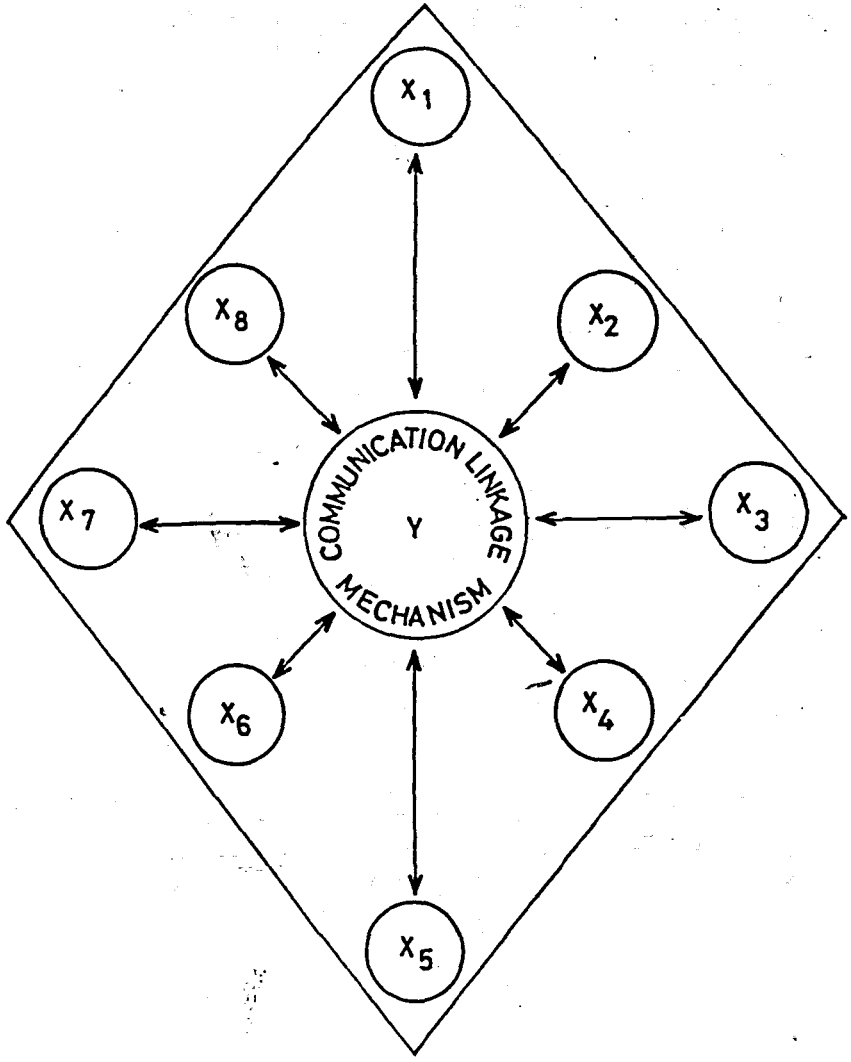
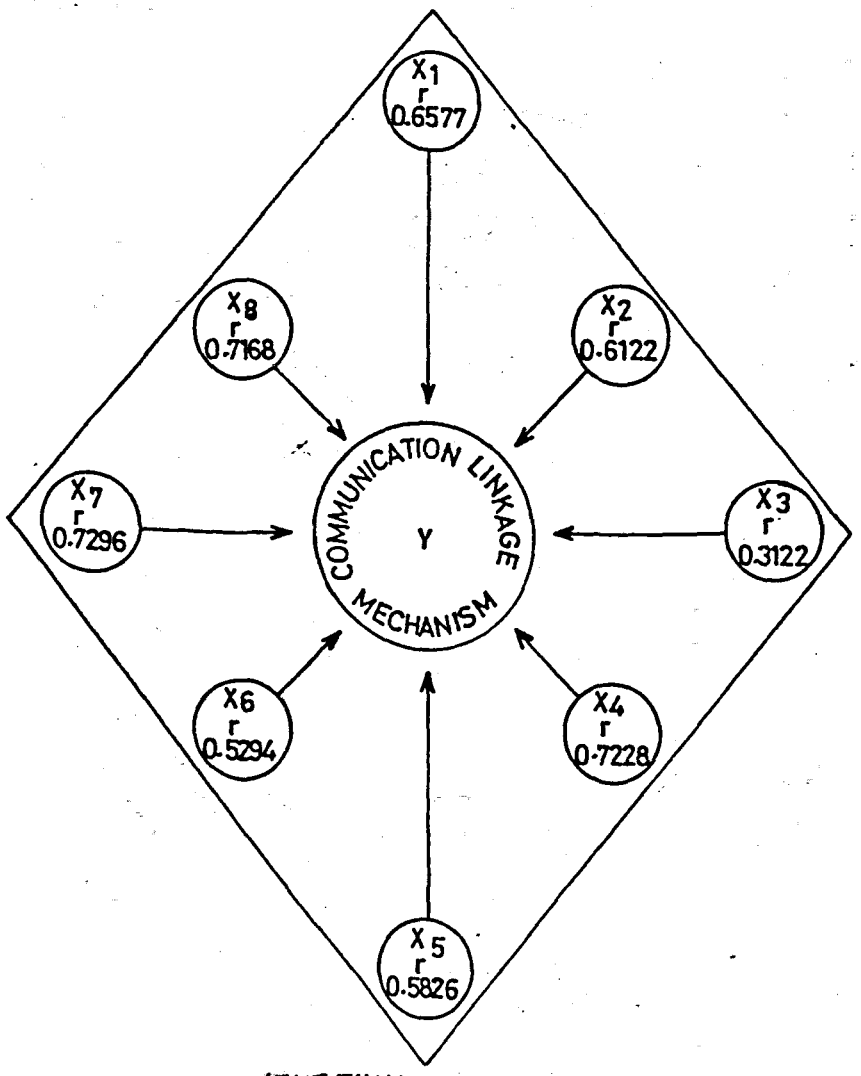


FIG. XIII CHARACTERISTICS OF FARMERS (THE PARADIGM).

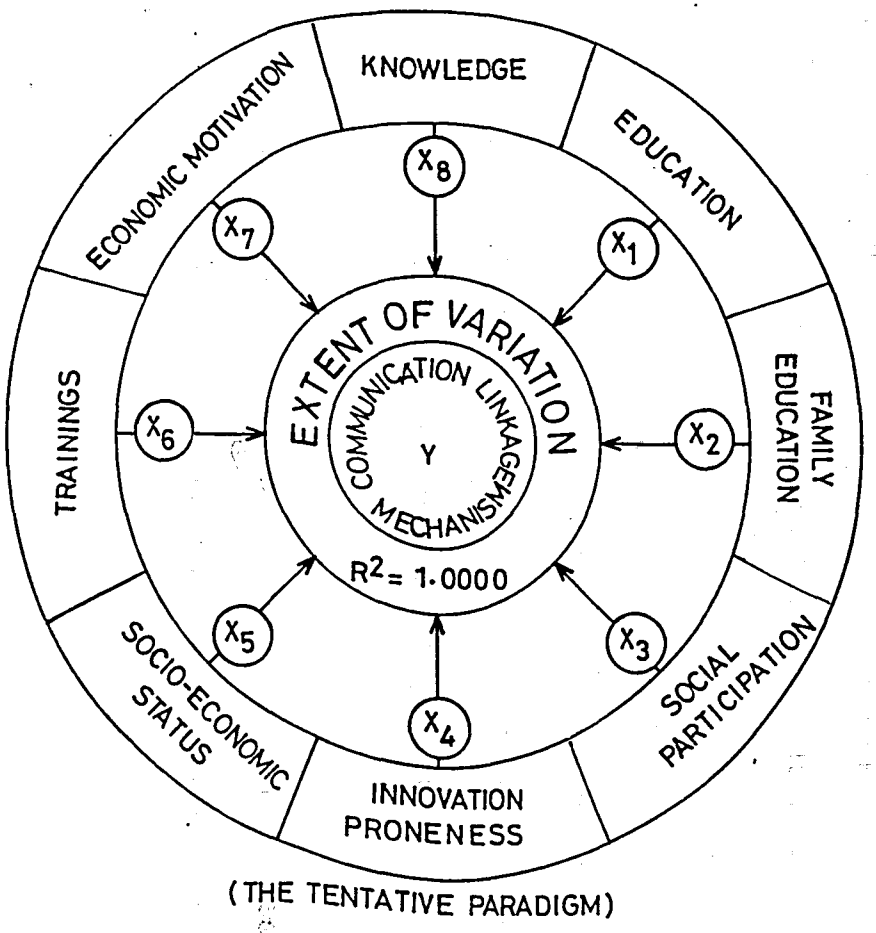


(THE TENTATIVE PARADIGM)

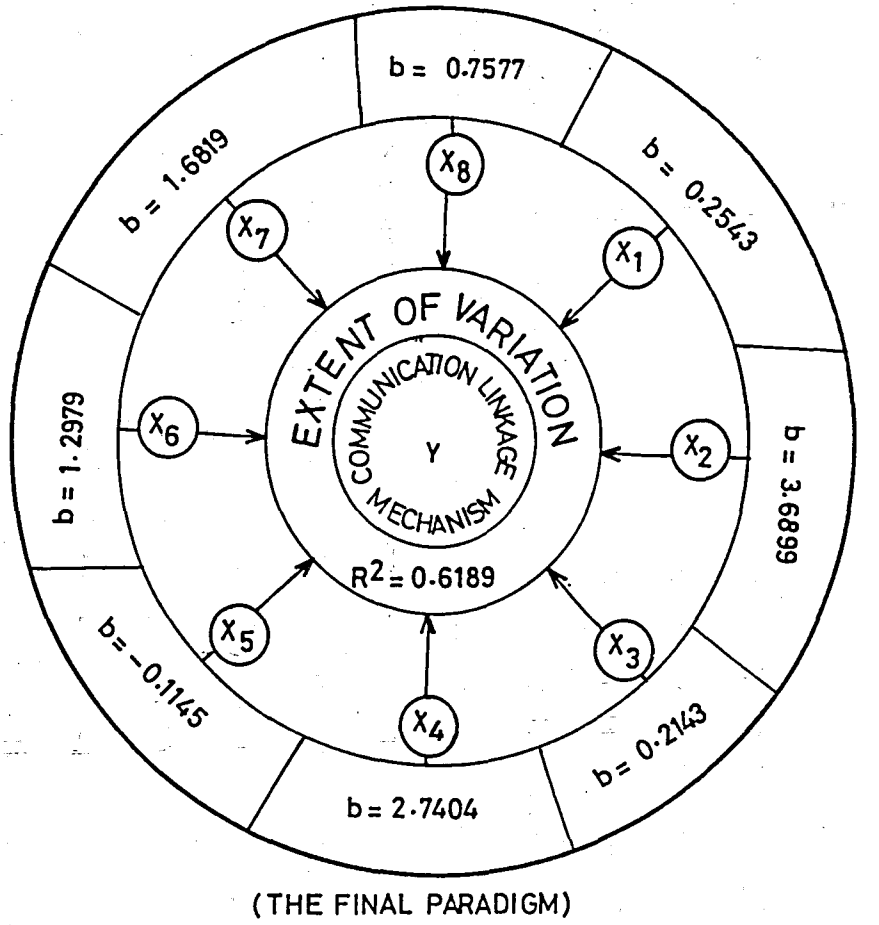


(THE FINAL PARADIGM)

FIG.XIV FACTORS ASSOCIATED WITH COMMUNICATION LINKAGE MECHANISM OF FARMERS FOR ACQUISITION OF FARM TECHNOLOGY.



(THE TENTATIVE PARADIGM)



(THE FINAL PARADIGM)

FIG. XV EXTENT OF VARIATION CAUSED BY SELECTED INDEPENDENT VARIABLES IN COMMUNICATION LINKAGE MECHANISM OF FARMERS FOR ACQUISITION OF FARM TECHNOLOGY.

Data concerning correlational and regression analysis of farmers' antecedent variables on communication linkage mechanism for acquisition of farm technology have been presented in table 4.24.

It is obvious from the data in the table 4.24 that all the antecedent variables included in this study established positive and significant association with communication linkage mechanism of farmers for acquisition of farm technology. It implies that with the increase in education (X_1), family education (X_2), social participation (X_3), innovation proneness (X_4), socioeconomic status (X_5), trainings (X_6), economic motivation (X_7) and knowledge (X_8) of crop production technologies higher will be the communication linkage mechanism. The positive association of these antecedent variables have been reported by other authors also, e.g. education, socio-economic status and economic motivation by Pandey (1979), Vijayraghavan and Subramanyan (1981) and Gogoi (1984). Positive and significant association of social participation and family education with communication behaviour of farmers have been reported by Singh *et al.* (1994). Association of innovation proneness and trainings with communication linkage mechanism for acquisition of dryland agro-technology was reported by Daivadeenam and Satyanarayana (1991). It showed that findings of this study are in the line with the studies conducted earlier in this field.

The table 4.24 depicts that amount of variation in communication linkage mechanism for acquisition of farm technology by farmers was jointly

Table 4.24: Correlational and regressional analysis of farmers' antecedent variables on communication linkage mechanism for acquisition of farm technology

Code No.	Antecedent variables	Correlation coefficients ('r' values)	Regression coefficients ('b' values)	't' values
X_1	Education	0.6577*	0.2543	0.7531
X_2	Family education	0.6122*	3.6899	1.6232
X_3	Social participation	0.3122**	0.2143	0.0816
X_4	Innovation proneness	0.7228*	2.7404	1.0352
X_5	Socio-economic status	0.5826*	-0.1145	-0.3231
X_6	Trainings attended	0.5294*	1.2979	0.5135
X_7	Economic motivation	0.7296*	1.6819**	2.2330**
X_8	Knowledge	0.7168*	0.7571	1.2784

R^2 = 0.6189

F value = 14.4149*

* Significant at 0.01 level of probability

** Significant at 0.05 level of probability

contributed by eight variables to the extent of 61.89 per cent. The calculated F value of 14.4149 (8 and 71 d.f.) was found to be significant The data also indicated that regression coefficient of economic motivation contributed significantly. However, regression coefficients of remaining variables did not contribute significantly. The further perusal of data indicated that regression coefficients of education (X_1), family education (X_2), social participation (X_3), innovation proneness (X_4), trainings (X_6) and knowledge (X_8) showed positive trend while socioeconomic status (X_5) showed non-significant negative trend. The prominent regression coefficient values were of family education (X_2), innovation proneness (X_4) and trainings (X_6). This suggests that an increase in family education (X_2), innovation proneness (X_4) and trainings (X_6) by one unit would lead to increase in use of linkage mechanism by 3.6899, 2.7404 and 1.2979 units, respectively when other factors are held constant. The nonsignificant negative trend of socioeconomic status suggests that increase in socio-economic status by one unit would lead to decrease in communication linkage mechanism by 0.1144 units when other factors are held constant.

4.6 SUGGESTED STRATEGY FOR EFFECTIVE COMMUNICATION LINKAGE MECHANISM FOR GENERATION, TRANSFER AND ADOPTION SYSTEMS

So far as this investigation is concerned, strategy refers to the design, the blue print, the plan of action needed to streamline the operation of work. Hence, the strategy will concern with working out design for bringing out improvement in communication linkage mechanism of researchers, extension

personnel and farmers. What has been presented and discussed in the text of this thesis covers the existing situation. But winding up of problem at this stage will lead to an impression that the facts have been collected, analysed and interpreted. Therefore, what is needed is to elaborate the likely use of findings of this study. Therefore, the strategy discussed below is based on the results of this investigation.

In the present era of technology explosion, a steady flow of agricultural knowledge leads to the gap between what is generated by researchers and what is practised by the users which is required to be bridged. The present investigation was an attempt to find out the factors which either accelerate or retard the communication linkage mechanism of researchers, extension personnel and farmers. The results of this study, if applied judiciously and wisely, shall help in improving communication linkage mechanism of researchers, extension personnel and farmers, thereby bridging a yawning gap between technology generation and its use.

The study has shown that cent per cent researchers were doctorate in agricultural sciences, whereas majority of extension personnel possessed bachelors degree in agriculture and few respondents possessed master's degree in agriculture. The education was found to exhibit nonsignificant negative correlation with communication linkage mechanism of extension personnel. This seems to be illogical but may possibly because of reasons that those who have higher education may aspire for better job and also may consider themselves misfit for extension work. So the department of agriculture should

make concerted efforts to fulfil their aspirations and make them fit for extension work by solving the problems which they face while carrying out extension work.

A large majority of researchers and extension personnel belonged to rural areas. Majority of extension personnels' parental occupation was farming while it was other than agriculture in case of researchers and have shown negative and nonsignificant association with researchers' communication linkage mechanism. So it is suggested that efforts should be made to recruit researches from farming community. Both rural-urban background and parental occupation have shown negative and nonsignificant correlation with communication linkage mechanism of extension personnel although majority belonged to rural areas and farming as their parental occupation. This may probably be due to their confidence to be more competent enough with regard to 'know-how' and 'do-how 'of farm technology. So there is a need to make consulted efforts to convince and encourage them to increase their linkage mechanism so as to enhance their competence of 'know-how' and 'do-how' of farm technology.

The trainings imparted to researchers and extension personnel by their departments were found to be low in number indicating that they had not received most of trainings arranged for them. However, in the present era of technology explosion, training to researchers and extension personnel becomes imperative to enable to them to develop scientific attitude, gain confidence in the work and to be abreast with recent advances necessary for

acquisition and dissemination of farm technology. Therefore, it is suggested that both researchers and extension personnel should be given opportunity to attend more and more training programmes specialised as well as general.

The researchers and extension personnel possessed low to moderate level of work experience. The work experience indeed is greatly related with dissemination of farm technology. Therefore, the major responsibility of transfer of technology may be entrusted to researchers and extension personnel having comparatively more experience of working. However, researchers and extension personnel having comparatively less working experience may be attached with their senior colleagues in the department till such time they attain sufficient experience to discharge their responsibilities.

The communication facilities possessed by researchers and extension personnel were found to be of low to medium level. Though researchers were in better position than extension personnel. The non or less availability of needed communication facilities certainly prevented acquisition and dissemination of farm technology which ultimately results in low or no acquisition and utilization of technology.

The extension personnel have mainly depended upon the literature available to them through official circulars. To make them more functional and effective it is essential that in every extension worker's office a small library be set up where provision should be made to subscribe officially more and more informative journals, books and other related material for their wider exposure.

Most of the researchers and extension personnel were not found fully satisfied with the job they held. Most probably dissatisfied personnel might have not been committed to their job. There is every likelihood that dissatisfied or non or less satisfied researchers and extension personnel will be least interested in obtaining additional information and ultimately sending them to users. This will certainly result in their low communication linkage mechanism. The researchers and extension personnels' dissatisfaction and non or less commitment to their job may be because of organisational constraints like improper service conditions, absence of provision of incentives, non or less recognition for good work, etc. The supervisors in their departments should look into it carefully and must make concerted efforts to isolate all those organisational constraints which lead to personnels' dissatisfaction. Simply isolating constraints will not be enough but they need to be rooted out and better service conditions to be offered to attract the talented persons who can work with satisfaction and dedication for further agricultural development because job satisfaction have established positive and significant association with both technology generation, utilization and dissemination mechanism of both researchers and extension personnel.

Majority of researchers and extension personnel were having moderate job commitment. So personnels' less commitment to their job may be because of certain organisational constraints like absence of provision of incentives, non or less recognition for good work, lack of cooperation from colleagues/ superiors, non-congenial working atmosphere, non-participation in decision

making etc. So the causes of less or non-commitment to job should be identified and remedial measures should be taken to promote the job commitment of personnel which is positively and significantly associated with their performance.

The researchers have most frequently used modes like self observation, research journals, research seminars/workshops/conferences and superior officers and local/state research institute, i.e. Agricultural University as the main source for generation of technology. While they have got least feed back from the modes like extension personnel and farmers which are very much crucial for need-based technology generation. Therefore, there is a need to have inbuilt mechanism in the system for proper and timely feedback from extension personnel and farmers to researchers in order to generate problem-oriented and need-based farm technology. The study revealed that researchers have made use of group contact methods/media (such as farm darshan, kisan mela and research reports) for transfer of technology to extension personnel and farmers which were either obligatory on their part or to fulfil their academic activities. They have used least the personal contact media/methods like personal visits, correspondence etc. and the use of mass media like television and radio was also less for transfer of technology. This media use pattern does not seem to be conducive for progress of extension work.

The less use of radio and television as mass media by researchers may be due to the policy of Doordarshan Kendra's and Radio stations to invite the scientists of nearby agricultural institutes like KGK, KVK or research stations

etc. It is therefore, suggested that existing policies of inviting scientists of nearby institutes need to be modified in such a manner that help inviting talented scientists from institutions of agricultural sciences irrespective of distance from the Doordarshan Kendra and Radio stations so as to have varied and wider representation. This policy, it is believed, can help to generate interest among scientists and also provide information generated under varied conditions for the larger benefit of the farmers. Moreover, scientists interested in gathering detailed technical information about varied regions are likely to utilise the mass media, i.e. radio and television and thereby, their viewing and listening behaviour can be improved.

The frequent and regular workshops/seminars need to be arranged to discuss the issues related with agricultural technology and there should be a joint partnership of the researchers, extension personnel and farmers in such workshop/seminars. The deliberations between researchers, extension personnel and farmers, it is believed, shall be more functional and fruitful in terms of agricultural development. Moreover, mutual trust and respect for each other shall be improved.

The extension personnel linkage mechanism used for acquisition of farm technology revealed that state department of agriculture was their main source and its inbuilt programmes were the most used modes such as staff meetings, trainings and literature circulated by the department. The study brought to surface that extension personnels' dependence about farm technology is mainly on literature circulated by the department. But the

information which is derived from varied modes including the aforesaid mode led to better understanding and conviction which will greatly help in utilization of the technology at the earliest. Therefore, the implementing authority should make efforts to provide information through several parallel modes like journals, books and magazines, etc. They have less used agricultural university for acquisition of farm information. So they should be encouraged to undertake visits to agricultural universities and research stations spread all over the country for the purpose of obtaining latest technical 'know-how' and 'do-how' regarding different aspects of crops being grown. This will certainly provide wider exposure of extension personnel which may help in acquisition of greater amount of required information. The department should identify the institutions having specialisation in particular field(s) and extension personnels' specialisation should be matched with specialised institutions for in-service trainings and refresher courses.

The extension personnel have least used the modes of personal visits and correspondence with researchers ultimately resulting in poor communication between these. This might have deprived them of latest technical 'know-how'. So the department should depute CAOs and ADOs- the grassroot extension workers in monthly trainings imparted by master trainers of the university.

The study also revealed that extension personnel most frequently used personal contact methods like farm and home visits followed by group contact methods like group meetings, demonstrations, crop competitions etc. It is

suggested that, field days, demonstrations, campaigns, crop competitions as group contact methods should also be given much emphasis as these may help a lot in convincing the clientele because of use of principle of 'seeing is believing'.

The study has brought to surface that majority of farmers (41.25%) possessed education upto matric while only 10 per cent had obtained education above matriculation. It is noted that nearly half of farmers did not possess education upto matric meaning thereby that their mental horizon was not as developed as it should be for the purpose of receiving, understanding, managing and applying recent advances. So the implementing agencies should make efforts to organise non-formal educational programmes to increase their mental ability to receive and understand and apply the recent advances. The required inputs may also be made available to farmers at their doorsteps on affordable prices.

The study also pointed out that majority of farmers (77.50%) were having low to medium level of family education. While interviewing it was found that illiterate farmers took help from their educated sons and daughters in matters of receiving, processing and adoption of farm information meaning thereby family education play an important role in agricultural development. So government should concentrate more on programmes like adult education to increase the number of educated families. It was found that 60 per cent of respondents were members of at least one or more organisations. Social participation leads to greater interactions among farmers which will help in

promoting adoption of improved crop production practices. So different village level institutions need to be geared up to promote social participation. As high as 75 per cent of farmers were having moderate to high level of innovative proneness meaning thereby that the newer technology is readily acceptable to farmers. Therefore, these farmers can form a target group as and when new technology comes into existence. Therefore, this target group should first be tapped so that this may help better to convince their fellow farmers in the area.

Majority of respondents (75.00%) had low to medium level of socio-economic status. It is highly correlated with kind of linkages used for adoption of farm technology. This indicated that frequency of interaction increases with increase in socio-economic status. So programme implementing authority should take steps to improve the position of a person in the society so that more and more colleagues, officials would like to interact with them and this shall certainly lead to increase in linkages.

The study revealed that majority of farmers (77.50%) have not attended any training related to agriculture. So it is a matter of serious concern for department of agriculture and agricultural university which are responsible for development of agriculture in the state, i.e. providing the latest 'know-how' and 'do-how' to the farmers. Therefore, specialised trainings should be organised at village level in order to provide opportunity to large number of farmers to participate so as to acquire the latest advances in agriculture.

A large majority of respondents (73.75%) belonged to moderate to high level of economic motivation. It suggests that newer technology which is profitable is readily adopted by the farmers. So researchers should concentrate on production of technologies which are more economically viable.

Large majority of farmers had low to medium level of knowledge of cotton production technology while moderate to high level of knowledge of wheat production technology. The positive and significant association of knowledge level with communication linkage mechanism for adoption of farm technology suggests that higher the knowledge level higher will be the rate of adoption. So implementing agencies should make efforts to increase the interactions, i.e. higher the interactions with farmers higher is their knowledge. So they should make maximum use of group contact methods like result and method demonstrations, short duration trainings, filed days etc.

The study revealed that farmers have most frequently utilised modes like progressive farmers, friends, neighbours, relatives and fellow farmers and sources such as seed/fertiliser store, market and commercial agencies of insecticides/pesticides for adoption of farm technology. So the extension functionaries of the Department of Agriculture have yet to come up as popular source of information for farmers. Therefore, it is necessary that field functionaries need to promote their interactions with farmers so that scientific knowledge possessed by them is utilized by maximum number of farmers. Similarly, the scientists of Agricultural University need to improve their

interactions with the farmers. The improved and frequent interactions between the scientists and the farmers shall accelerate the pace of adoption of disseminated technology because of the researchers' higher credibility for providing technical 'know-how' and 'do-how'.

There is a need to promote interactions between farmers and farm scientists and also between farmers and extension personnel. So the government should lay greater emphasis on organising qualitative extension activities in the villages, i.e. discussion sessions, meetings, short duration training programmes, result and method demonstrations. Field days and campaigns should also be organised from time to time by farm scientists and extension personnel. The farmers have made less use of mass media like radio and television and farm literature. So the information banks should be developed to provide more scientific information to farmers.

Since extension by nature is dependent on a strong research base whereas, research to be fruitful is dependent on proper feed back from extension personnel and farmers. Therefore, to plan and undertake field-oriented and problem-oriented researches which can be beneficial to the ultimate users, there is need to strengthen linkages between researchers, extension personnels and farmers.

5. SUMMARY AND CONCLUSION

Developing countries of the world including our are engaged in gigantic task of societal development. Societal development involves adoption and integration of innovations so that new ways of thinking and doing become a part of life of the people. So in context of our country societal development is greatly linked with agricultural development because of the fact that large population of the country resides in villages whose main source of livelihood is agriculture. Agriculture contributes 29.4 per cent of GDP and also employing 64 per cent of country's working force. Agriculture in India is developing very fast, large number of innovations are being developed and released for adoption by users through a network of agricultural research organisations, institutions and agencies. Therefore, the farm innovations are in abundance but what worries is the transfer of these innovations from their

point of generation to point of utilisation. However, farmers are not keeping pace with constantly fast changing technologies and as a result a yawning communication gap between technology generation and technology utilisation levels does exist. Hence, efficiency of communication is a matter of great concern to bridge this gap in order to bring about speedy agricultural development which is vulnerable and vital too. Since long research system, extension system and client system have been operating for agricultural modernisation in terms of production and productivity with extension system charged with ultimate responsibility of communication efficiency. Effective communication of innovations generated by agricultural research system to multitude farmers helps to achieve planned change on agricultural front. This speaks of importance of linkages between systems of generation, transfer and utilization of farm technology. Therefore, it was thought to ascertain the existing communication linkage mechanism for generation, transfer and adoption of farm technology with the following specific objectives:

1. *Communication linkage mechanism as modes and as sources used by* researchers for generation of farm technology.
2. Communication linkage mechanism of researchers for transfer of technology to extension personnel and farmers.
3. Communication linkages between extension personnel and farmers for transfer of technology.
4. Communication linkages used by farmers for acquisition of technology.

5. To suggest a suitable strategy for effective communication linkages between three systems

The study was confined to purposively selected district of Hisar. Since it fulfilled the requirement of all the three types of respondents selected for the study, i.e. researchers, extension personnel and farmers. From Hisar district two subdivisions namely, Hisar and Hansi were selected purposively because of easy accessibility to the investigator to approach extension personnel who formed the respondents for this study. Hisar-I and Hansi-I blocks were selected randomly from the selected subdivisions. One village from each selected block was taken up randomly. In all two villages, namely, Niyana and Bhatla were selected. The study envisaged three types of respondents, i.e., researchers (for generation of technology), extension personnel (for transfer of technology) and farmers (for adoption of technology). So the respondents were selected by applying a suitable sampling procedure as given under: For researchers, all the scientists in the Department of Plant Breeding of CCS HAU, Hisar, including master trainers actively involved in carrying out research work on wheat and cotton crops were included as researcher respondent for this study and these were 24 in number. Similarly, all the extension personnel of the ranks of SDAO, SMS, CAO and ADO of selected subdivisions were included as extension personnel respondents numbering 65 in total. For selection of farmer respondents, one tenth of self cultivating farmers were selected randomly, i.e. 40 farmers from each selected village. Thus, total number of sampled farmers were 80. Thus

total sampled respondents were 169 (80 farmers, 65 extension personnel and 24 researchers). Data from respondents were collected through well structured questionnaire for both researchers and extension personnel and interview schedule for farmers. However, personal contacts were also made to get objective information. The respondents' background factors numbering eight were considered as independent variables and communication linkage mechanism as dependent variable based on past researches, discussion with members of advisory committee and personal experiences. The system analysis approach was adopted assuming that systems under study were structurally static at the time of investigation and their communication functions were going on. The data was analysed by using different statistical techniques such as frequencies, percentage, total choice scores, zero order correlation and multiple regression analysis.

5.1. FINDINGS OF THE STUDY

5.1.1 Profile of the respondents

A minute look at the tables 4.1, 4.2 and 4.3 containing profile of all kinds of respondents highlighted the following findings.

5.1.1.1 Researchers: Cent per cent of respondents were doctorate in agriculture, 75 per cent had more than 5 years of present service experience and 62.50 per cent had upto 5 years past service experience. Majority of respondents were having service as their parental occupation followed by farming and majority belonged to rural areas, had received two trainings, had moderate to high level of job satisfaction while 46.67 per cent had low

level of communication facilities and job commitment.

5.1.1.2 Extension personnel

Majority (89.23%) of respondents possessed bachelors degree in agriculture whereas only few were postgraduate, majority (above 70%) had more than 5 years of present service experience and past service experience upto 5 years, belonged to rural areas, had farming as their parental occupation, nearly half had received 1-3 trainings, majority (75.23) were having low to medium level of job satisfaction, nearly half of them had low communication facilities and 40 per cent with moderate job commitment.

5.1.1.3 Farmers

Majority of farmers (41.25%) had education upto matriculation, nearly half possessed medium level of family education, majority of them had participated in one or more organisations, 62.50 per cent belonged to medium level of innovativeness category and 77.50 per cent had not received any training while majority of farmers were having low to medium level of socio-economic status and moderate to high level of economic motivation and majority (75%) were having low to medium level of knowledge of cotton crop while in case of wheat crop they had moderate to high level of knowledge.

5.1.2 Communication linkage mechanism of research system .

5.1.2.1 Researchers' communication linkage mechanism for generation of farm technology: The researchers used two types of linkages, i.e. modes and sources for generation of farm technology. Among modes, self

observation, research material/journals, research seminars/workshops/ conferences and superior officers or immediate superiors were most frequently utilised whereas farm telecast, farm broadcast, VIPs and administrators and farmers tours were the least used for generation of farm technology. As regards sources used for generation of technology by researchers, local research institutes, state research institutes followed by regional research institutes were mostly used whereas international research institutes, private organisations and voluntary organisations were least used for generation of farm technology.

The researchers have drawn most of the information for generation of farm technology from the modes like self observation, research journals, research seminars/workshops/conferences and demonstrations whereas farmers tours, VIPs and administrators, television, field survey and farmers tools were least used and minimum information were drawn from these modes. While the sources from which most of the information drawn were local or state research institutes followed by regional research institutes, the least information were drawn from voluntary organisations, private organisations and international research institutes. The researchers found the research journals, self observation and superior officers most useful modes for generation of farm technology. While VIPs and administrators, farm telecast, field surveys and farmers tours were reported as least useful modes. The local research institutes or state agricultural research institutes and regional research institutes were perceived very useful for generation of farm technology.

The modes like self observation, research journals, professional meetings and demonstrations were perceived most credible for generation of farm technology. Regarding sources local/state research institutes were considered most credible followed by regional and national research institutes.

5.1.2.2 Communication linkages used by researchers for transfer of technology to extension personnel: The researchers have most frequently used the methods./media or channels like farm darshan, kisan mela, research reports, group discussions, personal contacts and visits, trainings, workshops for transfer of technology to extension personnel while they least used the mass media or channels like television, radio, advisory letters, newspapers, personal letters and telephone calls while disseminating the technology to extension personnel.

5.1.2.3 Communication linkages used by researchers for transfer of farm technology to farmers: The methods/media or channels most frequently utilised by researcher for transfer of technology to farmers were publication of popular articles, on campus demonstrations, kisan mela and, on campus trainings of farmers whereas, they have made least use of mass media or channels like television talks, film shows, advisory letters, telephone, office calls, and personal letters. It is clear from the findings that researchers have made use of those media/methods or channels which are obligatory on their part to perform their duties and moreover, they are the part and parcel of their academic activities such as publication of popular articles, conducting demonstrations and training at university, and organising kisan mela at CCS HAU, Hisar.

5.1.3 Communication linkage mechanism of extension system

5.1.3.1 Communication linkage mechanism of extension personnel for acquisition of farm technology: The extension personnel used two types of linkages, i.e. modes and sources for acquisition of farm technology. Among modes staff meetings, trainings, senior extension personnel, leaflets, folders/ pamphlets, departmental circulars and SMSs of department of agriculture were most frequently used as well as most of the information regarding farm technology were drawn from these modes. While scientists working in agro-industries, telecast, salesmen of fertilizers/chemicals, journals, farm broadcast and personal correspondence with researchers were least used and minimum information were drawn from these modes. As regards sources the extension personnel most frequently used organisations such as state department of agriculture followed by directorate of extension education of CCS HAU, Hisar and the most of information were drawn from these sources by them. Whereas, voluntary organisations, professional/extension organisations were either not used or to a very negligible extent for acquisition of farm technology.

The modes like staff meetings, trainings, SMSs of Agricultural University demonstrations, kisan mela and senior extension personnel were considered most credible for acquisition of farm technology, while scientists operating in agro-industries, salesmen of fertilizers/chemicals were considered least credible. As regards sources credibility, state department of agriculture was considered most credible followed by Directorate of Extension Education of CCS HAU Hisar for acquisition of farm technology by extension

personnel.

5.1.3.2 Communication linkages used by extension personnel for transfer of technology to farmers

The methods/media or channels most frequently used by extension personnel for transfer of farm technology to farmers were farm and home visits, group meetings, training of farmers, demonstrations, crop competitions and field trips while mass media or channels like television talks, radio talks, telephone calls, educational films, publications, advisory letters and exhibitions were least used for transfer of technology to farmers. The study revealed that extension personnel made use of personal contact methods or media like farm and home visits followed by group contact methods like group meetings, demonstrations, trainings etc. while they least used the mass media or channels for transfer of farm technology to farmers were least used by them.

5.1.4 Communication linkage mechanism of farmers for adoption of farm technology

The farmers have used two types of linkages, i.e. modes and sources for acquisition of farm technology. Among modes, progressive farmers, friends, neighbours, relatives and fellow farmers were most frequently used as well as maximum information were drawn from these and also considered most useful for acquisition of farm technology whereas, advisory letters, farmers tours, agricultural exhibitions and demonstrations were least used by farmers and minimum information were drawn from them. As regards

sources seed/fertiliser store, market, commercial agencies of insecticides/ pesticides were most frequently used and most of the information were drawn from these sources.

Progressive farmers, friends, relatives and fellow farmers were considered most credible modes by farmers whereas farmers tours, advisory letters, and agricultural exhibitions were considered least credible for acquisition of farm technology. Among sources CCS HAU, research stations and seed/fertilizer stores were considered most credible sources for acquisition of farm technology while farmers organisations, voluntary organisations and commercial agencies of insecticides/pesticides were considered least credible by farmers.

5.1.5 Respondents' antecedent variables influence on their communication linkage mechanism

5.1.5.1 Researchers' antecedent variables influence on their communication linkage mechanism: Researcher communication linkage mechanism for generation of farm technology had significant and positive correlation with antecedent variables viz. job satisfaction, communication facilities and job commitment. While education exhibited no relationship with communication linkage mechanism for generation of technology but experience, rural-urban background, parental occupation and trainings did not establish significant correlation with communication linkage mechanism.

The multiple regression analysis between communication linkage mechanism for generation of farm technology and antecedent variables revealed that 49.85 per cent variation on linkage use of researchers was jointly

explained by these variables. However, none of antecedent variable was found to exhibit significant regression coefficient towards communication linkage mechanism of researchers for generation of farm technology.

Correlational analysis revealed that only three antecedent variables namely job satisfaction, communication facilities and job commitment had positive and significant relationship with communication linkage mechanism of researchers for transfer of technology to extension personnel.

Eight variables jointly explained to the tune of 40.63 per cent variation in communication linkage use of researchers for transfer of technology to extension personnel.

The variable of job satisfaction had positive and significant association with communication linkage use of researchers for transfer of technology to farmers.

All the antecedent variables jointly explained 29.06 per cent variation in communication linkage use of researchers for transfer of technology to farmers. However, none of the antecedent variables was found to exhibit significant regression coefficient towards their communication linkage mechanism for transfer of technology to farmers.

5.1.5.2 Extension personnel antecedent variables influence on their communication linkage mechanism: Only three antecedent variables, viz .job satisfaction, job commitment and communication facilities had positive and significant association with communication linkage mechanism of extension personnel for acquisition of farm technology. However, education,

experience, rural-urban background, parental occupation and trainings had non-significant relationship with it but education, rural-urban background and parental occupation had shown nonsignificant negative correlation with communication linkage mechanism of extension personnel for acquisition of farm technology.

The multiple regression analysis between communication linkage mechanism of extension personnel for acquisition of farm technology and antecedent variables revealed that 31.76 per cent variation could be explained by them. However, only job commitment variable was found to exhibit significant regression coefficient towards their communication linkage mechanism for acquisition of technology.

Correlational analysis revealed that only three variables of job satisfaction, job commitment and communication facilities had significant and positive correlation with communication linkage use of extension personnel for transfer of technology to farmers. However, education, experience, rural-urban background, parental occupation and trainings had non-significant correlation with it but education and rural-urban background have shown nonsignificant negative correlation with it.

All the antecedent variables jointly explained 23.64 per cent variation in communication linkage mechanism for transfer of technology to farmers. While only variable of communication facilities exhibited significant regression coefficient towards the communication linkage mechanism for transfer of technology to farmers.

5.1.5.3 Farmers' antecedent variables influence on their communication linkage mechanism for acquisition of farm technology: All antecedent variables included in the study had significant and positive association with the farmers' communication linkage mechanism. Multiple regression analysis revealed that 61.89 per cent variation in their communication linkage mechanism was jointly explained by them. However, only variable of economic motivation exhibited significant regression coefficient towards their communication linkage mechanism for adoption of farm technology.

CONCLUSION

It has become obvious that researchers most frequently used modes were self observation, research journals, research seminars/workshops/ conferences and superior officers or immediate superiors for generation of farm technology. The sources mainly used for generation of technology were local/state agricultural research institute i.e., university. The study also revealed that researchers disseminated the information through academic activities, viz. publication of their research reports in form of popular articles. Whereas mass media like radio and television were used to a negligible extent by them. The extension personnel gathered information mostly through inbuilt programmes or activities of state department of agriculture viz. staff meetings, senior extension personnel, leaflets, pamphlets/folders, departmental circulars and subject matter specialists of department of agriculture. Surprisingly the research publications, i.e. journals were least utilised or to a very negligible extent for receiving information. Similarly the farmers have acquired most

of the information through the modes like progressive farmers, friends, relatives and fellow farmers and sources such as seed/fertilizer store, market and commercial agencies of insecticides/pesticides. Farmers by and large utilised informal personal linkages over media and institutional linkages. The study revealed that researchers had not received feedback from extension personnel and farmers. It has also emerged from the findings that there was inadequate inter-system communication pattern for researchers. However, the extension personnel had better communication with superiors but inter-system communication was inadequate. It has been further observed that linkage between researchers, extension personnel and farmers is quite weak. There existed unsatisfactory inbuilt mechanism for effective linkage and communication among researchers, and extension personnel and farmers since CAOs and ADOs-the grassroots workers and farmers are deprived of monthly trainings provided by master trainers.

LITERATURE CITED

Akhouri, M.M.P. 1973. Communication behaviour of extension personnel: An analysis of Haryana agricultural extension system. Ph.D. Thesis, IARI, New Delhi.

Amalraj, V.A. and Prasad, M.S. 1984. Role of fertilizer dealers in the transfer of new farm technology. *Indian J. Extn. Edn.* **20**(3&4): 69-70.

Ambastha, C.K. 1974. Communication patterns in farm information development, extension and client system in Bihar: A system approach, Ph.D. Thesis, IARI, New Delhi.

Ambastha, C.K. 1980. Communication pattern of farm scientists. A path analysis. *Indian J. Extn. Edn.* **16**(1&2): 34-38.

Ambastha, C.K. and Singh, K.N. 1976. Farm Scientists communicate to farmers. *Indian J. Extn. Edn.* **12**(3&4): 1-5.

Ambastha, C.K. and Singh, K.N. 1977. Communication pattern of farm scientists: A system analysis. *Indian J. Extn. Edn.* 13(1&2): 22-30.

Ambastha, C.K. and Singh, K.N. 1977. Communication pattern of farm scientists: A path analysis. *Indian J. Extn. Edn.* 13(1&2): 9-16

Ambastha, C.K. and Singh, K.N. 1980. Communication pattern of farm scientists. *Indian J. Extn. Edn.* 1634-38.

Appa Rao, G. and Rogers, E.M. 1980. Caste and formal education in inter-personal diffusion of an innovation in two Indian villages. *Indian J. Extn. Edn.* 16(3&4): 1-9.

Arnon, I. 1968. *Organisation and Administration of Agricultural Research.* Elsevier Publishing Company Ltd., London.

Babu, A. and Sinha, B.P. 1985. Communication behaviour of extension personnel with regard to modern rice technology. *Indian J. Extn. Edn.* 21(3&4): 11.

Balasubramanium, U.K. and Menon, K.R. 1977. Extension personnel linkage with researchers. *Indian J. Extn. Edn.* 13(3&4): 61-63.

Baldwin, S.B. and Haymond, J.L. 1994. A system approach to communication behaviour among Scientists, Foresters and NIPF landowners. *South. J. Appl. Forest.* 18(4): 175-180.

Benor Daniel and Harrison, J.Q. 1977. Agricultural extension: The training and visit system. World Bank, USA, Washington.

Bhatia, B.S. and Sandhu, A.S. 1975. Determinants of job effectiveness of VLWs. *Indian J. Extn. Edn.* 11: 62-64.

Bhople, R.S. 1985. Communication patterns in farm innovation extension, acceptance and adoption by the farmers in Maharashtra state. Ph.D. Thesis (Unpublished), PAU, Ludhiana.

Bhople, R.S. and Thakre, S.M. 1994. Farm information sources utilization, adoption and transfer behaviour of farmers. *Rural India* **57**: 153-156.

Channegowda, M.P. 1983. Interaction between researchers and farmers in Bangalore district of Karnataka. *Indian J. Extn. Edn.* **19**(3&4): 66-68.

Chaubey, C.L. 1972. A study of differential adoption of high yielding wheat varieties technology as related to and influenced by selected demographic, socio-psychological and political varieties in Sehore district, Madhya Pradesh. Ph.D. Thesis, IARI, New Delhi.

Chole, R.R. and Radhukar, W.B. 1978. Source-credibility pattern among small farmers and big farmers. *Indian J. Extn. Edn.* **14**(1&2): 50-53.

Choughenour, M.C. 1968. Some general problems in diffusion from the perspective of the theory of social action, Diffusion research needs, North Central Res. Bull. Univ. Missouri. 5-21.

Copp, J.H., Sill, M.L. and Brown, B.T. 1958. The function of information sources in the farm practice adoption process. *Rural Sociol.* **23**: 146-157.

Daivadeenam, P. and Satyanarayana, Ch. 1991. Communication linkage mechanism used by researchers for generation of dryland agro-technology. *J. Res. APAU* **19**(1): 37-38.

Daivadeenam, P. and Satyanarayana, Ch. 1991. A study of characteristics influencing the communication linkages used by farmers for acquisition of dryland agro-technology. *J. Res. APAU* **19**(2): 90-91.

Daivadeenam, P. and Satyanarayana, Ch. 1991. A study of communication linkages used by farmers for acquisition of dryland agro-technology. *J. Res. APAU* 19(3): 162-163.

Daivadeenam, P. and Satyanarayana, Ch. 1991. Communication linkage mechanism used by researchers for transfer of dryland agro-technology. *J. Res. APAU* 19(1): 41-42.

Dhaliwal, A.J.S. and Sohal, T.S. 1965. Extension contacts in relation to adoption, agricultural practices and socio-economic status of farmers. *Indian J. Extn. Edn.* 1(1): 58-62.

Dhillon, J.S. and Sandhu, A.S. 1977. Determinants of job effectiveness of the demonstrations for introducing seeds, fertilizers and implements and factors associated with the non-adoption of them. *Indian J. Agron.* 8:2.

English, H.B. and English, A.C. 1961. *A comprehensive dictionary of psychological and socio-analytical terms.* New York: Longmans Green and Co.

Gogoi, D.K. 1984. A village level analysis of communication network of agricultural information in relation to adoption of improved farm practices in developed and underdeveloped areas of Punjab. Ph.D. Thesis (Unpublished), PAU, Ludhiana.

Gonorkar, P.C. and Khonde, S.R. 1979. Information transfer process - An evaluation study. *Agricultural Situation in India* 34(2): 699-703.

Grewal, I.S. 1976. Multivariate analysis of adoption of high yielding wheat technology in arid, central and west zones of Punjab state. Ph.D. Thesis (Unpublished), PAU, Ludhiana.

Guba, E.G. 1968. *Development, diffusion and knowledge, production and utilization in education administration.* (Eds. Eidell, T.L. and Kitchel, J.M. The Centre for the Advanced Study of Educational Administration, Univ. of Orgeon, Orgeon.

Havelock, R.G. 1968. *Dissemination and transmission roles*. In: L.E. Terry *et al.* (Ed). OP Cit: 64-119.

Hooda, R.S. 1987. Study of communication behaviour of farmers in Hisar with special emphasis on associated constraints. M.Sc. Thesis (Unpublished), HAU, Hisar.

Hunter, G. 1970. *The Administration of Agricultural Development Lessons from India.* Oxford Univ. Press, New York.

Indira Gandhi 1976. The Seminar on Transfer of Technology to Rural India. *Rural India* 39(7): 167.

Jain, N.C. 1970. Communication patterns and effectiveness of professionals performing linking roles in a research dissemination organisation. Ph.D. Thesis, Michigan State University, USA.

Janardhan, K.S. 1980. A study of job performance and job satisfaction of AEOs and factors associated with them. Thesis abstracts. 7: 105-106.

Jha, U.C. 1974. Communication behaviour of farmers and its influence on knowledge, symbolic and use adoption. Ph.D. Thesis, IARI, New Delhi.

Jhamthani, A. and Singh, J.P. 1985. Directory of degree research extension (1972-78). Division of Agriculture Extension, IARI, New Delhi.

Kamble, L.P. and Sinde, T.S. 1988. Use of information sources at different stages of adoption. *Maha. J. Extn. Edn.* 17: 219-220.

Kherde, R.L. and Sahaya, B.N. 1972. Role performance and role production of the VLWs in the new strategy of agriculture production. *Indian J. Extn. Edn.* 8(1&2): 67-70.

Kolte, N.V. 1972. Production of effective job performance of the agricultural extension officers of community development blocks. Ph.D. Thesis, University of Udaipur, Udaipur.

Laharia, S.N. 1978. A study of personal and organisational variables influencing the productivity of agricultural scientists. Ph.D. Thesis, HAU, Hisar.

Lakshminarayan, M.T. and Veerabhadriah, V. 1992. Extension teaching methods used by field - extension functionaries. *Indian J. Extn. Edn.* 28(3&40: 34-37.

Lal, D. 1972. Some correlates of communication behaviour of the Punjab farmers. M.Sc. Thesis (Unpublished), PAU, Ludhiana.

Lingwood, David, A. 1960. Communication behaviour of communication researchers: Centre for Research on the Utilization of Scientific Knowledge. University of Michigan.

Lionberger, H.F. 1951. Sources and use of farm and home information by low income farmers in Missouri. *Missouri Agril. Expt. Stat. Res. Bull.* 472p.

Lionberger, H.F. 1955. Information seeking habits and characteristics of farm operators. *Missouri Agril. Expt. Stat. Res. Bull.* 581p.

Lionberger, H.F. 1960. Adoption of new ideas and practices: A summary of the research dealing with the acceptance of technological change in agriculture, with implications for action in facilitating social change, Ames: Iowa State Univ. Press.

Lionberger, H.F. and Chang, H.C. 1970. *Farm Information for Modernizing Agriculture*: The Taiwan System, New York: Praeger Publisher.

Majumdar, A.K. and Majumdar, P.K. 1967. Adoption and some psychological characteristics of farmers. *Indian J. Extn. Edn.* 3: 19-21.

Malik, J.S., Narwal, R.S. and Yadav, Lali 1990. Effect of socio-economic variables on extension personnel communication pattern. *Maha. J. Extn. Edn.* 9: 87-95.

Mathur, P.N. and Pandey, S.N. 1983. Communication in training and visit extension system. *Interaction* 1: 68-76.

Moulik, T.K., Rao, C.S.S. 1965. Self rating scale for farmers. In: Measurement in Ext. Research Instruments, New Delhi: 1-15.

Murthy, A.S. 1969. Social and psychological correlates in predicting communication behaviour of farmers. Ph.D. Thesis. IARI, New Delhi.

Myren, D.T. 1964. First inter American research symposium on the role of communication in agricultural development. Mexico city, Oct. 5, 13: 3.

Narwal, R.S. 1982. Changes in farmers' knowledge about and attitude towards some selected aspects of agricultural technology with coming of irrigation water in a traditionally dry farming tract of Haryana. Ph.D. Thesis (Unpublished), HAU, Hisar.

Natikar, K.V. and Jayaramiah, K.M. 1988. The information sources consulted by extension personnel of T&V system. *Indian J. Extn. Edn.* 24(3&4): 79-81.

Nawab, Khalid, and Lawrence, L.D. 1994. Communication linkages among researchers, extension personnel and farmers of Pakistan. *J. Extn. Syst.* 10(2): 36-46.

Ojaimbo, J.B. 1990. Communication of agricultural information between research scientists, extension personnel and farmers in Kenya. Dissertation Abstracts -International. A *Human. Soc. Sci.* 50(8): 22-86.

Pandey, S.N. 1979. A study of communication patterns under the T&V system of agricultural extension in Chambal command area development project of Rajasthan. Ph.D. Thesis (Unpublished), IARI, New Delhi.

Parker, E.P. and Paisley, W.J. 1967. Scientific information exchange at inter-disciplinary behavioural science convention: Pale Atte, Institute of Communication Research Stanford University.

Parshad, R. 1973. Differential contribution of some correlates of village level workers influencing their communication effectiveness in context of high yielding varieties programme. A study conducted in Punjab state. Ph.D. Thesis (Unpublished), PAU, Ludhiana.

Parshad, R. and Sinha, P.R.R. 1971. Farmers characteristics influencing the use of various categories of information sources in the adoption of soil stirring plough. *Indian J. Extn. Edn.* 7(3&4): 99-105.

Patel, I.C. 1972. Communication patterns and procedures associated with village level workers effectiveness. *Indian J. Extn. Edn.* 8(3&4): 1-8.

Patel, I.C. and Leagan, P.J. 1968. Some background and personal traits related to village level workers effectiveness. *Indian J. Extn. Edn.* 4(3&4): 1-10.

Patel, M.C., Vekaria, R.S. and Waghmare, S.K. 1995. Communication media used by tribal and non-tribal farmers. Communicator **30**(4): 16-17.

Patel, M.M., Parmar, P.S. and Dubey, M.C. 1995. Credibility pattern of different sources of farm information. *Maha. J. Extn. Edn.* **14**: 33-34.

Pelze, D.C. and Andrews, F.M. 1966. *Scientists in Organisations*. New York: John Willey.

Perumal, G. and Rai, G.C. 1976. Job performance of agricultural extension officers in Tamil Nadu. *Indian J. Extn. Edn.* **13**(3&4): 56-80.

Perumal, G. and Rai, G.C. 1978. Job satisfaction and job performance of AEOs of Tamil Nadu. *Indian J. Extn. Edn.* **14**(1&2): 73-75.

Pye, L.W. 1963. *Communication and Political Development*. Princeton: Princeton Univ. Press.

Radhukar, W.B. 1958. Impact of fertilizer extension programmes on the minds of the farmers and their reactions to different extension methods. *Indian J. Agron.* **3**: 119-136.

Radhukar, W.B. 1962. The relationship of certain factors to the success of village level workers. *Rural Sociol.* **27**(4): 418-427.

Radhukar, W.B. 1967. Communication pattern in the acceptance of agricultural practices. T.P.S. Chowdheri (ed). Selected readings on community development (1967), Hyderabad, National Institute of Community Development, pp 20-35.

Rani, G.J., Reddy, S.V. and Rao, G.N. 1989. Influence of selected variables on scientific productivity of agricultural scientists. *Indian J. Ext. Edn.* **23**(3&4): 26-29.

Ray, G. 1975. Contact of extension officers with different sources of agricultural information in West Bengal. *Indian J. Extn. Edn.* **11**(1&2): 65-66.

Reddy, K.P. 1984. Analysis of information flow and communication linkages in transfer of dairy management practices - A system perspective. Ph.D. Thesis, APAU, Rajendranagar, Hyderabad.

Reddy, K.P. and Reddy, H.N.B. 1987. Researchers communicate to farmers - An inter-system analysis. *Indian J. Extn. Edn.* **6**: 23-26.

Reddy, T.V.S. and Patel, I.C. 1973. Some general characteristics of AEOs in Gujarat State. *Indian J. Extn. Edn.* 9(1&2): 10-18.

Rogers, E.M. 1983. *Diffusion of Innovations*, New York: The Free Press.

Rogers, E.M. and Shoemaker, E.F. 1971. Communication of Innovations: A cross cultural approach. New York press.

Rogers, E.M. and Svenning, L. 1969. Modernization among peasants; The impact of communication: New York. Holt, Rinehart and Winston.

Salvi, P.V. and Dudhani, C.M. 1967. Role of personal characteristics in job effectiveness of VLWs. *Indian J. Extn. Edn.* **3**: 129.

Sangha, G.S. 1979. Communication behaviour of the agricultural extension officers of Punjab. Ph.D. Thesis (Unpublished), PAU, Ludhiana.

Sanoria, Y.C. 1977. Correlates of communication efficiency of agricultural extension personnel. *Indian J. Extn. Edn.* **13**(3&4): 64-67.

Sanoria, Y.C. 1978. Communication efficiency of agricultural scientists. *Indian J. Extn. Edn.* **14**(3&4): 81-83.

Sanoria, Y.C. and Singh, K.N. 1976. Communication pattern of extension personnel. *Indian J. Extn. Edn.* **12**(1&2): 28-34.

Sanoria, Y.C. and Singh, K.N. 1977. Communication pattern of Agricultural scientists. *Indian J. Extn. Edn.* **15**(3&4): 9-14.

Sarkar, D.R. and Patnaik, K. 1967. Study of selected factors in the job satisfaction of VLWs. *Indian J. Extn. Edn.* **3**(1&2): 49-54.

Sengupta, T. 1963. Characteristics of effective village level workers. M.Sc. Thesis, IARI, New Delhi.

Sethy, B. Sinha, B.P. and Bahal, R. 1984. Some entrepreneurial characteristics in the adoption of an improved farm technology. *Indian J. Extn. Edn.* **20**(1&2): 29-37.

Shankariah, Ch. 1969. A study of differential communication patterns in a progressive and non-progressive village. PhD. Thesis, IARI, New Delhi.

Sharma, M.L. and Khan, M.A. 1997. Communication sources of farmers of south eastern Madhya Pradesh. *Agri. Extn. Rev.* 21-22.

Sherief, A.K., Menon, A.G.G. and Bhaskaran, C. 1993. Communication behaviour of non contact farmers. *Rural Extension Bull., Kerala, India.* **3**: 33-35.

Shete, N.B. 1974. A study of communication behaviour of extension personnel of Maharashtra agricultural extension system. Ph.D. Thesis (Unpublished), IARI, New Delhi.

Singh, D. and Singh, M.R. 1972. Farmers perception of differential credibility pattern of information sources. *Indian J. Extn. Edn. 8(3&4): 74-78.*

Singh, G.S. 1989. Communication system for human resource development of farmers in Haryana. PhD. Thesis (Unpublished), HAU, Hisar.

Singh, H. 1982. An analysis of communication patterns among information generating, information disseminating and information utilizing systems of dairy farming in intensive cattle development project, Ludhiana. Ph.D. Thesis (Unpublished), NDRI, Karnal.

Singh, I.B. 1970. Communication behaviour and social change in relation to high yielding varieties programme in Kosi area, M.Sc. Thesis, IARI, New Delhi.

Singh, J. 1988. Communication pattern of agricultural extension personnel. M.Sc. Thesis (Unpublished), HAU, Hisar.

Singh, K.N. 1983. Models of extension and communication with farmers. *J. Rural Dev.* 6(2): 187-212.

Singh, K.N. and Jha, P.N. 1965. Utilization of sources of farm information in relation to adoption of improved agricultural practices. *Indian J. Ext. Edn.* 1(1): 34-42.

Singh, N. 1995. Transfer of technology through T & V system - An impact study. Ph.D. Thesis (Unpublished), CCS HAU, Hisar.

Singh, R., Tyagi, K.C. and Singh, R. 1994. Correlates of communication behaviour of dairy farmers. *Indian J. Dairy Sci.* 47(6): 480-486.

Singh, R. 1972. A study of socio-psychological values and some biological characteristics in relation to adoption of farm mechanisation by the farmers of Ludhiana (Punjab). Ph.D. Thesis (Unpublished), PAU,. Ludhiana.

Singh, Y.P. 1965. A study of communication networks in sequential adoption and key communicators. Ph.D. Thesis, IARI, New Delhi.

Singh, Y.P. and Nirwal, R.S. 1974. Audience analysis for using written word. Community Development and Panchayati Raj Digest 6(1): NICD-Hyderabad: 22-28.

Sinha, R.R., Kubde, V.R. and Pardhan, T.P. 1988. Impact of wheat result demonstration on knowledge, adoption and attitude of farmers of Nepal. *Maha. J. Extn. Edn.* 7: 139-141.

Snedecor, G.W. and Cochran, W.G. 1967. *Statistical Methods*. Ames, Iowa State Univ. Press.

Sohal, T.S. and Tyagi, K.C. 1978. Role of knowledge in adoption of dairy innovations. *Indian J. Ext. Edn.* 14(3&4): 16-25.

Sohi, J.S. and Kherde, R.L. 1980. A study of dairy adoption behaviour of small and marginal farmers in Punjab. *Indian J. Extn. Edn.* 16(1&2): 84-86.

Sridhar, S. and Reddy, H.N.B. 1977. Communication patterns of extension personnel and factors associated with them. M.Sc. (Agri.) Thesis, U.A.S., Hebbal, Bangalore.

Subhash Chandra, S.P. and Channegowda, M.B. 1985. Information input pattern of agricultural researchers at Dharwad, Karnataka State. *Indian J. Extn. Edn.* 21(1&2): 72-73.

Supe, S.V. 1969. Factors related to different degrees in decision - making among farmers. Ph.D. Thesis, IARI, New Delhi.

Talukdar, R.K. 1984. Productivity of agricultural development officers in Haryana. A factor analysis study. Ph.D. Thesis (Unpublished), HAU, Hisar.

Trivedi, G. 1963. Measurement and analysis of socio-economic status of rural families. Ph.D. Thesis IARI, New Delhi.

Varma, U. 1987. An analysis of communication pattern among information generating, information disseminating and information utilizing systems of Home Science in Haryana. Ph.D. Thesis (Unpublished), HAU, Hisar.

Veeraswamy, S., Satapathy, C. and Rao, G. Appa 1992. Information input, processing and output behaviour of farm scientists. Indian J. Extn. Edn. 28(3&4): 67-71.

Veerabhadriah, V. 1981. Time management, job involvement and job performance of extension supervisors. Thesis Abstr. 9: 124-126.

Vekaria, R.S. and Pandya, R.D. 1995. Communication media used by paddy growers. *Communictor* 30(1): 13-15.

Vekaria, R.S., Pandya, R.D. and Patel, S.R. 1993. Media behaviour of rice growers. *Communictor* 28(4): 31-39.

Verma, N.S. 1985. Knowledge gap and constraints in fertilizer use. Ph.D. Thesis (Unpublished) HAU, Hisar.

Vickery, B.C. 1963. Scientific information; Problem and prospects. *Minerva* 2(11): 21-28.

Vijayaragavan, K. and Subramanyan, V.S. 1980. Communication behaviour of garden land and dryland farmers. *Indian J. Extn. Edn.* **16**(1&2): 71-81.

Vijayaragavan, K. and Subramanyan, V.S. 1981. Socio-psychological factors associated with communication behaviour of farmers. *Indian J. Extn. Edn.* **17**(3&4): 22-30.

Wilkening, E.A. 1950. Sources of information for improved farm practices. *Rural Sociol.* **15**: 19-30.

Yadav, V.P.S. 1991. Differential communication gap in technology transfer under T & V system. M.Sc. Thesis (Unpublished), HAU, Hisar.

APPENDIX I

Procedure of computing job satisfaction categories of researchers

Job satisfaction scores group	Frequency	Weighted frequency	Cumulative weighed frequency	Category
28	1	28	28	
40	2	80	108	
41	2	82	190	
42	2	84	274	Low
45	1	45	319	
46	1	46	365	
48	3	144	509	Medium
49	2	98	607	
50	4	200	807	
52	2	104	911	
53	1	53	964	
55	1	55	1019	High
56	1	56	1075	
57	1	57	1132	

APPENDIX II

Procedure of computing communication facilities scores categories of researchers

Communication facilities scores group	Frequency	Weighted frequency	Cumulative weighed frequency	Category
8	1	8	8	
17	1	17	25	
18	1	18	43	
19	1	19	62	
20	1	20	82	Low
21	1	21	103	
22	1	22	125	
24	2	48	173	
27	1	27	200	
28	1	28	228	
29	2	58	286	Medium
31	4	124	410	
32	2	64	474	
33	1	33	507	
37	1	37	544	High
39	1	39	583	
42	1	42	625	
44	1	44	669	

APPENDIX III

Procedure of computing job commitment categories of researchers

Job commitment scores group	Frequency	Weighted frequency	Cumulative weighted frequency	Category
13	1	13	13	
14	2	28	41	
15	2	30	71	
16	1	16	87	Less
17	1	17	104	
18	2	36	140	
19	1	19	159	
20	5	100	259	
22	1	22	281	Moderate
23	1	23	304	
24	4	96	400	
26	1	26	426	High
27	1	27	453	
28	1	28	481	

APPENDIX IV

Procedure of computing job satisfaction scores categories of extension personnel

Job satisfaction scores group	Frequency	Weighted frequency	Cumulative weighed frequency	Category
17	1	17	17	
25	1	25	42	
30	3	90	132	
32	3	96	228	
33	1	33	261	Low
35	1	35	296	
36	4	144	440	
37	2	74	514	
39	5	195	709	
40	15	600	1309	
44	5	220	1529	
45	6	270	1799	Medium
46	2	92	1891	
47	7	329	2220	
49	2	98	2318	
50	2	100	2418	
52	3	156	2574	High
57	1	57	2631	
65	1	65	2696	

APPENDIX V

Procedure of computing communication facilities scores categories of extension personnel

Communication facilities scores group	Frequency	Weighted frequency	Cumulative weighted frequency	Category
2	5	10	10	
4	2	8	18	
7	5	35	53	
9	6	54	107	Low
10	3	30	137	
11	3	33	170	
12	7	84	254	
14	5	70	324	
15	3	45	369	Medium
17	8	136	505	
18	2	36	541	
20	5	100	641	
22	4	88	729	
23	1	23	752	
24	1	24	776	High
26	2	52	828	
29	1	29	857	
36	2	72	929	

APPENDIX VI

Procedure of computing job commitment scores categories of extension personnel

Job commitment scores group	Mid value	Frequency	Weighted frequency	Cumulative weighted frequency	Category
12-13	12.5	1	12.5	12.5	
14-15	14.5	1	14.5	27.0	Less
16-17	16.5	1	16.5	43.5	
18-19	18.5	12	222.0	265.5	
20-21	20.5	19	389.5	655.0	Moderate
22-23	22.5	7	157.5	812.5	
24-25	24.5	12	294.0	1106.5	
26-27	26.5	5	159.0	1265.5	
28-29	28.5	1	28.5	1294.0	High
30-31	30.5	5	152.5	1446.5	
32-33	32.5	1	32.5	1479.0	

APPENDIX VII

Procedure of computing family education scores categories

Family education scores group	Mid value	Frequency	Weighted frequency	Cumulative weighted frequency	Category
0.0-0.8	0.40	3	1.20	1.20	
0.8-1.6	1.20	15	18.00	19.20	Low
1.6-2.1	1.85	10	18.50	37.70	
2.1-3.4	2.75	34	93.50	131.2 0	Medium
3.4-4.5	3.95	15	59.25	190.45	
4.5-5.0	4.75	1	4.75	195.20	High
5.0-5.8	5.40	2	10.80	206.00	

APPENDIX VIII

Procedure of computing socio-economic status scores categories

Socio-economic scores group	Mid value	Frequency	Weighted frequency	Cumulative weighted frequency	Category
17-18	17.5	3	52.5	52.5	
19-20	19.5	4	78.0	130.5	
21-22	21.5	2	43.0	173.5	
23-24	23.5	1	23.5	197.0	Low
25-26	25.5	1	25.5	222.5	
27-28	27.5	4	110.0	332.5	
29-30	29.5	7	206.5	539.0	
31-32	31.5	7	220.5	759.5	
33-34	33.5	12	402.0	1161.5	
35-36	35.5	3	106.5	1268.0	Medium
37-38	37.5	6	225.0	1493.0	
39-40	39.5	9	355.5	1848.5	
41-42	41.5	5	207.5	2056.0	
43-44	43.5	6	261.0	2317.0	High
45-46	45.5	7	318.5	2635.5	
47-48	49.5	3	142.5	2778.0	

APPENDIX IX

Procedure of computing economic motivation scores categories

Economic motivation scores group	Mid value	Frequency	Weighted frequency	Cumulative weighted frequency	Category
18-19	18.5	1	18.5	18.5	
20-21	20.5	3	61.5	80.0	Low
22-23	22.5	7	157.5	237.5	
24-25	24.5	10	245.0	482.5	
26-27	26.5	15	397.5	880.0	
28-29	28.5	9	256.5	1136.5	Medium
30-31	30.5	12	366.5	1502.5	
32-33	32.5	8	585.0	2087.5	
34-35	34.5	6	207.0	2294.5	High
36-37	36.5	8	292.0	2586.5	
38-39	37.5	1	37.5	2624.0	

APPENDIX X

Procedure of computing knowledge scores categories

Economic motivation scores group	Mid value	Frequency	Weighted frequency	Cumulative weighted frequency	Category
A. Cotton					
11-12	11.5	1	11.5	11.5	
13-14	13.5	6	81.0	92.5	Low
15-16	15.5	16	248.0	340.5	
17-18	17.5	10	175.0	515.5	
19-20	19.5	16	312.0	827.5	Medium
21-22	21.5	11	236.5	1064.0	
23-24	23.5	12	282.0	1356.0	
25-26	25.5	6	153.0	1509.0	High
27-28	27.5	2	55.0	1564.0	
B. Wheat					
13-14	13.5	7	94.5	94.5	Low
15-16	15.5	17	263.5	358.0	
17-18	17.5	12	210.0	568.0	Medium
19-20	19.5	15	292.5	860.5	
21-22	21.5	21	451.5	1312.0	High
23-24	23.5	8	188.0	1500.0	

APPENDIX XI

DEPARTMENT OF EXTENSION EDUCATION
COLLEGE OF AGRICULTURE
CCS HARYANA AGRICULTURAL UNIVERSITY
HISAR

Dr. R.S. Narwal
Professor and Head

No. EE/96/152
Dated: 15.1.96

Dear Sir,

One of my Ph.D. students, Sh. Bharat Singh (93A38D) has to undertake a research project entitled "Communication Linkage Mechanism for generation, transfer and adoption of farm technology" as a part of his Ph.D. study programme. The study envisaged the gathering of information from the extension personnel/researchers, without which the completion of research project in hand is a remote possibility. Therefore, I am approaching you through this communication and request you to kindly fill up the attached questionnaire. Sh. Bharat Singh will approach you personally in this regard.

I am conscious of your busy schedule of work even though you are requested to squeeze some minutes to reply the enclosed questionnaire and send the same to the undersigned at the earliest possible. The information provided by you shall be kept strictly confidential. It is hoped that necessary cooperation in this regard shall be forthcoming as has also been received in the past. Early and objective response is expected from you.

Hoping for favourable response,

With regards,

Sincerely,
Sd/-
(R.S. Narwal)

APPENDIX XII

CCS HARYANA AGRICULTURAL UNIVERSITY, HISAR
DEPARTMENT OF EXTENSION EDUCATION
QUESTIONNAIRE FOR RESEARCHERS

TITLE OF THE RESEARCH PROJECT:

COMMUNICATION LINKAGE MECHANISM FOR GENERATION, TRANSFER AND ADOPTION OF FARM TECHNOLOGY

PART -I

1. Name _____ 2. Designation _____

3. Department _____ 4. Age _____ years

5. Educational qualification

Name of degree	University	Year	Duration	Division/ OGPA
1. B.Sc. (Ag.)/ B.Sc.(Hons.) Agri.				
2. M.Sc. (Agri.)				
3. Ph.D.				

6. Experience
   Past experience _____ years
   Present experience _____ years

7. Rural-urban background
   a) Rural b) Urban c) Ruurban

8. Parental occupation
   Farming/service/business/any other

9. Have you attended any training on any aspect of agriculture ? If yes, please mention the following :

Sr.No.	Subject of training	Place/ institution	Duration	Year

10. Job satisfaction

Please express your opinion about certain factors of your job by checking (✓) on appropriate category against each statement. Your reply shall be kept confidential and therefore feel free to express your view

Sr. No.	Job factors	Highly satisfied	Satisfied	Neutral	Not satisfied	Highly dissatisfied
1.	Job security					
2.	Opportunity for promotion					
3.	Opportunity for further research/ education					
4.	Participation in decision making					
5.	Recognition for good work					
6.	Salary					
7.	Congenial work atmosphere					
8.	Leave					
9.	Status in organisation					
10.	Cooperation from colleagues					
11.	Nature of work					
12.	T.A. payment					
13.	Housing/office accommodation					

Finally overall, how do you feel satisfied with your work, status, promotion prospects etc. Please tick (✓) the following:

Highly satisfied/satisfied/neutral/not satisfied/dissatisfied

11. Communication facilities

How many of the following facilities are available to you and to what extent these are made available to you for communication work ?

Sr. No.		Easily available (2)	Available with difficulty (1)	Not at all available (0)
A.	**A.V. aids**			
1.	Photography			
2.	Artist facility			
3.	Slide projector facilities			
4.	Slides and film strips			
5.	Films			
6.	Exhibition unit			
7.	Public address set			
8.	Demonstration equipments			
9.	Printing			
10.	Posters			
11.	Video/camera			
12.	Tape recorder			
B.	**Office**			
1.	Typing			
2.	Cyclostyling			
3.	Adequate office space			
4.	Office furnitures			
5.	Electricity			
6.	Water supply			
7.	Medicinal facilities			
8.	Departmental conveyance			
9.	Stationery			
10.	T.A. and D.A.			
C.	**Inputs**			
	Chemical and other ingredients			

12. Job commitment

Please indicate the time utilised by you on different activities. Please put the tick (✓) mark against appropriate item in the appropriate column.

	Much	Moderate	Less	Not at all
1. Time devoted to research work				
2. Innovation/variety/technology developed				
3. Technical trainings attended				
4. Technical trainings given by you to others				
5. Sharing of technology with other faculty members				
6. Dissemination of technology developed by you				
7. Recommendations made on different crop production practices				
8. Extension activities such as demonstrations, fairs and field days etc. organised				
9. Seminars/Conferences/Symposiums/ Workshops etc. attended by you				
10. Any other please specify				

PART II

Researchers' communication linkages for generation of farm technology

Please indicate the use frequency, usefulness, credibility and extent of information drawn from the following communication modes and sources used for the generation of technology

	Frequency of use			Extent of information drawn			Useful-ness			Credibility		
	MF	F	LF	MI	SI	LI	VU	U	IU	MC	C	LC
A. Modes												
1. Self observation												
2. Research material/journals												
3. Professional meetings												
4. Superior officers/immediate superiors												
5. Colleagues												
6. Farmers												
7. Extension personnel (feed back)												
8. Farmers meetings												
9. Extension personnel meetings												
10. VIPs and administrators												
11. Field surveys												
12. Farmers tours												
13. Demonstrations												
14. Farm broadcasts												
15. Farm telecasts												
16. Trainings												
17. Research seminars/workshops/ conferences												
18. Any other												

B. Sources

1. Research institutes
a) International level
b) National level
c) Regional level
d) State level
e) Local
2. Other state research institutes
3. Voluntary organisations
4. Private organisations
5. Any other institute/organisation
Please specify

PART III

Researcher - Extension Personnel Communication Linkages

Do you communicate research results or solutions of various field problems of Agriculture to Extension Personnel of various extension agencies involved in agricultural development

Yes/No

If yes, kindly give the following information in detail. Different methods/media or channels of communication are given below. Which of them did /do you use to disseminate research results. Please (✓) against as many methods you use/used in an appropriate column.

Sr. No.	Methods/media or channels of communication	Frequency of communication		
		Mostly (2)	Sometimes (1)	Never (0)
1.	Personal contacts			
2.	Personal visits			
3.	Office letters			
4.	Office calls			
5.	Telephone calls			
6.	Trainings			
7.	Workshops			
8.	Seminars			
9.	Conferences			
10.	Campaigns			
11.	Professional meetings			
12.	Group discussions			
13.	Kisan Mela			
14.	Farm Darshan			
15.	Publications			
i)	news letters			
ii)	Magazines			
iii)	Folders/handouts			
16.	Personal letters			
17.	Advisory letters			
18.	Radio talks			
19.	Telecast/T.V. talks			
20.	Newspapers			
21.	Research reports			
22.	Any other, please specify			

PART IV

Researchers - Farmers Communication Linkages

Do you get chance to communicate scientific information in agriculture to farmers directly ?

Yes/No

If yes, kindly indicate the methods/media or channels of communication used by you and their respective frequency of use by putting tick mark (✓) against the following in an appropriate column.

Sr. No.	Methods/media or channels	Mostly (2)	Sometimes (1)	Never (0)
1.	Personal visits/farm and home visits			
2.	Training of farmer at : i) CCS HAU ii) Village			
3.	Demonstrations at : i) CCS HAU ii) Village			
4.	Publicatins/popular articles			
5.	Radio talks/farm broadcasts			
6.	T.V. talks/telecasts			
7.	Advisory letters			
8.	Personal letters			
9.	Field days			
10.	Film shows			
11.	Kisan Mela			
12.	Office calls			
13.	Telephone calls			
14.	Rabi and kharif campaign			
15.	Professional meetings			
16.	Any other, please specify			

APPENDIX XIII

CCS HARYANA AGRICULTURAL UNIVERSITY, HISAR
DEPARTMENT OF EXTENSION EDUCATION

QUESTIONNAIRE FOR EXTENSION PERSONNEL

TITLE OF THE RESEARCH PROJECT:

COMMUNICATION LINKAGE MECHANISM FOR GENERATION, TRANSFER AND ADOPTION OF FARM TECHNOLOGY

PART - I

1. Name _____ 2. Designation _____

3. Department _____ 4. Age _____ years

5. Educational qualification

Name of degree	University	Year	Duration	Division/ OGPA
1. B.Sc. (Ag.)/ B.Sc.(Hons.) Agri.				
2. M.Sc. (Agri.)				
3. Ph.D.				

6. Experience
   Past experience _____ years
   Present experience _____ years

7. Rural-urban background
   a) Rural b) Urban c) Ruurban

8. Parental occupation
   Farming/service/business/any other

9. Have you attended any training on any aspect of agriculture ?
If yes, please mention the following :

Sr.No.	Subject of training	Place/ institution	Duration	Year

10. Job satisfaction

Please express your opinion about certain factors of your job by checking (✓) on appropriate category against each statement. Your reply shall be kept confidential and therefore feel free to express your view

Sr. No.	Job factors	Highly satisfied	Satisfied	Neutral	Not satisfied	Highly dissatisfied
1.	Job security					
2.	Opportunity for promotion					
3.	Opportunity for further research/ education					
4.	Participation in decision making					
5.	Recognition for good work					
6.	Salary					
7.	Congenial work atmosphere					
8.	Leave					
9.	Status in organisation					
10.	Cooperation from colleagues					
11.	Nature of work					
12.	T.A. payment					
13.	Housing/office accommodation					

Finally overall, how do you feel satisfied with your work, status, promotion prospects etc. Please tick (✓) the following:

Highly satisfied/satisfied/neutral/not satisfied/dissatisfied

11. Job commitment

Please indicate the time utilized by you on different activities. Tick mark (✓) against appropriate item in appropriate column

	Much	Moderate	Less	Not at all
1. Technical guidance and support to CAOs, ADOs and SMSs (for SDAO only)				
2. Participate in monthly workshops, district technical committees and seasonal zonal workshops (For SDAO only)				
3. Periodically information acquisition on inputs supply, their prices and place of availability to field staff and higher authorities (For SDAO only)				
4. Collect information on serious pests, diseases and natural calamities, report significant occurrences and trends to higher authority				
5. Technical training and guidance to CAOs/ ADOs/VEWs (for SMS only)				
6. Formulation of crop production recommendations (for SMS only)				
7. Getting training and exposure to Research (SMS only)				
8. Technical guidance to ADOs/AIs/VEWs (for CAO only)				
9. Field visits				
10. Technical guidance to farmers				
11. Technical guidance to contact farmers only				
12. Office work				

13. Conducting demonstrations/field trials
14. Organising field days
15. Organising exhibitions
16. Arranging farmers trainings
17. Any other please specify

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12. Facilities

How many of the following facilities are available to you and to what extent these are made available to you for communication work ?

Sr. No.	Easily available (2)	Available with difficulty (1)	Not at all available (0)
A.	**A.V. aids**		
1.	Photography		
2.	Artist facility		
3.	Slide projector facilities		
4.	Slides and film strips		
5.	Films		
6.	Exhibition unit		
7.	Public address set		
8.	Demonstration equipments		
9.	Printing		
10.	Posters		
11.	Video camera		
12.	Tape recorder		
B.	**Office**		
1.	Typing		
2.	Cyclostyling		
3.	Adequate office space		
4.	Office furnitures		
5.	Electricity		
6.	Water supply		
7.	Medicinal facilities		

8. Departmental conveyance
9. Stationery
10. T.A. and D.A.

C. Inputs
Ingredients for demonstration

PART II

Communication linkages used by Extension personnel for acquisition of farm technology

Please indicate the use frequency, usefulness, credibility and extent of information drawn from the following communication modes and sources used for acquisition of farm technology

	Frequency of use			Extent of information drawn			Useful-ness			Credibility		
	MF	F	LF	MI	SI	LI	VU	U	IU	MC	C	LC
A. Modes												
1. Radio/Farm broadcasts												
2. Package of practices booklet												
3. Leaflets, pamphlets and folders												
4. Magazines												
5. Newspapers												
6. Specialists of department of Agri./SMS agri. Univ.												
7. Staff meetings												
8. Trainings												
9. Professional journals/extension journals												
10. Films/Telecast/News reels, etc.												
11. Kisan Mela												

12. Farm Darshan
13. Field days
14. Departmental circulars
15. Fellow extension personnel;
16. Senior extension personnel
17. Salesman of fertilizers, chemicals etc.
18. Scientists agri. University
19. Scientists agro-industries
20. Progressive farmers
21. Research journals
22. Demonstrations
23. Personal visits to researchers
24. Personal correspondence with researchers
25. Seminars/conferences/ workshops
26. Any other

B. Sources

1. CCS HAU Hisar/Directorate of Extn. Edn.
2. State Dept. of Agri.
3. State Agro-Industries/Pvt. firms of insecticides/pesticides
4. Voluntary organisations
5. Any other professional/extn. organisation

Any other

PART III

Extension Personnel Farmer's Communication Linkages

You might have used several media/methods or communication channels for transmitting the agricultural knowledge to the farmers. Indicate which and with what frequency you used the following media/methods or communication channels so as to transmit agril. Knowledge to farmers by putting tick (✓) mark in appropriate column against the method used:

Sr. No.	Media / channel	Frequency of use			
		Most frequently	Frequently	Rarely	Never
1.	Farm and home visits				
2.	Office calls				
3.	Telephone calls				
4.	Advisory letters				
5.	Field days/field trips				
6.	Trainings of farmers				
7.	Demonstration s(Result/method)				
8.	Publications				
9.	Leaflets and bulletins pamphlets				
10.	Farm magazines				
11.	Educational films/film shows				
12.	Campaigns				
13.	Exhibitions				
14.	Crop competitions				
15.	Farmers tours				
16.	Radio talks				
17.	Television talks				
18.	Farm literature				
19.	Group meetings				
20.	Any other, please specify				

APPENDIX XIV

DEPARTMENT OF EXTENSION EDUCATION
CHAUDHARY CHARAN SINGH
HARYANA AGRICULTURAL UNIVERSITY, HISAR

FARMERS' INTERVIEW SCHEDULE

TITLE OF THE RESEARCH PROJECT:

COMMUNICATION LINKAGE MECHANISM FOR GENERATION, TRANSFER AND ADOPTION OF FARM TECHNOLOGY

PART -I

1. General information

   Sr. No. : _____

   Date of interview : _____

   Name of respondent: _____ Age: _____

   Village : _____ Sub-division : _____

2. Family education

Sr. No.	Name	Age	Relation	Level of education						
				I	RO	RW	Pry.	M	HS	AHS
1.										
2										
3										
4										
5										
6										
7										

I = Illiterate, RO = Read only, RW = Read and write, Pry = Primary, M=Middle, HS = High School, AHS = Above High School

3. Social participation

i)	Member of no organisation	(0)
ii)	Member of one organisation	(1)
iii)	Member of more than one organisation	(2)
iv)	Organisation office holder	(3)
v)	Distinctive feature (wider public leader)	(6)

4. Innovation proneness

		Most like	Least like
A.	1. They talk of many new practices these days but who know better than old ones (1)		
	2. I try to keep myself upto date with information on new farm practices, but that does not mean I try out all the new methods on my farm (2)		
	3. I feel restless till I try out a new farm practice I have heard about (3)		
B.	1. Somehow I believe that traditional ways of farming are the best (1)		
	2. I usually wait to see the results my neighbours obtain before I try out the improved practices (2)		
	3. From time to time I have heard of several new farm practices and I have tried out most of them in the last two years		
C.	1. After all our fore fathers were wise in their farm practices and I do not see any reason for changing these old methods(1)		
	2. I am cautious about trying an improved practice (2)		
	3. Often improved farm practices are not successful. However, if they are promising I would surely like to accept them (3)		

5. Socio-economic status of the family

I. Caste:

i)	Scheduled caste	(1)
ii)	Lower caste	(2)
iii)	Artisan caste	(3)
iv)	Agriculture caste	(4)
v)	Prestige caste	(5)
vi)	Dominant caste	(6)

II. Occupation

i)	Labour	(1)
ii)	Caste occupation	(2)
iii)	Business	(3)
iv)	Independent profession	(4)
v)	Cultivator	(5)
vi)	Service	(6)

III. Education

i)	Illiterate	(1)
ii)	Can read only	(1)
iii)	Can read and write	(2)
iv)	Primary	(3)
v)	Middle	(4)
vi)	High school	(5)
vii)	Graduate and above	(6)

IV. House

i)	No house	(0)
ii)	Hut	(1)
iii)	Kaccha house	(2)
iv)	Mixed house	(3)
v)	Pucca house	(4)
vi)	Mansion	(5)

V. Land

i)	No land	(0)
ii)	Less than one acre	(1)
iii)	1-5 acres	(2)
iv)	5-10 acres	(3)
v)	10-15 acres	(4)
vi)	15-20 acres	(5)
vii)	More than 20 acres	(6)

VI. Material possession

i)	Cycle	(1)
ii)	Bullock cart	(1)
iii)	Radio	(1)
iv)	Television	(1)
v)	Chairs/sofa set	(1)
vi)	Improved agricultural implements	(2)
vii)	Scooter/motor cycle	(2)
viii)	Car/Jeep	(2)

VII. Farm power

i)	No draft animal	(0)
ii)	1-2 draft animals	(1)
iii)	3-4 draft animals	(2)
iv)	One or more prestige animal	(4)
v)	5-6 draft animals or tractor	(6)

VIII.Family

i) Type Nuclear (1) Joint(2) Extended (3)

ii) Size Upto 5 members (1)
Above 5 members (2)

6. Trainings attended

Have you attended any training on any aspect of agriculture ? Yes/No
If yes, please mention the following:

Sr.No.	Subject of training	Place	Duration	Year
1.				
2.				
3.				
4.				
5.				

7. Economic motivation:

		SA (7)	A (5)	UN (4)	DA (3)	SDA (1)
i)	A farmer should work towards large yields and economic profits					
ii)	The most successful farmer is one who makes the most profit					
iii)	A farmer should try any new farming idea which may earn him more money					
iv)	A farmer should grow cash crops to increase monetary profits in comparison to growing of food crops for home consumption					
vi)	A farmer must earn his living but the most important thing in life can't be defined in economic terms					

SA = Strongly agree, A = Agree, UN = Undecided, DA = Decided,
SDA = Strongly disagree

KNOWLEDGE TEST - COTTON

8(a) 1. Mention the recommended high yielding varieties of cotton of your area

a) Desi cotton: G-27, DS 5, RG 8, HD 107, HD 123 C/IC

b) American cotton: HS 6, HS45, H 777, HHH 81, F 505, F 414 C/IC

2. What is the recommended time of sowing ?
Desi cotton - April C/IC
American cotton -Entire May C/IC

3. What is recommended seed rate ?
Delinted - 5-6 kg/acre C/IC
Linted- 8 kg/acre C/IC

4. i) Should the seeds be treated before sowing Yes/No

ii) Which chemical and what dose should be used for seed treatment (Succinic acid, @ 2 gm/10-15 kg seed) C/IC

5. What is the recommended direction of sowing ?

East to west C/IC

6. What should be the spacing between ?

a) Line to line (60-75 cm) C/IC
b) Plant to plant (30 cm) C/IC

7. What is the recommended depth of sowing ?

4-5 cm C/IC

8. How many hoeings should be done ?

2-3 hoeings C/IC

9. What is recommended method of sowing
Pora method/cotton seed planter C/IC

10. At what time thinning should be done ?
    2-3 weeks after sowing C/IC

11. Which and how much of fertilizers per acre are recommended ?

Name of thefertiliser	Quantity/acre	Time of application

12. Should the entire dose of Nitrogenous fertilizer be applied at sowing? C/IC

13. When the phosphatic fertilizer should be applied ?

14. How many irrigations are recommended to get better yield of cotton, if mansoon is normal ?

    3-4 irrigations C/IC

15. When the Ist irrigation in cotton should be given after sowing ?

    40-45 days C/IC

16. When the irrigation should be stopped in cotton ?
    After opening of 1/3rd of bolls C/IC

17. Please, name the serious insect pests of cotton of your area along with their recommended control measure

Name of insect/pest	Insecticide/pesticide	Dose/acre	
Thrips	Metasystox 25 EC	250-300 ml	C/IC
Jassid	Dimecron 85 WSC	700-100 ml	C/IC
Boll worm:	Carboryl 50 WP	700-900 gm	C/IC
(Pink/spotted)	Cyper methrin 20 EC/Fenvalrate 20 EC	800-100 ml	C/IC

18. Name of the diseases of cotton of your area and also their control measure

Name of disease	Recommended control measure

19. How many times and at what interval the recommended insecticides should be sprayed to save cotton from attack of insects ?

8 times, interval should be 12-15 days C/IC

8(b)1. Mention the recommended high yielding varieties of wheat of your area

Early sown C/IC
Timely sown C/IC
Late sown C/IC

2. What is the recommended time of sowing of wheat crop ?

Early sown C/IC
Timely sown C/IC
Late sown C/IC

3. What is recommended method of sowing ?

Kera/pora/seed-cum-fertilizer drill C/IC

4. What is the recommended seed rate ?

5. How much more seed is recommended for late sowing of wheat crop ?

6. Is there need for seed treatment ? Yes/No

If yes, then, mention the name of chemical and its recommended dose

Chemical _____

Dose/kg seed ____

7. What should be spacing between
Line to line _____

8. What should be the depth of sowing ?

9. Which and how much of fertilizers are recommended per acre ?

Fertilizer	Dose/acre
Urea	
DAP	
Zinc	

10. When the phosphatic fertilizers should be applied ?

11. How much of the nitrogenous fertilizer should be applied at the time of sowing ?

12. When the second dose of N-fertilizer should be applied ?

13. Does dwarf wheat varieties require higher doses of fertilizer ?

14. How many irrigations are recommended to get better yield of wheat ?

15. Name the most important stage at which irrigation is considered

16. Name at least two serious weeds of wheat crop and what are the recommended control measures ?

	Weed	Weedicide	Dose
1.			
2.			

17. Which variety of wheat is sensitive to the use of weedicide, 2,4-D

18. Name the two most serious diseases of wheat and what are their recommended control measures ?

	Name of disease	Pesticide	Dose
1.			
2.			

C = correct, IC = Incorrect

PART II

FARMERS

Please indicate the use frequency, usefulness, credibility and extent of information drawn from the following modes and sources of communication by you for acquisition of farm technology.

	Frequency of use drawn			Extent of information			Usefulness			Credibility		
	MF	F	LF	MI	SI	LI	VU	U	LU	MC	C	LC

A. Modes

1. Scientist agri. uni./ agro-industry
2. Extension personnel (SDAO, CAO, ADO)
3. Progressive farmers
4. Local leaders
5. Neighbours
6. Relatives
7. Friends
8. Fellow farmers
9. Farm broadcast/radio
10. Farm Telecast/TV
11. Farm literature/ publication
    - i) CCS HAU Farm bulletins
    - ii) Issues of Haryana Kheti/Farming
    - iii) Any other

	Frequency of use drawn	Extent of information	Usefulness	Credibility
	MF F LF	MI SI LI	VU U LU	MC C LC
12.	News papers			
13.	Farmers/fair/farm darshan/field days			
14.	Agricultural exhibitions			
15.	Demonstrations			
16.	Group discussions/ group meetings			
17.	Farmers tours			
18.	Advisory letters			
19.	Salesmen/private dealers			
20.	Any other			
B.	**Sources**			
1.	Market			
2.	Cooperative society/ Gramin Bank			
3.	Research stations			
4.	CCS HAU			
5.	Fertilizers/seed store			
6.	Agro industry			
7.	Commercial agencies of insecticides/pesticides			
8.	Farmers organisations			
9.	Voluntary organisations			
10.	Any other, please specify			