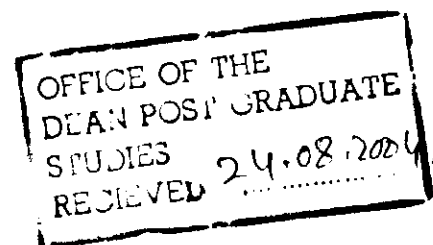


# EXTENSION MANAGEMENT BY AGRICULTURAL DEVELOPMENT OFFICERS OF WEST BENGAL



*A thesis  
submitted to the  
Bidhan Chandra Krishi Viswavidyalaya  
in partial fulfilment of the requirements for the award of the degree of  
Doctor of Philosophy  
in  
AGRICULTURAL EXTENSION*

by

**Nirmal Kumar Patra**

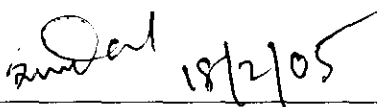
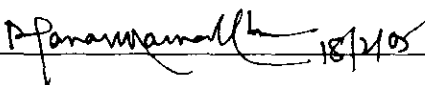
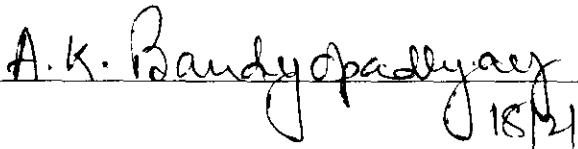
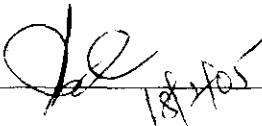


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DEPARTMENT OF AGRICULTURAL EXTENSION  
FACULTY OF AGRICULTURE  
BIDHAN CHANDRA KRISHI VISWAVIDYALAYA  
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**APPROVAL OF EXAMINERS FOR THE AWARD OF  
THE DEGREE OF DOCTOR OF PHILOSOPHY  
IN  
AGRICULTURAL EXTENSION**

We, the undersigned, having been satisfied with the performance of **Sri Nirmal Kumar Patra**, in the *VIVA-VOCE* Examination, conducted today, the 18<sup>th</sup> Feb'.....2005, recommend that the thesis be accepted for the award of the Degree of Doctor of Philosophy in Agricultural Extension of Bidhan Chandra Krishi Viswavidyalaya.

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**CERTIFICATE**

This is to certify that the work recorded in the thesis entitled “**Extension Management by Agricultural Development Officers of West Bengal**” submitted by **Sri Nirmal Kumar Patra** for the award of the Degree of Doctor of Philosophy in Agricultural Extension of Bidhan Chandra Krishi Viswavidyalaya, is a faithful and bonafide research work carried out under my personal supervision and guidance. The results of the investigation reported in the thesis have not so far been submitted for any other Degree or Diploma. The assistance and help received during the course of investigation have been duly acknowledged.

Dated, Mohanpur, Nadia  
the 23<sup>rd</sup> August 2004

  
(SAGAR MONDAL)  
Supervisor and Chairman, Advisory Committee

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Dated: 23rd August 2004

Nirmal Kumar Patra  
(NIRMAL KUMAR PATRA)

# CONTENTS

| <b>Chapter</b> | <b>Particulars</b>                     | <b>Page</b> |
|----------------|--|-------------|
| 1.             | INTRODUCTION                           | 1           |
| 2.             | REVIEW OF LITERATURE                   | 7           |
| 3.             | METHODOLOGY                            | 25          |
| 4.             | RESEARCH SETTING                       | 40          |
| 5.             | FINDINGS AND DISCUSSION                | 53          |
| 6.             | SUMMARY CONCLUSION AND RECOMMENDATIONS | 109         |
| 7.             | FUTURE SCOPE OF RESEARCH               | 124         |
|                | BIBLIOGRAPHY                           | i-viii      |
|                | APPENDICES                             | i-xiv       |

## LIST OF TABLES

| Table No. | Particulars  | Page |
|-----------|--|------|
| 1.        | Agro-climatic zone-wise distribution of Blocks   | 48   |
| 2.        | Distribution of respondents according to their age, educational status and service tenure as ADO                               | 54   |
| 3.        | Distribution of ADO respondents according to training programmes they have undergone as well as training organized for farmers | 56   |
| 4.        | F-matrix for five extension activities judged by 100 respondents   | 59   |
| 5.        | P-matrix corresponding to the F-matrix   | 60   |
| 6.        | Rearranged P-matrix-smallest to highest column sum   | 60   |
| 7.        | Z-matrix–hierarchy of extension activities of Agricultural Development Officers  | 60   |
| 8.        | Rotated factor (varimax) matrix of effective management of agricultural extension  | 69   |
| 9.        | Indicators of effective management of agricultural extension at the block level  | 71   |
| 10.       | Successful extension work conducted by the ADOs and reasons for success  | 87   |
| 11.       | Distribution of mean scores according to importance and competency   | 91   |
| 12.       | Constraints in planning at Block level as perceived by the ADOs and measures suggested for improvement                         | 96   |
| 13.       | Constraints in obtaining cash input as perceived by the ADOs and measures suggested for improvement                            | 98   |
| 14.       | Constraints in obtaining kind input as perceived by the ADOs and measures suggested for improvement                            | 99   |
| 15.       | Constraints in staffing as perceived by the ADOs and measures suggested for improvement  | 101  |
| 16.       | Constraints in infrastructural facilities of ADO office as perceived by the ADOs and measures suggested for improvement        | 102  |
| 17.       | Constraints in coordination at Block level as perceived by the ADOs and measures suggested for improvement                     | 104  |
| 18.       | Constraints in supervision of agricultural development work as perceived by the ADOs and measures suggested for improvement    | 106  |
| 19.       | Constraints in farmer's participation at Block level as perceived by the ADOs and measures suggested for improvement           | 107  |
| 20.       | Constraints in sustainable agriculture as perceived by the ADOs and measures suggested for improvement                         | 108  |

## LIST OF FIGURES

| Figure No. | Particulars  | Page |
|------------|--|------|
| 1.         | Map of West Bengal   | 42   |
| 2.         | Bar diagram showing hierarchy of extension activities as perceived by the ADOs | 61   |
| 3.         | Matrix for determining importance of activities and competency of KPS          | 93   |

# **CHAPTER 1**

## **INTRODUCTION**

# INTRODUCTION

In the wake of economic liberalization initiated in 1991 and our accession to World Trade Organisation (WTO) in 1995 leading to globalization, the question of economic return from agricultural activities has acquired added importance. The market forces are no more confined to the domestic territory. The process of globalization of trade, liberalization of economy and the revolution in information technology gave rise to the concept of “global village”. Hence, the need for re-orienting our agricultural extension system to meet the emerging challenges and to grab the ensuing opportunities has become a matter of paramount importance.

Today, Indian agriculture has become vibrant, buoyant and resilient as a result of Green Revolution in food crops production, White Revolution in milk and milk products, Blue Revolution in fish and marine production and Yellow Revolution in oilseed crops production. The commodity based Technology Missions also helped to accelerate the process of growth in the production of commodities like oilseeds, pulses etc. (Singh, 2004).

The national agricultural extension system evolved with the establishment of the Department of Agriculture in the Imperial and provincial governments. Efforts to strengthen this Department continues up to the time of Independence. Agricultural extension was one of the activities of the Department and no special attention was paid to accelerate transfer of technology efforts. However, some isolated attempts were made to start special rural development programmes, including improvement of agriculture (Prasad, 1989). Soon it was realized that sporadic and *ad hoc* programmes might not be effective and that there was a need for sustained rural (including agricultural) development programmes. A nationwide, multi-purpose extension network backed with professionals became indispensable. Consequently, 55 Community Development Projects were started in 1952. Each project covered 300

villages with a village level worker for a group of 10 villages. For each project, extension officers – technical persons in agriculture, animal husbandry, cooperation, village industries and rural engineering were provided. The programme was based on the philosophy of integrated rural development. In 1953, the National Extension Service Programme, identical to the community development programme but with less resource intensity, was launched with a view to cover the entire country by 1960/61. The programme aimed to accelerate the pace of rural development, including increased employment and production by the application of scientific methods in agriculture. The programme greatly emphasized the principle of development through *self-help and peoples' participation*. The central government largely bore the cost of the programme.

Front-line extension work also was initiated as agricultural research system grew in the Indian Council of Agricultural Research (ICAR) and State Agricultural University (SAU). A Department of Directorate of Extension was established in the ICAR institutes and SAU's. The basic objective of these departments was to conduct extension research, demonstrate latest technologies, provide feedback to scientists, and provide training support to State Department of Agriculture. Besides, the ICAR started three major front-line extension projects viz. National Demonstration Project (1964). Operational Research Project (1974-75) and Lab-to-Land Project (1979). Another significant development in front-line extension was the establishment of Krishi Vigyan Kendras (KVKs) and Trainers' Training Centres (TTCs) in 1974. These KVKs and TTCs were aimed to improve technical literacy of farmers including rural women on the principle of '*teaching by doing and learning by doing*'. These KVKs are currently managed by the ICAR institutes. SAUs and non-governmental organization (NGOs) with financial support from the ICAR.

The central government also launched several schemes to achieve self-sufficiency in food production. The important programmes were: Intensive Agricultural District Programme (1960) and Intensive Agricultural Areas Programme

(1964). These programmes concentrated on the transfer of 'package of practices' and supply of critical inputs to farmers. In other words, *extension strategy combined technical information with the supply of inputs*. However, this strategy was discontinued with the reorganization of the extension system under the Training and Visit (T & V) System in 1974-75. The T & V system emphasized single-purpose professional extension workers, regular training of extension personnel and transfer of technology through personal contact with farmers. This concept was further strengthened through establishing research-extension-farmer linkages under the National Agricultural Extension Project (NAEP) in 1983.

The Department of Agriculture, West Bengal prepared and submitted its proposal in 1975, for re-vitalization of the existing extension and research set ups and extension methodologies. The World Bank Team pointed out certain deficiencies, which it thought should be corrected and a series of consultations and discussion followed. The chief points of modification of the existing practice proposed by the World Bank Mission, were:

- (i) the block level and village level extension workers were to devote whole time for agricultural development work and continuously trained in a professional manner.
- (ii) extension workers, agricultural scientists and the farmers were to be in regular and frequent contact to exchange technological information generated at one end and receiving farmers' problems in the process of crop production on the other under single line of command.
- (iii) village level workers were to be in contact with the farmers constantly to help them solving the problems faced, by systematic visits.
- (iv) The system would give more stress on number of training of the departmental extension officers coupled with visits to review the field activities in the production sites. This is to be named as Training and Visit (T & V) system.

### **Need for the study**

The Department of Agriculture, West Bengal finally decided in 1977 to implement the proposed World Bank Scheme for “Re-organisation of Extension and Research Services in West Bengal”. Under this scheme the Agricultural Extension Officers at the Block level, upgraded and re-designated step by step as Agricultural Development Officer (ADO) were separated from the set up of the Block Development Officer. He was made accountable for his due discharge of duties, primarily to the Sub-Divisional Agricultural Officer (SAO) and then to the other officers in the hierarchy. All the 335 Blocks in the State was to have one ADO and in those blocks where irrigation potentiality was developed by the Agri-Engineering Directorate, an additional post of ADO (Irrigation) was to be provided. All the 52 revenue Sub-Divisions was to have one SAO each to supervise the works of ADO/AEOs.

The village level workers/Union Agricultural Assistants/Agricultural Demonstrators were to be designated uniformly as “Krishi Prayukti Sahayak” (KPS). In each Block a team of KPS will work under the instruction of the respective ADO/AEO, with about 800-1200 farm families being assigned to each. Thus, according to the World Bank Scheme, a single line administration was emerged to look after the agricultural development work of the State.

Regarding the extension techniques it was ensured that the KPS will receive the farmers’ problems and pass these on to the ADO/AEO and then to the Agricultural Scientists through the Principal Agricultural Officer (PAO)/ Joint Director of Agriculture (JDA) of the district/range seeking solution. The scientists on the other hand would pass on the solution of the problems if readily available at hand or take up research investigations to find solution and pass on the finding at a later stage. Thus, a two-way communication system was ensured keeping the extension workers in between to meet both ends together.

According to van den Ban and Hawkins (1998) research into the structure and functions of organizations is increasing rapidly. Before the Second World War most research of this type was conducted in factories. Today the emphasis has changed to include hospitals, research institutes and other service organizations as well as commercial firms. According to them little attention has been paid to extension organizations, despite the fact that poor organization of those services often creates a bottleneck for their delivery. For these reasons it is of utmost importance to conduct a study on the management of extension activities by the Agricultural Development Officers of West Bengal.

### **Objectives of the study**

The specific objectives of the study were:

1. To study the educational background and job status of the Agricultural Development Officers (ADOs) of West Bengal;
2. To assess the hierarchy of extension activities as perceived by the ADOs for agricultural development;
3. To find out the indicators of effective management of agricultural extension at the Block level;
4. To identify most successful extension work, conducted by the ADOs and reasons for success;
5. To assess the level of competency of the Krishi Prayukti Sahayaks (KPSs) as perceived by the ADOs in performing agricultural extension activities; and
6. To find out the management problems in implementing agricultural and rural development programmes as perceived by the ADOs and measures suggested for improvement.

**Limitation of the study**

The present study had the limitations of time and resources usually faced by a student investigator. However every effort and thought were exercised in making the study as objective and systematic as possible. The correctness of the responses, which were based primarily on recall, might in spite of best efforts of the investigator, leave margin for error to creep in.

In spite of the limitations, it is hoped that the study shall add to our knowledge in better functioning of the Agricultural Development Officers of West Bengal. The findings of the study are likely to be useful for the Department of Agriculture, Govt. of West Bengal as well as in other States in India.

**Layout of the study**

The thesis has been divided into eight chapters. The second chapter, following the first of introduction, deals with the review of literature related with the study. The third chapter, methodology includes determination of sample size, theoretical basis for the selection of variables, and their measurement. The fourth chapter deals with the research setting of the study. The fifth chapter contains the findings and discussion. The summary conclusion and recommendations have been presented in the sixth chapter, followed by future scope of research in the seventh and bibliography in the eight chapter. Lastly the appendices, including the interview schedule/questionnaire have been presented.

## **CHAPTER 2**

# **REVIEW OF LITERATURE**

# REVIEW OF LITERATURE

The review of literature should consist of conceptual literature concerning the concepts and theories and empirical literature consisting of studies made earlier which are relevant to the one proposed. The review of literature serves as a background for the present investigation and helps in understanding it in proper perspective.

The review of literature relevant to the study are presented under the following sub-heads:

- A. Organisational setup of the Department of Agriculture, Govt. of West Bengal after independence.
- B. Concept of Extension Management.
- C. Management problems in agricultural extension.

## **A. Organisational setup of the Department of Agriculture, Govt. of West Bengal after independence**

For better understanding the progress of the growth and development of the Department of Agriculture after independence, the period can be divided into three phases viz. from 1947 to 1962, from 1962 to 1977 and from 1977 onwards. In each phase the changes in the organizational setup of the department and the development activities initiated had been studied separately following the book. "A Brief History of Development of Extension and Research Services in the Department of Agriculture : West Bengal" written by B. Mandal and others in 2001.

### **Phase 1: From 1947 to 1962**

The setup:

Immediately after independence and partition of the country, the Department of Agriculture, West Bengal was headed by an ICS officer who also retained the

charge of the post of the Director of Agriculture. Shri S. K. Dey, ICS was the first Secretary and Director of Agriculture after partition and was succeeded by Shri M. M. Basu, ICS. Shri Basu remained in position for a short period and Shri K. K. Ghosh, IAS took over as Director of Agriculture. Concomitantly Shri Ghosh acted as Director of Food Production as head of Grow More Food Campaign. When in 1950 Dr. H. K. Nandi a reputed plant Breeder and Deputy Director of Agriculture, Orissa, joined the department as Director of Agriculture, Shri shifted exclusively as Director of Food Production. The post was however, abolished next year after the retirement of Shri Ghosh.

Shri K. Sen, ICS, Secretary, Department of Agriculture was the fore-runner in laying the foundation of agricultural education in the State. With his initiative and that of Dr. H. K. Nandi the first State College of Agriculture was established at Tollygunj, Calcutta, in 1952 to teach undergraduate courses in agriculture. Shri K. Sen was one of the administrators who thought and acted for the betterment of the Bengali farmers through better services of the Agriculture Department.

In 1950-51 the permanent set up of the Directorate of Agriculture was declared and became operative from 1<sup>st</sup> June, 1950, with the creation of the following cadres of services:

#### GAZETTED

West Bengal Higher Agricultural Service

West Bengal Agricultural Service

#### NON-GAZETTED

West Bengal Subordinate Agricultural Service Class-I

West Bengal Subordinate Agricultural Service Class-II

There was one Assistant Director to assist the Director of Agriculture. This post was converted to that of Joint Director of Agriculture, to look after research.

Alongwith two posts of Deputy Director of Agriculture were created and then converted to the posts of Joint Director of Agriculture to look after general development work and live-stock. There was one Deputy Director of Agriculture Marketing. This section existed since pre-independence period in the Head Quarter. Besides, there were Deputy Director of Agriculture (HQ), Superintendent of Agriculture (HQ), District Agricultural Officer (HQ) and Superintendent of Agriculture (Farms), to assist the Director of Agriculture.

The Sections of Livestock, Agricultural marketing and Agricultural Engineering were under the control of the Director of Agriculture and the sections were headed by Assistant/Deputy Director of Agriculture. The Agricultural Engineering section was headed by an Agricultural Engineer.

Later with the creation of a separate Directorate of Animal Husbandry, Dairying and Veterinary Services in July, 1959, this section was taken out from the Directorate of Agriculture.

Agricultural Marketing had separate identity even during pre-independence period and it was brought under the control of the Director of Agriculture elevating the post of the Deputy Director of Agricultural Marketing to that of Joint Director of Agriculture. The section was subsequently separated out with Additional Director of Agriculture as head.

In further development in early seventies the section of Agricultural Engineering was given the shape of a separate Directorate of Agricultural Engineering.

The State was divided into three ranges viz. Eastern with Headquarter at Alipur (later shifted to Kalyani), Western with Headquarter at Asansol and Northern with Headquarter at Jalpaiguri. One Deputy Director of Agriculture (DDA) was made in-charge of each range.

Superintendents of Agriculture (SA) were at the head of the team of agricultural workers in the districts. In the bigger districts one post of Additional SA was provided.

There were as many agricultural sub-divisions as were the revenue sub-divisions in which Sub-Divisional Agricultural Officer was at the head of the team of agricultural workers in it. There were generally as many number of agricultural Blocks as were the Police Stations. However to start with the number of NES blocks were lesser than the number of Police Stations. Progressively in later years all the Police Stations were covered by the NES blocks with one Agricultural Extension Officer in each placing Agricultural Inspector at Thana level. Larger Police Stations were divided into two NES blocks and in some cases into three blocks (e.g. Garbeta and Nandigram). Union Agricultural Assistants (UAA) were redesignated as Village Level workers (VLW) and posted at Union Board/Anchal Level in each block after adequate agriculture and extension training in Gram Sevak Training Centres (G.S.T.C.).

#### **Phase-II: From 1962 to 1977**

##### **Changes in the set up of Directorate of Agriculture**

The decade starting from 1960 was the period when foundation of the Directorate of Agriculture was laid for subsequent growth and development. Shri R. Ghosh, IAS, the then Commissioner of Agriculture and Community Development (Secretary) was a very dynamic personality with a realistic foresight. He correctly realized the need of the day. That the improvement in the agricultural production front of the State was closely linked with appropriate reorganization of the Directorate of Agriculture, was rightly felt by him which prompted him to bring about significant changes in the set up.

The acceptance of the changes proposed by Shri Ghosh by the Government was an indication that it recognized the essentiality of the growth of agricultural work

in the State. This recognition of the stress to be laid on agriculture was first of its kind in the history of the Department of Agriculture including pre- and post-independence era. The changes in the set up were reflected in the uprising trend in production. From the sixties the food production started showing an uprising trend.

### **Changes in the district set up**

In 10 districts the posts of Superintendents of Agriculture (SAs) were upgraded to those of Principal Agricultural Officer (PAO). In the remaining six, these were upgraded to the posts of Project Officer Multiple Cropping (POMC) – both in the rank of Deputy Director of Agriculture in late sixties with the launching of multiple cropping programme. In the 10 districts where the posts of SA were upgraded to PAO. Intensive Agricultural Area Programme (IAAP) was taken up preceded by Intensive Agricultural District Programme (IADP). The IADP was first initiated in 1962 in the district of Burdwan and in 1964 the programme was extended to nine other districts in the form of IAAP as per the directive principles of the Govt. of India. In Burdwan the IADP was implemented and supervised by the Project Executive Officer in the rank of Joint Director of Agriculture duly supported by Dy. Project Officer, Agronomist, Soil and Fertilizer specialists, Plant Protection Specialists, Seed Development Officers and Agricultural Engineers, each supported by adequate number of extension officers.

The number of AEOs in each IADP Block was three duly assisted by 20 VLWs in each of the 24 IADP Blocks in the district of Burdwan. There were a fleet of 24 tractors with trailers and other equipment and machinery in the IADP Engineering Workshop for cultivation, tillage and haulage under the direct supervision of the Agricultural Engineer of the Project. One additional jeep with a trailer was provided for each of 24 IADP block for movement of Extension Officers and demonstration inputs.

### **Changes in the range set up**

With these changes at the district level there was a change in the range set up. Instead of three ranges the state was divided into four ranges – with the post of the PEO, Burdwan being converted to the post of the range JDA to look after the districts of Burdwan and Birbhum. Instead of DDA being the range officer, JDA was made the head of the range, by upgrading the posts of the DDA. Suitable number of supporting staff was provided in each range to direct and supervise the agricultural developmental work in the districts under its control.

### **Other changes**

In the HQ, posts of Additional Director of Agriculture were created, one to look after general research and development work, designated as ADA (General) and the other to look after training and input management designated as ADA (Special). The post of JDA (Jute Development) was upgraded and designated as ADA (Jute) and later as ADA (Commercial Crops) to look after all commercial crops including Potato and Plantation crops. Simultaneously posts of JDA were created by elevating the existing posts of DDA and also creating new ones.

Before the CD blocks came into existence followed by NES blocks, Agricultural Inspectors in SAS-II continued to work in many Police Station areas assisted by Agricultural Demonstrators and Union Agricultural Assistants. After the creation of more and more CD blocks in the NES pattern these posts were withdrawn and re-adjusted by upgrading the Agricultural Inspectors as Assistant A.E.O.s and re-designating the U.A.A.s and A.D.s as VLWs.

### **Phase-III: From 1977 onwards**

After the significant changes brought about in the set up of the Directorate of Agriculture in the decade starting 1960, at the initiative of Shri R. Ghosh, IAS, Commissioner of Agriculture, another shake up of the set up was initiated during late seventies. This time it was at the instance of the World Bank Mission.

World Bank expressed its willingness to help re-organise and re-vitalise extension and research. Dr. Daniel Benor, a World Bank Consultant opened talks with the Govt. of India to devise ways and means by which both extension and research systems in the country could be re-vitalised. A Project Proposal was submitted by the Department of Agriculture in 1975 and the World Bank Officials visited the State to take stock of the existing set up and the proposed one. The central theme of the proposal envisaged re-organisation and strengthening of both extension and research organization. The concept of adaptive research in agriculture on the basis of farmers' needs and problems was afloat. The World Bank Officials identified certain deficiencies in the proposal and submitted its Appraisal Report after repeatedly visiting the State and meeting the farmers and the agricultural functionaries. A unique method of reaching farmers was suggested by Dr. Benor which was known to be the Training and Visit system. Besides, other organizational changes were also suggested.

Considering the necessity of devoting whole time attention to the agriculture related works by the extension functionaries at the block levels, the ADO/AEO in each block was to be put directly under the control of the district level officer through Sub-Divisional Agricultural Officer. Dr. Benor named this system as one line administration.

Thus all the districts of West Bengal were covered by the new system which provided for a single line command and the block level extension functionaries were freed from all other developmental work. Seventy five per cent of the existing Village Level Workers (VLWs) and Union Agricultural Assistants (UAAs) were re-designated as Krishi Prayukti Sahayaks (KPS) and posts of new KPS were created on the basis of the principle of providing one KPS per 800-1200 farm families. Posts of Joint Director of Agriculture were created/re-designated for the seven ranges of the State, demarcated in 1974 on the basis of agro-climatic zones, with 2-3 districts in each. The different ranges were:

1. Jalpaiguri range - covering Darjeeling, Jalpaiguri and Coochbehar.

2. Raigunj range - covering Uttar and Dakshin Dinajpore and Malda.
3. Nadia range - covering Nadia and Murshidabad.
4. Birbhum range - covering Birbhum, Bankura and Purulia.
5. Burdwan range - covering Burdwan and Hooghly.
6. Alipore range - covering North and south 24 Parganas and Howrah.
7. Midnapore range - covering Purba Midnapore and Paschim Midnapore.

Along with the re-vitalisation of the extension set up, the research set up was also re-vitalised following the principles laid out in the appraisal Report of the World Bank.

The research activities of the Department of Agriculture were restricted to the farmers' problem research. The farmers' problems were to be passed on to the research scientists by the extension workers which would be available to them through constant contact with the farmers. The basic and fundamental research was to be entrusted to the Bidhan Chandra Krishi Viswavidyalaya.

The crop oriented research stations, organized earlier, were renamed as Commodity Research Station (CRS). Thus six CRS came into being viz.

1. Rice Research Station, Chinsurah.
2. Pulses and Oilseeds Research Station, Berhampore.
3. Field Crops Research Station, Burdwan with main interest in Wheat.
4. Horticultural Research Station, Krishnagar.
5. Sugarcane Research Station, Bethuadahari, Nadia.
6. Water Management Research Station, Ranaghat, Nadia.

Alongside, to work on the diverse problems in the different agro-climatic zones the State was recognized to have six distinct agro-climatic zones as demarcated in 1974.

In each of these six agro-climatic zones one Zonal Adaptive Research Station (ZARS) was established. The names are given in parentheses.

1. Hill zone (Kalimpong)
2. Terai zone (Mohitnagar)
3. Old alluvial zone (Majhian)
4. New alluvial zone (Krishnagar)
5. Red and Laterite zone (Nalhati)
6. Coastal saline zone (Kakdwip)

Besides, in each of the 52 Sub-Divisions of the State, establishment of one Sub-divisional Adaptive Research Farm (SARF) was intended. But due to several constraints 43 such farms could be established. One of the Block Seed Farms (BSFs) established earlier in each sub-division was converted to SARF to conduct field research work on the basis of the technologies to be developed at the ZARS located in that agro-climatic zone. For each ZARS, thus there were more than one SARF.

After screening the problems at the CRS, work would be initiated if these were of adaptive in nature. If however, answers to the problems were readily available at hand on the basis of earlier work, the information would be passed on to the extension workers for adoption by the farmers. Consequent upon finding a solution at the CRS to the problem posed, it would be sent to the concerned ZARS for further refinement on the basis of the environmental reaction in the concerned agro-climatic zone. After verifying the finding of the CRS at the ZARS, the technology would finally be tested in the SARFs for formulating recommendation. Thus a two-way traffic was planned. problems moving from farmers' field to the CRS, solutions moving from CRS to the farmers through ZARS, SARF and the extension functionaries. Research and extension were made complementary to each other.

A post of Additional Director of Agriculture (Research) was created in 1977 to co-ordinate and supervise the research work undertaken by the various specialists, service laboratories, CRS and ZARS. This was the first step taken by the Department of Agriculture towards implementation of the World Bank Project proposals. In the extension side the Additional Director of Agriculture (General) as counterpart of ADA (Res), was entrusted with the responsibility of coordinating extension activities according to the new system introduced.

### **B. Concept of Extension Management**

The use of the term 'extension' originated in England in 1866 with a system of University extension which was taken up first by Cambridge and Oxford Universities, and later by other educational institutions in England and in other countries.

The National Commission on Agriculture (1976) refers to extension as an out-of-school education and services for the members of the farm family and others directly or indirectly engaged in farm production, to enable them to adopt improved practices in production, management, conservation and marketing.

Misra (1990) enumerated some dimensions of extension based on a sample of forty definitions of extension, covering a twenty-six year period from 1953 to 1989 presented below:

- First : Extension is based on the basic premise of the desire to help farmers (the altruistic dimension). There cannot be any extension without an effective desire to help the farmers (Lininger 1953, van den Ban 1979 and Bunting 1986 etc.).
- Secondly : Extension is an educational process. There is an over-whelming support for this view (e.g. Swanson and Claar, 1984 and Russel, 1986).
- Thirdly : Extension is a communication interventions (van den Ban, 1979; Röling, 1986; FAO, 1987 etc.). The communication is expected to be purposeful, useful, intelligent and guiding.

- Fourthly : Extension has a behavioural dimension. This is based on the premise that extension aims at inducing behavioural changes in the farmers (Mosher, 1978; Singh, 1980 and Roling, 1986).
- Fifthly : Extension has a technological dimension (Leagans, 1961, Rudramoorthy, 1964; FAO, 1987; Baxter, 1988). The technology has to fit in the farm characteristics (e.g. soil moisture regime) and the farmers' characteristics (e.g. socio-economic parameters).
- Sixthly : Extension has a research dimension (Gittinger, 1982; Shingi *et al.*, 1982; Bengtsson, 1983, FAO, 1987). Extension to be meaningful must have two-way linkage with farmers through extension, research-farmer and farmer research linkages.
- Seventhly : Extension has an inputs dimension. Extension must have input support failing which extension falls flat (Gittinger, 1982; Orivel, 1983 and FAO, 1987). In its current form the input dimension requires not only coordination of various support services but also timely information on market conditions (e.g. likely demand, price, likely supply, any government support measures like official procurement).
- Eighthly : Extension has an income dimension (Penders, 1956; Saville, 1965; Haq, 1979, Roling, 1982). In case extension does not result in increased production and productivity leading to increased income, extension could be said to have failed in achieving its objective.
- Ninthly : Extension has a professional dimension. The professional dimension has two facets. The first consists of formal extension education, predominantly represented by University courses of study in extension education at the graduate and post graduate level. The second facet

consists of the extension in practice. (Butt, 1961; Dahama, 1971; Singh, 1980, Supe, 1983). The recent emphasis on the second facet makes extension more business like and professionally competent to effectively deliver its services to its clients.

Lastly : Extension has a management dimension. This dimension never received any attention in the past. It received attention only recently when the weaknesses in the existing extension services became pronounced necessitating management reform along the Training and Visit (T & V) lines (Benor and Harrison, 1977; DOE, 1982; Benor *et al.*, 1984; Benor and Baxter, 1984 and Ray, 1989). The reform has introduced important management concepts of extension exclusivity, single line of command and reasonable span of control, professionalisation of extension service, institutionalization of farmer - extension - research linkage and monitoring and evaluation. In the 1990s and beyond, the management dimension is likely to be the most critical determinant of the success of the extension service.

The term management stems from the word 'manage' which in turn, is derived from the French word ménage meaning 'house keeping'. According to Morell (1969), management is that activity in a organization which consists in deciding upon the ends (goals) of an organization and in deciding upon the means by which the goals are to be effectively reached.

Appley (1969) defined management as guiding human and physical resources into a dynamic, hard-hitting organization unit that attains its objectives to the satisfaction of those served, and with a high degree of morale and sense of attainment on the part of those rendering the service.

According to Scanlan (1973), management involves the coordination and integration of all resources (both human and technical) to accomplish specific results.

The five basic functions which have historically formed the core of studying management are planning, decision making, organizing, directing and controlling.

As viewed by Koontz and Others (1984) it is the task of managers, to secure and utilize inputs to the enterprise, transforming them through the managerial functions of planning, organizing, staffing, leading and controlling – with due considerations of external variables – to produce outputs.

### **C. Management problems in agricultural extension**

van den Ban and Hawkins (1998) identified some management problems in agricultural extension organization in some countries. These are:

- (1) Staff pay is low compared with other government organizations, whereas extension agents often have to live in difficult conditions far from schools and other facilities.
- (2) Career development pathways are totally lacking of severely limited for field staff.
- (3) Extension agents are transferred frequently, often for political reasons.
- (4) Transport is a major problem, with inadequate budgets for travel allowances and few vehicles.
- (5) For field staff there is a lack of support from or liaison with:
  - i. Supervisors, who do not always help remove constraints to effective work;
  - ii. Research workers, who do not use feedback from extension agents when choosing research problems, and who do little research in farmers' field;
  - iii. Inputs suppliers, who do not always ensure an effective and timely distribution;
  - iv. Mass media;

- v. Trainers, who do not always stress the practical aspects of their subjects; and
  - vi. Other government departments involved in rural development.
- (6) The walls between different government departments can be high, which makes cooperation between them difficult. Many rural people receive their income from different branches of agriculture as well as from sources outside of agriculture. The present structure of government makes it difficult to develop an extension programme which helps them in an integrated way.
- (7) Extension agents have to spend excessive time writing reports and collecting statistics which are seldom used for improving rural development.
- (8) The extension programme is not adapted to varying local conditions, or there is no suitable technology for solving farmers' problems.
- (9) Part-time farmers and women have limited access to extension agents.
- (10) Extension agents are not always given realistic tasks, and are not held responsible for accomplishing these tasks. Often there are no clear job descriptions.
- (11) In a large number of countries, the Ministry of Agriculture is obliged to find employment for all graduates in agriculture. Therefore, nearly the whole extension budget is used for salaries, leaving very little for operating expenses. thus preventing the staff from working effectively.
- Furthermore. it is impossible to select the most suitable extension agents.
- (12) Technical assistance projects sometimes have developed their own extension organization in such a way that it cannot be integrated with

the national extension organization. This is often because far more is spent per farmer on extension work than is available for the nation as a whole.

Mandal *et al.* (2001) said that implementation of T & V system in West Bengal kept the agricultural officers very tightly busy for which the input supply position suffered which is the major factor for achieving tangible improvement in agricultural production. Arranging certified seeds of the high yielding and improved varieties, ensuring supply of fertilizers, ensuring availability of irrigation water, making special attempts to solve the inherent problems in the problem-stricken areas like dry land areas of lateritic zone, coastal saline areas and flood prone inundated areas, are those to which the agricultural officers could not pay that attention as was needed. Further, exposing the farmers to the possible danger of not using chemical fertilizers in balanced form, less use of organic manures, indiscriminate use of pesticides etc. was found to be difficult due to lack of sufficient time at disposal. Though the subjects were included in the training and visit programme it seemed the KPSs and ADOs were over-burdened with the responsibilities to handle. In case of mass attacks of insects and diseases also difficult in taking necessary action on war footing was felt. Thus gradually an element of diluted effort in the initial zeal in following T & V system, crept in specially during the period of contingencies.

According to Pal and Singh (1997) extension system is fraught with many problems and misconceptions. Extension system of the Department of Agriculture feels encroachment of its domain by research system, while researchers feel gap in transfer of technologies to farmers. As noted above, ICAR and SAUs should slice down front-line extension activities. It would be more appropriate if KVKs are transferred to or merged with ZARSS. The results of extension diversification involving private sector, NGOs, farmers groups and para-extension workers have been very encouraging and therefore support the case of institutional diversification (Keynan *et al.*, 1997 and Picciotto and Anderson, 1997).

The main extension system, *viz.* T & V system, has several operational problems. Besides lack of operational funds, ritualistic nature of extension approach and inadequate training for skill up-gradation constrain the effectiveness of the system (Picciotto and Anderson, 1997). Frequent changes in placement of extension workers and high proportion of vacant posts in remote areas have further reduced the efficiency of the system (Farrington *et al.*, 1997). Immediate action to correct these problems would give tremendous boost to the system. Some measures in this direction are proposed under transfer of technology component of the NATP.

Srivastava *et al.* (1998) observed that pre-service training has almost no value for the extension personnel. The in-service training is also found to be no effective as per job expectations. Hence there appears to be a case for examining the training component of the field extension personnel.

Reddy and Mathew (1998), observed that those who occupy the administrative and supervisory position in the T & V system should rise up to the occasion to foster attitude of agricultural officers towards farmers and T & V system and achievement motivation.

Verma (1998) presented that in case of extension systems, the concept of accountability is hardly considered. The time has now come that accountability should be taken as integral component of extension system management.

Gill *et al.* (1998) opined that there is an urgent need to reorient and manage the agricultural extension systems to meet the new challenges with the globalization of agriculture.

Sulaiman and Holt (2002) said that efforts to “broad-base” extension are in principle undoubtedly sound i.e. extension workers should be able to advise on agriculture in its broad definition and not just on crops, and on aspects of input supply, processing and marketing (increasingly, on the implications of new market

specifications for production and processing technology). The difficulty, however, is that in general the capabilities of those willing to live in remote areas are limited and improved impact across such a broad canvas would require long-term re-training (which is rarely available) and more impact-oriented reward structures, which are unlikely to be introduced within a permanent civil service structure. Publicly funded and publicly implemented services in more remote areas of India face chronic difficulty and without considerable reform are unlikely to serve as a basis for greater poverty orientation in extension.

According to Department of Agricultural and cooperation (DAC, 2002), Ministry of Agriculture, Govt. of India, most States, suffering under general financial constraints were unable to effectively carry out extension activities. Several of them were barely able to pay the salaries of their extension functionaries, leave alone, provide funds for demonstrations, mobility, skill upgradation etc. For full scale implementation of extension reforms suggested in Policy Framework for Agricultural Extension (PFAE) all over the country during the 10<sup>th</sup> Plan requires Rs.1,000 crores. However, the central government support is of the order of Rs.300 crores only in the 10<sup>th</sup> Plan. The States are expected to contribute 10 per cent of the cost and the total funding available would come to Rs.333 crores. Achieving financial sustainability and resource mobilization is an important reform agenda suggested in PFAE and this is expected to be achieved through cost cutting efficient use of available resources, privatization of agro-services, realistic cost recovery, co-financing and initiating new financial systems such as revolving funds.

According to Sulaiman (2003) though several new approaches to extension delivery were tried during the post T & V period, the State Departments of Agriculture (DoA) still face several constraints in providing adequate extension support to farmers. Technology dissemination continues to be understood as the main extension role and other support needs of farmers, that became important in the last one decade, remain unattended. These include : improved access to markets, research,

advice, credit, infrastructure, farmer organization development and business development services. There is an increasing realization at the policy level that extension need to play an expanded role. But this approach “Extension-plus”, has been put in practice in only in a few of the external aided agricultural development programmes such as Kerala Horticultural Development Programme (KHDP) has not yet become a part of mainstream extension practice. Agri-business firms such as Rallis and Mahindra and financial institutions like BASIX have innovated mechanisms to provide integrated technical support to farmers. Public extension, should prioritise its activities in each zone keeping in view the constraints and potentials in improving income of farmers and how effectively it could tap the skills and expertise of the diverse players for providing an integrated technical support. Research and extension strategies should emerge out of a broader livelihood analysis organized through a wider consultative exercise.

# **CHAPTER 3**

# **METHODOLOGY**

# METHODOLOGY

This chapter deals with the methods and procedures used in the study and consists of four main parts.

- A. Determination of sample size
- B. Empirical measures of variables
- C. Techniques of field data collection, and
- D. Statistical methods used

## **A. DETERMINATION OF SAMPLE SIZE**

Most statistical studies are based on samples and not on complete enumeration of population. The factors of time and cost are usually important considerations in social research. The most important consideration in selecting a sample is to see that it is closely representative of the universe. The size of a sample is no necessary insurance of its representativeness. Relatively small samples properly selected may be much more reliable than large sample poorly selected (Young, 1996).

As per Director of Agriculture, Government of West Bengal (2001) the State had 335 agricultural blocks in 18 agricultural districts under six agro-climatic zones. Generally an agricultural block is headed by an Agricultural Development Officer (ADO) in the West Bengal Agricultural Service (Administrative) WBAS (Admn.). This post was upgraded from West Bengal Junior Agriculture Service (Admn.) in 1983. The cadres under WBAS (Admn.) were separated from the set up of Block Development Officer (BDO) and they were working as an independent unit under a single line of command having their own office staff and a number of Krishi Prayukti Sahayaks (KPSs).

After discussion with the experts in the Department of Agricultural Statistics, Bidhan Chandra Krishi Viswavidyalaya, it was decided that about 30 per cent of the

total ADOs will be taken as sample for study. In this way out of 335 ADOs, 100 ADOs from six agro-climatic zones of the State was selected as sample for collection of data.

## **B. EMPIRICAL MEASURES OF VARIABLES**

For selection of appropriate variables for study, the experts in the Department of Agriculture, Govt. of West Bengal were consulted and available literature on agricultural extension education were gone through. By following specific objectives of the study, the theoretical basis for selection of variables and their empirical measures are presented.

### **I. Educational background and job status of Agricultural Development Officers (ADOs)**

As per Agriculture Department Notification No.9996-Estab. Dated the 30<sup>th</sup> October 1980 the essential educational qualification for direct recruitment to the post of West Bengal Agricultural Services (Administrative and Research Wing) is a Bachelor Degree in Agriculture with four years' Degree Course from a recognized University/Institute.

For the present investigation the educational qualification of Agricultural Development Offices in West Bengal were classified into three categories – Graduate, Post Graduate and Doctorate and the field of specialization in Master Degree includes Agronomy, Horticulture, Soil Science, Entomology, Agricultural Extension, Genetics and Plant Breeding, Plant Pathology, Agricultural Economics, Agriculture Engineering. Work experience in the organization as Agricultural Development Officers has been classified into 4 categories – upto 5 years, upto 10 years, upto 15 years and above 15 years.

The nature and types of in service training programme or seminar attended during the last three years as well as the number of training programmes for the farmers organized by the ADOs also taken into consideration. The responses were analysed on the basis of percentage of respondents reporting.

## **II. Hierarchy of extension activities as perceived by the ADOs for agricultural development**

The work and activities of the Department of Agriculture, Govt. of West Bengal at different level have undergone changes over the years. There is an increasing realization that extension need to play an expanded role in addition to dissemination of useful and relevant technology. This means helping farmers to access markets, research advise, credit, value addition opportunities, education on improved harvesting methods, standardization and grading, improved packaging and handling, proper use of information technology like “Agricultural Helpline” ‘E-Chaupal’, video conferencing etc.

The new economic policies implemented from early nineteen-nineties and the process of globalization initiated from mid-nineties have thrown a series of new challenges on Indian agriculture. Agriculture sector is becoming more and more commercialized and competitive. Due to new export import policies (EXIM Policy 2002-2007) the concern for economic return is becoming the central consideration in place of increased production alone. With the existing farming practices farmers are *not in a position to cope with the international competition*. The *farming practices* which may be crop production, horticulture, animal production, fishery etc. needs appropriate changes depending on the market situation. The cost of production of farm produce has to be reduced considerably, quality improved, farmers profitability maximized and environmental pollution avoided. Use of pest avoidance practices, enhancement of biological control methods and adoption of other non chemical methods of pest management would certainly save the environment as well as reduce the cost of cultivation.

Efficient use of fertilizer is a major factor in any programme designed to bring about an economic increase in agricultural production. The use of fertilizer without first testing the soil is like taking medicine without first consulting a physician to find out what is needed. Without a fertilizer recommendation based upon soil test a farmer

may be applying too much or too little of the plant food element. This not only means an uneconomical use of fertilizers, but also has a detrimental effect on soil health.

According to Chattopadhyay (1997) agricultural research as conceptualized in the Department of Agriculture is by an large, if not exclusively, extension oriented. The T & V system which was aimed to make a coordinated approach of research training and extension for increase in agricultural production, relied mainly on communication at personal levels. Technology can be successfully transferred through multimedia approach of which field demonstration plays an important role. This aspect had been neglected, consequently message cannot be properly communicated to the farmers.

Considering the present agricultural situation mentioned above and discussion with the experts of the Department of Agriculture at various levels, the following five areas relating to extension activities were identified for the present investigation. These are:

- A. Demonstration
- B. Farmers' Training
- C. Integrated Pest Management (IPM)
- D. Changing Cropping Pattern
- E. Soil Testing

It was intended to find out the relative importance of these five extension activities as perceived by the Agricultural Development Officers (ADOs) of West Bengal. For this purpose the method of Paired Comparisons (Edwards, 1969) was followed. The five extension activities were presented to the respondents (ADOs) in pairs, in 10 possible combinations. The respondents were asked to select one extension activity over the other from each pair separately which they considered more important.

### **III. Indicators of effective management of agricultural extension at the Block level**

Foundation for Organizational Research (1984) defined effective management as the process of achieving organizational goals by optimizing resources, maintaining and improving the internal health of the organization, while contributing to national growth. The term “effective management” is used interchangeably with organizational effectiveness.

To find out the indicators of effective management the following steps were gone through.

#### **Collection and initial selection of items**

The items (statements) were collected from different sources, such as literature, field extension personnel, scientists of agricultural University, experts in the Department of Agriculture and the researcher’s own experience. Initially 55 items relevant to the study were collected. These were edited as per criteria set up by Edwards (1969). The general guidelines for editing the statements following Edwards (1969) presented below:

- i. The statements should be short, simple, clear, direct and easily understandable.
- ii. Each statement should contain only one idea. There should be no insignificant idea or repetition of idea.
- iii. Statements that are irrelevant or may be interpreted in more than one way, should be avoided.
- iv. The use of double negatives should be avoided.

#### **Final selection and scoring of items**

The items were pre-tested with the ADOs and KPSs to judge their relevance in field situation. After discussion with the experts of the Department of Agriculture 39

items were finally selected for administration to the ADOs. Each item was provided with a 5 point scale, very important, important, moderately important, less important and unimportant with weights of 5, 4, 3, 2 and 1 respectively. The items finally selected are given in Appendix-IV.

#### **Indicators of effective management**

To find out the indicators of effective management of agricultural extension, at Block level Factor Analysis applying Principal Component Method and Varimax rotation technique was done with the responses obtained from the total number of respondents.

#### **IV. Most successful extension work conducted by the Agricultural Development Officers and reasons for success**

Farmers' problem in West Bengal varies considerably based on their agro-economic conditions and socio-psychological characteristics. Agricultural Development Officers posted at different agro-climatic zones of the State had the responsibility of disseminating extension services to the farmers field to increase their production and productivity.

It was intended to find out most successful extension work conducted by the ADOs of West Bengal during their service period and find out the reasons for success, the responses were ranked on the basis of percentage of respondents reporting.

#### **V. Level of competency of the Krishi Prayukti Sahayaks (KPSs) as perceived by the ADOs in performing agricultural extension activities**

One of the most significant developments in the field of organization in recent times is the increasing importance given to human resources. The development of people, their competencies and the process development of the total organization are the main concerns of human resource management (Pareek and Rao, 1992). Extension organizations in developing countries face the major problems of professional incompetence and lack of motivation among their employees.

To find out the level of competency of KPS working under the ADO for agricultural development the following steps were gone through.

### **Collection and initial selection of items**

A list of extension activities (items) relating to agricultural development usually performed by the KPS was collected in consultations with the ADOs and experts in the Department of Agriculture. Initially 12 activities performed by the KPS were collected and edited as per criteria set up by Edwards (1969).

### **Final selection and scoring of items**

The items (activities) were pre-tested with the ADOs and KPS to judge their relevance in field situation. After discussion with the experts of the Department of Agriculture, 8 items (activities) were finally selected for administration to the ADOs. The extension activities are presented below:

#### **1. Soil sample collection**

A vast land (or soil) shows heterogeneity with respect to topography, texture, colour, fertility status. The heterogeneity is reduced as far as possible by dividing the vast land into several soil units. From each unit some amounts of soil are collected for testing which are called soil sample.

#### **2. Visiting contact farmers**

Frequent contact between a Krishi Prayukti Sahayak (KPS) and all farmers in his circle is not possible. Instead, the KPS visits a small, selected number of farmers called "contact farmers" in each farmers group. Contact farmers are identified by the KPS and ADO with assistance of local villagers.

#### **3. Providing technical advice and feed back**

The KPS at circle or mouza level generally provide technical advice regarding new technology, viz. new variety, new method of cultivation and plant protection measures as well as he has to collect feed back information from the farmers.

#### **4. Crop cutting survey**

Crop cutting survey is a scientific estimation of yield of a particular Block/District/State for a particular crop and is expressed in kg/ha. Yield is estimated by taking weight of a particular crop obtained from the selected area which may be square, rectangular or even circular in shape.

#### **5. Crop demonstration**

Demonstration motivate groups of people in a community to adopt a new practice by showing its result. Crop demonstration provide an effective learning situation as farmers “see the new crops themselves” interact with the scientists and extension workers on the field and gets doubts clarified then and there it self.

#### **6. Field survey**

The KPS has to visit the farmers field in order to identify and note down important problems relating to crop production, field maladies etc. These are reported to the ADOs in their meeting session and proper feedback and recommendations are made to the farmers.

#### **7. Disaster management**

The loss of peoples lives and property due to natural disaster like flood, drought, cyclone etc. may to some extent be avoided or reduced by taking timely preventive action and efficient handling of post-occurrence management problems. Extension education has an important role to play in developing capability of the people to effectively face such situation. Creation of public awareness, training, involvement of voluntary organizations are considered important in this respect.

#### **8. Conducting farmers meeting**

Conducting farmers meeting is one of the most important job of the KPS at village level. A farmers meeting may be held in a research farm or in a farmers field or home. The objectives of conducting farmers meeting are to motivate them to adopt the practice by showing its performance and remove doubts, superstitions and unfavourable attitude about a new practice. The time of farmers meeting should be according to the convenience of the farmers.

It was intended to find out the importance of extension activities mentioned above as well as to judge the competency of KPSs to perform the activities for agricultural development. For this purpose each item (activity) was provided with a five point scale, very important, important, moderately important, little important and unimportant with weights of 5, 4, 3, 2 and 1 respectively. Similarly in order to judge the competency of KPS to perform the extension activities a five point scale, very competent, fairly competent, moderately competent, little competent and not at all competent with weights of 5, 4, 3, 2 and 1 respectively was given. The respondents (ADO) were asked to mark the weightage of each activity in respect of both importance and competency.

Following Hershkowitz (1973) a  $2 \times 2$  matrix was developed in order to establish the importance of extension activities and competency of the KPS. First an overall mean score for all items relating to importance and competency was calculated. Then the overall mean scores of importance and competency were plotted on x-axis and y-axis respectively. Perpendicular lines were then drawn from each of these points resulting in a  $2 \times 2$  matrix. The matrix had four quadrants - high competency - high importance (HH), high competency - low importance (HL), low competency - high importance (LH) and low competency - low importance (LL). Next all the extension activities were placed in the matrix on the basis of mean scores relating to importance and competency.

#### **VI. Management problems in implementing agricultural and rural development programmers as perceived by the ADOs and measures suggested for improvement**

Management is the process by which people, technology, job tasks and other resources are combined and coordinated so as to effectively achieve organizational objectives. To carry out their responsibilities, managers need to obtain recent, relevant information, to get cooperation from subordinates, peers, superiors and people over whom they may have no formal authority. The basic functional areas of management, as envisaged by Koontz *et al.* (1984) are Planning, Organizing, Staffing, Leading and

Controlling. Each of the management functions had some constrains. The following functional areas of management of extension organization at Block level in West Bengal were identified for the present investigation in consultation with the experts of the Department of Agriculture, ADOs and scientists of the University.

**Planning**

**Financing** (a) Cash

(b) Kind input

**Organising** (a) Staffing

(b) Infrastructural facility

(c) Coordinating

**Leading** (a) Supervising

(b) Farmers participation

(c) Sustainable agriculture

The ADOs were asked open ended questions to mention most important problems for each of the functional areas of management which they were facing and suggest measures for organizational effectiveness. The replies were ranked on the basis of percentage of respondent reporting.

### **C. TECHNIQUES OF FIELD DATA COLLECTION**

#### **Construction of the questionnaire**

Before construction of the data collection device, a pilot study was undertaken in Nadia and Paschim Midnapore districts in order to assess the feasibility of this research study. After conducting the pilot study a few lecturers of BCKV who rendered their services as ADO for sometimes were also consulted. Since the respondents were spread over the whole State, the questionnaire method of data collection was followed. As the personnel were under the control of the Directorate of

Agriculture, Government of West Bengal, necessary permission for collection of data was obtained.

The draft questionnaire for collection of data, incorporating the tools and techniques of measurement of different variables was pretested twice, each time with four ADOs in Nadia and Paschim Midnapore districts. On the basis of experiences in pretesting, appropriate changes in the construction of questions and their sequence were made. The final format of questionnaire is given in Appendix-IV.

### **Field data collection**

The sets of questionnaire along with letter from the supervisor and permission from the Director of Agriculture and Ex-officio secretary, Government of West Bengal were handed over to the Principal Agricultural Officers (PAO) and SAOs of the concerned district for distribution to the ADOs. In stead of direct mailing of the questionnaire to the ADOs, this method was followed because in questionnaire method rate of return of the filled in questionnaire is generally low. Further the PAOs/SAOs were the controlling officers of the ADOs who could get things done.

In this way the questionnaires were distributed to the ADOs and filled in questionnaire were also collected from the office of the PAO and SAO by the investigator. The data were collected from September 2002 to March 2004. Responses from 100 ADOs from 16 agricultural districts under six agro-climatic zones of West Bengal were collected during the period. Their distribution is given in Table 1 in chapter 4 (Research Setting).

### **D. STATISTICAL METHODS USED**

The statistical methods used in this study include – Mean, Percentage, The Method of Paired Comparisons and Factor Analysis. The statistical analyses were done following Panse and Sukhatme (1989), Edwards (1969), Harman (1976) and Kothari (1996).

### **Mean**

The mean is the arithmetic average and is the result obtained when the sum of the values of the individuals in the data are divided by the number of individuals in the data.

### **Percentage**

Percentages were used for making simple comparisons. For calculating percentage, the frequency of a particular cell was divided by the total number of respondents in that particular category and multiplied by 100.

### **The Method of Paired Comparisons**

Thurston developed the law of comparative judgment, which provides, rationale for the ordering of stimuli along a psychological continuum. It is a *psychological scaling method*, and makes possible the quantitative investigation of all kinds of values and subjective experiences (Edwards, 1969).

In this method, the stimuli (items, statements or variables) are presented in pairs in all possible combinations and the respondents are asked to select one stimulus over the other from each pair, which is judged as more favourable.

This method of psychological scaling also provides an estimate of the distances between each of the stimuli, in comparison to the stimulus with least preference, whose scale value is (arbitrarily) brought down to the level of 'zero'.

If there are  $n$  stimuli, the number of pairs which may be obtained are  $n(n-1)/2$ . The stimuli or items for judgment should be distinct from each other and easily understandable. To eliminate response bias, both the stimuli in each pair and the pairs themselves, are randomly arranged. The stimuli are then presented to the respondents, who are asked to select one stimulus over the other from each pair, which they consider as more favourable.

**The F-matrix**

The first table shall consist of *frequencies* corresponding to the number of times that each stimulus is judged more favourable than the other. The cell entries correspond to the frequency with which the column stimulus is judged more favourable than the row stimulus.

**The P-matrix**

The P-matrix gives the *proportion* of times the column stimulus is judged more favourable than the row stimulus. This is obtained by dividing each of the cell entries in the F-matrix by  $N$  i.e. total number of respondents, or this may be obtained conveniently by multiplying the cell entries of F-matrix by the reciprocal of  $N$  i.e.  $1/N$ . A rearranged *p*-matrix is then made with the stimulus having the smallest column sum at the left and that with the highest at the right.

**The Z-matrix**

The Z-matrix gives the *normal deviates* corresponding to the proportions in the table of P-matrix. These are obtained from the table of normal deviates (Edwards, 1969). In the Analysis of paired comparisons the method of complete data was used.

**Factor Analysis**

Factor analysis is a very useful and popular method of multivariate research technique, mostly used in social and behavioural sciences. According to Kothari (1996), factor analysis seeks to resolve a large set of measured variables in terms of relatively few categories, known as *factors*. This technique allows the researcher to group variables into factors (based on correlation between variables), and the factors so derived may be treated as new variables (often termed as latent variables) and their value derived by summing the values of the original variables, which had been grouped into the factor. The meaning and name of such new variable is subjectively determined by the researcher. Since the factors happen to be linear combinations of data, the coordinates of each observation or variable is measured to obtain what are

called *factor loadings*. Such factor loading represent the correlation between the particular variable and the factor, and are usually placed in a matrix of correlations between the variable and the factors.

### **Principal Component Analysis**

There are various, methods of factor analysis. The method of Principal Component Analysis was used in the present investigation.

The principal component analysis extracts  $m$ -eigenvectors (principal component axes) and corresponding  $m$ -eigenvalues (the variance measured along the eigenvector), from  $m \times m$  symmetrical matrix of correlation. The eigenvectors obtained from this principal component analysis are all orthogonal (i.e. inter-column correlations are near zero). The eigenvalues account for all of the original data variances in decreasing order such that each has variance or eigenvalue less than the previous ones. The total of the eigenvalues  $\lambda_1 + \lambda_2 + \dots + \lambda_m$  which is the same as the sum of the variances constituting the diagonal or trace of the correlation matrix before transformation. The principal components are then converted into factors by multiplying each element of the principal components or eigenvectors ( $V$ ) by the square-root of the corresponding eigenvalues ( $\lambda^{1/2}$ ). Factors, thus, besides the direction also represent the variances.

The analysis calls for the selection of a minimum number of meaningful and useful factors, considerably fewer in number than the original variables, which will account for most of the variances in the data set and, therefore, convey the same information. Various criteria for selection of suitable factors are available. Kaiser (1958) and others have recommended retaining all those eigenvalues which have values more than 1.

Next step is to remove the noise imposed by  $(m - p)$  unnecessary axes. To accomplish this  $p$ -orthogonal reference axes or factors are rotated about the origin to positions such that the variance of the loading from each variable onto each factor

axis is either extreme ( $\pm 1$ ) or near zero. This maximization of the range of the loading was performed by using Kaiser's Varimax criterion. Scanning through each factor column for *large absolute values* in the varimax matrix will reveal a few variables with significantly high loading and many others with insignificant loadings. The column showing communality ( $\sum h^2_j$ ) is the total amount of variance of each variable retained in the factors, and is computed by summing the squares of the elements of the factors in each row of the varimax matrix. Fairly high communality of each variable implies the appropriateness of the model adopted for the study. The last step involved meaningful interpretation of the factors.

# **CHAPTER 4**

## **RESEARCH SETTING**

## RESEARCH SETTING

The present investigation was carried out in West Bengal, India. West Bengal has geographical area of 88.75 lakh hectares and net cropped area 54.5 lakh hectares which is about 3 per cent of the land area of the country. With such meagre cropped area it has to provide food of 9 per cent of the total population of the country. It's total population is about 8,022,1171 and density of population, 904 persons per sq. km (in 2001 census) is highest among all the States. The States population is predominantly rural (74%). West Bengal agriculture is dominated by small and marginal farmers. 90 per cent of agricultural holdings and 63.6 per cent of operational area belong to small and marginal categories.

West Bengal is divided into nineteen administrative districts (18 agricultural districts since Kolkata has been excluded from the list of agricultural district). Each of the 18 districts has again been subdivided into several subdivisions and each of the subdivisions are composed of a number of Development Blocks. In West Bengal, there are 335 agricultural Blocks which cover 38,826 villages. The Blocks are the primary units of government administrative machinery at the village level.

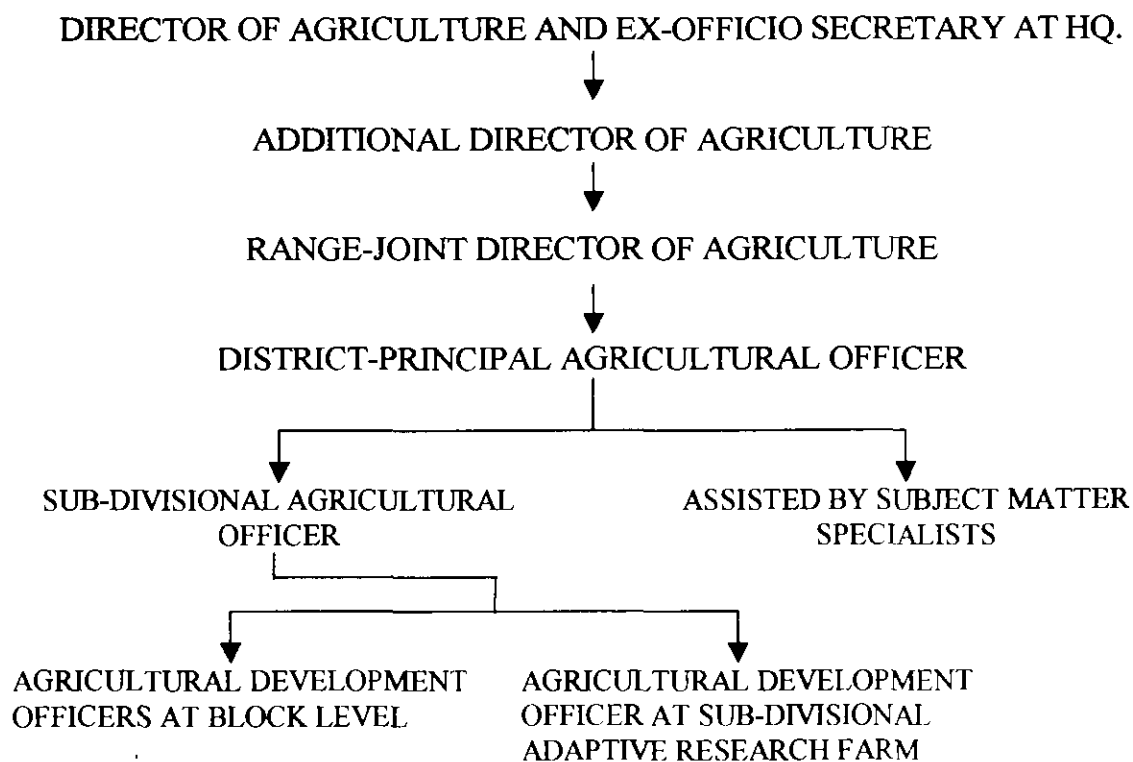
### **Rationale for selection of the State**

Selection of the State as the area of investigation was purposively made as the investigator possess adequate knowledge regarding Community Development and agricultural administration of the State. Secondly, most of the Agricultural Development Officers (ADOs) of the State completed their Graduation and Post Graduate Degree in Agriculture from Bidhan Chandra Krishi Viswavidyalaya, and Institute of Agricultural Science, Palli Siksha Bhavan, Visva Bharati. So it was an added advantage of the present investigator to convince the ADOs of West Bengal in order to get their quick and spontaneous responses. Finally the encouragement, support and cooperation rendered from the Director of Agriculture and Ex-officio.

Secretary Government of West Bengal and his colleagues at Writers' Building inspired greatly both the investigator and his supervisor to conduct this research study.

### **Administrative setup of Agricultural Department and their working relations in Agricultural development in West Bengal**

As per the compendium on Government Orders and Circulars published by the State Agricultural Technologists' Service Association (SATSA) West Bengal on 22<sup>nd</sup> February 2003, the present administrative setup of Agricultural Department of West Bengal and job chart of Agricultural Officers in Administrative wing is presented in brief.



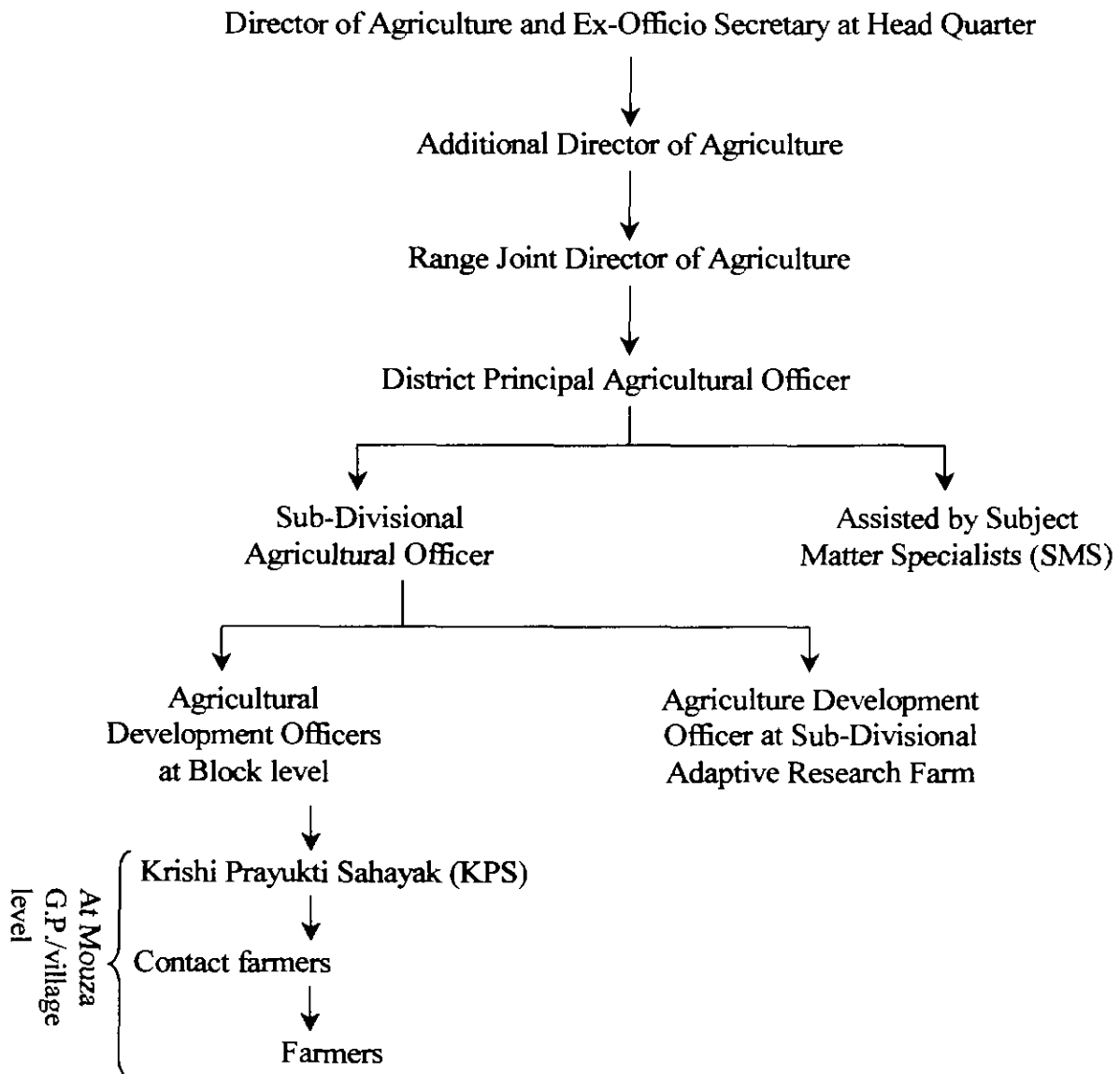
#### **Core activity**

1. Supervision on functioning of office, officers subordinate to him
2. Co-ordination with allied departments at the sub-divisional level



Fig-1 Map of West Bengal

3. Observation on financial propriety in respect of expenditure incurred for various development programmes (lion share being utilized by him as D.D.O. in the interest of public service).



#### Core activity (Block level)

1. Co-ordination between agricultural and public bodies in respect of development activities on agriculture,
2. Execution of different agriculture schemes including demonstration, trial etc.

3. Organisation of farmers training, meetings,
4. Extension of agriculture technology to farmers through T & V system and other modes of communication,
5. Assessment of coverage and productivity of crops through crop cutting experiment,
6. Assessment of input supply position and observations on quality control procedure and
7. Farm planning, disaster management and others.

### **Job Chart of Agricultural Officers in Administrative Wing**

#### **Range Level**

#### **Range Joint Director of Agriculture**

1. Planning of monthly colloquium-cum-workshop, co-ordination resource persons and extension officers in connection of Training and Visit Programme.
2. Co-ordination of Adaptive Research Programme at the Zonal Adaptive Research Stations and Sub-divisional Adaptive Research Farms.
3. Monitoring and evaluation of all development programme in the range, including minikit programme, community nursery programme and Multiple Cropping Programme.
4. Monitoring of financial expenditure of the districts (Plan, Non-plan and Centrally Sponsored).
5. Co-ordination and monitoring of Contingency Programme.
6. Regular inspection of Offices of P.A.O's and S.A.O.'s.
7. Regular field inspection of work of A.D.O./A.E.O. and other Block level officers and K.P.S. and fortnightly training under T & V Programme.
8. Regular inspection of Gramsevak Training Centres.

9. Regular inspection of Soil Conservation Work.
10. Any other technical/administrative/financial work may be assigned by the D.A. relating to agricultural development in the Range.

### **District Level**

#### **Principal Agricultural Officer/District Agricultural Officer**

1. Programme Planning, Co-ordination, monitoring and evaluation of all development scheme relating to agriculture.
2. Co-ordination/Liaison with other departments and other wings of the Agriculture Department.
3. Establishment.
4. Matters relating to accounts, budget, net grant statements, financial reports and returns.
5. Special programmes : DRDA, Special Component and Tribal sub plan.
6. Registration of fertilizer dealership and issue of licence for insecticides.
7. S. I. Schemes.
8. Regular inspection of the Office of S.A.O. and field inspection of work of A.D.O./A.E.O. and other Block Level Officers and K.P.S.
9. Regular inspection of Soil Conservation work in the district.
10. Any other work assigned by D.A. additional D.A. and J.D.A. relating to agricultural development in the district.

N.B. In the absence of P.A.O./non posting of P.A.O., the Agronomist who is senior most in the district, will look after the function of the P.A.O.

### **Sub-divisional Level**

#### **Sub-divisional Agricultural Officer**

1. Programme for planning, co-ordination, monitoring and evaluation.
2. Establishment.
3. Accounts.

4. All Special Programme including supervision of T & V Programme.
5. Registration of fertilizer dealership.
6. Farmers old age pension scheme.
7. Small Irrigation and other connected Schemes.
8. Crop Insurance Scheme.
9. Any other assigned by P.A.O. relating to agricultural development in the district.

**Up-gradation of West Bengal Junior Agricultural Service WBJAS (Admn.) to West Bengal Agricultural Service (Admn.)**

1. In terms of the notification of the Department of Agriculture Government of West Bengal (Notification No.12714 Estab. Dated 19.8.1983) a batch of 461 officers borne in the West Bengal Junior Agricultural Service (Administrative) cadre was upgraded to West Bengal Agricultural Service (Administrative) cadre along with their posts on the basis of recommendation of the Public Service Commission West Bengal with effect from 19.8.1983 on provisional basis due to pendency of some court cases against this upgradation of officers to WBAS (Admn.) cadre.
2. With the disposal of all the pending court cases in the matter of their upgradation, the Governor is now please to appoint on a regular basis all the above mentioned officers of the WBJAS (Admn.) cadre to the WBAS (Admn.) cadre with effect from 19.8.83.

**Block Level**

**Agricultural Extension Officers redesignated as A.D.O.:**

1. Co-ordination with Panchayat and other agencies.
2. T. & V. Programme.
3. Natural Calamity.
4. Watershed management, dry farming /rainfed farming, pulses and seed Farm.

5. Block Seed Farm.
6. Development programme (Irrigation, HYV and multiple cropping and others).
7. Minikit trials.
8. Statutory duties as per G.O.
9. S. I. Schemes.
10. Any other work assigned by P.A.O. & S.A.O. relating to agricultural development in the Block.

### **Village Level**

#### **Krishi Prayukti Sahayak (KPS) posted in Blocks**

1. Regularly attending fortnightly training under T. & V. programme.
2. Field visits and meeting farmers on scheduled dates for communicating impact points and practical demonstrations.
3. Conducting minikit trials.
4. Conducting mini demonstration in Farmers' field on important crops.
5. Collecting and reporting informations on crop prospectus, pest incidence, crop coverage, inputs position and natural calamities.
6. Soil samples collection.
7. Any other work assigned by S.A.O. & A.D.O./A.E.O.

#### **Staffing pattern of ADO office**

- |   |  |
|---|--|
| 1. Agricultural Development Officer         | 7. Night guard/Chowkidar/Darwan        |
| 2. One Agricultural Extension Officer (AEO) | 8. Fitter Mechanics                    |
| 3. One Assistant AEO                        | 9. Seed Store Darwan                   |
| 4. Headquarters KPS                         | 10. One KPS per Gram Panchayat/circle. |
| 5. Agricultural Clark (UDC/LDC)             |  |
| 6. ADO's orderly Peon                       |  |

### Agro-climatic zone-wise distribution of Blocks in West Bengal

As per the book, "A Brief History of Development of Extension and Research Services in the Department of Agriculture : West Bengal", published by Ex-Directors of Agriculture in 2001 the State has 335 Agricultural Blocks in 18 agricultural districts under six agro-climatic zones. The distribution of Blocks is given below. The Blocks in which studies were made have been marked with Asterisk (\*).

**Table 1. Agro-climatic zone-wise distribution of Blocks**

| District                                  | Sub-Divisions      | Blocks   |
|---|--------------------|--|
| <b>I. Hill Zone</b>                       |                    |  |
| <b>Darjeeling</b>                         | Darjeeling (Sadar) | Bijanbari, Sukia-Pokhri and Takdah*  |
|   | Kurseong           | Kurseong and Mirik*  |
|   | Kalimpong          | Kalimpong-I, Kalimpong-II and Gorubathan*                                      |
| <b>II. Teesta and Terai Alluvial Zone</b> |                    |  |
|   | Siliguri           | Siliguri-Naxalbari* and Kharibari-Phansidewa*                                  |
| <b>Uttar Dinajpur</b>                     | Islampur           | Islampur, Chopra*, Goalpukur-I, Goalpukur-II and Karandighi                    |
| <b>Jalpaiguri</b>                         | Jalpaiguri (Sadar) | Jalpaiguri*, Rajgunj*, Moynaguri*, Dhupguri*, Mal*, Metiali* and Nagrakata*    |
|   | Alipurduar         | Alipurduar-I*, Alipurduar-II*, Kalchini*, Kumargram*, Madarihat* and Falakata* |
| <b>CoochBehar</b>                         | CoochBehar (Sadar) | CoochBehar-I*, CoochBehar-II* and Tufangunj*                                   |
|   | Dinhata            | Dinhata-I,* Dinhata-II* and Sitai*   |
|   | Mathabhanga        | Mathabhanga-I*, Mathabhanga-II* and Sitalkuchi*                                |
|   | Mekligunj          | Mekligunj and Haldibari  |

| <b>III. Gangetic Alluvial Zone</b> |                      |  |
|------------------------------------|----------------------|--|
| <b>Uttar Dinajpur</b>              | Raijung              | Raigunj, Kaliagunj*, Hemtabad and Itahar   |
| <b>Malda</b>                       | Chanchal             | Harishchandrapur-I*, Harishchandrapur-II*, Chanchal-I*, Chanchal-II*, Ratua-I* and Ratua-II* |
|                                    | Malda (Sadar)        | Kaliachak-I, Kaliachak-II, Kaliachak-III, Manikchak and Englishbazar                         |
| <b>Murshidabad</b>                 | Berhampore (Sadar)   | Beldanga-I*, Beldanga-II*, Naoda*, Berhampore*, Hariharpara*, Domkal* and Jalangi*           |
|                                    | Lalbagh              | Lalgola, Murshidabad-Jiagunj, Bhagwangola-I, Bhagwangola-II, Raninagar-I, Raninagar-II       |
|                                    | Jangipur             | Farakka, Samsergunj and Suti-II  |
| <b>Nadia</b>                       | Krishnanagar (South) | Krishnanagar-I, Krishnanagar-II, Nabadwip, Chapra and Krishnagunj                            |
|                                    | Krishnanagar (North) | Karimpur, Tehatta-I, Tehatta-II, Kaligunj and Nakashipara                                    |
|                                    | Ranaghat             | Santipur*, Hanskhali, Ranaghat-I*, Ranaghat-II, Chakdah* and Haringhata*                     |
| <b>Hooghly</b>                     | Serampore            | Chanditala-I*, Chanditala-II*, Singur* and Serampur-Uttarpara*                               |
|                                    | Chinsurah (Sadar)    | Balagarh*, Polba-Dadpur* and Chinsurah-Mogra*  |
| <b>Howrah</b>                      | Howrah (Sadar)       | Bally-Jagacha and Domjur   |
| <b>24-Parganas (North)</b>         | Barasat-Barrackpore  | Habra-I*, Habra-II, Barasat-I, Barasat-II, Barrackpore*, Deganga* and Amdanga*               |
|                                    | Bongaon              | Bongaon, Gaighata and Bagda  |
|                                    | Basirhat             | Baduria and Swarupnagar  |
| <b>Burdwan</b>                     | Kalna                | Purbasthali-I, Purbasthali-II and Kalna-I  |
|                                    | Katwa                | Katwa-I, Katwa-II and Katugram-II*   |

| <b>IV. Vindhya Alluvial Zone</b> |                         |   |
|----------------------------------|-------------------------|---|
| <b>Dakshin Dinajpur</b>          | Balurghat               | Hili, Tapan*, Kumargunj, Gangarampur and Balurghat  |
|                                  | Raigunj                 | Bansihari and Kushmandi   |
| <b>Malda</b>                     | Malda (Sadar)           | Gajole, Habibpur, Bamangola and Old Malda   |
| <b>Murshidabad</b>               | Kandi                   | Kandi, Bharatpur-I, Bharatpur-II, Burwan and Khargram   |
|                                  | Jangipur                | Sagardighi, Raghunathgunj-I, Raghunathgunj-II and Suti-I  |
|                                  | Lalbagh                 | Nabagram  |
| <b>Burdwan</b>                   | Burdwan (Sadar)         | Burdwan*, Bhatar, Memari-I*, Memari-II*, Jamalpur, Raina-I*, Raina-II*, Khandakosh* and Galsi-II* |
|                                  | Kalna                   | Manteshwar*   |
|                                  | Katwa                   | Kalna-II, Mangalkote, Ketugram  |
|                                  | Durgapur-Asansol        | Galsi-I*  |
| <b>Hooghly</b>                   | Arambagh                | Pursura, Arambagh, Khanakul-I, Khanakul-II and Goghat   |
|                                  | Serampore               | Jangipara*, Haripal* and Tarakeshwar*   |
|                                  | Chinsurah (Sadar)       | Pandua* and Dhaniakhali*  |
| <b>Howrah</b>                    | Uluberia                | Udainarayanpur, Amta-I and Amta-II  |
|                                  | Howrah (Sadar)          | Jagatballavpur, Sankrail and Panchla  |
| <b>Purba Midnapore</b>           | Tamluk                  | Panskura-I, Panskura-II and Moyna   |
|                                  | Contai                  | Egra-I and Egra-II  |
|                                  | Ghatal                  | Ghatal, Daspur-I and Daspur-II  |
| <b>Paschim Midnapore</b>         | Midnapore Sadar (South) | Pingla, Narayangarh, Mohanpur, Sabang, Dantan-I and Dantan-II                                     |
|                                  | Midnapore Sadar (North) | Debra   |
| <b>Bankura</b>                   | Bishnupur               | Kotulpur, Indus and Patrasayer  |
| <b>Birbhum</b>                   | Bolpur                  | Nanoor  |
|                                  | Rampurhat               | Nalhati-II, Muraroi-II, Mayureshwar-II and Rampurhat-II   |

| <b>V. Red and Laterite Zone</b> |                         |  |
|---------------------------------|-------------------------|--|
| <b>Paschim Midnapore</b>        | Jhargram                | Jhargram, Nayagram, Sankrail, Jamboni*, Binpur-I, Binpur-II, Gopiballavpur-I* and Gopiballavpur-II               |
|                                 | Midnapore Sadar (South) | Keshiary, Khargpur-I, Khargpur-II, Salboni, Keshpur, Garbeta-I, Garbeta-II*, Garbeta-III and Midnapore           |
| <b>Bankura</b>                  | Bishnupur               | Sonamukhi, Joypur and Bishnupur  |
|                                 | Bankura (South)         | Ranibandh, Taldangra, Simlapal, Raipur-I, Raipur-II, Khatra-I, Khatra-II and Indpur*                             |
|                                 | Bankura (North)         | Bankura-I*, Bankura-II, Chhatna, Onda, Gangajalghati, Barjora, Saltora* and Mejia                                |
| <b>Birbhum</b>                  | Rampurhat               | Nalhati-I, Muraroi-I, Mayureshwar-I and Rampurhat-I  |
|                                 | Suri (Sadar)            | Mohammedbazar*. Sainthia, Dubrajpur, Khayrasol, Suri-I, Suri-II and Rajnagar                                     |
|                                 | Bolpur                  | Bolpur, Illambazar and Labpur  |
| <b>Burdwan</b>                  | Burdwan (Sadar)         | Ausgram-I* and Ausgram-II*   |
|                                 | Durgapur-Asansol        | Faridpur, Kanksa, Hirapur*, Jamuria-I*, Jamuria-II*, Salanpur*, Ranigunj*, Kulti*, Asansol*, Barabani and Ondal* |
| <b>Purulia</b>                  | Purulia (Sadar)         | Jhalda-I, Jhalda-II, Jaipur, Arsha, Bagmundi, Balarampur, Barabazar, Bandwan*, Manbazar-I* and Manbazar-II       |
|                                 | Raghunathpur            | Raghunathpur-I, Raghunathpur-II, Neturi*, Santuri. Kashipur, Hura, Pancha*, Para*, Purulia-I and Purulia-II*     |
| <b>Purba Midnapore</b>          | Ghatal                  | Chandrakona-I and Chandrakona-II   |

| <b>VI. Coastal Saline Zone</b> |                     |   |
|--------------------------------|---------------------|---|
| <b>Howrah</b>                  | Uluberai            | Shyampur-I, Shyampur-II, Bagnan-I, Bagnan-II, Uluberia-I and Uluberia-II  |
| <b>24-Parganas (North)</b>     | Basirhat            | Basirhat-I, Basirhat-II, Sandeshkhali-I, Sandeshkhali-II*, Minakhan, Hasnabad, Haroa and Hingaljanj   |
|                                | Barasat-Barrackpore | Rajarhat*   |
| <b>24-Parganas (South)</b>     | Alipur              | Bhangar-I, Bhangar-II, Sonarpur, Baruipur, Joynagar-I, Joynagar-II, Kultali, Canning-I, Canning-II, Basanti, Thakurpukur, Metiaburuj, Maheshtala, Bishnupur-I, Bishnupur-II, Budge Budge-I and Budge Budge-II |
|                                | Diamond Harbour     | Diamond Harbour-I, Diamond Harbour-II, Magrahat-I, Magrahat-II, Mathurapur-I, Mathurapur-II, Kakdwip and Namkhana*, Sagar*, Falta, Mandirbazar, Kulpi and Gosaba  |
| <b>Purba Midnapore</b>         | Contai              | Contai-I, Contai-II, Contai-III, Ramnagar-I, Ramnagar-II, Bhagabanpur-I, Bhagabanpur-II, Khejuri and Potashupur   |
|                                | Tamluk              | Tamluk-I, Tamluk-II, Mahisadal-I, Mahisadal-II, Nandigram-I, Nandigram-II, Nandigram-III, Sutahata-I and Sutahata-II  |

**A summary Table showing the agro-climatic zone-wise distribution of study Blocks is presented below**

| Sl. No. | Agro-climatic zones       | Total Blocks | Number of study Blocks |
|---------|---------------------------|--------------|------------------------|
| 1.      | Hill                      | 8            | 3                      |
| 2.      | Teesta and Terai alluvial | 31           | 25                     |
| 3.      | Gangetic alluvial         | 74           | 30                     |
| 4.      | Vindhya alluvial          | 74           | 15                     |
| 5.      | Red and laterite          | 85           | 23                     |
| 6.      | Coastal saline            | 63           | 4                      |
|         | <b>Total</b>              | 335          | 100                    |

# **CHAPTER 5**

# **FINDINGS AND DISCUSSION**

## FINDINGS AND DISCUSSION

The results of the investigation are presented and discussed in this chapter after appropriate statistical analyses. These are presented according to specific objectives of the study.

### **I. Educational background and job status of the Agricultural Development Officers (ADOs)**

The purpose for selection of this objective was to study the personal characteristics of the Agricultural Development Officers like age, educational status, service tenure and nature of training programme attended by them as well as the extent of training organized by them for the farmers one year prior to collection of data. These are presented in Table 2.

**Age:** It was found that the Agricultural Development Officers of West Bengal were predominantly young. Seventy three percent ADOs belonged to this category. The Ministry of Human Resource Development (1985) considered 'youth group' in India as persons in the age group 15 to 35 years. About 24 percent ADOs were middle aged i.e. 36-50 years old. ADOs 50 years and above were rather very few. Only three ADOs belonged to this category.

**Education:** The essential qualification for recruitment in the Agricultural Services (Administrative and Research Wing) under the Department of Agriculture, Govt. of West Bengal is the Bachelor Degree in Agriculture with four years Degree from a recognized University/Institute.

Table 2 shows that about 68 percent ADOs were having Post Graduate degree in agriculture and 24 percent were having Doctoral degree as their educational qualification. Agricultural graduate ADOs were rather few as only 8 percent ADOs belonged to this category.

**Table 2. Distribution of respondents according to their age, educational status and service tenure as ADO**

| Items   | Category                       | Frequency | Percentage   |
|---|--------------------------------|-----------|--------------|
| Age   | Young (upto 35 years)          | 73        | 73.00        |
|   | Middle aged (36-50 years)      | 24        | 24.00        |
|   | Old (51 years and above)       | 3         | 3.00         |
| Education   | Graduate/B. Sc. (Ag.)          | 8         | 8.00         |
|   | Post Graduate/M. Sc. (Ag.)     | 68        | 68.00        |
|   | Doctorate/Ph. D.               | 24        | 24.00        |
| Specialisation in Master Degree in Agriculture (N = 92) | <b>Crop Sciences</b>           |           |              |
|   | i) Agronomy                    | 30        | 32.60        |
|   | ii) Horticulture               | 19        | 20.65        |
|   | iii) Genetics & Plant Breeding | 6         | 6.52         |
|   |                                |           | <b>59.77</b> |
|   | <b>Plant Protection</b>        |           |              |
|   | i) Entomology                  | 11        | 11.95        |
|   | ii) Plant Pathology            | 7         | 7.60         |
|   |                                |           | <b>19.55</b> |
|   | Agricultural Extension         | 8         | 8.69         |
|   | Agricultural Economics         | 2         | 2.17         |
|   |                                |           | <b>10.86</b> |
|   | Soil Science                   | 7         | 7.60         |
| Agricultural Engineering                                | 0                              | -         |              |
| Others  | 2                              | 2.17      |              |
| Service Tenure  | Upto 5 years                   | 73        | 73.00        |
|   | Upto 10 years                  | 18        | 18.00        |
|   | Upto 15 years                  | 7         | 7.00         |
|   | Above 15 years                 | 2         | 2.00         |

**Specialisation in Post Graduate Degree**

About 60 percent ADOs completed their Master Degree in crop sciences comprising Agronomy, Horticulture, Genetics and Plant Breeding. In Plant protection comprising Entomology and Pathology about 20 percent ADOs completed their Post

Graduate course. About 11 percent ADOs had Master Degree in Agricultural Extension and Agricultural Economics. There was not a single ADO having a Master Degree in Agricultural Engineering.

**Service Tenure:** The table further depicts that 73 percent of the ADOs was having total service experience upto 5 years and the remaining 27 percent ADOs had higher level of service experiences.

The picture clearly exposed that most of the extension personnel under West Bengal Agricultural Service (Administrative) were young in age, highly educated and qualified in agricultural sciences particularly in crop science and plant protection but possessed little experience in their administrative position.

#### **Training programme attended by ADOs**

Training has gained wide acceptability for upgrading the knowledge skill and competency of extension personnel. Hayward (1990) observed that pre-service and regular in-service training is vital to effective extension. Training should not be limited to technical skills, but should specially focus on social skills. Also management weakness must be overcome through education and training.

A perusal of Table 3 reveals that about 74 percent of the total respondents attended one or more training programme, while about 26 percent ADOs had not undergone any kind of training programme/seminar in their total service career. About 57 percent ADOs had undergone in-service training mainly Induction and Refresher training, 37 percent ADO attended 5 days induction training of West Bengal Agricultural Service (Admn.) at Administrative Training Institute, Salt Lake, Kolkata and 20 percent respondents participated in Refresher training on quality control of fertilizers (14 days). Induction training is given immediately after employment to introduce the new entrant to the job. This helps in moulding the individuals as per requirements of the organization. Refresher training, on the other hand, is offered to update and maintain the specialized subject matter knowledge of

the incumbents. This deals with new information and new methods, as well as review of older materials. This type of training is given to the employees to keep them at their peak performance level and also to prevent them from getting into a rut (Ray, 2003). State level training on Integrated Pest Management, Jute and Allied Fibre and Rice were also imparted to the ADOs.

**Table 3. Distribution of ADO respondents according to Training Programmes they have undergone as well as training organized for farmers**

| Category  | Frequency | Percentage |
|---|-----------|------------|
| <b>TRAINING/SEMINAR ATTENDED BY THE ADOs</b>  |           |            |
| <b>A. GENERAL TRAINING</b>  |           |            |
| <b>I. Induction Training</b>  | 37        | 37.00      |
| Five days induction training of W.B.A.S. (Admn.) at Administrative Training Institute, Salt Lake, Kolkata |           |            |
| <b>II. Refresher Training</b>   | 20        | 20.00      |
| Refresher training on quality control of fertilizers (14 days)  |           |            |
|   |           | 57.00      |
| <b>B. TRAINING ON SPECIFIC TOPICS</b>   |           |            |
| <b>I. Training on IPM</b>   | 24        | 24.00      |
| State level "Transfer of Technology (TOT)" Programme on Integrated Pest Management (15 days)              |           |            |
| <b>II. Training on Jute &amp; Allied Fibre</b>  | 24        | 24.00      |
| State level training of Jute and Allied Fibres under Special Jute Development Programme (3 days)          |           |            |
| <b>III. Training on Rice Production</b>   |           |            |
| (a) State level programme on summer rice production technology  | 10        | 10.00      |
| (b) State level programme on winter rice production technology  | 9         | 9.00       |
|   |           | 19.00      |
| <b>C. OTHERS</b>  |           |            |
| I. State level training on Integrated Nutrient Management (2 days)  | 3         | 3.00       |
| II. State level training on Sugarcane   | 3         | 3.00       |
| III. Training on Betelvine (3-4 days)   | 3         | 3.00       |
| IV. Training on soil testing (3 days)   | 3         | 3.00       |

Contd...

**Table 3. Contd...**

| <b>Category</b>   | <b>Frequency</b> | <b>Percentage</b> |
|---|------------------|-------------------|
| <b>D. SEMINAR ATTENDED</b>  |                  |                   |
| I. National Seminar on use and development of biofertilisers, biopesticides and organic manure (2 days) | 3                | 3.00              |
| II. State level seminar on medicinal and aromatic plant (1 days)  | 1                | 1.00              |
| III. Plant protection Seminar   | 1                | 1.00              |
| IV. Did not attend any training   | 26               | 26.00             |
| <b>TRAINING ORGANISED BY THE ADOs FOR THE FARMERS</b>   |                  |                   |
| More than three   | 61               | 61.00             |
| Thrice  | 15               | 15.00             |
|   |                  | <b>76.00</b>      |
| Twice   | 11               | 11.00             |
| Once  | 9                | 9.00              |
| Did not organize any training for farmers   | 4                | 4.00              |

About 24 percent ADOs each had undergone State level transfer of technology programme on IPM (15 days) and training on Jute and Allied Fibres under SJDP (3 days). About 19 percent ADOs took part on State level training on summer and winter rice production. Besides a small number of ADOs participated on training and seminar programme, on different crops or extension programmes.

#### **Training organized by the ADOs for the farmers**

Most of the farmers of West Bengal are small and marginal having poor educational background, deficiency in knowledge, skill and ability in adopting a new technology. One of the important extension activities of the ADO was to conduct farmers training. It was intended to find out the extent of training programme organized by the ADOs for the farmers during the last one year prior to data collection.

Table 3 depicts that about three-fourth of the total ADOs reported that they had organized farmers training thrice or more than three times during the last one year. The performance of one fourth ADOs in organizing training programmes were quite low since about 20 percent ADOs organised farmers training once or twice and 4 percent ADOs did not organize any training programme during the last one year.

Organising training programmes for the farmers is an important extension activity of the ADOs. It was revealed from the study that there was inadequacy in this respect as about 24 percent ADOs did not organize sufficient number of training programmes for the farmers.

## **II. Hierarchy of extension activities as perceived by the ADOs for agricultural development**

Indian public extension system the largest in the world with vertically downward network has the responsibility of catering to the farming and allied needs of over 90 million farm families majority of whom are small and marginal farmers. In West Bengal, various extension activities are being carried out by the ADOs at the Block level. Management of extension activities at grass roots level may be effectively done if the Agricultural Department organize their extension work on priority basis based on research. In fact, this is essential for all organizations to reach their goal. The present investigation aimed at identifying meaningful extension activities and to find out the relative importance of these activities.

Five extension activities of Agricultural Development Officers (ADOs) at Block level – Demonstration, Farmers Training, Integrated Pest Management (IPM), Changing cropping pattern and Soil testing were identified for the present study. To establish the hierarchy of extension activities as perceived by the ADOs, the method of Paired Comparisons (Edwards, 1969) was followed. The five extension activities were presented to the respondents (ADOs) in pairs, in 10 possible combinations. The respondents were asked to select one activity over the other from each pair separately which they considered more important. The method of “complete data” was used as there was no Pij value equal to or greater than 0.99 or equal to or less than 0.01.

From the observed frequency of ADO's preference relating to extension activities, F-matrix or the frequency with which each column stimulus was judged more favourable than the row stimulus was obtained (Table 4). The cell entries of F-matrix were divided by N (the total number of respondents), to get the P-matrix (Table 5). The cell entries of P-matrix gave the proportion of times that the column stimulus was judged more favourable than the row stimulus. The P-matrix was then rearranged with the stimulus having the smallest column sum at the left and that with the highest at the right (Table 6).

**Table 4. F-matrix for five extension activities judged by 100 respondents**

| Extension activities          | Demonstration (A) | Farmers training (B) | I.P.M. (C) | Changing cropping pattern (D) | Soil testing (E) |
|-------------------------------|-------------------|----------------------|------------|-------------------------------|------------------|
| Demonstration (A)             | -                 | 50                   | 45         | 39                            | 38               |
| Farmers training (B)          | 50*               | -                    | 49         | 25                            | 29               |
| I.P.M. (C)                    | 55                | 51                   | -          | 37                            | 40               |
| Changing cropping pattern (D) | 61                | 75                   | 63         | -                             | 54               |
| Soil testing (E)              | 62                | 71                   | 60         | 46                            | -                |

\* To be understood as 50 ADOs preferred demonstration to farmers training and so on (i.e. the column stimulus was judged more favourable than the row stimulus)

The Z-matrix corresponding to the re-arranged P-matrix was obtained by converting the  $P_{ij}$  entries to  $Z_{ij}$  entries with the help of table given by Edwards (1969) and this is presented in Table 7. The column sum for each stimulus was obtained by adding the respective cell entries, taking the sign into consideration. The mean values were obtained by dividing the sums with the total number of stimuli (5 in the present case). The absolute scale value of the stimulus with the largest negative deviation (0.277) was added to all the column means to make the scale value for this stimulus zero and all of the others with positive sign. The hierarchy of extension activities of Agricultural Development Officers at Block level and the scale values are presented in Table 7 and diagrammatically in Fig. 2.

**Table 5. P-matrix corresponding to the F-matrix**

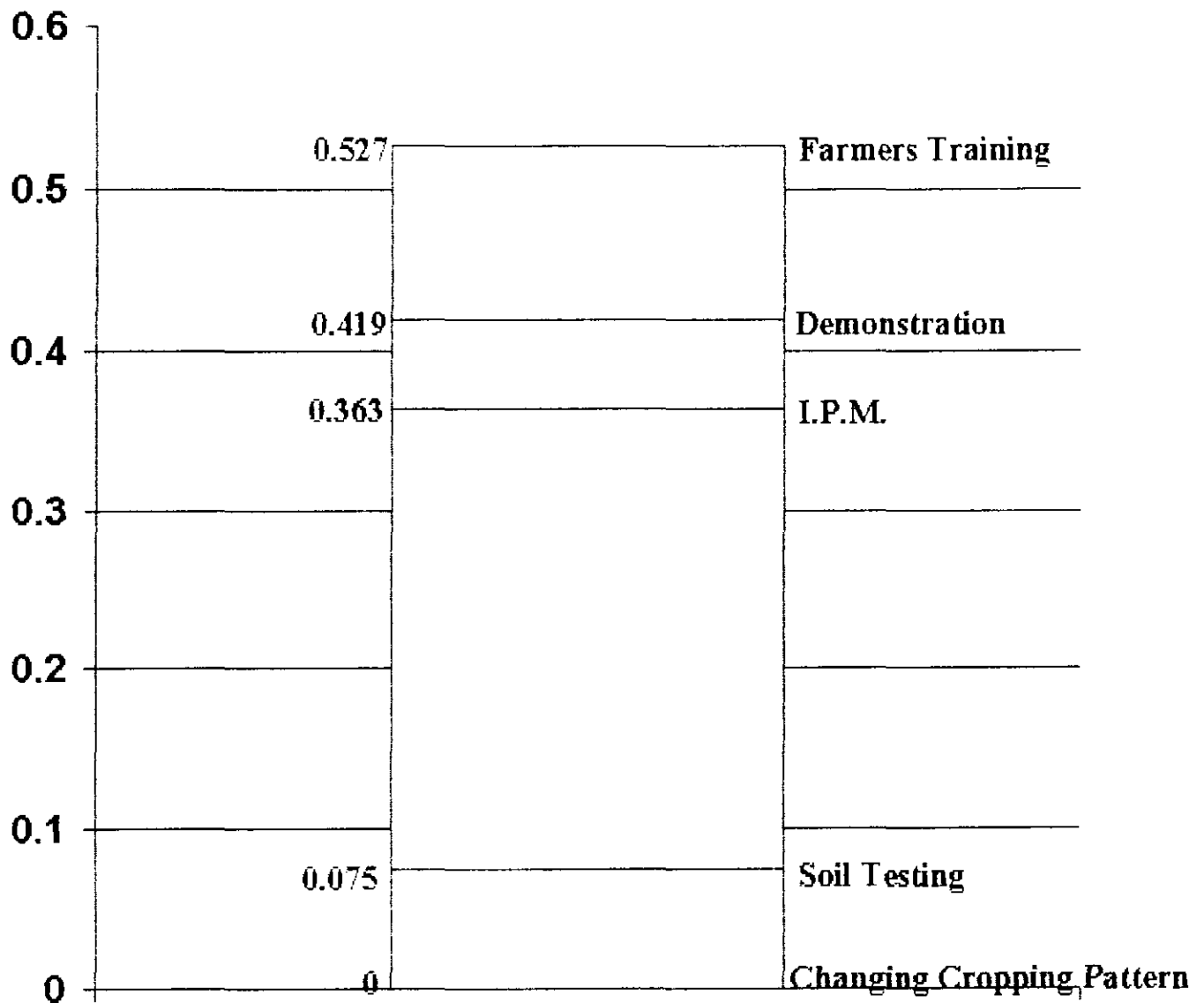
| Extension activities          | Demonstration (A) | Farmers training (B) | I.P.M. (C)   | Changing cropping pattern (D) | Soil testing (E) |
|-------------------------------|-------------------|----------------------|--------------|-------------------------------|------------------|
| Demonstration (A)             | 0.500             | 0.500                | 0.450        | 0.390                         | 0.380            |
| Farmers training (B)          | 0.500             | 0.500                | 0.490        | 0.250                         | 0.290            |
| I.P.M. (C)                    | 0.550             | 0.510                | 0.500        | 0.370                         | 0.400            |
| Changing cropping pattern (D) | 0.610             | 0.750                | 0.630        | 0.500                         | 0.540            |
| Soil testing (E)              | 0.620             | 0.710                | 0.600        | 0.460                         | 0.500            |
| <b>Sums</b>                   | <b>2.780</b>      | <b>2.970</b>         | <b>2.670</b> | <b>1.970</b>                  | <b>2.110</b>     |

**Table 6. Rearranged P-matrix smallest to highest column sum**

| Extension activities          | Changing cropping pattern (D) | Soil Testing (E) | I.P.M. (C)   | Demonstration (A) | Farmers Training (B) |
|-------------------------------|-------------------------------|------------------|--------------|-------------------|----------------------|
| Changing cropping pattern (D) | 0.500                         | 0.540            | 0.630        | 0.610             | 0.750                |
| Soil Testing (E)              | 0.460                         | 0.500            | 0.600        | 0.620             | 0.710                |
| I.P.M. (C)                    | 0.370                         | 0.400            | 0.500        | 0.550             | 0.510                |
| Demonstration (A)             | 0.390                         | 0.380            | 0.450        | 0.500             | 0.500                |
| Farmers Training (B)          | 0.250                         | 0.290            | 0.490        | 0.500             | 0.500                |
| <b>Sums</b>                   | <b>1.970</b>                  | <b>2.110</b>     | <b>2.670</b> | <b>2.780</b>      | <b>2.970</b>         |

**Table 7. Z matrix—hierarchy of extension activities of Agricultural Development Officers**

| Extension activities                  | Changing cropping pattern (D) | Soil Testing (E) | I.P.M. (C)    | Demonstration (A) | Farmers Training (B) |
|---------------------------------------|-------------------------------|------------------|---------------|-------------------|----------------------|
| Changing cropping pattern (D)         | 0.000                         | 0.100            | 0.332         | 0.279             | 0.674                |
| Soil Testing (E)                      | -0.100                        | 0.000            | 0.253         | 0.305             | 0.553                |
| I.P.M. (C)                            | -0.332                        | -0.253           | 0.000         | 0.126             | 0.025                |
| Demonstration (A)                     | -0.279                        | -0.305           | -0.126        | 0.000             | 0.000                |
| Farmers Training (B)                  | -0.674                        | -0.553           | -0.025        | 0.000             | 0.000                |
| <b>Sums Z</b>                         | <b>-1.385</b>                 | <b>-1.011</b>    | <b>0.434</b>  | <b>0.710</b>      | <b>1.252</b>         |
| <b>Mean Z</b>                         | <b>-0.277</b>                 | <b>-0.202</b>    | <b>0.086</b>  | <b>0.142</b>      | <b>0.250</b>         |
| <b>Add largest negative deviation</b> | <b>+0.277</b>                 | <b>+0.277</b>    | <b>+0.277</b> | <b>+0.277</b>     | <b>+0.277</b>        |
| <b>Rank (scale value) R</b>           | <b>0.000</b>                  | <b>0.075</b>     | <b>0.363</b>  | <b>0.419</b>      | <b>0.527</b>         |



**Fig 2: Bar Diagram Showing the Hierarchy of Extension Activities as perceived by the ADOs.**

For internal consistency check the absolute Average Discrepancy (AD) was calculated as per Edwards (1969) and was found to be 0.031. The method of computation has been presented in Appendix-V. Since the absolute Average Discrepancy is quite small, it may be inferred that the scale values obtained in the study are consistent.

The present findings were based on the responses of 100 Agricultural Development Officers spread over 16 agricultural district under six agro-climatic zones of the State. From the Table 7 and Fig. 2 it was found that, out of five extension activities “Farmers Training” had the highest scale value and was considered as the most important extension activity to be carried out by the ADOs of West Bengal.

With the fast growing and changing agricultural technology coupled with the equally changing agrarian structure and extension strategy a farmer has to know more and more about these in full and complete measure. This underlines the importance of extension programmes which are instructional in nature. Farmers’ training seems to be the only “instructional-intensive” extension programme which has the potentiality of comparatively reaching a large number of farmers within a reasonably short span of time (Vashistha, 1987). Several researchers, administrators, extension workers, agricultural technologists as well as farmers concerned with increasing agricultural production, have been emphasizing the importance of training in making the farmer understand and acquire the needed knowledge, skills and attitude about the new technology so that the farmer could derive maximum benefits out of new technology.

Fay (1962) stated –

“Training cultivators with the specific methods of crop production, if universally employed could easily double the current level of yield”.

Johnson (1964) stated -

“In India if the farmers were activated to use modern techniques through training, food deficiency would be wiped out”.

It is common knowledge that the farmers are varied in nature, especially in socio-personal characteristics such as age, education, social participation, mass media exposure, size of land holding etc. Common and blanket training programmes for the farmers will not suit them. In planning an effective training programme, the first essential step is to identify the training needs of farmers. Researches revealed that the training should now be more (i) technology specific, (ii) message specific, (iii) area specific, (iv) target beneficiary specific, (v) time specific, (vi) package of practices and inputs (resources with the target group) specific, (vii) location specific, (viii) market and motivation specific and oriented to and (ix) availability of communication and training facilities. Lack of specificity in any of the areas results in the loss of efforts and may lead to non-adoption, reversion to earlier practices and also tailoring the recommended inputs as per the resources availability with the users.

The second important extension activity as perceived by the ADOs was “Demonstration”. As early as 1928 the Royal Commission on Agriculture in India emphatically stated that –

“in order that agricultural researches may be of use to the cultivators, their results must be given to him in a form in which they become a part of his ordinary practices. In a country where illiteracy is widespread, as it is in India, ocular demonstration is the best method for convincing the cultivating classes the advantages of agricultural improvement”.

The demonstration offer opportunity to use many of the tools of information. In a demonstration, the farmer can see the crop growing, the implements used, the weeds and insect damage being controlled, fertilizer being applied and finally he can see the results when the crop is harvested. Demonstrations were most effective to educated as well as illiterate farmers in adoption of a new technology. According to Van den Ban and Hawkins (1998) demonstration must show clear differences between traditional and recommended practices, and they must be well managed.

Demonstration plot should be kept simple, preferably comparing only the traditional with the improved method on a good-sized field. Demonstration farms can show farmers the effects of change in their farming system, such as a change in crop rotation. Farmers often will accept that the experiences on the demonstration farm are valid for their conditions only if the demonstration farm and farmer are similar to their own situation.

In the context of ever increasing population in India, it has become necessary to follow intensive cropping programme with the continuous introduction of high yielding varieties of different crops in many cases without regarding for their susceptibility to pests along with the application of higher doses of fertilizers, irrigation and indiscriminate use of hazardous pesticides. This has led to the growing tolerance to pesticides in the insect-pests and has severely deteriorated the natural ecological balance.

Integrated way of Pest Management (IPM) is a system that in the context of the associated environment and population dynamics of the pest species (*viz.* insects, diseases, weeds, rodents etc.), utilizes all suitable techniques and methods (*viz.* cultural, mechanical, biological and chemical) in as compatible manner as possible and maintain the pest population below those causing economic injury. In IPM approach, greater emphasis is laid on the use of resistant varieties, conservation and augmentation of biological control agents (friendly insects, spiders, insect and disease pathogens), regular pest surveillance and use of sex pheromones for monitoring pest build up for undertaking economic threshold level (ETL) based IPM operations.

In the State a season long training on IPM in rice has been organized in collaboration with Department of Agriculture, Govt. of India and West Bengal with the financial support and expertise from FAO during February, 1995 to April, 1995. Besides, cluster IPM Demonstration-cum-training on rice have been organized in all the districts of West Bengal since 1994-95 both in *kharif* and in *rabi* season. Till date 200 numbers of Farmers Field School (FFS) have been organized, 1003 numbers of

nominated Extension Trainee Officers and 5,380 numbers farmers have trained (Konar, 1997). It is therefore, logical that the “Integrated Pest Management” as an important extension activity as perceived by the ADOs which was ranked third.

Soil testing for efficient use of fertilizer was ranked as the fourth important extension activity as perceived by the ADOs. It is well known that one of the chief factors responsible for obtaining satisfactory crop yields is the presence of essential plant nutrients in the soil in adequate quantities and in readily utilizable form. For maximum production and rational soil management, a knowledge of the fertility status and physical properties of soil is essential. Soil testing is one of the methods of determining the fertility status of the soils, so that recommendation in regard to deficient nutrients or soil amendments can be made. In fact, soil testing forms an essential part of any scheme of agricultural developments. While making the fertilizer recommendation socio-economic condition and local factors are to be considered. For recommending fertilizer dose the following points should be considered.

1. Initial fertility status of soil
2. Additional produce and the price of additional produce
3. Cost of fertilizers
4. Farm management quality
5. Availability of fertilizers
6. Crop to be grown
7. Possibility of risk involved
8. Productive potentiality of the land.

Changing cropping pattern had been ranked as the fifth and last important extension activities as perceived by the ADOs. In West Bengal farmers particularly the small and marginal farmers are cultivating traditional field crops like rice, potato, jute etc. over the years. They are not getting remunerative market price for their produce. With the existing farming practices farmers are not in a position to cope with the international competition. Although in some urban centred areas farmers had

moved from traditional to commercial production of vegetables, flowers, oilseeds etc. due to availability of good quality seeds and remunerative market price.

The ADOs perceived that this concept on changing cropping pattern has been newly introduced in extension work in the State which may be one of the reason for its low scale value.

### **III. Indicators of effective management of agricultural extension at the Block level**

The Foundation for Organisational Research (1984) defined effective management as the process of achieving organizational goals by optimizing resources, maintaining and improving the internal health of the organization, while contributing to national growth. They used the term 'effective management' interchangeably with 'organisational effectiveness'. Indicators are the principal means by which a monitoring unit keeps track of extension's capability, effectiveness and efficiency.

In the present investigation, it was intended to find out the indicators of effective management of agricultural extension at the Block level. For this purpose the method of Factor Analysis through Principal Component method and varimax rotation technique was adopted. Factor Analysis is a very useful and popular method for extracting minimum number of meaningful reference variables or factors from a multivariate data matrix, accounting for most of the data variance of the original sample set.

To bring out an easily comprehensible simple structure of management factors pertinent to agricultural extension at Block level, Factor Analysis through Principal Component method and varimax rotation technique was done with the responses from 100 Agricultural Development Officers of West Bengal. Factor Analysis involved computation of intercorrelation of variables, eigenvalues, extraction of factors, rotation and interpretation of factors.

### Correlation of variables

At the outset, correlation matrix of 39 variables was computed. The correlation matrix with 39 variables yielded 741 correlation coefficients. Out of them 193 correlation coefficients were positively significant at 1 percent level and 87 correlation coefficients were positively significant at 5 percent level. There was no negatively significant correlation coefficients at 1 or 5 percent level.

### Eigenvalues

The eigenvalues account for all of the original data variance in decreasing order such that each has variance or eigenvalues less than the previous one. The eigenvalues obtained in respect of 39 variables relating to agricultural extension were as follows:

|        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|
| 8.485, | 3.134, | 2.527, | 2.226, | 1.979, | 1.649, | 1.560, |
| 1.477, | 1.370, | 1.270, | 1.188, | 1.054, | 1.002, | 0.895, |
| 0.829, | 0.816, | 0.700, | 0.677, | 0.642, | 0.581, | 0.511, |
| 0.471, | 0.446, | 0.398, | 0.363, | 0.348, | 0.324, | 0.318, |
| 0.267, | 0.226, | 0.219, | 0.209, | 0.179, | 0.159, | 0.142, |
| 0.136, | 0.106, | 0.094, | 0.039, |        |        |        |

For the present investigation, the eigenvalues which were greater than 1, were retained (Kaiser, 1958). In the present set of data, the following 13 eigenvalues were more than 1.

|        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|
| 8.485, | 3.134, | 2.527, | 2.226, | 1.979, | 1.649, | 1.560, |
| 1.477, | 1.370, | 1.270, | 1.188, | 1.054, | 1.002, |        |

The total variance percentage explained by the eigenvalues were as follows:

|        |       |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|-------|
| 21.70, | 8.03, | 6.48, | 5.70, | 5.07, | 4.22, | 4.00, |
| 3.78,  | 3.51, | 3.25, | 3.04, | 2.70, | 2.57, |       |

The cumulative percentage of the eigenvalues were –

|        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 21.70, | 29.73, | 36.21, | 41.91, | 46.98, | 51.20, |
| 55.20, | 58.98, | 62.49, | 65.74, | 68.78, | 71.48, |
| 74.05, |        |        |        |        |        |

It could be observed that the 13 factors represented 74 percent of the total data variance.

### **Extraction of factors**

The Principal Component method as is known, is a method of 'breaking down' a covariance or correlation matrix into a set of orthogonal components or axes equal in number of variates concerned. The number of factors extracted from 39 variables were thirteen.

### **Rotation of factors**

The factors extracted as such are rarely interpretable and have only theoretical significance. It is, therefore, necessary to rotate the factors so that the rotated factors may be meaningfully interpreted.

In the present analysis, the method of 'varimax' rotation as suggested by Kaiser (1958) was used. Varimax rotation ensures maximisation of variance of a variable under a particular factor. According to Harman (1976), the varimax solution seems to be the 'best' parsimonious analytical solution which more nearly approximates simple structure.

Scanning of each factor column for large absolute values in the varimax matrix will identify a few variables with significantly high loading and many others with insignificant loadings. The column showing communality is the total amount of variance of each variable retained in the factors, and was computed by summing the squares of the elements of the factors in each row of the varimax matrix. The rotated factor (varimax) matrix of effective management of agricultural extension resulted after 30 iterations are presented in Table 8.

### **Interpretation of factors**

For interpretation of factors, variables with high factor loading (ignoring sign) and high communality were taken into consideration. In the present investigation variables with factor loading 0.50 and above and communality 0.60 and above were selected.

Table 8. Rotated factor (varimax) matrix of effective management of agricultural extension

| Variables   | Factors |        |        |        |        |        |        |        |        |        |        |        |        | Communi-<br>nality |
|---|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------------------|
|   | 1       | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | 11     | 12     | 13     |                    |
| X <sub>1</sub> Coordination with B.D.O.   | -0.024  | 0.150  | 0.010  | 0.171  | 0.000  | 0.151  | 0.057  | 0.40   | -0.001 | -0.150 | -0.797 | 0.090  | 0.244  | 0.805              |
| X <sub>2</sub> Coordination with Gram Panchayat Pradhan   | -0.099  | 0.158  | 0.051  | 0.217  | -0.022 | -0.062 | -0.094 | 0.037  | 0.014  | 0.186  | -0.059 | -0.044 | 0.776  | 0.741              |
| X <sub>3</sub> Coordination with KPS  | 0.109   | 0.091  | 0.854  | 0.088  | -0.104 | 0.008  | 0.051  | 0.093  | 0.093  | -0.081 | -0.103 | 0.074  | -0.007 | 0.811              |
| X <sub>4</sub> Coordination with S.M.S.   | 0.127   | 0.400  | 0.375  | 0.311  | -0.063 | 0.256  | 0.061  | 0.021  | -0.126 | 0.404  | 0.015  | 0.077  | -0.239 | 0.730              |
| X <sub>5</sub> Coordination with S.A.O.   | 0.080   | 0.134  | 0.503  | -0.033 | 0.054  | 0.435  | 0.061  | 0.189  | -0.344 | 0.216  | 0.137  | -0.068 | 0.155  | 0.721              |
| X <sub>6</sub> Coordination with B.V.S. (Block Veterinary Surgeon)  | 0.092   | 0.249  | 0.247  | 0.720  | 0.035  | 0.235  | 0.108  | -0.126 | -0.098 | 0.027  | -0.249 | 0.184  | -0.004 | 0.840              |
| X <sub>7</sub> Coordination with cooperative inspector  | 0.025   | 0.014  | 0.055  | 0.813  | -0.038 | -0.201 | -0.100 | 0.123  | 0.187  | 0.037  | 0.054  | -0.015 | 0.036  | 0.772              |
| X <sub>8</sub> Coordination with Bank Official  | 0.137   | 0.103  | 0.154  | 0.752  | 0.058  | -0.041 | 0.068  | 0.048  | 0.004  | -0.025 | 0.098  | -0.085 | 0.158  | 0.672              |
| X <sub>9</sub> Coordination with N.G.O.   | 0.144   | 0.160  | 0.153  | 0.316  | 0.094  | 0.177  | 0.073  | 0.004  | -0.036 | -0.145 | 0.589  | 0.195  | 0.114  | 0.636              |
| X <sub>10</sub> Coordination with dealers of agri-business  | 0.115   | -0.255 | 0.081  | 0.101  | 0.084  | 0.354  | 0.194  | 0.035  | 0.282  | -0.042 | 0.580  | 0.199  | 0.186  | 0.743              |
| X <sub>11</sub> Provide up-to-date information to KPS   | -0.065  | -0.089 | 0.181  | -0.111 | -0.082 | 0.149  | -0.100 | 0.101  | 0.629  | 0.137  | 0.017  | 0.281  | 0.065  | 0.604              |
| X <sub>12</sub> Provide up-to-date information to farmer  | 0.040   | 0.042  | -0.084 | -0.116 | 0.001  | 0.813  | 0.091  | -0.010 | 0.145  | 0.075  | 0.050  | 0.023  | -0.036 | 0.725              |
| X <sub>13</sub> Keep himself professionally up-to-date by reading journals, literature, bulletins etc.  | 0.250   | 0.065  | 0.168  | 0.137  | -0.208 | 0.087  | 0.180  | -0.027 | 0.054  | 0.715  | 0.142  | -0.021 | 0.079  | 0.738              |
| X <sub>14</sub> Inform farmers about different schemes under Block programme  | 0.381   | 0.050  | -0.127 | 0.241  | 0.215  | 0.131  | 0.055  | -0.137 | 0.623  | 0.058  | 0.042  | -0.223 | -0.029 | 0.760              |
| X <sub>15</sub> Carry out crop cutting experiment   | 0.281   | 0.150  | 0.127  | 0.136  | 0.020  | 0.001  | 0.168  | 0.241  | 0.609  | -0.070 | 0.086  | 0.105  | -0.047 | 0.619              |
| X <sub>16</sub> Pursue farmers to form Agril. Cooperatives  | 0.477   | 0.189  | 0.131  | 0.308  | 0.146  | -0.022 | 0.032  | 0.131  | 0.204  | 0.157  | 0.240  | 0.126  | -0.328 | 0.663              |
| X <sub>17</sub> Assist farmers in maintaining the cropping patterns for the field.  | 0.030   | 0.109  | 0.421  | 0.109  | 0.431  | 0.187  | 0.235  | 0.159  | 0.392  | 0.161  | 0.064  | -0.086 | 0.045  | 0.696              |
| X <sub>18</sub> In-service training of ADO to develop administrative capability, communication skill, leadership ability, report writing, linkage mechanisms etc. | 0.010   | 0.088  | 0.073  | -0.137 | 0.303  | 0.058  | -0.024 | 0.195  | 0.075  | 0.763  | -0.092 | 0.166  | 0.154  | 0.812              |
| X <sub>19</sub> In-service training of KPS  | 0.143   | 0.544  | 0.065  | -0.049 | 0.114  | 0.350  | -0.154 | 0.146  | -0.014 | 0.248  | -0.015 | 0.219  | -0.272 | 0.687              |
| X <sub>20</sub> Career development training of ADO (to upgrade knowledge, skill and ability)  | 0.084   | 0.039  | 0.246  | 0.146  | -0.004 | 0.260  | 0.068  | 0.737  | 0.141  | 0.133  | -0.091 | -0.071 | -0.060 | 0.761              |
| X <sub>21</sub> Career development training of KPS  | 0.157   | 0.220  | 0.110  | 0.062  | 0.145  | 0.628  | 0.016  | 0.503  | 0.104  | 0.019  | -0.042 | 0.100  | -0.099 | 0.790              |
| X <sub>22</sub> Fortnightly meeting of ADO  | 0.085   | 0.911  | 0.075  | 0.008  | 0.032  | 0.086  | 0.079  | 0.060  | 0.017  | 0.078  | -0.070 | 0.034  | 0.177  | 0.904              |
| X <sub>23</sub> Fortnightly meeting of KPS  | 0.076   | 0.924  | 0.089  | 0.049  | 0.030  | -0.030 | 0.097  | -0.047 | 0.058  | -0.122 | -0.044 | -0.021 | 0.056  | 0.906              |

Contd....

Table 8. Contd...

| Variables   | Factors      |              |              |              |              |              |              |              |              |              |              |              |              | Communality |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|
|   | 1            | 2            | 3            | 4            | 5            | 6            | 7            | 8            | 9            | 10           | 11           | 12           | 13           |             |
| X <sub>24</sub> Training of farmers regarding fertilizer management                                     | 0.653        | 0.076        | -0.045       | -0.143       | 0.055        | 0.172        | 0.322        | -0.029       | 0.148        | -0.101       | 0.063        | 0.164        | 0.140        | 0.757       |
| X <sub>25</sub> Training of farmers regarding water management  | 0.401        | 0.083        | 0.098        | 0.105        | -0.014       | 0.096        | 0.673        | -0.182       | 0.112        | -0.019       | 0.107        | 0.240        | 0.017        | 0.766       |
| X <sub>26</sub> Training of farmers regarding soil health management                                    | 0.148        | 0.108        | 0.075        | -0.056       | 0.228        | 0.040        | 0.776        | 0.277        | -0.006       | 0.151        | -0.038       | -0.063       | -0.081       | 0.810       |
| X <sub>27</sub> Training of farmers regarding post harvest technology                                   | 0.752        | 0.054        | -0.008       | 0.081        | 0.089        | 0.118        | 0.343        | 0.095        | -0.040       | 0.124        | 0.073        | -0.045       | -0.137       | 0.766       |
| X <sub>28</sub> Training of farmers regarding selection of HYV seeds                                    | 0.650        | -0.021       | 0.169        | 0.102        | 0.211        | 0.197        | 0.362        | 0.011        | 0.038        | 0.098        | 0.193        | -0.114       | 0.012        | 0.738       |
| X <sub>29</sub> Training of farmers regarding Hybrid varieties  | 0.708        | 0.230        | 0.306        | -0.050       | 0.116        | 0.287        | 0.039        | 0.119        | 0.033        | 0.147        | 0.012        | -0.142       | 0.115        | 0.808       |
| X <sub>30</sub> Provision of computer based information system at ADO office                            | 0.281        | 0.030        | 0.163        | 0.019        | 0.125        | 0.102        | 0.066        | 0.031        | 0.151        | 0.144        | 0.087        | 0.735        | 0.070        | 0.734       |
| X <sub>31</sub> Provision of Telephone in the ADO office  | 0.173        | -0.040       | 0.105        | -0.069       | 0.149        | -0.161       | 0.168        | 0.627        | 0.042        | 0.044        | 0.157        | 0.385        | 0.301        | 0.784       |
| X <sub>32</sub> Provision of vehicles for increasing mobility of the ADO                                | 0.111        | 0.081        | 0.673        | -0.089       | 0.275        | -0.174       | 0.087        | 0.163        | 0.174        | -0.053       | -0.001       | 0.243        | 0.057        | 0.712       |
| X <sub>33</sub> Importance of crop weather forecasting  | 0.752        | -0.075       | 0.140        | 0.011        | 0.134        | -0.058       | 0.037        | 0.152        | 0.098        | 0.072        | -0.136       | 0.248        | 0.007        | 0.731       |
| X <sub>34</sub> Identification, collection and documentation of I.T.K. (Indigenous technical knowledge) | 0.730        | 0.074        | -0.076       | 0.016        | -0.033       | -0.133       | -0.006       | 0.112        | 0.062        | 0.007        | 0.090        | 0.135        | -0.176       | 0.637       |
| X <sub>35</sub> Motivating farmers for commercial cultivation for better price                          | 0.312        | -0.030       | 0.070        | 0.062        | 0.239        | 0.014        | 0.382        | 0.253        | 0.034        | -0.025       | 0.031        | 0.376        | -0.161       | 0.545       |
| X <sub>36</sub> To inspire people below poverty line to form self help group                            | 0.211        | -0.018       | 0.191        | 0.031        | 0.731        | -0.029       | 0.099        | 0.007        | 0.044        | 0.006        | 0.074        | 0.117        | -0.242       | 0.708       |
| X <sub>37</sub> To inspire panchayat for proper utilization of common property resources                | 0.601        | 0.108        | 0.134        | 0.160        | 0.379        | -0.034       | -0.085       | -0.008       | 0.108        | 0.269        | -0.032       | 0.240        | 0.195        | 0.749       |
| X <sub>38</sub> Dissemination of food preservation technology among the women                           | 0.554        | 0.067        | 0.098        | 0.053        | 0.597        | 0.048        | -0.049       | -0.013       | 0.003        | 0.201        | 0.077        | 0.182        | -0.088       | 0.773       |
| X <sub>39</sub> Development of community seed farm  | 0.150        | 0.071        | -0.239       | -0.026       | 0.727        | 0.105        | 0.199        | 0.100        | -0.028       | -0.080       | -0.003       | -0.006       | 0.261        | 0.750       |
| <b>Percentage of variance</b>   | <b>21.70</b> | <b>8.03</b>  | <b>6.48</b>  | <b>5.70</b>  | <b>5.07</b>  | <b>4.22</b>  | <b>4.00</b>  | <b>3.78</b>  | <b>3.51</b>  | <b>3.25</b>  | <b>3.04</b>  | <b>2.70</b>  | <b>2.57</b>  |             |
| <b>Cumulative percentage of variance</b>  | <b>21.70</b> | <b>29.73</b> | <b>36.21</b> | <b>41.91</b> | <b>46.98</b> | <b>51.20</b> | <b>55.20</b> | <b>58.98</b> | <b>62.49</b> | <b>65.74</b> | <b>68.78</b> | <b>71.48</b> | <b>74.05</b> |             |

### Indicators of effective management of agricultural extension at the Block level

To find out the indicators of effective management of agricultural extension, factors similar in nature were grouped together. The indicators were named on the basis on similarity of variables representing the factors in the group. The indicators were arranged on the basis of total percentage of variance explained by the factors in the group. In this process four indicators of effective management of agricultural extension at the Block level were identified. These are presented in Table 9.

**Table 9. Indicators of Effective Management of Agricultural Extension at the Block level**

| Factors and variables  | Percentage of variance explained by the factors | Indicators of effective management of Agricultural Extension  |
|--|---|---|
| <b>Factor 1</b><br>Training of farmers regarding post-harvest technology<br>Importance of crop weather forecasting<br>Identification, collection and documentation of indigenous technical knowledge<br>Training of farmers regarding hybrid varieties<br>Training of farmers regarding fertilizer management<br>Training of farmers regarding selection of HYV seeds<br>To inspire panchayat for proper utilization of common property resource | 21.70   | <b>1. Capacity Building of Farmers on Resource Management</b> |
| <b>Factor 7</b><br>Training of farmers regarding soil health management<br>Training of farmers regarding water management  | 4.00  |   |
| <b>Total</b>   | <b>25.70</b>                                    |   |
| <b>Factor 2</b><br>Fortnightly meeting of KPS<br>Fortnightly meeting of ADO<br>In-service training of KPS  | 8.03  |   |
| <b>Factor 6</b><br>Provide up-to-date information to farmers<br>Career development training of KPS   | 4.22  |   |

Contd...

**Table 9. Indicators of Effective Management of Agricultural Extension at the Block level**

| Factors and variables   | Percentage of variance explained by the factors | Indicators of effective management of Agricultural Extension               |
|---|---|--|
| <b>Factor 8</b><br>Career development training of ADO to upgrade knowledge, skill and ability<br>Provision of telephone in ADO office   | 3.78  |  |
| <b>Factor 10</b><br>In-service training of ADO to develop administrative capability, communication skill, leadership ability, report writing, linkage mechanism<br>Keep himself professionally up-to-date by reading journals, literature, bulletin | 3.25  | <b>2. Capacity Development of Extension Personnel</b>                      |
| <b>Factor 12</b><br>Provision of computer based information system at ADO office  | 2.70  |  |
| <b>Total</b>  | <b>21.98</b>                                    |  |
| <b>Factor 3</b><br>Coordination with KPS<br>Provision of vehicles for increasing mobility of ADO<br>Coordination with SAO   | 6.48  |  |
| <b>Factor 4</b><br>Coordination with cooperative inspector<br>Coordination with Bank official<br>Coordination with Block veterinary surgeon   | 5.70  | <b>3. Strengthening Collaboration with Rural Development Functionaries</b> |
| <b>Factor 11</b><br>Coordination with BDO<br>Coordination with NGO<br>Coordination with dealers of agribusiness   | 3.04  |  |
| <b>Factor 13</b><br>Coordination with Gram Panchayat Pradhan  | 2.57  |  |
| <b>Total</b>  | <b>17.79</b>                                    |  |
| <b>Factor 5</b><br>To inspire people below poverty line to form Self Help Group<br>Development of community seed farm<br>Dissemination of food preservation technology among the women  | 5.07  |  |
| <b>Factor 9</b><br>Provide up-to-date information to KPS<br>Inform farmers about different schemes under Block programme<br>Carry out crop cutting experiment   | 3.51  | <b>4. Promoting Group Action</b>   |
| <b>Total</b>  | <b>8.58</b>                                     |  |
| <b>Grand total</b>  | <b>74.05</b>                                    |  |

### **Indicator 1: Capacity Building of Farmers on Resource Management**

Indicator 1 consisted of two factors which explained 25.70 percent of the total data variance. Factor 1 and 7 which comprise indicator 1 are explained below:

#### **Factor 1**

Factor 1 accounted for 21.70 percent of the total data variance. Seven variables having high factor loadings and high communality were chosen to interpret this factor. The factor loadings were all positive. The variable and their factor loadings were:

|   |       |
|---|-------|
| X <sub>27</sub> Training of farmers regarding post harvest technology                             | 0.752 |
| X <sub>33</sub> Importance of crop weather forecasting  | 0.752 |
| X <sub>34</sub> Identification, collection and documentation of<br>Indigenous Technical Knowledge | 0.730 |
| X <sub>29</sub> Training of farmers regarding hybrid varieties                                    | 0.708 |
| X <sub>24</sub> Training of farmers regarding fertilizer management                               | 0.653 |
| X <sub>28</sub> Training of farmers regarding selection of HYV seeds                              | 0.650 |
| X <sub>37</sub> To inspire Panchayat for proper utilization of<br>common property resource        | 0.601 |

As a result of varimax rotation in factor matrix, variables X<sub>27</sub> and X<sub>33</sub> had the highest factor loadings of Factor 1. Post harvest technology as comprising all the technique (methods) which reduce the post harvest losses and help economic utilization of crops (including waste) to the maximum as fresh produce or to make nutritious, safe and stable products (Verma and Joshi, 2000). Post harvest loss reduction technology encompasses the usage of optimum harvest factors, reduction of losses in handling, packaging, transportation, storage, processing and preservation with low cost technology. Training of farmers regarding post harvest technology is foremost and most essential task.

From time immemorial the farmer has been aware of the need to know the coming weather in advance. This particular interest of the farmer is reflected in rural proverbs and folklores giving thumbrules for anticipating local weather situation.

Farmers' weather bulletin is a regular, daily feature of the Indian Meteorological Department serving farming community since 1945. Agricultural Development Officers must have a full understanding of the origin, framing, implications and limitations of crop weather forecast for formulating appropriate farming advisories in the light of the available current information on crop condition and agronomic operations. They must educate the farmers in the modern methods for mitigation of weather hazards and help the farmer to get over his customary fatalistic attitude to the effects of weather on crops. They also teach the farmers to shed his apathy to weather forecasts and weather information and cultivate the habit of listening to the farmers' programmes broadcast over the radio.

Indigenous Technical Knowledges (ITKs) are based on experiences, tested in most cases over centuries and endowed with best adaptability to local environment. These are dynamic, holistic, ecofriendly, sustainable; and interwoven and assimilated in the cultural life of the people. Since information on ITK are seldom documented, it often happens that such information are lost, if not passed on from generation to generation or protected and practiced by the local people. Hence, it is imperative to document and protect our valuable ITK for posterity.

Three variables viz.  $X_{29}$ ,  $X_{24}$  and  $X_{28}$  had been chosen from varimax matrix were related to production inputs. For higher yield, knowledge of farmers regarding selection of HYV seeds and hybrid varieties is a *sine qua non*. Similarly for minimizing cost of cultivation judicious application of fertilizers based on soil testing is also essential. The farmers should be trained regarding the proper dose, time and method of fertilizer application.

Jodha (1986) defines Common Property Resources (CPR) as the “resources accessible to the whole community of a village and to which no individual has exclusive property rights”. In other words, a CPR is subject to individual use but not to individual possession. The significance of common property resources lies in their potential to meet the basic needs *i.e.* fuel wood, timber, food, fencing, fodder, green manure, water etc. Despite environmental imperatives supporting the needs for CPRs and quantifiable evidences on their contributions to rural economy, CPRs are on the decline in every parts of India gradually. The ADOs should inspire the local panchayats for proper utilization of common property resources.

#### Factors 7

Factor 7 accounted for 4.00 percent of the total data variability. Two variables were chosen to interpret this factor. The factor loadings were all positive. The variables and their factor loadings were

|  |       |
|--|-------|
| X <sub>26</sub> Training of farmers regarding soil health management | 0.776 |
| X <sub>25</sub> Training of farmers regarding water management       | 0.673 |

Soils are a vital natural resource, on whose proper use depends the life-supporting system and socio-economic development of any country. India is facing a great dilemma between the problems of increasing food production and the deterioration of soil quality. On the one hand, there is an increasing demand for food, fodder and fibre for the existing population. On the other hand, there is an urgent need to maintain the soil health and quality without causing undesirable side effects such as pollution and environmental degradation.

Water is also one of the most important inputs essential for the production of crops. Plant needs it continuously during their life and in huge quantities. Both its shortage and excess affect the growth and development of a plant directly and consequently, its yield and quality. Artificial water - supply through irrigation on one

occasion , and the removal of excess water through drainage on another occasion, therefore, become imperative, if the crops are to be raised successfully. Water management thus comprises irrigation or drainage or both, depending considerably on the environmental conditions, soil, crops and climate. Training of farmers regarding soil health management by judicious application of organic and inorganic manure and maintaining proper crop rotation as well as management of water was essential for increasing production and productivity.

All the variables under Factor 1 and 7 are related with the farmers' training regarding proper mobilization of production inputs and rural resources. Inputs are material aspect of technology, the application of which can bring increased yield and income in an enterprise. Majority of the farmers of the State are small and marginal having poor educational background, deficiency in knowledge skill and ability in mobilizing various production inputs *viz.*, seeds, fertilizers, water, soil health management practices etc.

The new economic policies implemented from early nineteen-nineties and the process of globalization initiated from mid nineties have thrown a series of new challenges on Indian agriculture. Agriculture sector is becoming more and more commercialized. As the farmers are changing from traditional to modern farming practices, adequate knowledge of farmers regarding proper mobilization of these production inputs and resources is a *sine qua non*. In the previous chapter it was found that farmers' training was the most important extension activity as perceived by the ADOs. For proper management of agricultural production inputs and rural resources, capacity building of farmers through continuous education and training is an important task on the part of the ADOs. Capacity building is the application of education and training intervention to enhance knowledge and skills i.e. human capacity of an individual or institution. Capacity development and capacity building replace *training*. Still commonly used as a generic term to discuss diverse learning activities (Skelton *et al.*, 2003). From the above discussion it appears that the most

important indicator of effective management of agricultural extension at Block level is “Capacity Building of Farmers on Resource Management”.

### **Indicator 2: Capacity Development of Extension Personnel**

Indicator 2 consisted of 5 factors which explained 21.98 percent of the total data variance. Factors 2, 6, 8, 10 and 12 jointly comprised indicator 2 are explained below.

#### **Factor 2**

Factor 2 accounted for 8.03 percent of the total data variability. Three variables having high factor loadings and high communality were chosen to interpret this factor. The factor loadings were all positive. The variables and their factor loadings were as follows:

|  |       |
|--|-------|
| X <sub>23</sub> Fortnightly meeting of KPS | 0.924 |
| X <sub>22</sub> Fortnightly meeting of ADO | 0.911 |
| X <sub>19</sub> In-service training of KPS | 0.544 |

One of the important task of the ADOs in West Bengal is to hold a fortnightly meeting with the Krishi Prayukti Sahayaks (KPS) who are working directly with the farmers in the villages. The main purpose of this meeting is to review the work of each KPS and to discuss common problems and lessons of extension work. The meeting provides useful interim forum where the KPS may bring urgent problems to the attention of the ADOs. It is practically useful time for the ADO to review methodological aspect of extension and the impact of his KPS on the farmers.

Training is the process of acquiring specific skills to perform a job better. In-service training of extension personnel like KPS is essential for improving their performance level. In-service training is a problem-centred, learner-oriented and time bound series of activity.

**Factor 6**

This factor accounted for 4.22 percent to the total data variance. Only two variables were chosen to interpret this factor. The variables and their factor loadings were

|  |       |
|--|-------|
| X <sub>12</sub> Provide up-to-date information to farmer | 0.813 |
| X <sub>21</sub> Career development training of KPS       | 0.628 |

Information is a critical resource in the operation and management of agricultural enterprise. Timely availability of relevant information is vital for effective performance of agricultural operations. The ADOs have to collect up-to-date information and disseminate it to the farmers through their field staff like KPS and other extension personnel.

**Factor 8**

This factor accounted for 3.78 percent of the total data variability. Two variables were chosen for interpretation of this factor. The factor loadings were all positive. The variables and their factor loadings were as follows:

|   |       |
|---|-------|
| X <sub>20</sub> Career development training of ADO to up grade knowledge, skill and ability | 0.737 |
| X <sub>31</sub> Provision of Telephone in ADO office  | 0.627 |

Two variables (X<sub>21</sub> and X<sub>20</sub>) *i.e.* career development training of KPS and ADO to upgrade knowledge, skill and ability have fallen under Factor 6 and Factor 8 respectively. This type of in-service training is designed to upgrade the knowledge, skills and ability of employees to help them assume greater responsibility in higher positions. The training is arranged departmentally for successful extension workers, at all levels, for their own continuing education and professional development. Malone (1984) stated that career development is the act of acquiring information and resources that enables one to plan a programme of life-long learning, related to his or her worklife.

Telephone and transport facilitate mobility which are essential for modern organizations. By using telephones the extension personnel can keep contact with the district headquarters, different rural development organizations, as well as with the farmers. This improves speed of communication and involves considerable saving of time, money and labour.

### **Factor 10**

Factor 10 accounted for 3.25 percent of the total data variance. Two variables were chosen to interpret this factor. The factor loadings were positive. These were presented below:

|  |       |
|--|-------|
| X <sub>18</sub> In-service training of ADO to develop administrative capability, communication skill, leadership ability, report writing, linkage mechanism etc. | 0.763 |
| X <sub>13</sub> Keep himself professionally up-to-date by reading journals, literatures, bulletins etc.  | 0.715 |

In-service training is a process of staff development for the purpose of improving the performance of an incumbent holding a position with assigned job responsibilities. It promotes the professional growth of individual. According to Malone (1984) it is a programme designed to strengthen the competencies of extension workers while they are on the job. Different types of in-service training are generally imparted to the ADOs to develop their administrative capability, communication skill, leadership ability, report writing and linkage mechanism.

The role of extension personnel is to keep abreast of current recommendations and findings, related to farm production by reading agricultural journals, literatures bulletins. Lancaster and Sattar (1984) suggested that the information needed by the extension agent should be practical, current, proven and locally relevant.

### Factor 12

Factor 12 accounted for 2.70 percent of the total data variance. Only one variable with high factor loading and high communality was chosen to interpret this factor. The factor loading was positive. This was presented as follows:

|  |       |
|--|-------|
| X <sub>30</sub> Provision of computer based information system at ADO office | 0.735 |
|--|-------|

The increase in accessibility to computers world wide and the new computer communication software packages makes it possible to use the computer as a means for communication and information retrieval. In India a large number of computer aided rural development programmes are being implemented viz., M. S. Swaminathan Information Village Project in Pandicherry, Warna Wired Village Project in Maharashtra, Gyandoot in Madhya Pradesh etc. A computerized information network at Block level relating to availability of good quality production inputs, marketing information, weather forecasting, may enhance the effective management of agricultural extension.

All the variables under Factor 2, 6, 8, 10 and 12 were mostly related with the training and capacity development of extension personnel i.e. ADOs and KPS. According to Skelton *et al.* (2003) Capacity Development (also Human Capacity Development) refers broadly to the comprehensive programme of education, skills training, professional development activities, conferences and other systemic approaches used to improve or enhance the performance of personnel within an institution or sector. Current capacity development strategies therefore tend to include human resources development as well as the building of strong and capable organizations, institutions and nations. The second important indicator of effective management of agricultural extension at Block level emerged as “Capacity Development of Extension Personnel”.

### **Indicator 3: Strengthening Collaboration with Rural Development Functionaries**

Indicator 3 consisted of four factors which explained 17.79 percent of the total data variance. Factors 3, 4, 11 and 13 which comprise indicator 3 are explained below:

#### **Factor 3**

Factors 3 accounted for 6.48 percent of the total data variability. Three variables were chosen to interpret this factor. The factor loadings of all the variables were positive. The variable and their factor loadings were –

|   |       |
|---|-------|
| X <sub>3</sub> Coordination with KPS                                | 0.854 |
| X <sub>32</sub> Provision of vehicle for increasing mobility of ADO | 0.673 |
| X <sub>5</sub> Coordination with SAO                                | 0.503 |

Coordination means establishing harmonious relationship between the efforts of individuals and groups for the accomplishment of enterprise objectives (Ray, 2003). For smooth running of an enterprise coordination is necessary within the organization as well as with outside organizations. For smooth functioning of agricultural development work at Block level the ADOs should maintain good coordination with their office staffs particularly with the KPS, working under their guidance and supervision. The ADOs also had to maintain a good coordination with their higher authority like Sub-Divisional Agricultural Officers.

The study reveals that the total number of Gram Panchayats in 100 study Blocks were 975. This indicates that there are average 10 Gram Panchayats in each agricultural Block. The ADOs and KPS should travel to all the Gram Panchayats in conducting various meetings, field visit etc. For increasing mobility of the extension personnel provision of vehicle is essential.

**Factor 4**

Factor 4 accounted for 5.70 percent of the total data variance. Three variables were chosen to interpret this factor. The factor loadings of all the variables were positive. The variables and their factor loadings were –

|   |       |
|---|-------|
| X <sub>7</sub> Coordination with cooperative inspector    | 0.813 |
| X <sub>8</sub> Coordination with Bank official            | 0.752 |
| X <sub>6</sub> Coordination with Block Veterinary Surgeon | 0.720 |

The ADOs in West Bengal not only had to maintain a good coordination with its line Departments but also to the other Govt. Officials viz. Cooperative Inspector, Bank Official and Block Veterinary Surgeon of the concerned Block for smooth functioning. The extension personnel should be conversant about financing of projects by the banks. Bank officials should be involved in selected extension programmes. The extension agent should be aware of the basics of cooperative societies.

**Factors 11**

Factor 11 accounted for 3.04 percent of the total data variance. Three variables were chosen to interpret this factor. All factor loadings were positive. These were presented below:

|  |       |
|--|-------|
| X <sub>1</sub> Coordination with BDO                       | 0.797 |
| X <sub>9</sub> Coordination with NGO                       | 0.589 |
| X <sub>10</sub> Coordination with dealers of agri-business | 0.580 |

Creation of Block Administration as a Team had been a unique feature for administering development programmes in rural India. Conceptually and functionally it was quite different from the other established Government Offices. Each Block office had a Block Development Officer (BDO) as the head. The BDO is the key person in the whole community development programme. The extension personnel particularly the ADOs should maintain a harmonious relationship with the BDO.

In recent years many observers have suggested that agricultural and rural development strategies would benefit from increased collaboration between Government research and extension organization and non-governmental development organizations, hereafter called GOs and NGOs, respectively (Carrol, 1992).

In rural Bengal the Dealers of agri-business generally sell the agricultural production inputs like seeds, fertilizer, plant protection chemicals to the farmers. In some cases they also advice the farmers regarding the plant protection measures. Closer linkages with the NGO and Dealers of agri-business are important considerations for smooth functioning of agricultural and rural development programme.

### **Factor 13**

Factor 13 accounted for 2.57 percent of the total data variance. Only one variable with high factor loading was chosen which was presented below:

X<sub>2</sub> Coordination with Gram Panchayat Pradhan 0.776

The extension personnel should maintain a harmonious relationship with the grass root level organization particularly with the Pradhans of Gram Panchayat regarding selection of beneficiaries and distribution of inputs/minikits to the farmers. Without proper coordination with panchayat functionaries it is difficult to carry out any rural development programme by the agricultural department alone.

Rural areas have a number of organizations at the local level, which can play a complementary role in improving rural life. The organizations may be grouped into two categories – non profit and profit making organizations. Involvement of these organization at the local level may be regarded as a necessary condition for successful implementation of extension programmes. The extension agent should build up and maintain close contact with these organizations and find out areas of functional coordination with them. All the variables under Factors 3, 4, 11 and 13 were relating to coordination with various rural development organizations at the village level.

Thus it appears that “Strengthening Collaboration with Rural Development Functionaries” emerged as the third important indicator of extension management at Block level.

#### **Indicator 4: Promoting Group Action**

Indicator 4 consisted of two factors which explained 8.58 percent of the total data variance. Factor 5 and 9 which comprise indicator 4 are explained below:

##### **Factor 5**

Factor 5 accounted for 5.07 percent of the total data variability. Three variables were chosen to interpret this factor. The factor loading were all positive. The variables and their factor loadings were –

|   |       |
|---|-------|
| X <sub>36</sub> To inspire people below poverty line to form Self-Help Group  | 0.731 |
| X <sub>39</sub> Development of community seed farm                            | 0.727 |
| X <sub>38</sub> Dissemination of food preservation technology among the women | 0.597 |

In recent years the group approach to various poverty alleviation programmes is getting recognition in India. Self-Help Group has been defined by National Bank for Agriculture and Rural Development (NABARD) in India as “a small, economically homogeneous and affinity group of rural poor, voluntarily formed to save and mutually agree to contribute to a common fund to be lent to its members as per group decision for their socio-economic development”.

The ADOs in West Bengal contemplated that they should encourage the village poor to form Self-Help Group under different projects of poverty alleviation. They should also play an important role in developing community seed farm for the farmers. They also can disseminate food preservation technology among the rural women based on the principle of group approach.

**Factor 9**

Factor 9 accounted for 3.51 percent of the total data variability. Three variables were chosen to interpret this factor. The factor loadings were all positive. The variables and their factor loadings were –

|  |       |
|--|-------|
| X <sub>11</sub> Provide up-to-date information to KPS                        | 0.629 |
| X <sub>14</sub> Inform farmers about different schemes under Block programme | 0.623 |
| X <sub>15</sub> Carry out crop cutting experiment                            | 0.609 |

The ADOs should keep abreast of current recommendations and findings related to farm production by maintaining continuous contact with agricultural research stations. They also train and inform village extension workers particularly the KPS on the latest farm technology and help them in solving field problems.

The ADOs also has the responsibility to inform the farmers particularly those who are illiterate and have no mass media exposure regarding different rural development schemes launched at Block level.

Crop cutting experiment is a scientific estimation of yield of a particular Block/District/State for a particular crop and it expressed in kg/ha. Yield is estimated by taking weight of a particular crop obtained from the selected area, which may be square, rectangular or even circular in shape. The extension personnel particularly the KPS posted in farms and research station has to conduct crop cutting experiments in every plot of his block on every crop.

Group approach can potentially provide greater coverage of the target population than would normally be possible by working with individual farmers. A group approach of extension has the potential to distribute the benefit equally to all categories of farmers in the community. As per the NABARD estimate the number of SHGs existing during September 2002 is 5.00,000 covering over 40 million very poor people. Out of these, about 90 percent are women groups. Organisation of self-help

groups and motivating the group members to carry out projects should be aimed at by the extension personnel at the Block level. So “Promoting Group Action” emerged as the fourth important indicator of effective management of agricultural extension at the Block level.

#### **IV. Most successful extension work conducted by the ADO's and reasons for success**

Agricultural extension, although mostly carried out within the frame work of the agricultural administration, should be considered as a distinct public service, offering knowledge of new agricultural technology to farmers. The primary objective of agricultural extension work has long been dissemination of innovations to increase productivity (cultivation methods, mechanization, new varieties, use of fertilizer, irrigation, new crops etc.). The main aim has been to move from traditional type of farming to a new type of agriculture with strong links to the economy as a whole (Orivel, 1983).

In the present investigation an open-ended question was put to the ADOs regarding the most successful extension work conducted by them during their service period and also to mention the reasons for success. Out of 100 ADOs 72 percent ADOs reported many successful extension activities.

All the extension activities had been grouped into seven categories. These are (1) Integrated Pest Management, (2) Changing cropping pattern, (3) Conducting training of farmers under Integrated Cereal Development Programme (ICDP), (4) Organic farming for sustainable agriculture, (5) Organization of Farmers' Club and Self-Help Group, (6) Demonstration/Training under North Bengal Terai Development Project (NBTDP) and (7) Control of Rice Tungro Virus and Brown Plant Hopper. These had been presented in Table 10 along with the reasons for success.

Table 10 reveals that 26 percent respondents reported that farmers training on Integrated Pest Management of crops, particularly on paddy crop through farmers

Field School was the most successful extension activities. The IPM training educated the farmers to identify the harmful insects, helpful insects and disease symptoms of the crop properly. Farmers learnt regarding harmful effect of overdose of pesticides which lead to the health hazards and causes pollution. The reasons for success were low cost technology, provision of IPM input to farmers, participation of KPS and farmers training.

**Table 10. Successful Extension Work Conducted by ADOs and Reasons for Success**

| Sl. No. | Extension work   | Frequency | Percentage | Rank | Reasons for success  |
|---------|--|-----------|------------|------|--|
| 1.      | <b>Integrated Pest Management (IPM)</b>  | 26        | 26.00      | I    | 1. Low cost technology<br>2. Provision of IPM input to farmers<br>3. Participation of KPS<br>4. Training of farmers on IPM |
| 2.      | <b>Changing cropping pattern</b>   | 21        | 21.00      | II   |  |
|         | (a) Groundnut<br>Introduction of groundnut cultivation among the tribal farmers in Dhupguri, Jalpaiguri district; Nabadwip Block, Nadia district, Goalpukur Block (Uttar Dinajpur) |           |            |      | 1. Availability of local market and remunerative market price<br>2. Good quality seed<br>3. Low water requirement          |
|         | (b) Floriculture<br>Motivated farmers to cultivate seasonal flower like marigold, tuberose, gladiolus at Rajarhat Block (North 24 Pgs.) and at Maynaguri Block, Dist. Jalpaiguri   |           |            |      | 4. Group meeting and field visit<br>5. Active cooperation of Agril. Deptt. N.G.O., BDO & KPS                               |
|         | (c) Oil seeds<br>Introduction of oilseed crop in Sandeshkhali-II Block in <i>Rabi</i> season replacing <i>Boro</i> cultivation   |           |            |      |  |
|         | (d) Banana<br>Introduction of Malbhog (Martaman) banana among 100 farmers in CoochBehar  |           |            |      |  |

Contd...

**Table 10. Successful Extension Work Conducted by ADOs and Reasons for Success**

| Sl. No. | Extension work  | Frequency | Percentage | Rank | Reasons for success   |
|---------|---|-----------|------------|------|---|
|         | (e) Vegetables<br>Cultivation of vegetables at Matiali Block Jalpaiguri and green manure due to installation of River Lift Irrigation   |           |            |      |   |
|         | (f) Conversion of monocropped area to multiple crop at Goghat Block, Hooghly during 1978-85 through Awareness Camp  |           |            |      |   |
| 3.      | <b>Conducting training of farmers under Integrated Cereal Development Programme (ICDP)</b>  | 8         | 8.00       | III  | 1. Demonstration<br>2. Use of HYV seeds<br>3. Soil testing<br>4. Distribution of implements   |
| 4.      | <b>Organic farming for sustainable agriculture</b>  | 7         | 7.00       | IV   | 1. Low cost technology<br>2. Availability of high quality seed<br>3. Use of bio-pesticides, bio-fertilizer<br>4. Cooperation from Panchayat, KPS and Pesticides dealers |
| 5.      | <b>Organisation of Farmers' Club and Self-Help Group</b>  | 5         | 5.00       | V    | 1. Cooperation of Panchayat functionaries<br>2. Cooperation of Bank and NGO   |
| 6.      | <b>Demonstration/Training under North Bengal Terai Development Project (NBTDP)</b><br>(a) Demonstration of wheat under NBTDP<br>(b) Farmers training under NBTDP<br>(c) Preparation of "Soil-cement" channel under NBTDP  | 3         | 3.00       | VI   | 1. Active participation of farmers<br>2. Locally available material<br>3. Low cost rechnology   |
| 7.      | <b>Control of RTV and BPH of rice</b><br>(a) Group meeting of farmers for controlling Rice Tungro Virus at <i>Kharif</i> paddy during 2000 in Malda<br>(b) Skip row transplanting of paddy in Brown Plant Hopper prone area at Bhagawangola-II Block in Murshidabad | 2         | 2.00       | VII  | 1. Cooperation of KPS   |

Changing cropping patterns had been ranked as the second successful extension activity as reported by 21 percent ADOs. Table 10 reveals that in different parts of West Bengal ADOs had introduced many commercial cash crops viz. cultivation of groundnut, floriculture, oilseeds, vegetables, replacing traditional crops for better return. The reasons for success were – availability of local market and remunerative market price, provision of good quality seeds, low water requirement, conducting group meeting and field visit and active cooperation of Agricultural Department, N.G.O., B.D.O. and KPS.

Conducting training of farmers under Integrated Cereal Development Programme (ICDP); organic farming for sustainable agriculture had been reported by 8.00 percent and 7.00 percent ADOs respectively. Only 5 ADOs exhibited their success relating to organization of Farmer's club and self help group with active cooperation of Panchayat and Bank personnel. Only 3 ADOs conducted demonstration/training and helped in preparation of soil-cement channel under North Bengal Terai Development Project (NBTDP) and two ADOs reported their success in controlling Rice Tungro Virus and Brown Plant Hopper of Rice when the disease was widespread.

The important factors of successful extension work derived from the above analysis are summarized below. Irrespective of technology this common factors will be helpful for transfer of technology work.

### **1. Low cost technology**

Technology adoption with varied farming situation is a complex exercise. For successful extension work any technology formulated after under controlled conditions require to be matched, modified and adopted to location specific situation. governed by the environmental factors on the one hand, and the socio-economic condition as well as farmers needs and problems on the other.

## **2. Good quality production inputs**

Availability of good quality production inputs like HYV seeds, tools and implements, agrochemicals at proper time and at a reasonable rate was also an important criteria for successful extension work.

## **3. Rural marketing**

Availability of local market and remunerative market price was also sine qua non for successful extension work. Efforts to improve the marketing system should taken into consideration. Communication of market information, formulation of appropriate production and marketing strategy, and development of infrastructure facilities including storage, transport and air-conditioning etc. was essential for successful extension work.

## **4. Participatory Development Approach**

Participation of extension personnel like KPS, ADOs, Block personnel, NGO as well as formation of Self Help Group, Youth Club, Farmers Interest Group (FIG), Irrigation management Society, Marketing Societies were also essential for successful extension work. The role of extension agency has to be truly that of a facilitator.

## **V. Level of competency of Krishi Prayukti Sahayaks (KPS) as perceived by the ADOs in performing agricultural extension activities**

The term 'skill' and 'competency' have been defined in extension by Weidemann (1977) as an attitude, behaviour, or understanding demonstrated by a learner at a specified level of performance. According to Welford (1976) competency is a synonym of many words with its usage. It might be regarded as knowledge, skill, attitude, ability, capability, proficiency and efficiency. Basically, performance is central to the whole idea of competency whichever way it is used. Individuals on the job could be regarded as competent when they are able to accomplish a set of tasks at a given performance level that involves knowledge, skills and attitude required as a result of training.

In West Bengal it was found that the total number of Krishi Prayukti Sahayaks (KPS) in 100 study Blocks were 958. This figure indicates that average nine KPS are working in a block under the guidance and supervision of ADOs. The present investigation was conducted to find out the competency of KPS in performing the agricultural extension activities at village level and also to explore some specific areas, the KPS are not competent to perform properly. Eight important extension activities relating to agricultural development generally performed by KPS had been identified. The ADOs were asked to assess the level of importance of each extension activity as well as the level of competency of the KPS to perform each activity separately. The mean scores of importance of activity and competency of KPS were presented below.

**Table 11. Distribution of mean scores according to importance and competency**

| Sl. No. | Extension activities of KPS              | Mean score (importance of activity) | Mean score (competency of KPS) |
|---------|--|-------------------------------------|--------------------------------|
| 1.      | Soil sample collection                   | 4.52                                | 3.57                           |
| 2.      | Visiting contact farmers                 | 4.50                                | 3.46                           |
| 3.      | Providing technical advice and feed back | 4.64                                | 3.30                           |
| 4.      | Crop cutting survey                      | 4.36                                | 3.52                           |
| 5.      | Crop demonstration                       | 4.48                                | 3.50                           |
| 6.      | Field survey                             | 4.24                                | 3.27                           |
| 7.      | Disaster management                      | 4.20                                | 2.94                           |
| 8.      | Conducting farmers meeting               | 4.50                                | 3.68                           |
|         | <b>Overall mean score</b>                | <b>4.43</b>                         | <b>3.40</b>                    |

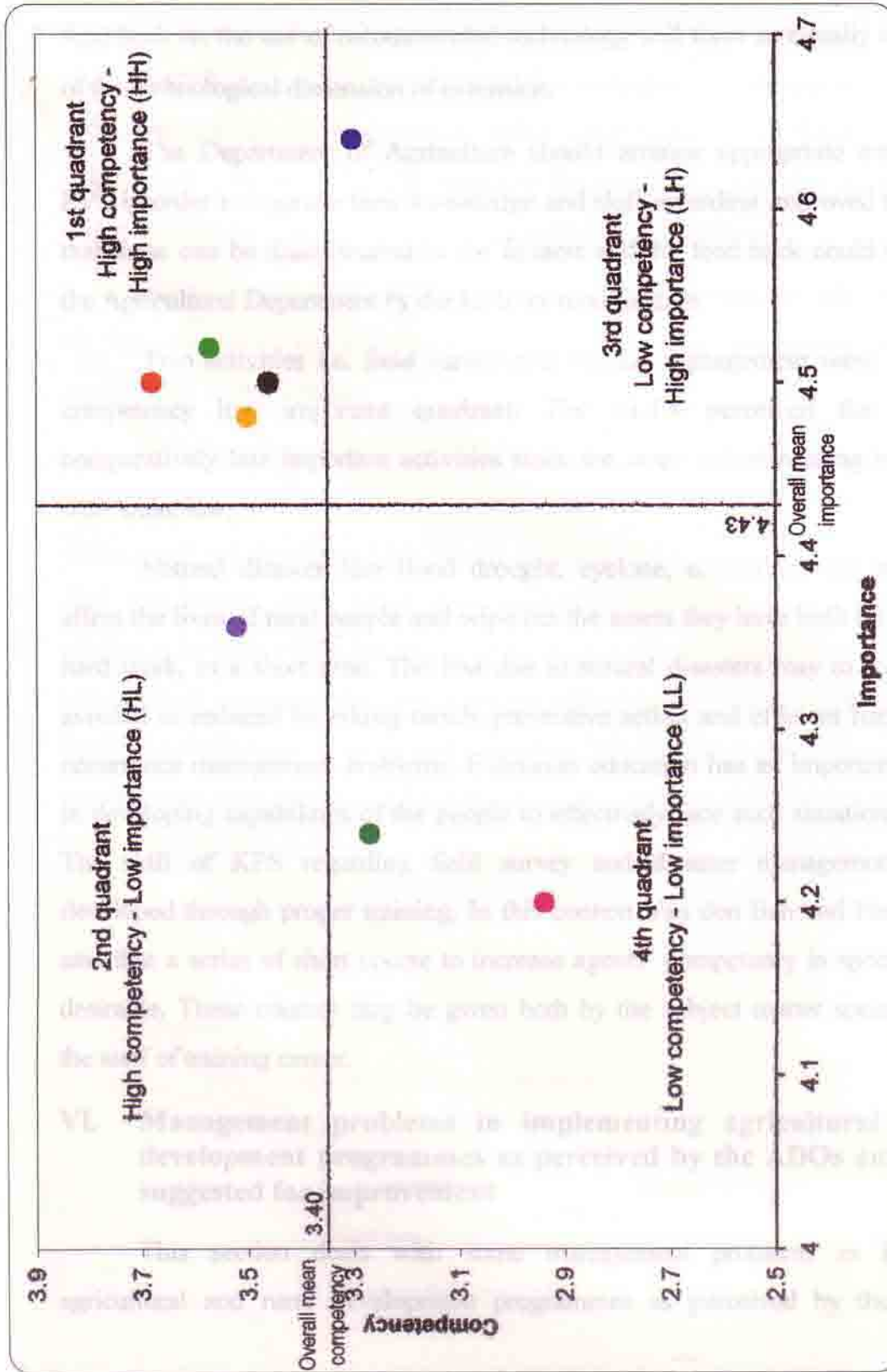
Following Hershkowitz (1973) a  $2 \times 2$  matrix was developed to assess the relative position of the extension activities in the matrix. The overall mean scores relating to importance and competency were plotted on X-axis and Y-axis respectively (Fig. 3). Perpendicular lines were then drawn from these overall mean scores resulting in a  $2 \times 2$  matrix. The matrix had four quadrants – High competency – high importance (HH); High Competency – low importance (HL); Low competency – high importance (LH); and low competency – low importance (LL).

Next, all the extension activities were placed in the matrix on the basis on mean score relating to importance and competency. Those activities falling in the low competency – high importance (LH) quadrant should be given topmost priority followed by the activities falling in low competency – low importance (LL) quadrant. These are presented here:

| Activities  | Mean score of competency |
|---|--------------------------|
| <b>Quadrant 1: High Competency – high importance (HH)</b> |                          |
| Conducting farmers meeting                                | 3.68                     |
| Soil sample collection                                    | 3.57                     |
| Crop demonstration  | 3.50                     |
| Visiting contact farmers                                  | 3.46                     |
| <b>Quadrant 2: High competency – low importance (HL)</b>  |                          |
| Crop cutting survey                                       | 3.52                     |
| <b>Quadrant 3: Low competency – high importance (LH)</b>  |                          |
| Providing technical advice and feed back                  | 3.30                     |
| <b>Quadrant 4: Low competency – low importance (LL)</b>   |                          |
| Field survey  | 3.27                     |
| Disaster management                                       | 2.94                     |

Four activities namely conducting farmers meeting, soil sample collection, crop demonstration and visiting contact farmers had fallen in high competency – high importance quadrant and only one activity viz. crop cutting survey had fallen in high competency – low importance quadrant. The ADOs in West Bengal perceived that these activities were very important (except crop cutting survey) and the KPS were competent to perform these activities.

Only one activity viz. providing technical advise and feed back had fallen in low competency – high importance quadrant. The ADOs perceived that this was an important activity but the KPS were not competent to perform this activity. It had been mentioned in chapter 2, (Review of Literature) that there are several dimension



• Soil sample collection, • Visiting contact farmers, • Providing technical advice and feed back, • Crop cutting survey, • Crop demonstration, • Field survey, • Disaster management and • Conducting farmers meeting

**Fig. 3** Matrix for determining importance of activities and competency of KPS

of extension, of which technological dimension is an important one. Transfer of technology is an essential part of extension in addition to technological package. A feed back on the use of recommended technology will form an equally important part of the technological dimension of extension.

The Department of Agriculture should arrange appropriate training for the KPS in order to upgrade their knowledge and skill regarding improved technology so that these can be disseminated to the farmers and the feed back could be brought to the Agricultural Department by the KPS for modification.

Two activities i.e. field survey and disaster management were fallen in low competency low important quadrant. The ADOs perceived that these were comparatively less important activities since the mean values relating to competency were quite low.

Natural disaster like flood drought, cyclone, earthquake etc. may seriously affect the lives of rural people and wipe out the assets they have built up with years of hard work, in a short time. The loss due to natural disasters may to some extent be avoided or reduced by taking timely preventive action and efficient handling of post occurrence management problems. Extension education has an important role to play in developing capabilities of the people to effectively face such situation (Ray, 2003). The skill of KPS regarding field survey and disaster management should be developed through proper training. In this context Van den Ban and Hawkins (1998) said that a series of short course to increase agents' competency in specific fields are desirable. These courses may be given both by the subject matter specialists and by the staff of training center.

## **VI. Management problems in implementing agricultural and rural development programmes as perceived by the ADOs and measures suggested for improvement**

This section deals with some management problems in implementing agricultural and rural development programmes as perceived by the ADOs and

measures suggested for enhancing the efficiency and effectiveness of Agricultural Extension services in the State.

The term efficiency and effectiveness have been defined by Drysdale and Shute (1989). Efficiency in the agricultural extension service can be defined as the ability of the extension service to utilize scarce resources to facilitate the flow of information from the extension service to the farmer in a way that address the needs of the farming community and national development objectives.

Effectiveness, in the agricultural extension service can be defined as the ability of the extension service to persuade the farming community to adopt the government's programmes.

For the purpose of the present study, the following management functions at Block level were taken into considerations. These are Planning, Financing, Organising and Leading. Each of the management functions had some constraints. The respondents were asked open ended questions to mention most important problems for each of the functional areas of management which they were facing and also suggest measures for organizational effectiveness. These were ranked on the basis of percentage of respondents reporting. The item and sub items of the specific management functions of ADO's at Block level covered in this study were as follows:

Planning

Financing (a) Cash input

(b) Kind input

Organising (a) Staffing

(b) Infrastructural facilities

(c) Coordinating

Leading (a) Supervising

(b) Farmers' participation

(c) Sustainable agriculture

Out of 100 ADO respondents 29 ADOs did not mention any management problems as well as any suggestions for improvement since the total service tenure of these ADOs were less than two years.

### Planning

Planning is decision making and involves selecting and integrating the courses of action that an organization will follow to attain its objectives. Planning is deciding in advance what to do, how to do, when to do, who is to do and with what result. Planning results from the interaction of the two systems – the change agent system and the client system, in the context of their objectives, resources, facilities, constraints and time. The problems in planning at Block level as perceived by the ADOs and measures suggested by them for improvement are presented in Table 12.

**Table 12. Constraints in planning at Block level as perceived by the ADOs and Measures suggested for improvement**

| Sl. No. | Items  | Frequency | Percentage | Rank |
|---------|--|-----------|------------|------|
| 1.      | <b>Perceived Problems</b>  |           |            |      |
|         | (i) Lack of scope of planning at ADOs end and absence of stakeholder during planning | 48        | 48.00      | I    |
|         | (ii) Imposition of planning from higher level for execution                          | 41        | 41.00      | II   |
|         | (iii) Rigid rules and regulations  | 27        | 27.00      | III  |
| 2.      | <b>Suggested Measures</b>  |           |            |      |
|         | (i) Initiation of planning at ADOs end with stakeholder participation                | 51        | 51.00      | 1    |
|         | (ii) Formulation of planning based on local demand and agro-climatic situation       | 32        | 32.00      | II   |
|         | (iii) Flexible rules and regulation and less paper work                              | 24        | 24.00      | III  |

**Planning : constraints and suggestions**

‘Lack of scope of planning at ADOs end’ and absence of stakeholder during planning’ were the most important problems of planning as perceived by the ADOs. Even though plans submitted to Panchayat level, no plan was taken into consideration by the Panchayat Samiti. The ADOs suggested that all the planning should be made at ADOs end with stakeholder participation.

In this context van den Ban and Howkins (1998) said that participation of farmers (stakeholder) can and often be achieved informally. The extension agents can listen very carefully to different types of farmers in their area in order to understand their needs, their goals and their opportunities. This information can and should play an important role in planning the extension programme. They can and should learn from the experiences of the most successful farmers and use this information in formulating extension messages which are tested in the local situation.

‘Imposition of planning from higher level for execution’ and ‘rigid rules and regulations’ were also important problems of planning for which the ADOs suggested that more financial power, provision of flexible rules and regulations should be ensured for better planning at Block level. Besides, the ADOs also suggested that planning should be formulated based on local needs and agro-climatic situation.

**Financing**

Financing is the act or process of proving and/or raising funds. To make planning successful timely and adequate provision of financial resources is of utmost importance for an organization. Similarly sound financial management may be fundamental to success. Poor financial management may on the other hand, often accompanies and contributes to failure.

The constraints perceived by the ADOs in obtaining cash input and kind input from the Govt. are furnished in Table 13 and 14 respectively.

**Table 13. Constraints in obtaining cash input as perceived by the ADOs and measures suggested for improvement**

| Sl. No.                      | Items   | Frequency | Percentage | Rank |
|------------------------------|---|-----------|------------|------|
| <b>1. Perceived Problems</b> |   |           |            |      |
|                              | (i) Lack of financial power of ADOs   | 65        | 65.00      | I    |
|                              | (ii) Inadequate fund for conducting training, meeting etc.                                  | 44        | 44.00      | II   |
|                              | (iii) Insufficient office contingency fund  | 36        | 36.00      | III  |
| <b>2. Suggested Measures</b> |   |           |            |      |
|                              | (i) Financial power of Drawing and Disbursing Officer (DDO) to the ADOs with proper manning | 67        | 67.00      | I    |
|                              | (ii) Provision of advance cash in conducting training meeting                               | 52        | 52.00      | II   |
|                              | (iii) Provision of more contingency fund  | 43        | 43.00      | III  |
|                              | (iv) Provision of revolving fund  | 28        | 28.00      | IV   |
|                              | (v) Provision of TA, DA etc.  | 25        | 25.00      | V    |

**Cash input : constraints and suggestions**

Since the ADOs are not drawing and disbursing officers (DDO), 'lack of financial power' of ADOs' was the most important problem as perceived by the ADOs. Generally the sub-Divisional Agricultural Officers (SAOs) and Principal Agricultural Officer (PAOs) in the District have the financial power of drawing and disbursing cash with the help of cashier. The ADOs suggested that provision of financial power of Drawing and Disbursing of cash to the ADOs should be ensured. Insufficient office contingency fund, inadequate fund for conducting training, meeting were also important problems relating to cash. Besides, inadequate fund for different programmes and insufficient T.A./D.A. were also important problems of cash input. ADOs suggested that provision of more contingency fund, advance cash in conducting farmers training meeting and provision of T.A., D.A. as a solutions to these problems.

### Kind Input: Constraints and Suggestions

‘Supply of input, Minikit late in the season’ was an important problem as perceived by the ADOs. The ADOs suggested ‘provision of input, Minikit well ahead of crop season’. Input should reach to ADO office prior to season so that input distribution may be completed in due time.

**Table 14. Constraints in obtaining kind input as perceived by the ADOs and measures suggested for improvement**

| Sl. No.   | Items   | Frequency | Percentage | Rank |
|-----------|---|-----------|------------|------|
| <b>1.</b> | <b>Perceived Problems</b>                                 |           |            |      |
|           | (i) Supply of input, Minikit late in the season           | 58        | 58.00      | I    |
|           | (ii) Low quality of production input                      | 43        | 43.00      | II   |
|           | (iii) Lack of need based, location specific input         | 22        | 22.00      | III  |
| <b>2.</b> | <b>Suggested Measures</b>                                 |           |            |      |
|           | (i) Provision of input, Minikit well ahead of crop season | 63        | 63.00      | I    |
|           | (ii) Provision of tested and certified Minikit            | 43        | 43.00      | II   |
|           | (iii) Provision of locally demand and need based input    | 25        | 25.00      | III  |

‘Low quality of production input’ and ‘lack of need based, location specific input’ were next important problems for which the ADOs suggested ‘provision of tested and certified minikit’ and ‘provision of locally demand and need based input’.

It has been mentioned earlier that for successful extension work provision of good quality production input like seeds, planting materials, fertilizers etc. was essential at proper time and at a reasonable rate.

### Organising

Organising is determining, assembling and arranging the resources by function and in relation to the whole to meet the planned objectives (Appley, 1954). Organising aims at integrating the available factors into an optimum relationship with a view to putting the plan into action. In the present study staffing, infrastructural facilities and coordinating at the Block level have been investigated.

The organization must be manned with the right type of personnel required for different jobs so delegated or assigned. This is the function of staffing. At the Block level each ADO office has a number of extension personnel and office staff. These are : 1. One Agricultural Extension Officer, (ii) One Assistant AEO, (iii) Headquarters KPS, (iv) Agricultural Clerk (UDC/LDC), (v) ADOs orderly peon, (vi) Night guard/chowkidar, (vii) Fitter mechanics and (viii) One KPS per Gram Panchayat/circle etc.

Infrastructural facilities include the physical facilities of the office of ADO. Without provision of adequate infrastructural facilities such as vehicle, telephone, godown, the ADO office could not function properly.

Coordination means establishing harmonious relationship between the efforts of individuals and groups for the accomplishment of enterprise objectives.

For smooth running of an enterprise coordination is necessary within the organization, as well as with outside organization. Rural areas have a number of organizations at the local level like. Panchayat, Bank and Cooperative. The extension agent should build up and maintain close contact with these organizations and find out areas of functional coordination with them.

The constraints perceived by the ADOs in staffing, Infrastructural facilities and coordinating and suggestions for their improvement are furnished in Table 15, 16 and 17 respectively.

### **Staffing : Constraints and Suggestions**

Worldwide, there are currently more than 6,00,000 extension workers. About 95 percent of extension staff work in public agricultural extension system (Umali and Schwartz, 1994) and 90 percent of extension workers in the world are located in developing countries, over 70 percent in Asia alone. Extension coverage (the ratio of extension personnel to farmer population) by public extension services in developing countries varies from 1 : 1800 to 1 : 3000. Developed countries of Europe. North

America and Asia have ratios averaging about 1 : 400. Although staff numbers are high in many developing countries, staff quality is often low. Poorly trained and motivated personnel, lack of qualified, competent and trusted staff, and staff quality and low morale have been identified (Antholt, 1994 and Nagel, 1997).

**Table 15. Constraints in staffing as perceived by the ADOs and measures suggested for improvement**

| Sl. No.   | Items  | Frequency | Percentage | Rank |
|-----------|--|-----------|------------|------|
| <b>1.</b> | <b>Perceived Problems</b>                                      |           |            |      |
|           | (i) Inadequate training of staff                               | 45        | 45.00      | I    |
|           | (ii) Lack of adequate KPS and other staff                      | 27        | 27.00      | II   |
|           | (iii) Delay in filling up of vacancies                         | 22        | 22.00      | III  |
| <b>2.</b> | <b>Suggested Measures</b>                                      |           |            |      |
|           | (i) Provision of training of the staff                         | 52        | 52.00      | I    |
|           | (ii) Expeditious filling up of vacancies of KPS and other post | 38        | 38.00      | II   |
|           | (iii) Creation of a post of cashier                            | 16        | 16.00      | III  |

A perusal of table 15 revealed that 'Inadequate training of staff' was considered as the most important problem of staffing. About 52 percent ADOs suggested 'provision of training of the staff'.

Training is the process of acquiring specific skills to perform a job better. According to Halim and Ali (1997) there are three approaches to training. In the traditional approach, the training staff designs the objectives, contents, teaching methods etc. In the experimental approach, the goals and other elements of training are jointly determined by the trainers and trainees or their organizations. In performance-based approach to training, goals are measured through attainment of a given level of proficiency.

'Lack of adequate KPS and other staff' and 'Delay in filling up of vacancies' were next important problems of staffing as perceived by the ADOs. For better

functioning of the ADO office as well as to increase organizational effectiveness the ADOs suggested 'expeditious filling up of vacancies of KPS and other post'.

'Creation of a post of cashier'; was also suggested by 16 percent ADOs. This may help the devolution of financial power of Drawing and Disbursing (DDO) to the ADOs.

**Table 16. Constraints in infrastructural facilities of ADO office as perceived by the ADOs and measures suggested for improvement**

| Sl. No.   | Items   | Frequency | Percentage | Rank |
|-----------|---|-----------|------------|------|
| <b>1.</b> | <b>Perceived Problems</b>   |           |            |      |
|           | (i) Lack of vehicle at ADO office   | 68        | 68.00      | I    |
|           | (ii) Lack of telephone  | 22        | 22.00      | II   |
|           | (iii) Lack of Godown  | 18        | 18.00      | III  |
|           | (iv) Lack of computer based information system                                    | 16        | 16.00      | IV   |
| <b>2.</b> | <b>Suggested Measures</b>   |           |            |      |
|           | (i) Provision of vehicle at ADO office/hiring of vehicle at least twice in a week | 68        | 68.00      | I    |
|           | (ii) Provision of telephone   | 22        | 22.00      | II   |
|           | (iii) Provision of computer/internet  | 20        | 20.00      | III  |
|           | (iv) Provision of Godown  | 18        | 18.00      | IV   |

### **Infrastructural facilities: Constraints and Suggestions**

Lack of adequate infrastructural facilities in ADO office often hampered its efficiency. 'Lack of vehicle at ADO office' for increasing mobility was the most important problem as perceived by 68 percent respondents. As a solution to this problem the ADOs suggested 'provision of vehicle at ADO office'. But considering the financial constraints of the Department of Agriculture, provision of vehicle in each Block is not feasible. An alternative way for solution of this problem have been evolved by the ADOs. They suggested the provision for hiring of vehicle at least twice in a week so that they can communicate with the villagers very quickly in conducting training/meeting etc.

Lack of Telephone and Godown have been ranked as second and third important problems respectively and the ADOs have keen desire to have such infrastructural facilities.

It is revealed from Table 2 that the ADOs of West Bengal were highly qualified and about one-fourth ADOs possessed Doctoral Degree in agriculture. A computerized information network at Block level was strongly felt by the ADOs. This may help the farmers in obtaining information relating to availability of good quality production inputs, marketing information, weather forecasting, damage control mechanism etc.

### **Coordinating : Constraints and Suggestions**

Agricultural development depends not only on farmers and the extension organization, but also on many other organizations like Panchayat, Bank, NGO, Public Health, Input Supply agency etc. involved directly or indirectly for rural development. Without the active and whole hearted support and cooperation of these organizations, the extension personnel could not implement the development work timely and efficiently.

A perusal of Table 17 revealed that there was inadequate coordination between extension organization and Block Development Officers (BDO), Panchayat, NGO, and Livestock Department. 'Deployment of ADO's staff by BDO without prior intimation ' was an important problem of coordination as perceived by 31 percent ADOs. Inadequate cooperation from panchayat NGO and Livestock Department was also reported by the ADOs. The elected member of the Panchayat in some cases had biased approach during selection of beneficiary. Besides, contradictory working schedule of different line department sometimes also hamper proper functioning of development work.

**Table 17. Constraints in coordination at Block level as perceived by the ADOs and measures suggested for improvement**

| Sl. No.   | Items   | Frequency | Percentage | Rank |
|-----------|---|-----------|------------|------|
| <b>1.</b> | <b>Perceived Problems</b>   |           |            |      |
|           | (i) Deployment of ADO's staff by BDO without prior intimation                     | 31        | 31.00      | I    |
|           | (ii) Inadequate cooperation from Panchayat NGO and Livestock Department           | 27        | 27.00      | II   |
|           | (iii) Contradictory working schedule of different line Department                 | 22        | 22.00      | III  |
|           | (iv) Vested interest of elected members of Panchayat                              | 21        | 21.00      | IV   |
| <b>2.</b> | <b>Suggested Measures</b>   |           |            |      |
|           | (i) Formation of coordination committee   | 42        | 42.00      | I    |
|           | (ii) Unbiased approach of panchayat functionaries during selection of beneficiary | 25        | 25.00      | II   |

As a solution to these problems the ADOs suggested that 'Formation of Coordination Committee' would remove the hurdles and better harmonious working relationship may be achieved. Besides, the Panchayat functionaries should have an unbiased approach during selection of beneficiary.

According to Malaviya and Sethi (2002) the essence of linkages and coordination is team spirit. This team spirit is volatile substance and it evaporates.

This is happening due to the fact that organization systems are suffering from the diseases of (i) Department isolation, (ii) Personal factionalism, (iii) Mutual recrimination and (iv) Ego-centered role performance. To overcome the linkages and problem of coordination the remedial measures suggested and is being used these days is constitution of coordination committee and other forums.

### Leading

The managerial function of leading is defined as the process of influencing people so that they will strive willingly and enthusiastically towards the achievement

of organization and group goals (Koontz and Others, 1984). In the present investigation, supervising, farmers participation and sustainable agriculture were selected for study.

Supervision is doing something to people in order to cause them to do their assigned tasks properly. According to Benor and Baxter (1984), the purpose of extension supervision is not merely to check that the personnel do their work in a correct, timely manner; more important is the objective of assisting and guiding them to do their assigned tasks effectively.

'The Farmers First' is now is the slogan. Farmers should be at the center of all interactions in agriculture development processes. According to van den Ban and Hawkins (1998) "Participation" has quite different connotations for different people, such as:

- (i) Cooperation of farmers in the execution of the extension programme by attending extension meetings, demonstrating new methods on their farmers, asking their extension agent questions, etc.
- (ii) Organization of the implementation of extension activities by farmers' groups, such as meetings where an extension agent gives a lecture etc.
- (iii) Farmers or their representatives participating in organization of the extension service, in decision making on goals, target groups messages and methods and in evaluating of activities.

According to Roling and Wagemakers (1998) the term "Sustainable Agriculture" implies regenerative practices which optimally use locally available resources and natural processes, such as nutrient recycling; build on bio-diversity; regenerate and develop natural resources; and limit the use of external inputs of agro-chemicals, minerals and non-renewable energy.

The constraints perceived by the ADOs in supervising, farmers participation and sustainable agriculture are furnished in Tables 18, 19 and 20.

**Table 18. Constraints in supervision of agricultural development work as perceived by the ADOs and measures suggested for improvement**

| Sl. No.   | Items   | Frequency | Percentage | Rank |
|-----------|---|-----------|------------|------|
| <b>1.</b> | <b>Perceived Problems</b>                         |           |            |      |
|           | (i) Lack of vehicle for supervision               | 62        | 62.00      | I    |
|           | (ii) Very little time to supervise farmers' field | 48        | 48.00      | II   |
|           | (ii) Lack of supervision from higher authority    | 28        | 28.00      | III  |
| <b>2.</b> | <b>Suggested Measures</b>                         |           |            |      |
|           | (i) Arrangement of vehicles for supervision       | 60        | 60.00      | I    |
|           | (ii) Minimising paper work and official meeting   | 38        | 38.00      | II   |

### Supervising: Constraints and Suggestions

'Lack of vehicle for supervision' was the most important problem as perceived by 62 per cent ADOs. The ADOs suggested for arrangement of vehicles for supervision. About 48 per cent ADOs had reported that due to official work load very little time was available to supervise farmers field. As a solution to this problem they suggested for minimizing paper work and official meeting. Lack of supervision from higher authority was also reported by the ADOs. In this context, van den Ban and Hawkins (1998) also pointed out that extension agents have to spend excessive time writing reports and collecting statistics which are seldom used for improving rural development.

A study of supervisory practices of improve field performance of agricultural extension in Kenya, Malawi, and the Philippines revealed the following effective supervisory practices (Honadle, 1982): (i) Use of collaborative, realistic and result oriented target setting and a daily activity plan, (ii) a need-based participatory evaluation system, (iii) involvement of farmers in decision making and (4) effective communication and use of simple proforma and report procedures. Upto 86 per cent of field agents in South-East Asia reported "friendship" as the most effective way for supervisors to ensure extension workers' reliable performance (Goodell, 1983).

### Farmers' participation: Constraints and suggestions

The ADOs had perceived that poor educational background of farmers was an important factor which hinder peoples' participation in any rural development programme. Besides, political interference during selection of farmers for demonstration, meeting, training etc. was also important problems for low participation of farmers in extension programme.

**Table 19. Constraints in Farmers' participation at Block level as perceived by the ADOs and measures suggested for improvement**

| Sl. No.   | Items   | Frequency | Percentage | Rank |
|-----------|---|-----------|------------|------|
| <b>1.</b> | <b>Perceived Problems</b>   |           |            |      |
|           | (i) Poor educational background of farmers  | 42        | 42.00      | I    |
|           | (ii) Political interference during selection of farmers for demonstration, meeting, training etc. | 32        | 32.00      | II   |
| <b>2.</b> | <b>Suggested Measures</b>   |           |            |      |
|           | (i) Introduction of Participatory Rural Appraisal (PRA) method                                    | 36        | 36.00      | I    |
|           | (ii) Arrangement of farmers training, group discussion etc.                                       | 34        | 34.00      | II   |

As a solution to these problems the ADOs suggested for introduction of Participatory Rural Appraisal (PRA) method. A participatory extension approach not only changes the relationship between the village extension workers and their farmers, but also requires a complete change in the culture of the whole extension organization. For increasing farmers participation the ADOs also suggested for arranging more number of farmers training, group discussion etc.

### Sustainable agriculture: constraints and Suggestions

According to Ray (2003) a necessary condition for sustainable agriculture is that large number of farming households must be motivated to use coordinated resource management. This could be for pest and predator management, nutrient

management, controlling the contamination of aquifers and surface water courses, coordinated livestock management, conserving soil and water resources, seed stock management etc.

**Table 20. Constraints in sustainable agriculture as perceived by the ADOs and measures suggested for improvement**

| Sl. No.   | Items  | Frequency | Percentage | Rank |
|-----------|--|-----------|------------|------|
| <b>1.</b> | <b>Perceived Problems</b>                                    |           |            |      |
|           | (i) Low availability of organic manure                       | 48        | 48.00      | I    |
|           | (ii) Unscientific crop rotation practice                     | 41        | 41.00      | II   |
|           | (iii) Lack of seriousness of farmers about agro-ecosystem    | 37        | 37.00      |      |
|           | (iv) Indiscriminate use of chemical pesticides               | 36        | 36.00      | III  |
| <b>2.</b> | <b>Suggested Measures</b>                                    |           |            |      |
|           | (i) Conducting training programme on sustainable agriculture | 52        | 52.00      | I    |
|           | (ii) Motivating farmers to produce FYM and organic manure    | 43        | 43.00      | II   |
|           | (iii) Making people aware on the concept of IPM              | 42        | 42.00      | III  |
|           | (iv) Organisation of farmers club                            | 24        | 24.00      | IV   |

A perusal of Table 20 reveals that the important constraints of sustainable agriculture as perceived by the ADOs were: low availability of organic manure; unscientific crop rotation practice, lack of seriousness of farmers about agro-ecosystem and indiscriminate use of chemical pesticides.

As a suggested measures the ADOs put more emphasis on conducting training programme on sustainable agriculture. The training programmes should be designed to motivate farmers to produce FYM and organic manure, and awareness of people on Integrated Pest Management (IPM). Besides, they also suggested for organization of farmers club which can play an active role to motivate the farmers in this direction.

## **CHAPTER 6**

# **SUMMARY CONCLUSION AND RECOMMENDATIONS**

## **SUMMARY CONCLUSION AND RECOMMENDATIONS**

The Department of Agriculture, West Bengal decided in 1977 to implement the proposed World Bank Scheme of 'Re-organisation of Extension and Research Services in West Bengal'. Under this scheme the Agricultural Extension Officers at the Block level, upgraded and redesignated step by step as Agricultural Development Officer (ADO), were separated from the set up of the Block Development Officers. He was made accountable for his due discharge of duties, primarily to the Sub-Divisional Agricultural Officer (SAO) and then to the other officers in the hierarchy. The village level workers/Union Agricultural Assistants /Agricultural Demonstrators were to be designated uniformly as "Krishi Prayukti Sahayak" (KPS). In each Block a team of KPS would work under the instruction of the respective ADO, with about 800-1200 farm families being assigned to each. Thus, according to the World Bank Scheme, a single line administration was emerged to look after the agricultural development work of the State. The need for study of some aspects of extension management by the ADOs was felt to make it more effective as an organization for agricultural and rural development at the Block level.

The specific objectives of the study were -

1. To study the educational background and job status of the Agricultural Development Officers (ADOs) of West Bengal;
2. To assess the hierarchy of extension activities as perceived by the ADOs for agricultural development;
3. To find out the indicators of effective management of agricultural extension at the Block level;
4. To identify most successful extension work, conducted by the ADOs and reasons for success;

5. To assess the level of competency of the Krishi Prayukti Sahayaks (KPSs) as perceived by the ADOs in performing agricultural extension activities: and
6. To find out the management problems in implementing agricultural and rural development programmes as perceived by the ADOs and measures suggested for improvement.

Based on extensive review of literature, discussion with the experts of the Department of Agriculture and ADOs and pilot study, a system of important variables which are likely to be related with the extension management by the ADOs was selected.

The field investigation was carried out in West Bengal, India. As per Director of Agriculture, Government of West Bengal (2001) the State had 335 agricultural Blocks in 18 agricultural districts under six agro-climatic zones. After discussion with the experts in the Department of Agricultural Statistics, Bidhan Chandra Krishi Viswavidyalaya, it was decided that about 30 percent of the total ADOs will be taken as sample for study. In this way, out of 335 ADOs, 100 ADOs from all the agro-climatic zones of the State were selected as sample for collection of data. Since the respondents were spread over the whole State, the questionnaire method of data collection was followed. The data were collected from September 2002 to March 2004.

The statistical methods used in this study were Mean, Percentage, The Method of Paired Comparisons and Factor Analysis applying Principal Component Method and Varimax rotation technique.

The important findings are presented according to specific objectives of the study.

#### **I. Educational background and job status of the Agricultural Development Officers (ADOs)**

It was found that most of the Agricultural Development Officers under West Bengal Agricultural Service (Administrative) were young in age, highly educated and qualified in agricultural sciences particularly in crop science and plant protection.

They possessed little experience in their administrative position because about 73 percent of the total ADOs was young *i.e.* upto 35 years old and having total service experience upto 5 years. About 68 percent ADOs were having Post Graduate degree in agriculture and 24 percent were having Doctoral degree as their educational qualification. Regarding specialization in Post Graduate Degree about 60 percent ADOs completed their Master degree in crop science, comprising Agronomy Horticulture, Genetics and Plant Breeding. In Plant Protection Comprising Entomology and Pathology about 20 percent ADOs completed their Post Graduate course and 11 percent ADOs had Master Degree in Agricultural Extension and Agricultural Economics.

About 74 percent of the total respondents attended one or more training programme, while about 26 percent ADOs had not undergone any kind of training programme/seminar in their total service career.

One of the important extension activities of the ADOs was to conduct farmers training. It was intended to find out the extent of training programme organized by the ADOs for the farmers during the last one year prior to data collection. About three-fourth of the total ADOs reported that they had organized farmers training thrice or more than three times during the last one year and about 20 percent ADOs organized farmers training once or twice.

## **II. Hierarchy of extension activities as perceived by the ADOs for agricultural development**

By review of literature and discussion with the experts of the Department of Agriculture at various levels, five extension activities of Agricultural Development Officers (ADOs) at Block level – Demonstration, Farmers' Training, Integrated Pest Management (IPM), Changing cropping pattern and Soil testing were identified. It was intended to find out the relative importance of these five extension activities as perceived by the ADOs. For this purpose, the method of Paired Comparisons (Edwards, 1969) was followed. The five extension activities were presented to the

respondents (ADOs) in pairs, in 10 possible combinations. The respondents were asked to select one extension activity over the other from each pair separately which they considered more important. The relative importance of the extension activities according to their scale values was as follows:

| <b>Extension Activities</b>      | <b>Scale values</b> | <b>Rank</b> |
|----------------------------------|---------------------|-------------|
| Farmers Training                 | 0.527               | 1           |
| Demonstration                    | 0.419               | 2           |
| Integrated Pest Management (IPM) | 0.363               | 3           |
| Soil Testing                     | 0.075               | 4           |
| Changing cropping pattern        | 0.000               | 5           |

### **III. Indicators of effective management of agricultural extension at the Block level**

In the present investigation, it was intended to find out the indicators of effective management of agricultural extension at the Block level. For this purpose, the method of Factor Analysis through Principal Component method and varimax rotation technique was adopted. Factor analysis is a very useful and popular method for extracting minimum number of meaningful reference variables or factors from a multivariate data matrix, accounting for most of the data variance of the original sample set.

To bring out an easily comprehensible simple structure of management factors pertinent to agricultural extension at Block level, Factor Analysis through Principal Component method and Varimax rotation technique was done with the responses from 100 Agricultural Development Officers of West Bengal. Factor Analysis involved computation of intercorrelation of variables, eigenvalues, extraction of factors, rotation and interpretation of factors.

The eigenvalues account for all of the original data variance in decreasing order such that each has variance or eigenvalues less than the previous one.

For the present investigation, the eigenvalues which were greater than 1, were retained. In the present set of data, 13 eigenvalues were more than 1.

For extraction of factors the Principal Component method as is known, is a method of 'breaking down' a covariance or correlation matrix into a set of orthogonal components or axes equal in number of variates concerned. The number of factors extracted from 39 variables were thirteen.

For rotation of Factors the method of 'varimax' rotation was used. *Varimax rotation ensures maximisation of variance of a variable under a particular factor.*

Scanning of each factor column for large absolute values in the varimax matrix, will identify a few variables with significantly high loading and many others with insignificant loadings. The column showing communality is the total amount of variance of each variable retained in the factors, and was computed by summing the squares of the elements of the factors in each row of the varimax matrix.

For interpretation of factors, variables with high factor loading (ignoring sign) and high communality were taken into consideration. In the present investigation variables with factor loading 0.50 and above and communality 0.60 and above were selected.

To find out the indicators of effective management of agricultural extension, factors similar in nature were grouped together. The indicators were named on the basis on similarity of variables representing the factors in the group. The indicators were arranged on the basis of total percentage of variance explained by the factors in the group. In this process four indicators of effective management of agricultural extension at the Block level were identified.

The indicators of effective management of agricultural extension at the Block level, according to their degree of importance as reflected by the percentage of variance explained by the factors in the group were as follows:

| Indicators  | Percentage of variance |
|---|------------------------|
| 1. Capacity Building of Farmers on Resource Management              | 25.70                  |
| 2. Capacity Development of Extension Personnel                      | 21.98                  |
| 3. Strengthening Collaboration with Rural Development Functionaries | 17.79                  |
| 4. Promoting Group Action   | 8.58                   |
| <b>Total</b>  | 74.05                  |

#### **IV. Most successful extension work conducted by the ADO's and reasons for success**

In the present investigation an open-ended question was put to the ADOs regarding the most successful extension work conducted by them during their service period and also to mention the reasons for success. Out of 100 ADOs 72 percent ADOs reported many successful extension activities.

All the extension activities had been grouped into seven categories. These were (1) Integrated Pest Management, (2) Changing cropping pattern, (3) Conducting training of farmers under Integrated Cereal Development Programme (ICDP), (4) Organic farming for sustainable agriculture, (5) Organization of Farmers' Club and Self-Help Group, (6) Demonstration/Training under North Bengal Terai Development Project (NBTDP) and (7) Control of Rice Tungro Virus and Brown Plant Hopper.

The study revealed that about 26 percent respondents reported that farmers training on Integrated Pest Management of crops, particularly on paddy crop through farmers Field School was the most successful extension activities. The IPM training educated the farmers to identify the harmful insects, helpful insects and disease symptoms of the crop properly. Farmers learnt regarding harmful effect of overdose of pesticides which lead to the health hazards and causes pollution. The reasons for

success were low cost technology, provision of IPM input to farmers, participation of KPS and farmers training.

Changing cropping patterns had been ranked as the second successful extension activity as reported by 21 percent ADOs. In different parts of West Bengal ADOs had introduced many commercial cash crops viz. cultivation of groundnut, floriculture, oilseeds, vegetables, replacing traditional crops for better return. The reasons for success were – availability of local market and remunerative market price, provision of good quality seeds, low water requirement, conducting group meeting and field visit and active cooperation of Agricultural Department, N.G.O., B.D.O. and KPS.

Conducting training of farmers under Integrated Cereal Development Programme (ICDP); organic farming for sustainable agriculture had been reported by 8.00 percent and 7.00 percent ADOs respectively. Only 5 ADOs exhibited their success relating to organization of Farmer's club and self help group with active cooperation of Panchayat and Bank personnel. Only 3 ADOs conducted demonstration/training and helped in preparation of soil-cement channel under North Bengal Terai Development Project (NBTDP) and two ADOs reported their success in controlling Rice Tungro Virus and Brown Plant Hopper of Rice when the disease was widespread.

The important factors of successful extension work derived from the above analysis are summarized below.

1. Low cost technology
2. Good quality production inputs
3. Rural marketing
4. Participatory Development Approach

## **V. Level of competency of Krishi Prayukti Sahayaks (KPS) as perceived by the ADOs in performing agricultural extension activities**

In West Bengal it was found that the total number of Krishi Prayukti Sahayaks (KPS) in 100 study Blocks were 958. This figure indicates that average nine KPS are working in a Block under the guidance and supervision of ADO. The present investigation was conducted to find out the competency of KPS in performing the agricultural extension activities at village level and also to explore some specific areas, the KPS are not competent to perform properly. Eight important extension activities relating to agricultural development generally performed by KPS had been identified. The ADOs were asked to assess the level of importance of each extension activity as well as the level of competency of the KPS to perform each activity separately.

Following Hershkowitz (1973) a  $2 \times 2$  matrix was developed to assess the relative position of the extension activities in the matrix. The overall mean scores relating to importance and competency were plotted on X-axis and Y-axis respectively. Perpendicular lines were then drawn from these overall mean scores resulting in a  $2 \times 2$  matrix. The matrix had four quadrants – High competency – high importance (HH); High Competency – low importance (HL); Low competency – high importance (LH); and low competency – low importance (LL).

Next, all the extension activities were placed in the matrix on the basis of mean score relating to importance and competency. Those activities falling in the low competency – high importance (LH) quadrant should be given topmost priority followed by the activities falling in low competency – low importance (LL) quadrant. This is being presented.

| Activities  | Mean score of competency |
|---|--------------------------|
| <b>Quadrant 1: High Competency – High importance (HH)</b> |                          |
| Conducting farmers meeting                                | 3.68                     |
| Soil sample collection                                    | 3.57                     |
| Crop demonstrating  | 3.50                     |
| Visiting contact farmers                                  | 3.46                     |
| <b>Quadrant 2: High competency – low importance (HL)</b>  |                          |
| Crop cutting survey                                       | 3.52                     |
| <b>Quadrant 3: Low competency – high importance (LH)</b>  |                          |
| Providing technical advice and feed back                  | 3.30                     |
| <b>Quadrant 4: Low competency – low importance (LL)</b>   |                          |
| Field survey  | 3.27                     |
| Disaster management                                       | 2.94                     |

Four activities namely conducting farmers meeting, soil sample collection, crop demonstration and visiting contact farmers had fallen in high competency – high importance quadrant and only one activity viz. crop cutting survey had fallen in high competency – low importance quadrant. The ADOs in West Bengal perceived that these activities were very important (except crop cutting survey) and the KPS were competent to perform these activities.

Only one activity viz. providing technical advise and feed back had fallen in low competency – high importance quadrant. The ADOs perceived that this was an important activity but the KPS were not competent enough to perform this activity. Transfer of technology is an essential part of extension in addition to technological package. A feed back on the use of recommended technology will form an equally important part of the technological dimension of extension.

The Department of Agriculture should arrange appropriate training for the KPS in order to upgrade their knowledge and skill regarding improved technology so that these can be disseminated to the farmers and the feed back could be brought to the Agricultural Department by the KPS for modification.

Two activities *i.e.* field survey and disaster management were fallen in low competency low important quadrant. The ADOs perceived that these were comparatively less important activities since the mean values relating to competency were quite low.

The skill of KPS regarding field survey and disaster management should be developed through proper training.

#### **VI. Management problems in implementing agricultural and rural development programmes as perceived by the ADOs and measures suggested for improvement**

Management functions of Agricultural Development Officers Like Planning, Financing, Organising and Leading were taken up for the present investigation. The respondents were asked open ended questions to mention important problems which they were facing in each of the management functions at the Block level. They also suggested important measures to improve organizational effectiveness. These were ranked on the basis of percentage of respondents reporting.

##### **Planning : Constraints and Suggestions**

The important problems of planning as perceived by the ADOs were: Lack of scope of planning at ADOs end and absence of stakeholder during planning; imposition of planning from higher level for execution.

The suggested measures were: Initiation of planning at ADOs end with stakeholder participation; Formation of planning based on local demand and agro-climatic situation; flexible rules and regulation and less paper work etc.

##### **Financing : constraints and suggestions**

To make planning successful timely and adequate provision of financial resources both cash and kind input is of utmost importance for an organization. The important problems of financing were: Lack of financial power of ADOs; Inadequate fund for conducting farmers training, meeting; supply of input; minikit late in the season, low quality production input etc.

The ADOs suggested for devolution of financial power of Drawing and Disbursing Officer (DDO) to the ADOs with proper manning; provision of advance cash in conducting farmers training, meeting etc.; provision of input, minikit well ahead of crop season, provision of tested and certified minikit etc.

### **Organising : Constraints and Suggestions**

Organising is determining, assembling and arranging the resources by function and in relation to the whole to meet the planned objectives. In the present study staffing, infrastructural facilities and coordinating at the Block level have been investigated.

The important problems of organizing were: Inadequate training of staff; lack of adequate KPS and other staff; lack of vehicle at ADO office, lack of telephone and computer based information system; Deployment of ADO's staff by BDO without prior initiation. Inadequate cooperation from Panchayat, NGO and Livestock Department etc.

The suggested measures were: provision of training of staff; expeditious filling up of vacancies of KPS and other post; creation of a post of cashier; provision of vehicle at ADO office or hiring of vehicle at least twice in a week; provision of telephone, computer/internet; formation of coordination committee etc.

### **Leading : Constraints and Suggestions**

The managerial function of Leading is a process of influencing people so that they will strive willingly and enthusiastically towards the achievement of organization and group goals. In the present investigation, supervising, Farmers participation and sustainable agriculture were selected for study.

The important problems relating to Leading as perceived by the ADOs were: Lack of vehicle for supervision; very little time to supervise farmers field; lack of supervision from higher authority; poor educational background of farmers; political interference during selection of farmers for demonstration, meeting, training, etc. The

problems relating to sustainable agriculture were – Low availability of organic manure; unscientific crop rotation practice, indiscriminate use of chemical pesticides etc.

The ADOs suggested that arrangement of vehicles for supervision and minimizing paper work and official meeting may improve supervision of agricultural development work. For enhancing farmers participation, Introduction of Participatory Rural Appraisal (PRA) method as well as more number of farmers training, group discussion should be arranged.

For sustainable agriculture the ADOs suggested for motivating farmers to produce FYM and organic manure; making people aware on the concept of Integrated Pest Management (IPM) and organization of farmers club.

## **CONCLUSION AND RECOMMENDATIONS**

In West Bengal the Director of Agriculture is the topmost official at the State Head quarter. The Agricultural Development Officers (ADOs) occupy the lowest position in the administrative set up. At Block level the ADO and KPS may be regarded as the “interface” between the rural people and Government extension personnel as rural people generally approach the ADO/KPS for agricultural information and advice.

On the basis of the present investigation, the following conclusions and recommendations may be made in respect of extension management by the Agricultural Development Officers at the Block level in West Bengal.

1. Most of the ADOs under West Bengal Agricultural Service (Administrative) were young, highly educated and specialized in agricultural sciences particularly in crop science and plant protection. But their service tenure as ADO was quite low and they possessed little experience in their administrative position.

Adequate training programmes particularly pre-service and in-service training may be imparted to develop their administrative capability, communication skill, leadership ability and linkage mechanism.

2. The success of extension personnel at the Block level (ADOs and KPS) shall depend on the extent to which they can effectively perform the management functions like capacity building of farmers on resource management through farmers training, demonstration, group meeting etc.; strengthening collaboration with rural development functionaries viz. Panchayat, Bank, NGO etc.; and promoting group action *i.e.* formation of Self-Help Group, Farmers Club etc.
3. For any successful extension programme and transfer of technology, capacity building of stakeholders (*i.e.* farmers) through education and training is a sine qua non. Capacity building of farmers on resource management emerged as the most important indicator of extension management at Block level.

The Department of Agriculture may concentrate in the Farmers training programme and field demonstration that improve the educational level of farmers on input use, availability, time and method of application of inputs (seeds, fertilizers, pesticides, credit etc.), prices, market etc. especially in food crops. To facilitate conducting farmers training, the required amount may be paid to the ADOs in advance.

4. The findings revealed some important ingredients of successful extension work. These were - low cost technology; provision of good quality production inputs, availability of rural marketing facilities and participatory development approach which means active participation of KPS, ADO, NGO, Bank personnel, Panchayat as well as formation of Self-Help Group, Farmers' Interest group etc.

Before dissemination of any new technology or introducing a new crop to the farmers, timely availability of essential inputs may be ensured by the Department of Agriculture. Otherwise, the farmers are likely to suffer economically.

5. The study also revealed that the level of competency of the Krishi Prayukti Sahayaks in performing agricultural extension activities was not up to the mark. The ADOs perceived that in some specific areas, performance level of the KPS was satisfactory. But in some important areas like providing technical advice and feedback; conducting field survey and disaster management, the KPSs possessed little competency. Providing latest technology to the farmers and presenting feedback to the research scientists or subject matter specialist is an important job of the KPS at village level.

The Department of Agriculture may organise adequate training programmes for the KPS to develop their skill and competency in the areas where they are lagging behind.

6. A computerized information network at the Block level relating to availability of good quality production inputs, marketing information, weather forecasting, damage control mechanism etc. may enhance effective management of agricultural extension. Setting up of computerized 'Rural Knowledge Centres' shall facilitate empowerment of the rural community.

In this era of information technology, extension personnel will also have to acquire the latest knowledge as well as skills using computers, multimedia, internet etc.

7. Several studies revealed that farmers generally seek agricultural information and advice from the progressive farmers in the neighbourhood and in most cases they approach the dealers of agribusiness.

A participatory extension approach may be more fruitful in bridging the gap between the Govt. bureaucracy and rural people. For sustainable

agricultural development, participation of voluntary organizations like NGOs, input dealers, Bank personnel, Panchayat is considered essential apart from active participation of Govt. extension personnel.

8. The management problems as perceived by the ADOs are to be continuously assessed. Lack of financial power of ADOs, lack of scope of planning at ADOs end and absence of stakeholder during planning, inadequate and delay in getting fund for conducting farmers training/meeting, supply of input, minikit late in the season and low quality production input, lack of vehicles at ADO office etc. are some of the problems which may be critically examined.

On the basis of survey of the problems in Planning, Financing, Organising and Leading, a number of suggestions from the ADOs have emerged. These may be considered by the Department of Agriculture for adoption to enhance the efficiency and effectiveness of extension organization at the Block level.

# **CHAPTER 7**

## **FUTURE SCOPE OF RESEARCH**

## **FUTURE SCOPE OF RESEARCH**

1. The present study was conducted with some dimensions of extension management by Agricultural Development Officers of West Bengal. This type of study may be conducted with extension personnel of other disciplines like Horticulture, Veterinary and Animal Science, Fishery etc.
2. Similar study may be conducted with the Krishi Prayukti Sahayak (KPS) who are the lowest level functionaries in the Department of Agriculture.
3. The present study was conducted with the ADOs under West Bengal Agricultural Service (Administrative) only. Similar type of study may be conducted with the ADOs under West Bengal Agricultural Service (Research).
4. This type of study may be conducted with the ADOs/AEO in other States to arrive at some generalizations.
5. Similar study may be replicated with women extension personnel to derive some unique gender issues in this area.
6. In the changed global scenario, WTO etc., the role, area and scope of agricultural extension personnel in terms of value addition process in agriculture may be studied.
7. Similar type of study may be conducted to assess the capability of any extension system in post disaster management.

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# **APPENDICES**

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## APPENDIX-I

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### BIDHAN CHANDR KRISHI VISWAVIDYALAYA



P.O. Krishi Viswavidyalaya (741 252), Dist. Nadia, West Bengal  
Phone: Office (033) 2587-22275/22277/From Calcutta 9173-222666;  
Residence at Mohanpur (03473) 222444/From Calcutta 9173-222444;  
FAX: 03473-22275/22277/From Calcutta 9173-22275/22277  
e-mail:vcbckv@vsnl.net/ddasgupta70@hotmail.com

**Prof. Debabrata Das Gupta**  
Vice-Chancellor

D.O.No.VC/BCKV/G8/28/123  
Date: August, 8, 2002

Dear Dr. Trivedi,

One of our Ph. D. students, **Shri Nirmal Kumar Patra**, has been working on a problem "*Extension Management by Agricultural Development Officers of West Bengal*", under the supervision of Dr. Sagar Mondal, Senior Lecturer in Agricultural Extension of this Viswavidyalaya. The study aims at understanding the mechanism of organizing extension services by the Agricultural Development Officers and also identify the contributory factors influencing efficient extension management at field level.

A questionnaire has been evolved for collection of relevant information from all the Agricultural Development Officers of the State of West Bengal, attached to the Administrative Wing of your Directorate. The information thus collected, will be utilized for the purpose of the research study only, leading to the award of Ph. D. degree of Shri Patra.

I request you to kindly permit Shri Patra to canvass the questionnaire, both personally as well as through mail, to elicit the information. I would also request you to kindly issue necessary orders to the concerned quarters, so that the ADOs extend all possible help by way of providing necessary information to make the endeavour successful. The findings of the study will be shared with you at the completion of the work with due acknowledgement. A copy of the questionnaire is enclosed for your kind perusal.

With best regards,

Yours sincerely,

**(D. Das Gupta)**

**Dr. N. Trivedi.**  
Director of Agriculture & Ex-Officio Secretary,  
Department of Agriculture, Govt. of West Bengal,  
Writers' Buildings, Kolkata-700 001

Encl: As stated.

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## APPENDIX-II

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### BIDHAN CHANDRA KRISHI VISWAVIDYALAYA DEPARTMENT OF AGRICULTURAL EXTENSION

From:  
**Dr. Sagar Mondal**  
Reader



P.O. Krishi Viswavidyalaya  
Mohanpur, Nadia, West Bengal  
Pin – 741 252  
Phone (03473) 222655  
FAX: (03473) 233273/233275/233277  
e-mail: mmabckv@vsnl.net

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Ref. No.

Dated: September 14, 2002

To  
The A.D.O.

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Sir,

**Shri Nirmal Kumar Patra**, Ph. D. Research Scholar has been working on a problem “Extension Management by Agricultural Development Officers of West Bengal” under my supervision. For this purpose a questionnaire/interview schedule has been evolved for collection of relevant information from all the ADOs (Administrative) of West Bengal. The Director of Agriculture and Ex-Officio Secretary, Govt. of West Bengal, after going through the questionnaire has been pleased to grant me permission for conducting research on the topic (Letter of the Director of Agriculture and Ex-Officio Secretary, Govt. of West Bengal, enclosed herewith).

This is also for your kind information that since it is a Ph. D. research study, the information thus collected will be utilized for the research work only and will not be used or presented for any other purposes or forum. Your responses will be kept absolutely confidential. The findings will be presented after undertaking statistical analyses, without any reference to the source of information.

Só, you are earnestly requested to fill up the entire questionnaire to make the endeavour successful.

Thanking you,

Yours sincerely,

Dated, Mohanpur ....., 2002

**(Sagar Mondal)**

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**APPENDIX-III**

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**Directorate of Agriculture, West Bengal  
Writers' Buildings, Kolkata-700 001**

Memo No. 1178(17)PS/Dated, Kolkata the 19/8/2002

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To  
The Principal Agriculture Officer  
P.O. & Dist. \_\_\_\_\_

Sri Nirmal Kumar Patra, a Ph. D. Research Scholar in Agricultural Extension, Bidhan Chandra Krishi Viswavidyalaya is conducting a study on "Extension Management by Agricultural Development Officers of West Bengal" under the supervision of Dr. Sagar Mondal, Senior Lecturer in Agricultural Extension, Bidhan Chandra Krishi Viswavidyalaya.

Sri Patra may approach with a Questionnaire for collection of the required data. You may please instruct the Agricultural Development Officers to furnish replies to the Questionnaire appropriately. The results of the study are likely to be useful to improve the functioning of the Department of Agriculture, West Bengal.

Enclosure: Questionnaire

Director of Agriculture & Ex-Officio  
Secy. Agri. Deptt. West Bengal

Memo No. 1178/1(2)PS/Dated, Kolkata the 19/8/2002.

Copy forwarded for information to

1. The Dean, Faculty of Agriculture, BCKV, Mohanpur, Nadia.
2. Dr. Sagar Mondal, Senior Lecturer, in Agricultural Extension, BCKV, Mohanpur, Nadia.

Director of Agriculture & Ex-Officio  
Secy. Agri. Deptt. West Bengal

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## APPENDIX-IV

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### BIDHAN CHANDRA KRISHI VISWAVIDYALAYA DEPARTMENT OF AGRICULTURAL EXTENSION

#### QUESTIONNAIRE

*To be filled up by the West Bengal Agricultural Service (Administrative)*

- Block ..... Panchayat Samiti .....
- District ..... Total No. of K.P.S. in the Block .....
- Sub-Division ..... Total No. of Gram Panchayat in the  
Range ..... Block .....
1. Name of the A.D.O. .... Age ..... years
2. Educational Qualification : Graduate/Master Degree/Doctorate
3. Field of specialization (in M. Sc.) : Agronomy/Horticulture/Soil Science/ Entomology/  
Agricultural Extension/Genetics & PB./Plant  
Pathology/Agricultural Economics/ Agricultural  
Engineering/Others.
4. Work experience in the organization : Upto 5 years/Upto 10 years/Upto 15 years/above  
(As A.D.O.) 15 years
5. No. of years in the present post ..... years
6. Please State the type of Seminar/Symposium/Training programme in State level and  
above you have attended during the last three years? State duration of each.
- | Type of programme | Duration (in days) |
|-------------------|--------------------|
|                   |                    |
7. How often you have organized training programme for the farmers during the last one  
year? (a) once (b) twice, (c) thrice and (d) more

## II. Hierarchy of extension activities as perceived by the ADOs for agricultural development

Some important extension activities are usually conducted by the A.D.O. These are (A) Demonstration, (B) Farmers' Training, (C) I.P.M., (D) Changing cropping pattern and (E) Soil Testing. These five activities have been presented in all possible pairs (i.e. Total 10 pairs). Please select one activity from each pair which you consider more important (Please put a Tick (√) mark in one item from each pair and total ten tick marks against ten pairs).

- |                               |                               |
|-------------------------------|-------------------------------|
| (A) Demonstration             | (A) Demonstration             |
| (B) Farmers ' Training        | (D) Changing cropping pattern |
| (C) I.P.M.                    | (B) Farmers' Training         |
| (E) Soil Testing              | (C) I.P.M.                    |
| (A) Demonstration             | (C) I.P.M.                    |
| (C) I.P.M.                    | (D) Changing cropping pattern |
| (D) Changing cropping pattern | (B) Farmers' Training         |
| (E) Soil testing              | (E) Soil testing              |
| (B) Farmers' Training         | (A) Demonstration             |
| (D) Changing cropping pattern | (E) Soil testing              |

## III. Indicators of effective management of Agricultural Extension at Block level

You are working as A.D.O. for quite a number of years. Please let me know from your experience the extent to which you consider the following items important for effective management of extension organization. At first read all the items (statements). Then put a tick mark (√) in appropriate coloum (box) against each item (Total 39 Tick marks against 39 items).

| Sl. No. | Statements  | Very important | Important | Moderately important | Less important | Unimportant |
|---------|---|----------------|-----------|----------------------|----------------|-------------|
| 1.      | Coordination with B.D.O.  |                |           |                      |                |             |
| 2.      | Coordination with Gram Panchayat Pradhan  |                |           |                      |                |             |
| 3.      | Coordination with KPS   |                |           |                      |                |             |
| 4.      | Coordination with S.M.S.  |                |           |                      |                |             |
| 5.      | Coordination with S.A.O.  |                |           |                      |                |             |
| 6.      | Coordination with B.V.S. (Block Veterinary Surgeon)   |                |           |                      |                |             |
| 7.      | Coordination with Cooperative Inspector   |                |           |                      |                |             |
| 8.      | Coordination with Bank Official   |                |           |                      |                |             |
| 9.      | Coordination with N.G.O.  |                |           |                      |                |             |
| 10.     | Coordination with dealers of agri-business  |                |           |                      |                |             |
| 11.     | Provide up-to-date information to KPS   |                |           |                      |                |             |
| 12.     | Provide up-to-date information to farmer  |                |           |                      |                |             |
| 13.     | Keep himself professionally up-to-date by reading journals, literatures, bulletins etc.   |                |           |                      |                |             |
| 14.     | Inform farmers about different schemes under Block programme  |                |           |                      |                |             |
| 15.     | Carry out crop cutting experiment   |                |           |                      |                |             |
| 16.     | Persue farmers to form agril. cooperatives  |                |           |                      |                |             |
| 17.     | Assist farmers in maintaining the cropping patterns for the field   |                |           |                      |                |             |
| 18.     | In service training of A.D.O. to develop administrative capability, communication skill, leadership ability, report writing, linkage mechanism etc. |                |           |                      |                |             |
| 19.     | In-service training of K.P.S.   |                |           |                      |                |             |
| 20.     | Career development training of A.D.O. (To upgrade knowledge, skill and ability)   |                |           |                      |                |             |

| Sl. No. | Statements  | Very important | Important | Moderately important | Less important | Unimportant |
|---------|---|----------------|-----------|----------------------|----------------|-------------|
| 21.     | Career development training of K.P.S.   |                |           |                      |                |             |
| 22.     | Fortnightly meeting of A.D.O.   |                |           |                      |                |             |
| 23.     | Fortnightly meeting of K.P.S.   |                |           |                      |                |             |
| 24.     | Training of farmers regarding fertilizer management                                     |                |           |                      |                |             |
| 25.     | Training of farmers regarding water management  |                |           |                      |                |             |
| 26.     | Training of farmers regarding soil health management                                    |                |           |                      |                |             |
| 27.     | Training of farmers regarding post harvest technology                                   |                |           |                      |                |             |
| 28.     | Training of farmers regarding selection of HYV seeds                                    |                |           |                      |                |             |
| 29.     | Training of farmers regarding Hybrid varieties  |                |           |                      |                |             |
| 30.     | Provision of computer based information system at A.D.O. office                         |                |           |                      |                |             |
| 31.     | Provision of Telephone in the A.D.O. office   |                |           |                      |                |             |
| 32.     | Provision of vehicles for increasing mobility of the A.D.O.                             |                |           |                      |                |             |
| 33.     | Importance of crop weather forecasting  |                |           |                      |                |             |
| 34.     | Identification, collection and documentation of I.T.K. (Indigenous Technical Knowledge) |                |           |                      |                |             |
| 35.     | Motivating farmers for commercial cultivation for better price                          |                |           |                      |                |             |
| 36.     | To inspire people below poverty line to form self help group                            |                |           |                      |                |             |
| 37.     | To inspire panchayat for proper utilization of common property resources                |                |           |                      |                |             |
| 38.     | Dissemination of food preservation technology among the women                           |                |           |                      |                |             |
| 39.     | Development of community seed farm  |                |           |                      |                |             |

**IV. Please state most successful extension work conducted by you during your service period of A.D.O. (if any). Also state the reason(s) for success**

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**Most successful extension work**

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**Reasons for success**

---

- 1.
  - 2.
  - 3.
  - 4.
  - 5.
  - 6.
- 

**V. Level of competency of the Krishi Prayukti Sahayak (KPS) as perceived by the ADOs in performing agricultural extension activities**

A list of activities generally performed by K.P.S. is given below. Since the performance of the K.P.S.s may vary; considering the average performances of all the KPSs working under you, please indicate your perception about the competence of the KPS in respect of each activity and also judge the importance of each activity.

| <b>Importance of the activities</b> | <b>Competency to perform the activities</b> |
|-------------------------------------|---|
| 1 = Unimportant                     | 1 = No at all competent                     |
| 2 = Little important                | 2 = Little competent                        |
| 3 = Moderately important            | 3 = Moderately competent                    |
| 4 = Important                       | 4 = Fairly competent                        |
| 5 = Very important                  | 5 = Very competent                          |

**Example:**

| Importance (weightage)                              | Activity                | Competency (weightage)                                 |
|---|-------------------------|--|
| 1 2 3 (4) 5   | 1. Minikit distribution | 1 (2) 3 4 5  |
| (4) = Minikit distribution is an important activity |                         | (2) = Little competent to perform minikit distribution |

Please encircle (○) the weightage of each activity (total eight activities) in respect of both importance and competence.

| Importance (weightage) | Activities of K.P.S.                      | Competency of K.P.S. (weightage) |
|------------------------|---|----------------------------------|
| 1 2 3 4 5              | 1. Soil sample collection                 | 1 2 3 4 5                        |
| 1 2 3 4 5              | 2. Visiting contact farmers               | 1 2 3 4 5                        |
| 1 2 3 4 5              | 3. Providing technical advice & feed back | 1 2 3 4 5                        |
| 1 2 3 4 5              | 4. Crop cutting survey                    | 1 2 3 4 5                        |
| 1 2 3 4 5              | 5. Crop Demonstration                     | 1 2 3 4 5                        |
| 1 2 3 4 5              | 6. Field survey                           | 1 2 3 4 5                        |
| 1 2 3 4 5              | 7. Disaster management                    | 1 2 3 4 5                        |
| 1 2 3 4 5              | 8. Conducting farmers meeting             | 1 2 3 4 5                        |

## VI. Management problems in Implementing Agricultural and Rural Development Programmes as perceived by the ADOs and Measures suggested for Improvement

Do you think that your organization has been experiencing some Yes/No problems in implementing development programs as well as for proper functioning of the organization?

Please select most important problems under the following categories which you have been experiencing

Also suggest important measures to enhance organizational efficiency

**Planning**

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**Problems**

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- 1.
- 2.
- 3.

---

**Suggestions**

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- 1.
- 2.
- 3.

**Financing****(A) Cash**

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**Problems**

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- 1.
- 2.
- 3.

---

**Suggestions**

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- 1.
- 2.
- 3.

**(B) Kind input**

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**Problems**

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- 1.
- 2.
- 3.

---

**Suggestions**

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- 1.
  - 2.
  - 3.
-

**Coordination**

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**Problems**

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- 1.
- 2.
- 3.

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**Suggestions**

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- 1.
- 2.
- 3.

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**Staffing**

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**Problems**

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- 1.
- 2.
- 3.

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**Suggestions**

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- 1.
- 2.
- 3.

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**Infrastructural Facility**

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**Problems**

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- 1.
- 2.
- 3.

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**Suggestions**

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- 1.
  - 2.
  - 3.
-

**Supervision**

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**Problems**

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- 1.
- 2.
- 3.

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**Suggestions**

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- 1.
- 2.
- 3.

**Farmers' Participation**

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**Problems**

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- 1.
- 2.
- 3.

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**Suggestions**

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- 1.
- 2.
- 3.

**Sustainable Agriculture**

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**Problems**

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- 1.
- 2.
- 3.

---

**Suggestions**

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- 1.
- 2.
- 3.

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**Comments**

Thanks

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## APPENDIX-V

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### The Internal Consistency Check

Having obtained the scale values of 5 stimuli (extension activities) on a least to most favourable psychological continuum, an internal consistency check was applied. This comprises comparing the observed or empirical proportions  $P_{ij}$  with those to be obtained in terms of theoretical or expected or derived scale values. The smaller the difference between the empirical proportions  $P_{ij}$  and the expected proportions  $P_{ij}'$ , the higher is the consistency of the scale values. If the difference is zero, it indicates perfect consistency. But this is rarely achieved. The internal consistency of five extension activities was computed as follows.

**Table A. Theoretical normal deviates  $Z_{ij}'$  corresponding to the scale distances between the statements of Table 7 (i.e. Z matrix)**

| Statements |             | D      | E      | C      | A      | B     |
|------------|-------------|--------|--------|--------|--------|-------|
|            | Scale value | 0.000  | 0.075  | 0.363  | 0.419  | 0.527 |
| D          | 0.000       |        |        |        |        |       |
| E          | 0.075       | -0.075 |        |        |        |       |
| C          | 0.363       | -0.363 | -0.288 |        |        |       |
| A          | 0.419       | -0.419 | -0.344 | -0.056 |        |       |
| B          | 0.527       | -0.527 | -0.452 | -0.164 | -0.108 |       |

**Table B. Theoretical proportions  $P_{ij}'$  corresponding to the theoretical normal deviates  $Z_{ij}'$  (consulting the Table of Normal Deviates)**

| Statements | D     | E     | C     | A     | B |
|------------|-------|-------|-------|-------|---|
| D          | -     |       |       |       |   |
| E          | 0.470 | -     |       |       |   |
| C          | 0.358 | 0.387 | -     |       |   |
| A          | 0.338 | 0.365 | 0.478 | -     |   |
| B          | 0.299 | 0.326 | 0.435 | 0.457 | - |

**Table C. Discrepancies between the observed proportions  $P_{ij}$  of Table 6 (i.e. Rearranged P-matrix) and the theoretical proportions  $P_{ij}'$  of Table B**

| Statements                                | D      | E      | C      | A       | B |
|---|--------|--------|--------|---------|---|
| D   | -      |        |        |         |   |
| E   | -0.010 | -      |        |         |   |
| C   | 0.012  | 0.013  | -      |         |   |
| A   | 0.052  | 0.015  | -0.028 |         |   |
| B   | -0.049 | -0.036 | 0.055  | 0.043   | - |
| $\Sigma$                                  | 0.123  | 0.064  | 0.083  | 0.043   |   |
| (Summation taking all values as positive) |        |        |        | = 0.313 |   |

$$\text{Average Discrepancy (AD)} = \frac{\Sigma |P_{ij} - P_{ij}'|}{\frac{n(n-1)}{2}} = \frac{0.313}{10} = 0.031$$