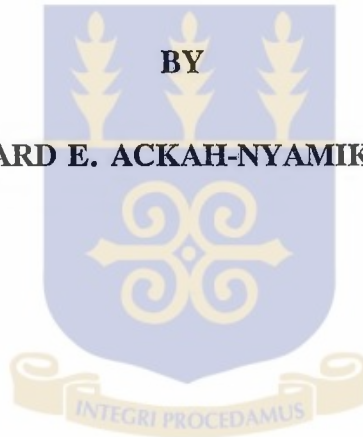


**FARMERS' PARTICIPATION IN THE TRANSFER OF IMPROVED
MAIZE PRODUCTION TECHNOLOGY IN GHANA: A CASE STUDY
OF MAIZE FARMERS IN SOME AREAS OF FANTEAKWA AND EAST
AKIM DISTRICTS.**



BY

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**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF PHILOSOPHY
(M.PHIL.), AGRICULTURAL EXTENSION, UNIVERSITY OF GHANA
LEGON.**

SEPTEMBER, 1994.



DECLARATION

I do hereby declare that this thesis is, with the exception of specified quotations and ideas attributed to specific sources, entirely my own work produced from research undertaken under supervision.



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The crest of the University of Ghana is a shield-shaped emblem. The top half is blue with three golden wheat stalks. The bottom half is white with a golden four-lobed floral or scrollwork design. Below the shield is a golden ribbon banner with the Latin motto "INTEGRI PROCEDAMUS" in blue capital letters.

DEDICATION

To my parents, my wife, Christie, and my son, Derrick.

ACKNOWLEDGEMENT

In undertaking this study, I have consulted many works on participation, agricultural extension and other social science texts, some of which I have formally acknowledged. I am grateful to all those whose works I have consulted. I am most grateful to Dr. Joe Geker, my supervisor, whose guidance, encouragement and comments contributed immensely to the success of this study. I wish also to express my sincere gratitude to Mr. Paschal B. Atengdem, and all the other lecturers and staff of the Department of Agricultural Extension, Legon, for their direct and indirect help to get this work through. My special thanks to Mr S.Y. Atsu, Acting Director of the Institute of Statistical, Social and Economic Research, (ISSER), Legon, who worked tirelessly on my work and made many useful suggestions to produce the final write-up. Finally I wish to thank George Mensah of Noguchi Memorial Institute For Medical Research (NMIMR), who did the computer analysis of the data; Dr. George Armah, also of NMIMR, on whose computer I edited my work; not forgetting Felix Asante, for his support and encouragement.

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ABSTRACT

The task of agricultural extension in Africa will for some time be mainly concerned with the transfer of agricultural technologies to farmers. This is because of the pressure on farmers to increase food production rapidly to match population increases and Agricultural Extension Services' belief that improved food production technologies do exist which, if adopted by the farmers, would significantly increase their food production from the present levels. Farmers' participation with agricultural extension agents was necessary to make them aware of improved maize production practices, and also to enhance their adoption of those practices. However, it did not really matter which extension participatory approach was used. This is because, although the two extension programmes studied (PPP and DAES) used different participatory approaches to deliver similar extension messages (improved maize production practices), the proportion of farmers in each group that used the various improved maize production practices was not significantly different.

TABLE OF CONTENTS

ACKNOWLEDGEMENT	iv
ABSTRACT	v
CHAPTER ONE INTRODUCTION	1
1.1 Purpose of the study	1
1.2 Justification for the study	1
1.3 Research question	4
1.4 Definition of terms	5
CHAPTER TWO LITERATURE REVIEW	6
2.1 Introduction	6
2.2 Participation	7
2.2.1 Interpretation of participation	8
2.2.2 Benefits of participation	12
2.2.3 Obstacles to participation	15
2.2.4 Studies on participation in Ghana	16
2.3 Transfer of technology to small scale farmers	19
2.3.1 Characteristics of small scale farmers	19
2.3.2 Demand for technology by farmers	20
CHAPTER THREE AGRICULTURAL RESEARCH AND EXTENSION IN GHANA	22
3.1 Introduction	22
3.2 Agricultural research in Ghana	23
3.2.1 C.S.I.R	24
3.2.2 C.R.I.G	25
3.2.3 The Universities	25
3.2.4 Ministry of Food and Agriculture	26
3.2.5 Quasi-Government agencies	26
3.2.6 Private sector	27
3.2.7 Research level technologies	27
3.2.8 Maize production technology	29
3.3 Agricultural Extension in Ghana	31
3.3.1 Background	31
3.3.2 URADEP and VORADEP	33
3.3.3 Global 2000	34
3.3.4 Pilot extension under ASRP	35
3.3.5 Other extension initiatives	36
3.3.6 Department of Agricultural Extension Service	36
3.4 Research-Extension Linkages	37
3.5 Conclusion	38

CHAPTER FOUR	METHODOLOGY	40
4.1	Description of the research design	40
4.2	Description of the sample	42
4.2.1	Definition of the population	42
4.2.2	Definition of the sample	42
4.3	Instrument used	44
4.4	Procedure	47
4.5	Profile of the districts	48
4.5.1	East Akim District	48
4.5.2	Fanteakwa District	50
4.6	Data management and analysis	51
4.7	Internal validity	52
CHAPTER FIVE	DISCUSSION OF FINDINGS	54
5.1	Introduction	54
5.2	Demographic characteristics of the farmers	54
5.2.1	Gender	54
5.2.2	Age distribution	56
5.2.3	Languages spoken	57
5.2.4	Education	57
5.2.5	Marital status	58
5.2.6	Occupation	60
5.2.7	Land acquisition	62
5.2.8	Size of farms	64
5.2.9	Crop mixtures	64
5.3	Nature of participation	65
5.3.1	Extension officer's visit to individual farmers	66
5.3.2	Farmer's individual visits to extension officers	72
5.3.3	Farmers' groups	74
5.3.4	Problem identification	77
5.3.5	Demonstrations of farming practices and inputs	80
5.4	Farmers' awareness of maize production technologies	82
5.5	Farming practices adopted by farmers.	84
CHAPTER SIX	SUMMARY, CONCLUSION AND RECOMMENDATIONS	89
6.1	Summary	89
6.2	Conclusion	96
6.3	Recommendations	97
APPENDICES		
A. Questionnaire		
B. Map of Fanteakwa and East Akim Districts		
REFERENCES		

CHAPTER ONE

INTRODUCTION

1.1 PURPOSE OF THE STUDY

The primary objective of this study was to find out whether the nature of farmers' participation with extension agents in technology transfer influences the level of agricultural technologies used by the farmers.

The secondary objectives were:

- (i) To find out the nature of farmers' participation with extension agents in problem identification and demonstration/testing of maize production technologies;
- (ii) To find out the level of maize production technologies used by the farmers;
- (iii) To find out farmers' awareness and sources of awareness of maize production technologies;
- (iv) To find out factors which enhance or inhibit farmers' participation in technology transfer; and
- (v) Based on the findings above to make appropriate recommendations to organisations involved in extension for rural development.

1.2 JUSTIFICATION FOR THE STUDY

Available data (Table 1.1) from the Ministry of Food and Agriculture (MOFA) (1992) indicate that the production and yields of major food crops in Ghana has generally remained below the potential levels. A major contributing factor is the low level of

modern agricultural technologies used by farmers in Ghana. The MOFA

Table 1.1 Area, production and average yield of major agricultural crops (1987 - 1992)

CROP	AREA ('000 ha)	PRODUCTION ('000 tonnes)	YIELD (tonne/ha)	POSSIBLE IMPROVED YIELD (tonne/ha)
Maize	551	750	1.4	> 3.0
Sorghum	408	370	0.9	> 2.0
Rice	92	120	1.3	> 2.5
Cassava	449	3300	7.5	> 20.0
Yam	170	1200	7.0	25.0
Cocoyam	219	1200	5.5	
Cowpea	43	14	0.3	> 1.4
Groundnut	153	140	0.9	1.5

Source: Ministry of Food and Agriculture, 1992.

has, on the other hand, indicated that not only is a wide range of agricultural technologies available but there is also considerable scope for increasing agricultural productivity through the use of improved crop varieties and crop protection measures while maintaining soil fertility through fertilizer use and soil conserving cultural practices.

Various factors explain the failure to raise crop yields in Ghana through the adoption of improved technologies. A factor that has received some attention currently is the lack of participation of farmers in agricultural research and extension programmes. This is the assertion in the World Bank's Staff Appraisal Report (1992)

on the National Agricultural Extension Project. The report pointed out that "...in Ghana, the technological recommendations to farmers tend to be based on research done by scientists who do not generally study farmers' practices before formulating their research issues". The Report went on, however, to state that the "...recent literature on farmers' participatory research and extension as well as international seminars on the subject would indicate the growing interest in indigenous knowledge systems and the association of farmers actively in technology development."

Concern with inadequate participation by farmers has been the subject matter of editorial comment in some local dailies. Writing under the heading "meaningful participation" the Daily Graphic (13 January, 1993) stressed the need for support and cooperation of farmers for agricultural research to gain acceptability and widespread application. In the same issue of the People's Daily Graphic, the Coordinator/Training Officer of the Ghana Grains Development Project (GGDP) mentioned that his outfit had decided to actively involve farmers in the annual planning sessions of the sector for easy identification of problems facing farmers in their farming practices. He further asserted that "...over the years, only agricultural extension officers and researchers had participated in the planning sessions to formulate agricultural practices which turned out to be unsuitable for the farmers, the ultimate users of such practices, thereby reducing productivity."

The above statements reveal two main ways in which farmers' participation is considered important for increased food

production; farmers' participation with agricultural researchers in the development of agricultural technologies; and farmers' participation with extension officers in technology transfer. There is however a third possibility where farmers, agricultural researchers and extension officers together participate in the development and transfer of agricultural technologies. Farmers' participation with extension officers in technology transfer is the main concern of this study.

With the availability of a wide range of agricultural technologies as mentioned by the MOFA, a research into the relationship between farmers' participation with extension agents in technology transfer and their use of those technologies is worth undertaking. The findings of this study, apart from adding to existing knowledge on participation, would also help extension officers and other agents of rural development to obtain more clarifications on some of the issues involved in participation of beneficiaries of rural development programmes in those programmes.

1.3 RESEARCH QUESTION

To make it easier for conclusions to be drawn in this study, a research question has been posed which the findings of this study would help to answer. The research question is: Does the nature of farmers' participation with agricultural extension officers in the transfer of improved maize production technologies influence the level of the technologies used by the farmers? As would be highlighted later, maize was chosen for this study because it is a

very important staple crop in Ghana. Also because of its importance as a staple crop, a lot of technologies have been made available by agricultural researchers to enable farmers increase production.

1.4 DEFINITION OF TERMS

To avoid confusion or misinterpretation of certain terminologies or concepts which will be used in this study, the following concepts or terms in the text carry these meanings:

(a) Participation:

Participation, for the purpose of this study is defined as an interaction that occurs between an extension agent and a farmer or a group of farmers with the intent or purpose of discussing or addressing issues relating to the farmers' farming activities; this interaction includes processes which involves mutual planning, programming, implementation and evaluation of those activities.

(b) Agricultural Technology:

This refers to any agronomic and/or cultural practices, inputs, as well as labour saving devices recommended by research, extension and any other credible source to farmers meant to boost the latter's farm productivity.

In the next chapter various concepts of participation from the literature reviewed are presented and discussed.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

A lot of concern has been expressed about the low level of food production in many Third World countries. Apart from unstable political conditions, unfavourable weather conditions and general poverty of farmers, the low level of food production is also sometimes attributed to the low level of improved agricultural technologies used by small scale farmers who produce the bulk of the food in most of these countries.

The transfer of agricultural technologies to farmers is mostly the responsibility of agricultural extension organisations. Researchers and practitioners have in recent literature and at international seminars advocated for more active participation of beneficiaries of rural development programmes in the activities of those programmes as a sure way of ensuring success of the programmes.

This study which attempts to look at farmers participation with extension officers in some specific extension activities therefore seeks to answer the following question: "Does farmers' participation with agricultural extension officers in the transfer of agricultural technologies influence the level of agricultural technologies used by the farmers?"

Agricultural researchers in Ghana have come a long way in their search for improved agricultural technologies which would, if

adopted by farmers, hopefully enable them to increase their food production. The availability of agricultural technologies for food production is evident from various publications, seminars and workshops which communicate new agricultural research discoveries to the public. The onus then is on agricultural extension officers to transfer these technologies to farmers to use in their food production. It is this search for ways to enhance farmers adoption of agricultural technologies introduced by extension officers which led the researcher of this study to investigate the above research question. The study seeks to provide appropriate guidelines to policy makers and practitioners concerned with transferring technologies to rural people aimed at improving their lot.

2.2 PARTICIPATION

As with other sectors in rural development, extension is susceptible to the emerging powerful argument that rural people must play an active part in development activities. Macdonald and Hearle (1984) provide us with the rationale behind people's participation in development process. They argue that ideally people should identify their own needs and problems as well as suitable solutions to such problems. However, they insist, in a development situation where people come into contact with ideas and techniques beyond the scope of their traditional knowledge, outside assistance is often necessary. They assert that assistance means giving help, not controlling.

2.2.1 INTERPRETATION OF PARTICIPATION

A review of the literature exposes one important characteristic of the term participation, ie, the presence of a wide range of interpretations of the term by researchers and practitioners alike. Oakley (1987) emphasized this important characteristic of the term when he mentioned that "to identify a range of interpretations of participation is more useful than to attempt a universal definition". Rahman (1981) also posits that given it's complex nature, participation can be explored but not contained in a formal definition. This point is further buttressed by Setty (1985) who is of the opinion that the concept of participation means different things for different people. A number of these statements on participation are presented here.

The Economic Commission for Latin America (1973) notes that participation is considered as a voluntary contribution by the people to one or another of the public programmes supposed to contribute to national development but the people are not expected to take part in shaping the programme or criticising it's content. Similarly Yadav (1980) views people's participation as involvement of the people in the development process voluntarily and willingly. Such participation cannot be coerced, he adds. Yadav gives further clarification to his statement when he mentions that people's involvement has to be understood in terms of participation in decision-making, implementation of development programmes, monitoring and evaluation of such programmes, and in sharing the benefits of development. Similarly Cohen and Uphoff (1977)

described participation with regard to rural development as including people's involvement in decision-making process, in implementing programmes, their sharing in the benefits of development and in efforts to evaluate such programmes. In his contribution to the discussion of the concept of participation, Verhagen (1980) opines that participation is generally presented as the active involvement of target groups in planning, implementation and control of programmes and not merely their passive acquiescence in performing pre-determined tasks.

A common feature of the above statements on participation is the use of the term "involvement" to explain the former. Some researchers are of the opinion, however, that participation and involvement should be differentiated. Those of this stand see participation as "taking part actively in decision-making process and citizen involvement as awareness of policies through consultations". However, Jagannadhan (1979) is of the opinion that involvement may be a more acceptable concept than participation. He states that while participation implies sharing, involvement connotes a sense of belonging. In a different vein from the above statements on participation, Uma Lele (1975) insists that participation means, in its broadest sense, to sensitize people and thus to increase the receptivity and ability of rural people to respond to development programmes as well as to encourage local initiatives. Here the emphasis of participation is on changing the individual's attitude towards development projects thus making him/her readily responsive to development initiatives.

Another perspective of participation is given by Rahman (1977). He mentions that participation is considered to be an active process, meaning that the person or group in question takes the initiative and asserts his/her autonomy or its autonomy to do so. This concept of participation emphasizes a process of social action in which the people of the community organize themselves for identifying their common needs and problems, plan a course of action with maximum reliance upon community resources and supplement the resources when necessary with service and material from governmental and non-governmental organisations outside the community.

In what looks like a reaction to the above interpretation of participation, Misra (1984) insists that it may be unrealistic to insist that true community participation is only achieved when the local people are in full control of the process or decide entirely for themselves which activities should be embarked upon. He mentions that it would be difficult for some sectoral agencies to put into operation such a concept of community participation, agricultural extension service being a typical example. Pearse and Stiefel (1979) in their contribution to the discussion on the concept of participation posit that the concept refers to the organised efforts to increase control over resources and regulative institutions in given social situation, on the part of groups and movements of those hitherto excluded from such control. In a similar vein Oakley and Marsden (1984) also see participation as empowering the rural people to play an effective role in rural

development. They are of the view that participation is achieved when citizens gain meaningful power in the social situation.

The range of statements on participation presented above are based upon the particular perspective of rural development considered by the authors. Hunter (1981) illustrates this point clearly when he looked at participation in relation to the farmer. He points out that participation in this sense implies that farmers themselves have a major say in the choice of the innovative programmes, in deciding on the methods to be used and in organising their own contribution of labour and management.

Generally, however, some consider that financial assistance rendered under any programme by an individual or a group is a mode of participation. Some others feel that taking part in any activity by giving one's own labour is also participation, still others think that a person who can contribute neither financially nor by labour but can guide the group or activity by mobilizing resources is also said to be participating in the programme.

The analysis of the divergent and convergent views expressed in the above statements on participation points to the fact that the definition of participation is essentially activity specific. In other words, the term can only be defined with reference to a specific activity or rural development programme for that matter. The definition of participation with regards to agricultural extension activities will therefore essentially be different from that relating to community development. However, one fact seems to run through all the statements presented: the beneficiaries of

rural development projects and the organisations which seek to promote such development must be partners in taking decisions concerning the programme and also take part meaningfully in all activities of the programme to ensure success.

2.2.2 **BENEFITS OF PARTICIPATION**

Another important feature of the literature and documents on participation are the benefits supposed to result from the practice of the concept. Here again, the benefits of participation mentioned by the various authors are essentially specific to the nature of rural development that they considered although like the various interpretations of participation, some common facts run through all of them.

Stressing on the importance of people's participation in development programmes, Cernea (1983) argues that there is clear evidence that officials do not necessarily have a better perspective than the local people on the latter's problems' best interest, and therefore beneficiaries' perspective into selecting and planning local investments is crucial. His argument is based on a practical experience from Mexico's Pider programme and cites an instance where a village in a Pider area submitted a written request for an investment fund to build a dance hall to the technical planners of the Pider programme. The request was considered both illogical and wasteful and was promptly rejected. However, a research team, puzzled by the application decided to visit the village that had proposed the unsuitable expenditure.

The research team discovered that many farmers in the village were musicians. So renowned was their musical reputation that on Sundays and holidays rural inhabitants from the surrounding areas came to dance on improvised, open air grounds. Therefore, most of the local council members of the village felt that a dance hall would be the best way to attract more visitors and sell their local produce thus generating employment and income. The research team concluded that the application for a dance hall was truly justified.

That popular participation is an important ingredient in the development process is buttressed by Colletta (cited in Kpornyo 1986). The first reason for the argument, he says, is that there is an awareness among many Third World nations that their greatest resource in the development process is the people themselves. Secondly, it is now being realised by governments that for any material good or service to be readily consumed depends on the cultural demand from the people, therefore when a collective decision is taken on the provision of any good or service then a large scale consumption is assured. The third reason for the place of participation in development is that when decision making is centralized local socio-cultural variations are not provided for. In the same vein the opportunity for the mobilization of vital local resources is lost.

Verhagen (1980) also argues that participation guarantees that the beneficiaries' own interests are taken into account. This enhances the likelihood that programmes and projects will prove

effective in meeting felt development needs and that participants share equitably in all benefits. Similarly Mehta (1984) insists that it is only through the participation of the people in development activities that one can ensure their commitment to develop themselves as well as their community and to build up confidence in them to take decisions on their own. According to him, centralized planning has resulted in creating greater dependency among the people.

The statements and opinions presented so far have buttressed an earlier point that was raised, ie, the definition and interpretation of participation depends on the particular perspective of rural development that is under consideration. Similarly the benefits of participation expected from any participatory approach to rural development will depend on the particular perspective of rural development in mind. Thus for farmers, the benefits of participation as defined by this study will include:

- farmers will understand their farming problems better;
- farmers will be able to assess various technologies available to them in relation to their problems;
- farmers will be able to make better choices from various technologies available;
- choosing the appropriate technology will minimise risk involved in experimenting with various technologies;
- finally, farmers' productivity is likely to increase.

2.2.3 OBSTACLES TO PARTICIPATION

Much of the literature on participation sees participation as the 'missing ingredient' in the development process, which if meaningfully inserted into the development process, would ensure success. However, as Pearse and Stiefel (1979) rightly pointed out, in spite of insistence on popular participation in United Nations development programmes, an examination of the performance is not encouraging .. "authentic popular participation seldom occurs." This in other words means that there are obstacles to the practice of participation. These obstacles are directly related to one's perspective of participation.

Where participation is interpreted as sharing in decision-making, it presupposes knowledge, information, competence, acceptability and a host of other qualities and capabilities which are generally rare among the people. The lack of these qualities and capabilities which the people are most often than not conscious of, creates a communication gap which limits their contribution to the decision-making process. At the developmental level, Cohen and Uphoff (1979) listed some obstacles to participation such as over-centralised planning, inadequate delivery mechanisms, lack of local coordination, inappropriateness of project technology, irrelevant project content, lack of social structures and so on. All these factors make it difficult for the people to participate meaningfully in development projects.

Cultural obstacles also constrain rural people from participation. Freire (1973) has mentioned factors such as

marginalisation, dependence and oppression as contributing to rural people's failure to respond to initiatives promoting participation. Hunter (1981) also highlights the inherent weakness of most rural people, their fears of opposition and their weakness to outside cajoling to get involved.

The bureaucratic nature of service organisations directly involved with rural development also limits the extent to which participation can be practiced. Some of the obstacles to farmers' participation with extension agents include the following:

- Illiteracy of the farmers;
- Cultural boundaries which restrict contact between female farmers and male extension agents;
- lack of farmers groups which limits the number of farmers the extension agents come into contact with;
- lack of transport and other logistics for the extension agents;
- farmers' general apathy due to earlier unfulfilled promises from service organisations.

These obstacles together with others restrict farmers' contact with extension agents, limit meaningful discussions that can occur between the farmers and the extension agents and hence limits participation.

2.2.4 STUDIES ON PARTICIPATION IN GHANA

Many papers that have been presented on the concept of participation in Ghana are not based on empirical work (Kpornyo

1986). Those which were based on empirical work studied participation in the context of rural development in Ghana and more specifically community participation. Among the few empirical works is Ohene-Konadus' doctoral thesis "Rural problems and strategy for Rural Development with special reference to Ghana" (1989). This was based mainly on observations and fieldwork done in some villages in Southern Ghana. According to the study, the isolation of the rural sector from the mainstream of development policy has imposed on the rural people despondency and partly leaving them on the periphery of the socio-economic and political structure of the country to do whatever possible with their environment to attain mere survival. Ohene-Konadu (1989) as part of his conclusion points out that people's initiative, their taking part in decision-making, involvement in a systematic effort to alter values and behavioural pattern and their active involvement and participation in the development process as a whole should be one of the cardinal principles of rural development.

D.Y. Kpornto's thesis (M.Phil. thesis, University of Ghana, 1986) entitled "Popular Participation in Rural Development, a case study of the Ho District" is also relevant. The study aimed at finding out the nature of popular participation in rural development with specific reference to finance and labour and the impact that popular participation has made on the lives of the people. He saw popular participation as an essential component in the development process. This, he pointed out is because the people participate in identifying their priority needs and choose

the means of achieving them. They will therefore approach the implementation of the resultant project with great zeal. Kpornyo, whose study was based on observations and field work in five different communities of the Ho District concluded that the basic needs approach to development should be adopted in the country because it is concerned with ending mass deprivation and designed to direct particular goods and services at particular identified people.

Finally D.K. Agyeman's work entitled "Centres of Modernization: A methodological Approach" (1984) is also worth mentioning. The study attempts to construct a model which sees the rural communities along a continuum of development and development needs. The basic proposition of the work is that "all rural communities can be arranged on a continuum of geo-social proximity to the centres of development (modernization) and that a rural community's definition of development and its felt needs shall be relative to its position on the continuum. The three villages studied occupied different locations from the University of Cape Coast (the centre of modernization): very close, intermediate position and farthest away. The findings of the study is that "no two types of villages may have the same order of priority for their development requisites". His conclusions therefore emphasizes the point that rural dwellers should be given the opportunity to express their felt needs. This, he said can be better done by allowing the citizen to participate in every phase of the development process.

2.3.0 TRANSFER OF TECHNOLOGY TO SMALL SCALE FARMERS

Agricultural technology has played, and will continue to play a substantial role in relation to the welfare of the small farm sector. However the issue of generation and transfer of technology has to be approached with caution and realism. Some important issues that must be considered in the generation and transfer of technology are characteristics of small scale farmers and their demand for technology. These are considered below.

2.3.1 CHARACTERISTICS OF SMALL SCALE FARMERS

Small farmers are an important part of the economic development in Third World Countries. A good description of small farmers is given by Pineiro et al (1980). He defines small scale farmers as those that have a small hired labour component and rudimentary means of production that is, those units in which the process of production is achieved, fundamentally through a combination of land and family labour. In these units, the main resource is the labour provided by the farmer and his family; the hiring of outside labour is relatively infrequent.

A high percentage of small farm produce is consumed on the farm. This plus the fact that the family needs some cash income to cover basic needs, clothing and home construction materials for example results in a relatively diversified, intensive production system where short-cycle crops and small animals are predominant. Thus, the farmer is able to meet his basic needs for food and periodically obtain cash.

Pineiro et al (op cit) also caution that it is important to understand that the problems of the small-farm sector are complex and that the category "small farmer" actually covers a variety of situations. There are small farmers who own their means of production and therefore have considerable stability as regards their place of work. Other small farmers do not own land and therefore are much less stable. Also the small-farm sector is a diversified one, contrary to that of large-scale commercial farmers whose behaviour is much more uniform because their decision is chiefly influenced by the market. In the case of small farmers, they are significantly different among countries, among regions of a country, and even among producers of different crops.

Since income is barely adequate and sometimes inadequate to meet basic needs, small farmers are particularly reluctant to take risks. Because they need a constant income to cover these basic needs, they instinctively make decisions that are based more on an assessment of gross profit than on any potential cost-benefit ratio. They are much more likely to try to reduce costs in order to ensure steady income to cover their needs than to try to increase their production efficiency by using external inputs. A clear example of this is the fact that most small farmers keep part of their grain harvest to be used as seed for the next planting rather than purchase improved seed from outside their own farms.

2.3.2 DEMAND FOR TECHNOLOGIES BY FARMERS

A recurring theme is that technology does exist which can

enable farmers to deal with the factors which affect their production and thus bring about substantial increases in yield (Carr 1989). The demand for technology however differs greatly with the universe of small-scale production systems. This is a result of the differences in environmental conditions and the different ways in which the factors of production are combined, all of which create different technological limitations. There is the need therefore for extension agents to ensure that the technologies that they offer are consistent with the particular situation of the farmer. In other words the technologies offered to farmers must be applicable to them in the context of their financial, economic, managerial as well as environmental constraints. Where technology is available, there is the need for greater sensitivity on the part of extension and research staff to the constraints which prevent farmers from adopting the techniques which they are promoting.

The foregoing discussion underscores the need for meaningful participation between the extension agents and the farmers for successful transfer of technologies. Agricultural research and extension are the means for generating and disseminating agricultural information to farmers. The development and activities of these two agencies in Ghana are considered in the next chapter

CHAPTER THREE

AGRICULTURAL RESEARCH AND EXTENSION IN GHANA

3.1 INTRODUCTION

Agriculture is the dominant sector of the Ghanaian economy, contributing 47.9% of the Gross Domestic Product (GDP) (Statistical Service 1993) and about three quarters of export earning; most of the population (about 70%, 1984 Census) live in rural areas and derive their incomes from agriculture. The nascent industrial sector depends on agriculture as a source of raw materials. Agriculture is an important source of public revenues, and has direct and indirect influences on public savings (and investments) and on private savings. Food prices account for a significant component of household expenditures and hence agriculture has substantial influence on the general level of prices (and indirectly on interest rates). Thus, agriculture is key to overall macro-economic performance (MOFA, 1992).

A look at the above attributes to agriculture in Ghana makes it imperative for agricultural productivity to be increased and kept high. But achieving an increase in agricultural productivity, according to Pickering (1989) is a complex business. He further mentions that to obtain maximum results a range of factors, many of them interdependent must be in place and in harmony. Two of these factors, he insists, are agricultural research and extension the means for developing and conveying to farmers the information

needed to increase their own productivity and the productivity of the land. Thus agricultural researchers and extensionists both have an undeniable mutual interest. This mutual interest entails providing the farmer with the knowledge, skills and technology which will enable the farmer improve his performance and ultimately enjoy a higher standard of living.

3.2 AGRICULTURAL RESEARCH IN GHANA

Research in agriculture has the basic task of developing farming knowledge to help farmers to be more manipulative of nature. The ultimate goal is usually to develop new technology which helps farmers to increase their productivity, solve their farming problems and attain better living standards.

Historically agricultural research in Ghana has been dominated by public sector institutions and agencies and this can be traced back to August 1958 when the Government of Ghana created the National Research Council (NRC) to organise and coordinate research in all it's aspects in Ghana. In 1959 the Ghana Academy of Science (GAS) was also established. The NRC and the GAS were merged in January 1963 to form a new Ghana Academy of Sciences with the responsibility of combining the functions of a learned society and a national research organisation.

The public agencies currently involved in agricultural research in Ghana include the Ministry of Environment, Science and Technology, of which the Council for Scientific and Industrial Research (CSIR) is a part, the Ministry of Agriculture, the

Ministry of Education, under which the three Universities fall, the Ministry of Lands & Natural Resources and parastatal organisations like the Cocoa Research Institute of Ghana (CRIG).

3.2.1 C.S.I.R.

The body presently responsible for most public research activities, including technical agricultural research in Ghana is the CSIR. The CSIR was set up in October 1968 and as its mandate demands, the major thrust of agricultural research in the country is undertaken by the six agricultural research institutes under it. These are Animal Research Institute (ARI), Crop Research Institute (CRI), Food Research Institute (FRI), Soil Research Institute (SRI), Institute of Aquatic Biology (IAB), and the Oil Palm Research Institute (OPRI). Each institute is headed by a Director who is guided by a Management Board which also acts as a liaison between the institute and the public. The activities of the individual institutes are overseen by the Director-General.

The CRI and SRI have field stations in different parts of the country to cover the various agro-ecological zones and ecosystems. The Savannah Agricultural Research Institute (SARI) of the CRI for instance covers the savannah areas of the Northern part of the country.

The agricultural institutes under the CSIR carry out research covering a wide range of topics, with individual researchers sometimes initiating their own projects with the approval of the Director. The Director can assign a suitable researcher to a

requested investigation. In some cases, however, there is some external influence on the direction of research. For instance in the case of the Grains Development Project of CRI the direction of the research is charted through an annual workshop which is attended by farmers, researchers, extension officers and policy makers who comment on past activities of the project and brainstorm on pertinent issues. The research program at the SARI of the CRI also goes through an evaluation every three years by a team of experts who also define priorities and suggest the general direction of research.

3.2.2 C.R.I.G.

Cocoa is a very important cash crop in the Ghanaian economy and incidentally also faces a lot of biological problems. It has therefore always been given a high priority in the research program of the country. When the West Africa Cocoa Research Institute (WACRI) became defunct in 1962, the Government set up the Cocoa Research Institute of Ghana to continue the activities of WACRI. CRIG is under the Ghana Cocoa Board.

3.2.3 THE UNIVERSITIES

The Universities form a significant base for research in the country. The two faculties of agriculture at the University of Ghana, Legon, and at the University of Science and Technology, Kumasi and a school of Agriculture at the University of Cape Coast, although were established to provide high level education in

agriculture, have contributed immensely to agricultural research with a focus on different agro-ecological zones. The University of Ghana, for instance, has three agricultural experiment stations. One of the stations is in the forest zone to carry out research on tree crops including citrus and plantains and also on small ruminants which usually form part of the farming systems, another station is in the Accra Plains with concentration on livestock, dairy and poultry and the use of animal drought power and the third station is on the fringes of the Accra Plains. The emphasis here is on agronomic practices on rice cultivation with and without irrigation. The Institute of Statistical, Social and Economic Research (ISSER) at the University of Ghana undertakes socio-economic research on different aspects of life including issues on food and agriculture and rural development.

3.2.4 MINISTRY OF FOOD AND AGRICULTURE (MOFA)

Some of the departments of MOFA undertake some research on a limited scale. The Crop Services Department's research for instance is directed at adaptive trials and post-harvest management. The fresh water Fisheries Department (FD) also undertakes some research restricted to marine fisheries with much emphasis on fish stock assessment and studying fishing methods for their suitability.

3.2.5 QUASI-GOVERNMENT AGENCIES

Quasi-Government agencies such as the Ghana Grains and Legumes

Development Board, (GLDB), the Forest Products Research Institute and the Ghana Atomic Energy Commission also undertake some research of agricultural significance. The GLDB works closely with the Crop Research Institute by testing research results under farm conditions (adaptive research). The GLDB also carries out research on appropriate on-farm storage devices as a means of reducing post-harvest losses and reducing the seasonal variation in prices through supply management.

3.2.6 PRIVATE SECTOR

The role of the private sector in agricultural research in Ghana is minimal. Some NGOs in Ghana, notably Global 2000, are however involved in adaptive trials. They are often linked to the local research institutes.

3.2.7 RESEARCH LEVEL TECHNOLOGIES

Ghana's agriculture is dominated by crop production and is predominantly small-scale with farm sizes usually less than two hectares. Amongst the food crops, the current concentration of research is on maize, sorghum, cowpea and soybean. The non-cereal staples such as cassava, yam, cocoyam and plantain have also received some attention in recent times. (MOFA 1991).

With Ghana's long history of education and research in agricultural science, all the technologies do exist at least at the researchers level (Asenso-Okyere 1992). Some food crops related technologies available at research levels include, adaptation to

and management of environmental factors and issues, production and post-harvest management of different crops, input uses and farm work and implements.

Useful information on the rational use of land resources exists. Various maps are available, and land classification, information and services for detailed soil survey are also available. Research is inactive in rain water harvesting. Tree planting, and other physical measures such as grass strips, clay or gravel bands, and terracing as well as fertilizer application and improved agroforestry practices are all practices which have received some research attention to correct the accelerated degradation of land quality, both physically and chemically.

Improvement of crop varieties is one of the major areas in crops research in Ghana. Improved varieties are available in most of the cereal crops and legumes notably maize, cowpea, sorghum, millet and rice. Cassava, yam, cocoyam, plantain, groundnut and soybean have also received some attention. Land preparation, time of field operations, planting spaces, weed control, and plant protection are some of the basic technologies in agronomic practices available for most crops. Various storage technologies using chemical, physical and biological means are also available. Village level processing of agricultural produce is also attracting increasing interest. Technologies available for agro-processing include 'gari' making, sheanut butter production and palm oil extraction.

3.2.8 MAIZE PRODUCTION TECHNOLOGY

Maize has received considerable attention with regard to agricultural research on food crops in Ghana. This may be because it is one of the main items of staple foods of most Ghanaians. Technologies, be it for agricultural production, industrial advancement or economic development usually come in packages. Thus, technologies must not be looked at as single practices or inputs but rather a couple of these practices and or inputs which together would improve efficiency and productivity. Thus in Ghana, a number of production technologies exist for the various food crops. With regard to maize, the production technology usually includes improved varieties, date of planting, planting in rows, fertilizer use, use of insecticides and weedicides, date of harvesting, and post harvest storage. These practices and inputs when used together, it is expected, would increase the farmers production level.

As mentioned earlier much research has been done on maize production in Ghana to address the above mentioned practices and inputs which together form the maize production technology or package. A number of improved varieties of maize with specific advantages eg. resistance to diseases and drought have been released with maturing periods of between 95-120 days. Date of planting, which is determined by the season, ecological zone and the particular variety used is also very important in determining yield of maize. Some research has been done to provide important information on this. It has been proved scientifically that when

maize is planted in rows more plants per acre is achieved, yield increases and it makes it easier for other cultural practices to be applied. Planting in rows is thus important in the maize technological package.

Although farmers are being encouraged to use non-chemical fertilizers like cow dung, chicken manure and compost, chemical fertilizer is also quite important for higher yields. Some research has been done especially on the use of chemical fertilizer to determine which of the ecological zones need fertilizer, how much of it and appropriate time for application. Also important is the type of fertilizer to use in a particular area and also the mode of application, ie burying or surface dressing.

The use of weedicides is not very popular among the small scale farmers, although weedicides tested for our soils and weeds do exist to combat weeds. Research has also been done to determine appropriate times to weed in the various ecological zones. Research has also shown that when maize is harvested early ie when a black layer develops at the point of attachment between the cob and the grain, it reduces the likelihood of the crop being attacked by destructive insects on the field.

Post harvest losses are responsible for the loss of large quantities of maize produced by farmers. Technology exists for reduction of post harvest losses.

3.3 AGRICULTURAL EXTENSION IN GHANA

3.3.1 BACKGROUND

Agricultural extension has played a significant role in agricultural development in Ghana since the early 1900's. Initially the primary interest was in export crops (notably oil palm, rubber and cocoa) and it formed part of the activities of church missionaries and foreign owned companies interested in the production of export crops. But later on, more emphasis was placed on food crops and livestock.

Ghana has, since independence, tried several agricultural extension approaches and methods under a variety of agricultural, rural integrated and pilot development projects. These were initiated by the government of the day, cooperative movements, church related development schemes and several donor assisted projects.

In the early 1960's the United Ghana Farmers' Cooperative Council (UGFCC) started to provide extension services to farmers. UGFCC was promoting the then Government's policy of collectivized agriculture and therefore used a group approach. The extension agents of the UGFCC gave advice and supplied inputs to farmers. Frequently, the latter preoccupied the staff at the expense of delivering extension messages thus limiting coverage of their services.

With the demise of the UGFCC in 1966, the technical manpower, machinery and other resources of the UGFCC were taken over by the Agricultural Extension Services Division of the Ministry of

Agriculture. In 1967, the government initiated the pilot project, "Focus and Concentrate", through the help of a USAID consultant Ray Jackson. This programme was however short-lived.

In 1968, the Extension Services became a unit within the Crop Production Division of the Ministry of Agriculture (Atengdem 1987). This implied that the extension officer was to disseminate technology mainly on crop production. The Animal Husbandry Division of the Ministry of Agriculture had to assign some of its staff to engage in some micro animal extension activities with livestock farmers.

The more recent and prominent experiences are the extension programs initiated under: (i) the World Bank/Ghana Government assisted Upper Region Agricultural Development Project (URADEP) during 1976-84, Volta Region Agricultural Development Project (VORADEP) during 1982-88 and the Agricultural services Rehabilitation project (ASRP), on-going since 1987; (ii) the Global 2000, which is supported by a Japanese and an American Non-Governmental Organisations since 1986; and (iii) the CIDA assisted Grains and Legumes Development Project, on-going since 1981. Other projects worth mentioning are the UNDP/FAO assisted integrated Agricultural Development programme at Mampong in Ashanti Region during 1986-1989, the GTZ assisted Ghanaian-German Agricultural Development project started in the early 1970's and the IFAD assisted Ghana Smallholder Rehabilitation and Development Programme, on-going since 1988, both in the Northern Region.

The above initiatives were designed independently of each

other and were not integrated with the extension programmes of the various departments of the Ministry of Agriculture (MOA)

3.3.2 URADEP AND VORADEP

URADEP was set up in 1976 as a pilot project for an integrated approach to agricultural development by the World Bank/Ghana Government/Netherlands Government partnership. Two novelty extension components/practices were introduced through URADEP to the extension services of Ghana - the Training and Visit (T&V) system of extension and the use of a General Extension Division which was responsible for extension activities in both crops and livestock production.

VORADEP which was set up in 1982 as a follow-up of URADEP also used a similar approach in extension services. The two projects provided good logistic support. The main extension recommendations under these projects were: use of improved varieties of seeds, row planting, proper plant population, use of fertilizers and pesticides, chemical weed control, improved harvesting and storage and proper preservation and processing of food. They focused mainly on cereals, and legumes (maize, sorghum, millet, groundnut and cowpea). Both projects also set up adaptive/farming systems research units to test relevant technologies, which facilitated development of close research-extension linkages. Farmers' agricultural services companies (FASCOMS) were established to supply inputs, and the project management liaised with credit institutions to help the farmers in obtaining institutional credit.

The extension service was thus spared the task of providing other services such as handling inputs, marketing of produce and lending and collection of loan repayments.

The T&V system, although regarded as a well organised management system, was generally considered to be expensive because of the inclusion of high cost components such as radio stations, foreign training of staff, very intensive farmer - extension agent ratio (1:500) and purchases of technologically advanced equipments such as cinema vans etc. An important problem faced by these projects is therefore that of sustainability as was evidenced by the lack of maintenance of the physical infrastructure and the inability to gainfully use the human resources after project completion due to problems of absorbing these projects into the mainstream extension service of the MOA.

3.3.3 GLOBAL 2000

The extension approach introduced by the Global 2000 project in 1986 was slightly different from that of URADEP and VORADEP. Farmers are selected for participation in the programme by extension staff in collaboration with community leaders. These selected farmers are required to set aside a one acre portion of their fields, called the production test plot (PTP) for demonstrating the technologies disseminated to them by the extension staff. The project also provided the farmers with a range of services including inputs, credit and attractive producer

prices. Farmers were allowed to repay the credit at harvest time and obtain inputs in kind for the next season.

The Global 2000 project demonstrated that given the proper enabling environment (a package of technical assistance, inputs, and markets for outputs) farmers are very responsive to advice from the extension service. It also demonstrated that production technologies exist for increasing output of some cereal and legume crops. However, the sustainability and productivity of the project to the institution of extension service over the long-term raised certain doubts owing to the lack of attention to institution building with emphasis on only short term gains in production and also the multiplicity of non-extension functions assigned to extension staff (credit administration, input supply and produce marketing).

3.3.4. PILOT EXTENSION UNDER ASRP

The T & V component of the pilot extension under ASRP is identical to the extension programmes under URADEP and VORADEP. It also focuses on selected grain crops (maize, sorghum, and pulses). However, in all the districts selected for implementing the pilot programme, the Global 2000 project is also active, and the extension officers involved in the PTP scheme are also involved in the implementation of the T & V system.

The ASRP pilot project further emphasised the good features of the T & V system such as, regularity in training of staff, regularity and predictability of visits to farmers with useful

messages, supervision of staff at all levels and continued and formal linkages with research. The project, however, lacks formal linkages with input supplies, credit institutions and marketing agencies.

3.3.5 OTHER EXTENSION INITIATIVES

The Cocoa Marketing Board (CMB) provides a comprehensive package of extension services to cocoa farmers ranging from the provision of planting materials and pest control services to marketing of cocoa. Relevant advice is also delivered to the farmers. Other commodity organisations such as the Ghana Cotton Company, Bast Fiber Development Board, and several Tobacco companies also undertake some extension services to farmers. The MOFA recently launched a rural development project in the Northern Region supported by International Fund for Agricultural Development (IFAD) which has a major extension component. There are also a number of NGO's with agricultural extension programmes, particularly in the Northern parts of Ghana.

3.3.6 DEPARTMENT OF AGRICULTURAL EXTENSION SERVICES (DAES)

In Ghana, the primary responsibility for agricultural extension (except cocoa) resides with the Ministry of Food and Agriculture (MOFA), and specifically the DAES. The DAES was established in 1987 to consolidate all non-cocoa public agricultural extension services and bring them under one umbrella.

MOFA's extension strategy embodies a unified extension system

whereby all extension messages are channelled to the farmer through a single agent under the administration of DAES. The extension approach used is a modified T & V system amended to suit Ghanaian conditions. In this wise, Front line staff (FLS) undergo regular training administered by subject matter specialists (SMS) who are also involved in the identification of technological problems faced by farmers.

The FLS are also expected to visit farmers' groups regularly to transfer technology to them. The new system places emphasis on farmers' involvement in technology identification and generation in order to make such technologies readily acceptable by the farmers.

3.4 RESEARCH-EXTENSION LINKAGES

The history of the development of agricultural extension in Ghana generally reveals a poor linkage of research with extension. The poor linkage has been attributed to the following; researchers often publish research results in scientific journals which tend to be too technical and also voluminous and thus do not benefit extension work since it has been observed that extension personnel seldom read journals or annual reports; low level of interaction between researchers and the information support units of various extension initiatives; and seminars and workshops which create avenues for extension officers, researchers, farmers and policy makers to interact are practically non-existent. These set backs result in researchers investigating problems that are not relevant to farmers' situation and consequently extension workers pass on

improvised technical messages.

3.5 CONCLUSION

From the above account it can be observed that the extension services in Ghana, until very recently, has acted mainly as a service unit providing inputs to farmers. Very little attention has been paid to the educational aspect of agricultural extension. The evolution of extension in Ghana has been more of organisational structural changes with little to show on the changing philosophy and practice of extension. It can also be observed that the transfer of technology function of extension as is practised in Ghana has also not been very successful in transferring agricultural technology to the majority of farmers. This has been mainly due to weak and informal linkages with agricultural research institutes. Where an educational component has been introduced to the extension services in Ghana, eg. the T & V system approach, the extension services has maintained a teacher - student relationship with its clients (farmers) and has even not incorporated research as a partner in this relationship (Atengdem, 1987). These and other factors call for mechanisms to institutionalise better coordination between extension and research (and farmers) to ensure a more efficient technology generation and utilization in Ghanaian agriculture.

The new extension system of the DAES-the Unified Extension System, addresses itself to these setbacks. However, the participatory organisation approach component of the new system

which encourages a closer farmer, research and extension involvement in agricultural development, must be investigated further to ensure its success. It is in this line that this study seeks to throw more light on farmers' participation in technology transfer. The procedures that were followed to obtain data for the study are outlined in the next chapter.

CHAPTER FOUR

METHODOLOGY

4.1 DESCRIPTION OF THE RESEARCH DESIGN

The research methodology chosen for this study was the causal-comparative research hence the use of a causal comparative design (Fraenkel and Wallen, 1993). The causal comparative design was chosen to enable this study to answer the research question posed in the introductory section ie 'Does the nature of farmers' participation with agricultural extension officers in the transfer of improved maize production technologies influence the level of technologies used by the farmers? Two groups of farmers, different on a variable ie nature of participation with extension agents, were compared on another variable ie level of improved maize production technology used by the farmers. A causal comparative research therefore allowed for the exploration of effects (dependent variable) caused by membership in a given group and thus enabled exploration of relationship between important variables in the study; nature of participation and level of agricultural technology used, in this case. The causal comparative design begins with a noted difference between two groups and then goes on to look for possible consequences of this difference. The two groups used in this study were maize farmer - beneficiaries of the People's Participation Programme (PPP) and maize farmer - beneficiaries of the Department of Agricultural Extension Services

(DAES). An assumption of this study was that agricultural extension agents of PPP and DAES had made certain recommendations with regard to maize to their beneficiaries through the use of different participatory approaches. Also the beneficiaries had adopted these recommendations based on their level of interaction and involvement in the introduction of those recommendations. The two groups of farmers would, therefore differ in the nature of participation, the independent variable. This difference will then be compared on another variable, ie, the dependent variable which is the level of agricultural technology used by the farmer.

In a causal-comparative study, the groups under consideration usually differ in one of two ways: one group either possesses a characteristic that the other does not, or the groups differ in known characteristics (Fraenkel and Wallen 1993). For this study the second possibility holds ie the groups differed on known characteristics. Thus the design for this study would look like:

Group	Independent Variable	Dependent Variable
I	Nature of Participation	Level of Agric Technology Used
II	Nature of Participation	Level of Agric Technology Used

4.2 DESCRIPTION OF THE SAMPLE

4.2.1 DEFINITION OF THE POPULATION

The first task in the selection of the sample for this study was the definition of the population of interest. It was therefore necessary to make a distinction between the target population and the accessible population: the target population being the population to which a researcher, ideally, would like to generalize results; and the accessible population being the population from which the researcher can realistically select subjects for a sample, and to which the researcher is entitled to generalize findings.

Target population : All maize farmers in Ghana who interact purposefully with an agricultural extension service.

Accessible population: All maize farmers in the Fanteakwa and East Akim districts of the Eastern Region of Ghana who interact purposefully with an agricultural extension service.

4.2.2 DEFINITION OF THE SAMPLE

Since the causal-comparative research was used in this study, two groups were selected which differed in the characteristic being

studied, ie nature of participation. For the purpose of this study, one group of farmers was selected from the Fanteakwa district. These farmers are maize farmers who are beneficiaries of the People's Participation Programme which operates in a number of villages and towns in the district and has its main office at Begoro. Another group of farmers was selected from the East Akim district. These are maize farmers who benefit from the services of the Department of Agriculture Extension Services which operates in various villages and towns in the district and has its main office at Old Tafo. From both groups, random sampling was used to select subjects for the sample. The Fanteakwa district is made up of thirteen sub- districts namely: Obooho, Begoro, Bususo, Besea, Ahomahomasu, Owusukrom, Akoradarko, Ehiamenkyene, Koradaso, Aboso, Asamanma, Potroase, Aworensua. The PPP however, operates in five of the subdistricts namely Begoro, Obooho, Ahomahomasu, Owusukrom and Besea. For each of these five subdistricts, a list of farmers who benefit from the PPP was provided and fifteen farmers were randomly selected from each subdistrict by the use of a table of random numbers. Thus the total number of farmers selected for this groups was 75 ($n = 15 \times 5 = 75$).

East Akim district is made up of fifteen subdistricts namely: Sekyerem, Abomosu, Old Tafo, Kibi, Anyriam, Anneabeng, Maase, Jejeti, Asiakwa, Osiem, Kukurantumi, Kwabeng, Apedua, Addonkwanta and Akropong. To give a fair comparison of the two groups under study, it was deemed necessary to select five subdistricts from the East Akim district, since five subdistricts were used for the

Fanteakwa district. This called for a two stage random sampling. Hence from the 15 subdistricts, five subdistricts were randomly selected by the use of a table of random numbers. The selected subdistricts were Addonkwanta, Kwabeng, Asiakwa, Kibi and Osiem. Fifteen farmers were then randomly selected from each subdistrict from a list of farmers provided by the extension service in the district, by the use of a table of random numbers. The total number of farmers selected for this group was also 75 ($n = 15 \times 5 = 75$). Thus in all, a total of 150 farmers were interviewed. This sample, was considered representative bearing in mind that the respondents were randomly selected and therefore each respondent had to be located wherever he or she may be in the various subdistricts. Logistics was also another limiting factor.

4.3 INSTRUMENT USED

The collection of data to answer the research question posed in the introductory section of the study formed a very important part of this research. For a causal-comparative study like this particular one, several options were available for the type of instrument to use for the data collection (Fraenkel and Wallen 1993). The interview schedule was used basically because the subjects from whom the data were collected were not conversant with the English language, so it was necessary to collect information from them orally in their own local language - Akan. Other reasons for using the interview schedule was that any obscure question could be clarified and respondents could also expand on answers

that are important. These advantages did come to light in the collection of data.

After deciding on the type of instrument to use in the data collection and also how the information was to be collected the next important issue was whether to find and administer a previously existing instrument or to develop and administer a new instrument. A thorough review of the literature available eliminated the former option since there was no interview schedule which could answer the research question posed by this study. There was the need for the development of an interview schedule specifically for this study.

In designing the interview schedule the main point of reference was the research question since data collected is to enable the study to answer the research question. As far as possible too, the contents of the interview schedule were selected such that valid conclusions about the nature of participation and the level of technology used by the maize farmers as well as other important characteristics of the farmers could be made. Also the cost involved in administering the instruments, ease in administering and analysing the data collected were among other things considered.

The interview schedule [Appendix B] was divided into two main sections, A and B. Section A was designed to obtain demographic information about the farmers such as sex, age, languages spoken, educational level, marital status and others. This was necessary to reveal whether the two groups compared were similar or differed

on any of the demographic factors since a difference between the groups with regard to any of the characteristics mentioned above could affect the variables on which the groups are compared. Section B of the interview schedule was divided into two sub-sections, (i) and (ii). Sub-section (i) attempted to determine the nature of farmers' participation in terms of regularity and frequency of meetings between the farmer and the extension officer either individually or in group; ability of the farmer to contribute to discussions during such meetings; and the involvement of farmers in the identification of their own problems. Subsection (ii) also attempted to measure the extent of farmers' participation in the demonstration/testing of agricultural technologies, farmers' awareness of various agricultural technologies, and also the various agricultural technologies that they are actually using. Based on the information gathered in sections A and subsections (i) and (ii) of section B, differences were drawn and the research question answered.

Farmers in the two study areas undertake farming activities throughout the week except on taboo days which are usually also the market days for the particular village or town. The administration of the interview schedule was therefore done on the market days when it was likely to meet farmers at home. The interviews were done at home for both groups, some in the morning and others in the afternoon. Each interview lasted about an hour which was short enough to avoid fatigue for both interviewer and interviewee but at the same time long enough for the necessary information to be

gathered. The data was collected by the writer and an MPhil student. To standardize the interview process, it was necessary to establish guidelines on how to go about the interviews and also how to express oneself in the local language since that was the medium of communication to be used. A resident in the area translated and explained all terms which were likely to pose problems during the interview.

4.4 **PROCEDURE**

Since the interviews were to be done in two districts, it was decided to take a district each, also to conduct six interviews a day, three in the morning and three in the afternoon. In all it took about two and a half months to finish with all the interviews (September, October and early November 1993). This was due to our having to meet most of the basic requirements of a random sampling, ie locating all selected subjects and also because we had to wait for the market days for the various areas. At each interview, we introduced ourselves with the assistance of the extension agent for the area who had earlier on informed the farmers about our visit. After telling them the purpose of the interview, the extension officer excused himself and the interview went ahead. The farmers were cooperative and provided the needed information which the interview was designed to obtain. To the best of our knowledge and capability, we obtained the needed information which the interview was designed to obtain.

4.5 PROFILE OF THE DISTRICTS

4.5.1 EAST AKIM DISTRICT

East Akim District is one of the 110 districts of Ghana and is part of the Eastern Region of Ghana. It lies between latitudes 6°30' N and 6° N and longitudes 1° W and 0°.

RELIEF: East Akim District lies in the forest zone of Ghana with a major and minor rainfall seasons, characteristic of forest zones. The soil in this area is mostly sandy loam.

DEMOGRAPHIC CHARACTERISTICS: The District has a population of about 80,000 people, 40% of this number are males and 60% females. The age distribution is quite uniform with 40% being between 0-17 years, 30% between 18-60 years and 30% of 61 years and above (1984 Population Census).

SOCIAL ORGANISATION: Like most other districts in Ghana, the towns and villages constituting the East Akim District have a similar social organisation which consist of the Omanhene, Chiefs, subchiefs, Elders and family heads.

POLITICAL ORGANISATION: The political organisation of the district is also similar to that of other districts consisting of a district secretary and a district administrative officer as well as other political groupings such as various political parties.

ECONOMIC ACTIVITIES: The most important economic activity of the majority of people living in this area is agriculture, mainly crop farming. Farmers here use very simple tools such as hoes and cutlasses and practice intercropping as well as crop rotation depending on the weather. Although several crops are grown

together, the most important crop mixture is maize, cassava and plantain. Other important economic activities in the area include livestock and poultry production, food processing and oil processing, sawmilling, chain-saw operation, mining and rattan weaving.

INFRASTRUCTURE: Roads in the area fall into the feeder roads and second class road categories. There are hospitals, clinics and health posts as well as Junior and Senior Secondary Schools. Depending on the community, pipe borne water, bore holes or streams are sources of water supply. Electricity is also available in the district capital. Toilet facilities mostly consist of KVIP (both public and private) and pit latrines.

EXTENSION ACTIVITIES: The work of agricultural extension service in the district consists mainly of dissemination of improved methods of production and provide advice on issues raised by farmers. Practices recommended by the service to maize farmers in the district are mainly improved techniques of farming which consist of:

- Planting in lines
- Planting high yielding varieties
- The use of fertilizers
- Chemical application
- Proper storage practices
- Identification of diseases and pests
- Proper management of farms

The discharge of this duty by extension in the district is however

saddled with problems such as lack of transport, insufficient transport allowance to staff, poor nature of roads and lack of teaching aids.

4.5.2 **FANTEAKWA DISTRICT**

Fanteakwa District is also in the Eastern Region of Ghana and lies between latitudes 6°30'N and 6° N and longitudes 1° W and 0.

RELIEF: Fanteakwa district lies within the forest zone of Ghana. The area is made up of secondary and patches of primary forest. In some areas where the vegetation has been intensely disturbed grasses and shrubs are predominant. The area is generally mountainous. The major rivers in the district include the Birim and the Afram. Forest reserve ranges in the district are the Dadebisa range at Abourso, Begoro ranges and the Southern range from Begoro to Samines. The district has two main rainy seasons characteristic of forest zones; the major rainy season is from March to July and the minor season from September to November. The average annual rainfall is between 1500 to 2000mm.

DEMOGRAPHIC CHARACTERISTICS: The farming population in the district is about 63,910 with an average family size of 10. The ratio of male to female farmers is 1:1.02.

SOCIAL AND POLITICAL ORGANISATION: The social and political organisation is similar to that of East Akim district.

ECONOMIC ACTIVITIES: The most important economic activity is agriculture with crop production being most important. Crops grown include maize, plantain, cocoyam, cassava, cowpea, oilpalm, citrus

and vegetables. The livestock includes cattle, sheep and goats. Poultry production is also present but is mostly on backyard garden basis.

INFRASTRUCTURE: Roads in the district are mainly third class roads. There are clinics, and health posts. Junior and Senior Secondary Schools are also present. There are pipe-borne sources of water but most are out of order. Streams and wells are thus important sources of water. The district capital, Begoro has hydro-electric power. The toilet facilities are mainly KVIP's and pit latrines.

EXTENSION ACTIVITIES: Apart from the Department of Agricultural Extension Services which is supposed to be in all the 110 districts of Ghana, the Fanteakwa District is also fortunate to have the Peoples Participation Programme which is also concerned with improving the productivity of the inhabitants. The technologies that the service disseminates are similar. For crops, emphasis is on improved seeds, farm sanitation, timely application of fertilizer, row planting, and use of agrochemicals. For livestock emphasis is on stock selection techniques, housing and sanitation, medication and feeding. Here too the discharge of extension duties is saddled with problems relating to mobility and motivation.

4.6 DATA MANAGEMENT AND ANALYSIS.

The data was captured using the dBase 1V Database Computer Software and the analysis was done using SPSS statistical software. The coded questionnaire was divided into two based on the area of collection. The various responses were cross tabulated in relation

to the specified variables and area. Based on these cross tabulation, chi-square was calculated for questions with only one response to find out significant differences between the responses. With multiple response questions the z-test was used to compare each particular response as a proportion of the total number of respondents in each area. This mainly applied to the awareness and improved food production technologies used by the farmers in their respective areas.

4.7 INTERNAL VALIDITY

Two weaknesses in causal-comparative research are lack of randomization and inability to manipulate an independent variable. In other words random assignment of subjects to groups is not possible in causal-comparative research since the groups are already formed. Manipulation of the independent variable is not possible because the groups have already been exposed to the independent variable. Thus a major threat to the internal validity of a causal-comparative study is the possibility of a subject-characteristics threat. Since the researcher has had no say in either the selection or formation of the comparison groups, there is always the likelihood that the groups are not equivalent on one or more important variables other than the identified group membership variable. One way that this study attempted to reduce subject-characteristic threat was to limit itself to only small scale farmers, since they are to some extent homogenous on various variables as indicated in the results.

Other possible threats to internal validity are loss of subjects, location and instrumentation. However none of these affected the study to any appreciable extent since they were taken care of cautiously. All the respondents were located and only two sites were chosen for the collection of data -the farmers' home or farm, and the conditions were similar for both groups. Training ourselves in the data collection also minimized threats to internal validity with regard to instrumentation. Thus as far as possible, any relationship that may be shown in this study among the variables would be due to the dependent and independent variables mentioned. In the next chapter, the findings of the study are discussed.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.1 INTRODUCTION

This chapter discusses the various findings that were made from the study. It discusses them under four major topics: The demographic characteristics of the farmers; the nature of farmers' participation with extension agents; the farmers' sources of awareness of improved maize production practices; and the improved maize production practices used by the farmers. The data collected and analysed served the main basis of this discussion. However, knowledge from literature and practical experience from the field were used to put the information into perspective.

5.2 DEMOGRAPHIC CHARACTERISTICS OF THE FARMERS

In order to put the findings of this study in perspective, it was necessary to obtain some background information about the respondents. The characteristics that were considered were gender, age, language, education, marital status, occupation, mode of land acquisition and size of farms. Below are the findings.

5.2.1 GENDER

Generally more males were interviewed than females. Sixty-four percent of the total number of farmers interviewed were males and the rest 36% were females. This general gender distribution also

reflected in the groups with more males than females being

Table 5.1

Gender Distribution

	GROUP				TOTAL	
	DAES		PPP			
GENDER:	No.	%	No.	%	No.	%
Male	51	68.0	45	60.0	96	64.0
Female	24	32.0	30	40.0	54	36.0
TOTAL	75	100.0	75	100.0	150	100.0

Source: Data from field survey.

Table 5.2

Age distribution

	GROUP				TOTAL	
	DAES		PPP			
AGES	No.	%	No.	%	No.	%
20 - 29	9	12.0	9	12.0	18	12.0
30 - 39	27	36.0	21	28.0	48	32.0
40 - 49	18	24.0	24	32.0	42	28.0
50 - 59	21	28.0	6	8.0	27	18.0
60 and above	0	0.0	15	20.0	15	10.0
TOTAL	75	100.0	75	100.0	150	100.0

Source: Data from field survey.

interviewed in each group (Table 5.1). At group level sixty-eight percent of the DAES farmers were males and the PPP farmers also had 60% of them being males; with the rest, i.e 32% of DAES farmers and 40% of PPP farmers being females. The general 64%-36% male-female distribution for the two groups, however, reflects the realities on the field and that is, although more women are engaged in food production, they rarely come into contact with agricultural extension agents for various reasons which could be cultural, social or even economic.

5.2.2 AGE DISTRIBUTION

The ages of the farmers ranged between 20 and 65 years, as shown in Table 5.2 above. The distribution of the farmers in the age categories used, ie, 20-29, 30-39, 40-49, 50-59 and 60 and above was however slightly different for the two groups. The highest proportion of the farmers, 32%, fell in the 30-39 age group made up of 36% of DAES farmers and 28% of PPP farmers. The next largest proportion of 28% fell in the 40-49 age group, made up of 32% of PPP farmers and 24% of DAES farmers. Eighteen percent of the farmers fell in the 50-59 age group, made up of 28% of DAES farmers and 8% of PPP farmers. The proportion of young farmers aged between 20-29 was similar in both groups, making up 12% each of their respective group's proportion. Only PPP farmers were aged beyond 60 years and they formed 20% and 10% of the group and the total number of farmers interviewed respectively.

5.2.3 LANGUAGES SPOKEN

As would be expected of a Twi speaking area, all the farmers interviewed in both groups spoke some Twi. For some of them Twi was the only language that they could speak. Such farmers formed 32% of the total number of farmers interviewed. Each group also had 32% of its farmers speaking only Twi. The rest of the farmers spoke a combination of Twi and either Krobo, English, Ewe or Ga. Due to the settlement of Krobos in the Fanteakwa district and surrounding areas, Krobo was quite a prominent language among the farmers in that area. Almost half of the PPP farmers could speak some Krobo as compared to less than one-eighth of DAES farmers who spoke the language. English language, spoken scantily and most often in 'pidgin' form, was spoken more by the DAES farmers (almost half) than the PPP farmers (about 1/3).

Language was not mentioned as a barrier to farmer's communication and hence participation with agricultural extension agents since Twi is mostly used which all of them, including the extension agents, could speak and understand. However, problems develop sometimes with the nomenclature of certain objects and practices, especially where the extension agent or the farmer is not an indigenous speaker of the Twi language. Efforts are usually made by both parties to settle on particular names or references for things that they come across during discussions.

5.2.4 EDUCATION

As Table 5.3 shows, more men were interviewed than women.

More than half of the DAES farmers (56.2%) completed middle school form four while only 27.7% of the women interviewed completed middle school form four. About 38% of the women had never had any form of education, formal or non-formal; the proportion of men in this category was 12.6%. This was the same in the groups too, with male members of the group being significantly more educated than the female group members.

Groupwise there was no significant difference between the educational levels reached by farmers in the two groups (Table 5.4). It is important, however, to observe that out of the 46% of the farmers who had middle school leaving certificate, DAES had 56% of its farmers having it whilst 36% of PPP farmers also had it. Also out of the 22% of the farmers who had not been to school, the proportion of PPP farmers was 32% and that for DAES farmers was 12%. In an interview with the extension agents in charge of these groups, they mentioned that it was easier for them to hold discussions with farmers concerning their farming activities where the farmers concerned have had at least some education to the middle school level. They claimed it was easier and simpler for such farmers to understand what they [extension agents] communicate to them.

5.2.5 MARITAL STATUS

Ninety-four percent of the farmers interviewed were married whilst 4% were single and 2% were widowed. Both groups therefore had most of their farmers married. Marriage sometimes constitutes

a barrier of communication between extension agents and farmers, especially the women, and more so in the rural areas where culture and tradition sometimes forbid it. Although this was not prevalent in this study there were a few cases in the Fanteakwa district,

Table 5.3 Educational Level by Sex

	GENDER				TOTAL	
	MALE		FEMALE			
EDUCATIONAL LEVEL	No.	%	No.	%	No.	%
Primary	21	21.8	12	22.3	33	22.0
MSLC	54	56.2	15	27.7	69	46.0
Secondary	6	6.2	6	11.2	12	8.0
Non Formal	3	3.2	0	0.0	3	2.0
No School	12	12.6	21	38.8	33	22.0
TOTAL	96	100.0	54	100.0	150	100.0

Source: Data from field survey.

where it was very difficult to convince Krobo women to be interviewed. Their simple reason was that their husbands were not there, although we had been introduced to them by their own extension agent. So although the old tradition which limits communication between women and men, where extension activities are concerned does not seem to be a problem, it may not have faded away

completely.

Table 5.4 **Educational level**

	GROUP				TOTAL	
	DAES		PPP			
EDUCATION	No.	%	No	%	No.	%
Primary	15	20.0	18	24.0	33	22.0
MSLC	42	56.0	27	36.0	69	46.0
Secondary	9	12.0	3	4.0	12	8.0
Non Formal	0	0.0	3	4.0	3	2.0
No School	9	12.0	24	32.0	33	22.0
TOTAL	75	100.0	75	100.0	150	100.0

Source: Data from field survey.

Pearson Chi-square value = 6.45059

Degrees of freedom = 4

Significance = 0.26481

5.2.6 **OCCUPATION**

As the topic of this study suggests, all the respondents were farmers. Some of them, however, engaged in other income generating activities to supplement that from farming, if that is their main occupation or vice versa (Table 5.5). A little above half of the respondents (52%) did not have any other occupation apart from farming. About sixty-two percent of that proportion were males and the rest 38% were females. The rest of the farmers were either artisans, traders or teachers. The over indulgence in other higher income generating activities other than farming could likely affect the latter especially in the case of small scale farmers where they

use their own labour and supervise everything themselves. When this is the case, it is very easy not to pay much attention to the farm and therefore to extension agents. However in the groups, 64% of DAES farmers were engaged in farming alone as an income generating activity. Forty percent of PPP farmers fell in this category. It could be deduced, but to a limited extent, that, more DAES farmers paid more attention to their farms than PPP farmers.

For the rest who engaged in other income generating activities, farming is the main income generating activity for most of them. The incidence of absenteeism at meetings is subsequently minimized.

Table 5.5 **Occupation of respondents**

	GROUP				TOTAL	
	DAES		PPP			
	GENDER		GENDER			
	MALE	FEMALE	MALE	FEMALE		
OCCUPATION	No.	No.	No.	No.	No.	%
Artisans	3	3	3	0	9	6.0
Trader	3	3	0	12	18	12.0
Teacher	0	3	0	3	6	4.0
No other occupation apart from farming	36	12	24	6	78	52.0
Others	9	3	18	9	39	26.0
TOTAL	51	24	45	30	150	100.0

Source: Data from field survey.

Table 5.6 Land Acquisition

	GROUP				TOTAL	
	DAES		PPP			
MODE OF ACQUI-SITION	No.	%	No.	%	No.	%
Own Land	48	64.0	15	20.0	63	42.0
Family	6	8.0	9	12.0	15	10.0
Leasehold	12	16.0	0	0.0	12	8.0
Shareholding	9	12.0	45	60.0	54	36.0
Others	0	0.0	6	8.0	6	4.0
TOTAL	75	100.0	75	100.0	150	100.0

Source: Data from field survey.

5.2.7 LAND ACQUISITION

Forty-two percent of the farmers interviewed owned the lands on which they farmed. This proportion was made up of 64% of DAES farmers and 20% of PPP farmers. On the other hand, 36% of all the farmers had lands for farming on shareholding basis. This was made up of 60% of PPP farmers and 12% of DAES farmers (Table 5.6, above). While more DAES farmers owned the lands for farming than PPP farmers, more PPP farmers acquired the land on shareholding basis than the DAES farmers. Most of the farmers who owned the lands on which they farmed inherited it from their ancestors while others had it as gifts from relatives and spouses. With regard to the lands acquired on shareholding basis, the usual practice is for the farmer to take 2/3 of the proceeds from the farm whilst the landlord takes 1/3. A possible explanation for the difference between the proportions of farmers who owned land in Fanteakwa and East Akim Districts is the fact that most of the farmers

interviewed in the former are settler farmers from the Krobo areas. According to the traditions in the Fanteakwa areas, lands are not sold out to immigrants. Rather, they are allowed to acquire it on shareholding terms. On the other hand most of the farmers interviewed in Easi Akim belong to families which own the lands hence have access to them. Other modes of land acquisition mentioned, which were less important in terms of the proportion of farmers who mentioned them, were family lands, leaseholds and tenancies. The mode of acquisition of land to some extent influences some of the decisions and practices that farmers can take or implement on their farms. A farmer who owns the land and is accountable to himself can decide to try any innovation or technology on his farm. On the other hand those farmers who do not own the land, sometimes, have to seek permission from their landlords before they undertake trials of any sort on the lands. A typical example relates to demonstration of inputs and practices. Some of the PPP farmers for instance mentioned that their landlords do not allow them to have demonstrations or try out certain agricultural practices, the outcome of which is uncertain. Similarly, the farmers themselves are aware of the fact that the little that they get from the farm would be shared with the landowners, hence hesitate to experiment. On this basis, it could be assumed that farmers who own the lands are more likely to try out new technologies.

5.2.8 SIZE OF FARMS

The average size of farms of the respondents was 1.4 hectares. More than half of the farmers (56%) had farm sizes between 0.81 and 1.20 hectares, characteristic of small scale farmers (Table 5.7). Other farm sizes with their corresponding proportion of farmers who had them were 0 - 0.80 hectares (16%); 1.20 - 1.60 hectares (14%) 1.61 - 2.40 hectares (2%) and 2.41 hectares and above (12%).

Table 5.7 **Farm size**

	GROUP				TOTAL	
	DAES		PPP			
FARM SIZE (ha)	No.	%	No.	%	No.	%
0 - 0.8	6	8.0	18	24.0	24	16.0
0.8 - 1.2	42	56.0	42	56.0	84	56.0
1.2 - 1.6	12	16.0	9	12.0	21	14.0
1.6 - 2.4	3	4.0	0	0.0	3	2.0
2.4 and above	12	16.0	6	8.0	18	12.0
TOTAL	75	100.0	75	100.0	150	100.0

Source : Data from field survey.

5.2.9 CROP MIXTURES

All the farmers in both groups practiced some form of intercropping using similar crops. The intercropping is either the

planting of different crops one after the other in rows or haphazardly, or planting of monocrops of about 2-4 different crops on different segments of the same farm. The crops mostly planted in both areas are maize, cassava, plantain, yam, cocoyam, pepper and beans, with cassava, maize and plantain combination being the most popular.

5.3 NATURE OF PARTICIPATION

The study selected various activities which bring farmers and agricultural extension agents together- to promote food production- to constitute their nature of participation. The respondents were therefore asked various questions on these activities. The activities considered were extension officers' visits to individual farmers and the interaction that occurs during such visits, farmers' individual visits to extension officers, farmers, group activities in relation to extension, problem identification, and farmers' involvement in extension demonstrations. Their responses are presented below.

5.3.1 EXTENSION OFFICER'S VISIT TO INDIVIDUAL FARMERS

Contact between farmers and agricultural extension agents is very important for the development of agriculture. It is during such contacts that ideas are exchanged between them as to ways to improve the farmers' productivity. Farmers and extension agents are partners in this case because the farmer wants to improve upon his production and also increase his income whilst the extension

agent also wants to prove his worth and why the tax payer's money must be used to pay him. With these at the back of their minds, both partners would wish to meet as often as possible to achieve their somewhat similar but different goals.

There are basically two options for extension agents to come into physical contact and hence interact with farmers. Either they visit the farmers individually on their farms or homes or visit them in groups. Both methods have merits and demerits and the choice of a particular method usually depends on the extension organisation in question and its philosophy of extension work. Sometimes too, certain obstacles like lack of transport, lack of proper supervision etc may limit the use of a particular method.

Eighty percent of the farmers interviewed mentioned that agricultural extension agents paid them individual visits on the farms and or at their homes to undertake extension work with them. For these farmers their participation with agricultural extension officers in technology transfer includes an individual and physical contact with the latter. This proportion was made up of all DAES farmers (i.e 100%) and 60% of PPP farmers. This means that all the DAES farmers who were interviewed received individual visits from extension agents as compared to 60% of of PPP farmers who did so. The 20% of the total number of respondents who said they had never received individual visits on their farms or at their homes were all PPP farmers (i.e 40% of PPP farmers). Chi-square computation for difference between the two groups with regard to the individual extension visits was significant. The responses from the farmers

give an indication that DAES agents place more emphasis on individual contacts and hence individual participation between farmers and extension agents as compared to PPP agents who use group participation.

Table 5.8 Extension Visits to Individual Farmer's Field/Home

	GROUP				TOTAL
	DAES		PPP		
INDIVIDUAL VISIT	No.	%	No.	%	No. %
YES	75	100.0	45	60.0	120 80.0
NO	0	0.0	30	40.0	30 20.0
TOTAL	75	100.0	75	100.0	150 100.0

Source: Data from field survey.

Pearson Chi-square value = 12.5

Degrees of freedom = 1

Significance = 0.00041

The individual method has certain advantages and extension organisations use it for various reasons. First extension work involves learning on the part of the farmer and individual method offers this opportunity to farmers. Second, since individuals have different abilities in absorbing information or learning due to difference in mentality and what motivates an individual to learn, it is important to have a method which takes into consideration these differences between individuals. Third, an individual method may be used as a follow up to group method to see how the individual farmer understood a group discussion. During individual discussions between the extension agent and the farmer the latter

supplies information required for solving a problem unique to the farm. It also gives the extension agent the opportunity to know the farmer very well. Also he/she is able to observe things for himself during such visits and to get first hand information on problems and their possible causes. Through that he/she helps the farmer to clarify his feelings, so as to be able to choose between conflicting goals.

The individual method however also has various disadvantages which discourage its use by extension organisations, the most important being the high cost involved in terms of staff time and travel. Secondly the extension agent reaches only a small proportion of his target group and even if he reaches a good number of them, the frequency of such visits is so low as to make it meaningless. Last but not the least, it is easier for the extension agent to give incorrect information to the farmer since there is only the farmer to check the validity of such information. A detailed analysis of the advantages and disadvantages of the individual method shows that when effectively used, it is likely to enhance farmers understanding of their own problems and therefore their willingness to use recommended practices to solve them. On this basis, DAES farmers were relatively better placed than the PPP farmers since a majority of DAES farmers benefitted from such individual visits. As mentioned earlier on, the frequency of the individual visits is also very important. An extension officer who pays his farmer an individual visit once a year is not likely to achieve any meaningful changes in the farmer.

The frequency of extension visits to the farmers ranged from daily visits to monthly and irregular visits. As Table 5.9 shows, all the DAES farmers recieved individual visits while the number of PPP farmers who recieved individual visits was 45. Most of the DAES farmers (84%) recieved weekly visits with the rest recieving daily or irregular visits from extension. None of them mentioned fortnightly or montly visits. On the other hand, out of the 45 PPP farmers who recieved individual visits, 66.8% of that number did so on irregular basis. Twenty percent of that number recieved their visits on monthly basis with the rest recieving weekly and fortnightly visits. None of the PPP farmers recieved daily visits. On the whole it could be noted that apart from covering almost all their farmers with individual visits, DAES agents also paid them frequent visits, a large number of them on weekly basis as compared to monthly and irregular visits received by PPP farmers.

Farmers who recieved individual extension visits were asked to indicate their satisfaction with the frequency of the vists. Thus all DAES farmers answered this question whiles 45 PPP farmers answered it (table 5.10). Ninety six percent of the DAES farmers mentioned that the visits were adequate to help them in their farming activities. The rest 4% said it was not. Sixty percent of the PPP who recieved individual extension visits said it was not adequate, but the rest 40% said it was adequate. The difference in response to this question was significant, with DAES farmers being more satisfied with the frequency of individual visits.

Table 5.9 Frequency of individual visits

	GROUP				TOTAL	
	DAES		PPP			
FREQUENCY OF INDV. VISITS	No.	%	No.	%	No.	%
Daily	6	8.0	0	0.0	6	5.0
Weekly	63	84.0	3	6.6	66	55.0
Fortnightly	0	0.0	3	6.6	3	2.5
Monthly	0	0.0	9	20.0	9	7.5
Irregularly	6	8.0	30	66.8	36	29.5
TOTAL	75	100.0	45	100.0	120	100.0

Source: Data from field survey.

Table 5.10 Adequacy of Extension Visits to Farmers
Field/Home

	GROUP				TOTAL	
	DAES		PPP			
INDIVIDUAL VISIT	No.	%	No.	%	No.	%
Yes	72	96.0	18	40.0	90	75.0
No	3	4.0	27	60.0	30	25.0
TOTAL	75	100.0	45	100.0	150	100.0

Source: Data from field survey.

Pearson Chi-square value = 15.68

Degrees of freedom = 1

Significance = 0.00008

Farmers mentioned that during individual contacts between them and extension officers either one or a combination of two or more of the following activities takes place; discussion of farming and related problems; demonstration of farming practices and proper use

of inputs; and discussion of new agricultural technologies. The farmers did not give any indication of their awareness of the programme or plan by which the extension agent undertook his/her extension activities with them. The only instance where the farmers came close to planning was their involvement in setting agenda for individual meetings. The agenda for the next individual meeting was usually fixed at their last meeting with the extension agent. However, the extension agents sometimes visited the farmers without any prior information. The farmers, though seldom, also invited the extension agents for adhoc agenda.

The question as to who sets the agenda for the next meeting, although posed some problems with regard to interpretation of the question and certainty of the answers, provided a range of responses which implied that the setting of agenda was not strictly restricted to any of the partners but rather flexible between them with a little tilt towards extension agents setting more agenda on their own (Table 5.11). The responses indicate that the extension agents at least allow farmers some freedom in deciding what should be discussed at individual meetings, although the farmers who do so are less than 40% of the total number of farmers. This issue is very important as a step towards meaningful participation between farmers and extension agents. Where farmers are more involved in choosing topics for discussion with minimal help from the extension agents, such topics are usually very pressing issues which affect the farmer since they know their problem better. On the whole DAES farmers seemed to be relatively more involved in setting agenda for

individual meetings. Generally, almost all the farmers in both groups who received individual visit from extension officers said they contributed meaningfully to discussions with extension agents. There were only very few cases where the farmers said they were not able to contributed meaningfully to discussions with the extension agents; the reason being gender difference.

Table 5.11 **Agenda Setting**

	GROUP				TOTAL	
	DAES		PPP			
AGENDA SET BY	No.	%	No.	%	No.	%
Extension Officer	30	40.0	27	36.0	57	38.0
Farmer	15	20.0	3	4.0	18	12.0
Farmer & Ext. Officer	30	40.0	9	12.0	39	26.0
No Response	0	0.0	36	48.0	36	24.0
TOTAL	75	100.0	75	100.0	150	100.0

Source: Data from field survey.

5.3.2 **FARMER'S INDIVIDUAL VISITS TO EXTENSION OFFICERS**

Another issue which was probed was farmers' visit to extension agents at their offices or homes purposely for extension advice since such visits also promote farmers participation with extension agents and to some extent shows the confidence that farmers have in extension agents. Very similar results were received for the two groups (Table 5.12). Seventy-two percent of the farmers said they did not pay any visit to extension officers. Half of this

proportion were DAES farmers and the other half were PPP farmers. Most of the farmers therefore did not visit the extension officers on their own. Various reasons were given such as the distance involved, lack of necessity for such visits and extension officers not inviting farmers to their offices. The 28% of the farmers who visited extension officers was made up of 14% DAES farmers and 14% PPP farmers.

Table 5.12 Farmers' Individual Visits to Extension Officers

	GROUP		TOTAL	
	DAES	PPP		
FARMERS INDV. VISIT TO EXT. OFFICER	No.	%	No.	%
Yes	21	28.0	21	28.0
No	54	72.0	54	72.0
TOTAL	75	100.0	75	100.0

Source: Data from field survey.

Pearson Chi-square value = 0.0000

Degrees of freedom = 1

Significance = 1.0

These farmers visited the extension officers for various reasons including; presentation of their farming problems; seeking of advice on some farming issues; enquiring information about new technologies and sometimes but to a lesser extent, purchasing

agricultural inputs. Farmers' visit to extension agents would not be necessary if the latter paid them adequate visits. This seldom occurs however, due to transportation and other related problems faced by extension agents. Participation between farmers and extension agents could be strengthened if farmers developed the habit of visiting extension agents to enquire about new information and also seek advice on their farming activities.

5.3.3 FARMERS' GROUPS

The use of farmers' groups for extension work is justified by a number of reasons. Firstly the extension agent reaches a larger proportion of his target group within a relatively shorter time as compared to meeting farmers individually. Secondly group members are easily exposed to problems and issues faced by other members which they relate to theirs and thereby appreciate them better. This is further made meaningful by the exchange of ideas on issues. Last, but not the least, it is relatively easy for group members to adopt practices once there is some collective decision to do so.

The use of groups for extension work is however saddled with problems, the most important being group members' lack of enthusiasm for group meetings and other activities of the group. Under such conditions meetings are seldom attended and group members always lag behind each other in activities of the group. The emphasis on the use of groups for extension work also depends on the extension organisation in question. For the purpose of this study a farmers' group is considered as a number of farmers who

have come together or have been put together under recognised leaders, (who are farmers themselves) and receive extension services through the group (in addition to other individual sources of extension service where applicable). The emphasis here is on the presence of recognised group leaders or executives and or extension officers' use of the group for extension work.

Based on the definition of farmer's group given above, almost all the DAES farmers mentioned that they did not belong to any farmers' group. A very small number of them said they belonged to certain food production groups, but did not come into contact with extension agents as a group. The reasons that the DAES farmers gave for not belonging to any farmers' group included the absence of farmers' groups in the area because none had been initiated, and lack of interest in farmers' groups. PPP farmers on the other hand were all members of organised groups with executive leaders, a constitution and also contributed financially to the group. It is through these groups that extension officers disseminated their information.

The reason why all the PPP farmers belonged to groups was that it was mandatory for them as PPP farmers to belong to a PPP farmers' group. Almost all of them (PPP farmers) said the extension officers held meetings with their various groups. However the frequency of these meetings or visits as given by the respondents differed. Monthly visits were most mentioned (50% of them). About 30% of them said the extension officers did not have any particular schedule of visits to their groups hence irregular visits. A few

of them (11%) said their groups met the extension officer fortnightly whilst a very few of them couldn't give the frequency of the visits. The respondents' satisfaction with the extension officers frequency of visit was probed and most of them (70.42%) said it was adequate for their farming activities hence they were satisfied. Some however thought otherwise because as they put it "they don't come when we actually need them."

A number of activities take place during group meetings, according to the respondents. Some meetings are able to tackle a lot of issues whilst others are limited to just a few problems depending on the agenda and questions asked by the farmers and observations made by the extension officers. The activities include: presentation of farming problems; demonstration of agricultural practices; education on agricultural practices; sale of agricultural inputs; discussions with other agricultural services personnel; and introduction of new agricultural technologies to farmers. Presentation of farming problems and education on agricultural practices were the most mentioned activities as taking place at group meetings.

Apart from a very few of the PPP farmers (4%) who said they were not able to express their views on their farming activities at group meetings most of them (82%) said they were always able to. An important point to note here is that with the group method of agricultural extension some of the farmers never have extension officers visiting their farms. In this study 40% of the PPP farmers had never received any extension officers on their field.

The extension officers therefore relied on what they saw on other farms to generalize to all the farms. This might not pose problems as long as similar problems are faced by the farmers. Where farmers face unique problems then it becomes difficult for the extension agents to appreciate these problems especially if the farmers happen to be among those who do not receive individual visits.

The PPP farmers, as individuals or by themselves did not visit extension officers, however, the executive officers visited them on behalf of the groups. But the purpose of these visits did not have any bearing on technical issues concerning farming but rather on group dynamics. Such visits were very irregular.

5.3.4 **PROBLEM IDENTIFICATION**

Farmers face a number of problems in their farming activities. These problems are what agricultural extension officers help them to solve. Ninety-two percent of all the respondents said they faced technical problems with regard to maize production whilst a very small percentage (8%) said they did not. The 92% proportion was made up of 44% DAES farmers and 48% PPP farmers. The difference between the responses of the two groups was not significant.

An attempt was made to explore the involvement of farmers in identifying technical problems on their maize farms. In line with that they were asked whether they had identified any technical

problems on their maize farms all by themselves before. Their responses indicated that almost all of them in both groups who faced technical problems had identified one or more all by themselves before. It is important to note, however, that not all of them could give the specific names of the problems that they faced - they could only describe what they thought was abnormal on their farm. Such descriptions were then given to the extension officer who was able to pinpoint the specific disease, and hence suggest solutions appropriate to the farmers' situation.

The technical problems that were mentioned fell under four main categories: pests; diseases; low soil fertility; and low yield. Pests, diseases and low soil fertility could also lead to low yields. The relative importance of these categories of technical problems differed for each group. Pests and low yield were the most common technical problems for DAES farmers while pests and diseases were most frequent occurring for PPP farmers. Most common to both groups was therefore the problems of pests. Some of the pests mentioned included insects such as weevils, crows which removed germinating seedlings, grasscutters and mice. Streak disease was the only one mentioned and this was by a very few number of the farmers.

Extension officers are trained among other things to identify and diagnose technical problems faced by farmers on their farms. The farmers were therefore asked whether extension officers had identified technical problems on their field before (Table 5.13); 42% of all the farmers gave a positive answer whilst the rest 58%

gave a negative answer. The response differed between the two groups of farmers. As the table shows, 52% of DAES farmers said 'yes' as compared with only 32% in the PPP group. The difference in the groups' response to this question reflected the fact established earlier that almost all the DAES farmers interviewed received extension agents on their farms as compared to PPP farmers, some of whom did not. It is therefore most likely for the former to have extension agents identifying more problems on their farms. While more than half of DAES farmers said extension officers had identified problems on their field before just about a third of PPP farmers gave a similar response.

It is apparent now, that it is not only the extension officers who identify technical problems on the farmers' field. Actually the farmers identify most of the problems whether by mere description or by specifically naming the problems. These technical problems identified by either the farmer or the extension officer become the basis of individual or group meetings held between the farmers and extension agents. Both groups gave similar responses as to the efforts that they put in when they were faced with technical problems on their fields. The efforts mentioned included; trying to solve it themselves; reporting the problem to the extension officer at his/her office; discussing problems with other farmers; and waiting till extension officers visited their farms. The most frequent response for both groups was the fact that they tried to solve the problems themselves.

Table 5.13 Extension officers identify problems

	GROUP				TOTAL	
	DAES		PPP			
EXT. OFFICER IDENTIFY PROBLEMS	No.	%	No.	%	No.	%
Yes	39	52.0	24	32.0	63	42.0
No	36	48.0	51	68.0	87	58.0
TOTAL	75	100.0	75	100.0	150	100.0

Source: Data from field survey.

As to the efforts put in by extension officers to solve farmers' problems the responses given by the two groups were significantly different although for the most frequent response, i.e extension officers making technical recommendation to them when they face problems, the proportion of farmers who gave it were similar for both groups. The difference occurred in the other responses that were given. Some of the PPP farmers mentioned that extension officers presented their problems at group meetings for discussions, whilst some said the extension officers did not make any effort to help them solve thier problems.

5.3.5 DEMONSTRATION OF FARMING PRACTICES AND INPUTS

Apart from individual and group visists or meetings where oral discussion of farming activities and problems are held, another important avenue for the exchange of knowledge and skills, and participation between farmers and extension officers is during practical demonstration of the use and efficacy of agricultrual

Practices and inputs. This avenue is very important because that is the opportunity that farmers get to learn by doing which educational research asserts is an efficient way of learning and applying what one learns. Extension agents in both groups made only limited use of practical demonstration as a means of portraying the use and efficacy of agricultural practices and inputs. Very few farmers had any demonstration on their farms. As Table 5.14 shows only 24% of all the farmers studied benefited from such demonstrations. This comprised 32% DAES farmers and 16% PPP farmers. No community or group demonstration farms or plots existed in the two areas.

The demonstrations were on testing of improved varieties of maize and row planting. These two practices are easier to demonstrate together because they go together, that is, improved varieties are, by recommendation, planted in rows. Another aspect of this issue was farmers' contribution towards these demonstrations. In both groups, all the farmers who were exposed to demonstrations of improved varieties and row planting provided the seeds, labour and land. The labour included that for weeding, ploughing, planting and harvesting. The extension officers provided supervision and technical advice.

Almost all the farmers in both groups on whose farms demonstrations had been done said they were using those technologies. The reason was that they yielded more than the traditional varieties.

Table 5.14 Extension Holding Demonstrations

	GROUP				TOTAL	
	DAES		PPP			
DEMONSTRATION	No.	%	No.	%	No.	%
Yes	24	32.0	12	16.0	36	24.0
No	51	68.0	63	84.0	114	76.0
TOTAL	75	100.0	75	100.0	150	100.0

Source: Data from field survey.

Perason Chi-square value = 0.36765

Degrees of freedom = 1

Significance = .54429

With regard to row planting, they said it made for cultural practices to be easily undertaken, hence a neat farm. The reasons given by some DAES farmers for not using the improved varieties tested on their farms included the easy susceptibility of such seeds to insect pests both on the field and in storage and the lower prices they attract from market women; the local varieties are preferred in the preparation of local foods.

5.4 FARMERS' AWARENESS OF MAIZE PRODUCTION TECHNOLOGIES AND INPUTS

Awareness is a very important concept in agricultural extension and technology transfer since it is only when farmers are aware of existing technologies that they will be in a position to decide whether to use it or not. Not all awareness results in

adoption, but for every adoption there definitely has to be some awareness. Due to recall bias it is quite difficult to truly find out the sources of farmers' awareness of practices and inputs that they know. Recall bias is aggravated by the many sources of awareness available for farmers to come into contact with new information. Despite these possible setbacks in knowing farmers' sources of awareness of technologies and inputs, it was still enquired.

In both groups farmers were aware of four main categories of farming practices and inputs. These are improved varieties, row planting, agrochemicals and fertilizer. Almost every farmer was aware of the above categories of farming practices and inputs but not all of them knew some of the specific examples in some of the categories. For instance a farmer may know that there are improved varieties that have been introduced to give higher yield but may not know the specific names such as Abeleehi or Dobidi. Similarly a farmer may be aware of the need and importance of fertilizer but may not know there are NPKs, urea, sulphate of ammonia etc. In otherwords, some of the farmers had general knowledge of the existence of certain practices and inputs but not the detailed information.

With regard to improved maize varieties for instance 28% of DAES farmers could not give the names of those improved maize varieties that they had heard about, or seen. The rest 72% of them could however name one or more improved varieties that they were aware of. The situation was different with PPP farmers. All the

farmers could mention at least one improved variety that they were aware of. Most of them however knew more than one. The difference between the two groups' responses was significant indicating a higher specific awareness of improved varieties by PPP farmers. With regards to fertilizer too, all the farmers had heard about fertilizer and its uses but not all of them knew their specific names. Thirty six percent of DAES farmers as against 56% of PPP farmers could name the particular fertilizer that they had heard about. These fertilizers included NPK, ammonium sulphate and urea. Hence again more PPP farmers were significantly more specific in the fertilizers that they had learned or seen.

With regard to row planting all the farmers had heard about it and its advantages as well as its drawbacks. A little more than half of DAES farmers (52%) were able to name the agrochemicals they had heard about and or used before and 64% of PPP farmers could tell the names of the agrochemicals that they were aware of. The chemicals mentioned were Actellic, Fostoxin, and Smithion. The two main sources of awareness of technologies and inputs by farmers were extension officers and other farmers. No mention was made of the electronic or print media. On the whole both groups were made aware of agricultural practices and inputs mostly by agricultural extension officers. (80% for new maize varieties, 76% for row planting, 57% for fertilizer, and 63% for agrochemicals.)

5.5 FARMING PRACTICES ADOPTED BY FARMERS

The ultimate wish of every agricultural extension agent is to see all his target farmers and possibly other farmers in the area

using agricultural practices and inputs which they have recommended to them. It is their conviction that if the farmers used those recommendations, their productivity would be increased appreciably. The adoption or use of agricultural practices and inputs by farmers is however not so simple or straightforward as the agricultural extension officers would expect. There is therefore usually a difference or a gap between what the agricultural extension officer recommends to farmers and what the farmers actually use on their farms. This gap or difference could be due to several factors. The possibility of the nature of participation between farmers and agricultural extension agents accounting for this difference or gap is what this study investigated. Since this study was restricted to maize, only those recommendations by agricultural extension officers to farmers relating to maize were considered.

The agricultural practices for maize recommended by the extension agents responsible for the different groups were the same, namely:

- the use of improved maize varieties;
- the use of fertilizers;
- planting in rows;
- the use of chemicals to control pests;
- the use of chemicals and proper sanitation to control diseases;
- proper storage practices.

The study was therefore limited to the above recommendations. The farmers were asked to indicate their use or otherwise of the

recommendations. The practices mentioned by the farmers fell in four main categories as follows:

- improved maize varieties;
fertilizer;
- row planting;
- use of chemicals.

As occurred with the farmers' awareness of maize production practices, some of them could only mention the main categories of practices that they had used whilst others could mention the specific names of certain practices under some categories. The two groups were compared on each category of practice to see whether there were differences in the proportion of the farmers in each group who were using those practices. This was appropriate because of the multiple response nature of the question.

The total number of farmers who had used at least one or more improved maize varieties totalled 117 (Table 5.15). About 54% of this number were DAES farmers and the remaining 46% were PPP farmers. This difference in percentage was not significant. Only 27 farmers had used fertilizer on their fields before. This number formed 18% of the total number of farmers all of whom were DAES farmers making the difference in use of fertilizer between the groups very significant.

Seventy two percent of the farmers were practicing row planting. About 53% of this proportion were DAES farmers and 47.2% were PPP farmers. The difference between the response was not significant. It must be noted that farmers who did not use

improved maize varieties used local varieties while those who did not plant in rows planted haphazardly. Thus a majority of the farmers used the recommended practices (78% in the case of improved varieties and 72% in the case of row planting). Sixty six farmers (44% of total) had used chemicals, one way or the other for the control of pests and diseases; 54.5% of this figure were DAES farmers and 45.5% were PPP farmers. This difference in proportions was not significant. Generally the two groups were significantly different on only one practice namely the use of fertilizer. However, the total number of farmers who adopted it were very low (18%). Hence the significant difference obtained between the two groups with regards to adoption of the practice was considered unimportant.

Table 5.15 Adoption of Farm Practices

FARM PRACTICES	GROUP				TOTAL	
	DAES (n ₁ =75)		PPP (n ₂ =75)			
	No.	%	No.	%	No.	%
Improved variety	63	53.8	54	46.2	117	78.0
Fertilizer use	27	100.0	0	0.02	27	18.0
Row planting	57	52.8	51	47.2	108	72.0
Use of Agro-Chemicals	36	54.5	30	45.5	66	44.0

NB: Total size = $N = n_1 + n_2 = 150$

Source: Data from field survey.

The groups were however not significantly different on the other three practices namely use of improved maize varieties, row

planting and the use of agro-chemicals. On these basis then there was no important significant difference between the maize production practices handled by the two groups- DAES farmers and PPP farmers.

The next chapter provides a summary of the study, a section on the conclusions drawn from the study as well as recommendations made.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATION

6.1 SUMMARY

The primary objective of this study was to find out whether the nature of farmers' participation with agricultural extension agents in technology transfer influences the level of agricultural technologies used by the farmers. Only one crop, was chosen for the study to ensure an in-depth study as well as clarity of observations. Maize was chosen because it is an important staple crop in Ghana and several improved production technologies have been made available by agricultural researchers for its production. Since the agricultural extension service of the Ministry of Food and Agriculture is responsible for communicating new technology generated from research to farmers, a closer look at their interaction and participation with farmers for that purpose was deemed worthwhile.

A review of the literature relating to participation advanced several arguments on the concept. However one important characteristic of the concept of participation which the review of the literature exposed was that it meant different things for different people. The differences in the statements on participation was traced to the particular perspective of rural development from which different authors looked at the term. The literature review also revealed several obstacles to the practice

of participation, but many authors were of the view that the advantages far exceed the disadvantages or obstacles. Some studies on participation in Ghana were presented, particularly those of Kpornyo (1986), Ohene-Konadu (1989) and Agyemang (1984). These studies came out with findings in support of the need for beneficiaries of rural development programmes to be actively involved in the planning and implementation of those programmes.

The farmers selected for this study were those with average farm sizes of between 0.4 hectares and 2 hectares. For these farmers production is achieved fundamentally through a combination of land and family labour with a small hired labour component. These farmers, who are usually referred to as small scale farmers (Pineiro et al, 1980), form an important part of the agricultural and economic development in Third World countries, including Ghana.

The farmers selected for the study included both sexes with relatively more males than females. In each group too, more males were interviewed than females. The range of ages were between 20 and 65. The study was done in a Twi speaking area and it was not surprising that all the farmers could speak the language. Some of them spoke more than one language, with some, especially the DAES farmers speaking English in the 'pidgin' form.

The educational level reached by the farmers although not very high, was quite impressive. Almost half of them had finished the MSIC, with a very small number of them reaching the secondary level. A few of them had been to the primary level. Some had however not been to school at all, but they formed only 22% of the

total sample. There was no significant difference between the level of education reached by the two groups of farmers.

Almost half of the farmers were not engaged in any other income generating activities apart from farming. Many farmers were however involved in income generating activities such as trading, artisanal activities and teaching.

Some of the farmers owned their lands for food production whilst others acquired theirs on shareholding basis and through other tenancy agreements. More DAES farmers owned their lands whilst more PPP farmers had their lands on shareholding basis. The crops grown by the farmers together with maize are cassava, plantain, yam, cocoyam, pepper, and beans.

With an idea of the characteristics of the respondents in mind, it was also important to look at the various agricultural research and extension initiatives which the respondents in one way or the other had come into contact with. This was done on a broader perspective by looking at development of agricultural research and extension in Ghana.

For agricultural research, the CSIR now forms an important body responsible for most of the research into food and animal production in Ghana. Other important research bodies which have contributed immensely to agricultural research in Ghana are the Universities, the Ministry of Food and Agriculture (MOFA), quasi-government agencies and the private sector. These bodies have, together, introduced many improved production technologies for various crops in Ghana, with maize receiving relatively more

attention due to its importance as a staple crop.

With regard to agricultural extension too, mention was made of various extension initiatives such as the United Ghana Farmers' Cooperative council (UGFCC) in the early 1960's, URADEP and VORADEP, GLOBAL 2000 and the Department of Agricultural Extension Service (DAES) which is currently responsible for agricultural extension (except cocoa) in Ghana. It was revealed that the history of the development of agricultural extension in Ghana generally shows a poor linkage of research with extension. The Unified Extension System recently adopted by the DAES is supposed to address itself to these shortcomings of the earlier systems.

A causal comparative research methodology was chosen for this study since it basically involved the comparison of two groups of farmers who supposedly had different forms of participation with their agricultural extension agents. The two groups of farmers, (with seventy-five farmers in each group) one from the Fanteakwa district and the other from the East Akim district, both of Eastern region were selected for the study. A simple random sampling was used for the selection of the farmers for each group. The farmers selected from the Fanteakwa district represented farmer-beneficiaries of the People's Participation Programme (PPP) and those selected from the East Akim district represented farmers who receive extension services from the Department of Agricultural Extension Services (DAES) in the district. The selection of these two groups of farmers was based on the presumption that, since the extension agents that come into contact with them come from

different extension organisations, it was likely that their nature or participation with their respective farmers would differ. This difference served the basis for comparing the farmers on the level of maize production technologies that they use. Data, most of which were categorical were collected from the farmers in the two groups and analysed using mainly the chi-square test.

A look at the nature of participation between the various extension agents and their respective farmers revealed important differences. First, all the DAES farmers received individual visits from their extension agents. This was however not the case with PPP farmers where about 40% had never received any individual visits from extension agents. The advantages of individual extension methods mentioned earlier would therefore apply more to the DAES farmers than the PPP farmers. On individual visits, the farmer is able to present all his/her problems and the extension agent also has the opportunity to verify some of the problems mentioned by the farmers. This form of participation is based on mutual trust and presents an important forum for farmers to assess agricultural technologies presented by extension agents. Although some PPP farmers received individual visits it was mostly irregular, whilst those which were regular were spaced too far apart in time. The DAES farmers however had a lot of their visits on weekly basis.

The issue of setting agenda for individual meetings left much to be desired as most of it was done by extension agents in both groups. Since these meetings are primarily in the interest of the

farmers, they must be the ones to set most of the agenda. This would reflect the problems they face on their farms. Too much reliance on the extension agents agenda would evolve a teacher-student relationship and over-dependence on extension programmes developed mostly by extension agents without the participation of farmers.

The idea of farmers visiting extension agents was not popular among the farmers. This is however one area which must be encouraged, since this would enhance the rate of interaction between farmers and extension agents. Extension agents are saddled with many problems in the performance of their duties, mobility being an important one. Therefore if farmers cultivated the habit of chasing extension agents for information, it would reduce the over dependence on visits by extension agents which is usually irregular.

The use of group extension methods, which has been so much advocated in recent times, and forms an important aspect of the Unified Extension System currently being used by DAES, had not been popular with extension agents in the study areas. Farmers were still visited on individual basis. All the PPP farmers however belonged to groups. The importance of group extension methods cannot be overemphasized. The group method is able to get to a majority of the farmers with extension advice and gives farmers the opportunity of knowing the experience of other farmers who undertake similar ventures. The individual method is usually used as a follow up to the group method. Both methods have important

advantages which make them appropriate for extension work. However an important advantage of the group method is the number of farmers that benefit from extension service in a relatively short time. Ideally therefore, when possible both methods must be used to complement each other.

The identification of problems on farmers' field either by farmers or by extension agents is very important since it is only when such problems are identified that solutions and recommendations could be suggested and considered respectively. Extension agents by the nature of their training are able to diagnose farmers' felt problems. The farmers on the other hand are very conversant with their problems since they come into regular contact with them. It is therefore important the two partners take an active part in identifying problems as well as analysing them for appropriate solutions.

All the farmers in both groups mentioned that they had identified problems on their farms before, but not all of them have had extension agents identifying problems on their farms.

The response received with regards to demonstration of farming practices by extension agents on farmers, field was discouraging. Only 24% of the farmers were privileged to have had demonstration on their farms (16% DAES and 8% PPP). This is sharply in contrast to one of the recommendations of the Unified Extension System which places much emphasis on demonstration. An example is the production test plots (PTP). Of the small number of farmers on whose farms demonstrations had been held, the demonstrations were

on improved maize varieties and row planting only. Since demonstration of production practices to farmers constitute an important way of farmers experiencing what is being transferred to them it must be encouraged.

All the farmers were aware of most of the production techniques recommended by extension agents although that is not their only source of awareness. The PPP farmers appeared more exposed to maize production practices although this did not reflect in their use of those practices. The very basic improved maize production practices such as the use of improved maize varieties, the use of fertilizers, row planting and use of chemicals was considered for this study. The farmers' responses showed that the majority of them were using the improved maize variety and practicing row planting. But the use of these practices was similar in both groups in terms of the proportion of farmers in the groups who used them. For the practice in which the two groups differed significantly (use of fertilizer), the overall proportion of farmers using it was so small as to make it important.

6.2 CONCLUSION

At the beginning of the study, the expectation was that there would be significant difference in the proportion of farmers from the two groups using the improved maize production practices that were considered due to the difference in the participatory approaches used by their respective extension agents to deliver extension messages. However, the data collected proved otherwise.

A majority of the farmers (78% and 72%) used improved varieties of maize and were also planting in rows respectively. There was no significant difference between the proportion of farmers from the two groups engaged in those practices.

With regard to the use of agro-chemicals too, 44% of the farmers were involved. There was no significant difference between the groups' use of agro-chemicals.

The only significant difference that occurred was in the proportion of farmers from the two groups who used fertilizer. None of the PPP farmers used fertilizer. Twenty-seven percent of DAES farmers used fertilizer. However this figure was considered too low to make it a meaningful difference.

Thus, the difference in participatory approaches used by the two extension programmes (DAES and PPP) to deliver extension messages did not result in any difference in the proportion of farmers from the two groups who used them.

6.3 RECOMMENDATIONS

Based on the data and results of this study, the following are recommended:

1. Farmers must be encouraged to pay more visits to agricultural extension officers. This will increase extension agent-farmer contact and involve more farmers in extension programmes.
2. More efforts must be made by DAES agents to motivate farmers to form viable farmers' groups. This

will increase the number of farmers that extension can reach and will also enhance exchange of ideas and information between them.

3. Extension demonstration plots must be provided in all the operational areas to increase contact between extension and farmers and also to give farmers the chance to assess recommended practices before adoption.
4. Studies on participation among farmers and its role in technology transfer.

APPENDIX A.**QUESTIONNAIRE FOR STUDY OF FARMERS' PARTICIPATION IN THE
TRANSFER OF IMPROVED MAIZE PRODUCTION TECHNOLOGIES IN GHANA:
A CASE STUDY OF MAIZE FARMERS IN SOME AREAS OF FANTEAKWA AND
EAST AKIM DISTRICTS.**

To be administered to:

Individual Farmers.

General Information:

Questionnaire No : _____

2. Date of Questionnaire: _____

3. Location : _____

A. Social Characteristics of Farmers.

- (1) Sex :
- | | | |
|----|--------|-----|
| 1. | Male | [] |
| 2. | Female | [] |

- (2) Age :
- | | | |
|----|--------------|-----|
| 1. | 20-29 | [] |
| 2. | 30-39 | [] |
| 3. | 40-49 | [] |
| 4. | 50-59 | [] |
| 5. | 60 and above | [] |

3) Language(s) spoken :

- | | | |
|-----|---------|-------|
| 1. | English | [] |
| 2. | Twi | [] |
| 4. | Ga | [] |
| 8. | Hausa | [] |
| 16. | Others, | _____ |

(4) Highest educational level attained

- | | | |
|----|----------------|-----|
| 1. | Primary | [] |
| 2. | M.S.L.C | [] |
| 3. | Secondary | [] |
| 4. | Post-Secondary | [] |
| 5. | University | [] |
| 6. | Non-formal | [] |
| 7. | No School | [] |

(5) Marital Status:

- | | | |
|----|---------|-----|
| 1. | Single | [] |
| 2. | Married | [] |
| 3. | Divorce | [] |
| 4. | Widow | [] |

(6) Occupation (s), other than farming:

- | | | |
|-----|---------------------|-----|
| 1. | Artisan | [] |
| 2. | Trader | [] |
| 4. | Teacher | [] |
| 8. | No other occupation | |
| 16. | Others, _____ | |

B. Farmer's Participation in Maize Technology Transfer**(i) Participation in Problem Identification**

(7) Do you farm on:

- | | | |
|-----|-----------------------|-----|
| 1. | Own land | [] |
| 2. | Family land | [] |
| 4. | Lease hold | [] |
| 8. | Share cropping | [] |
| 16. | others, specify _____ | |

(8) What is the size of your maize farm?

- | | | |
|----|------------------|-----|
| 1. | 0 - 0.8 hectares | [] |
| 2. | 0.8-1.2 hectares | [] |
| 3. | 1.2-1.6 hectares | [] |
| 4. | 1.6-2.4 hectares | [] |
| 5. | 2.4 and above | [] |

(9) What other food crops do you grow, apart from maize?

- | | | |
|-----|----------|-------|
| 1. | Cassava | [] |
| 2. | Pepper | [] |
| 4. | Tomatoes | [] |
| 8. | Plantain | [] |
| 16. | Yam | [] |
| 32. | Onion | [] |
| 64. | Others, | _____ |

(10) Does the extension officer visit you individually on your field/home?

- | | | |
|----|-----|-----|
| 1. | Yes | [] |
| 2. | No | [] |

(11) If yes, how often is this visit?

- | | | |
|----|---------------|-------|
| 1. | Daily | [] |
| 2. | weekly | [] |
| 3. | Fortnightly | [] |
| 4. | Monthly | [] |
| 5. | Irregularly | [] |
| 6. | Other,specify | _____ |

(12) Is the above frequency of visit to you, by the extension officer adequate for your farming activities?

- | | | |
|----|-----|-----|
| 1. | Yes | [] |
| 2. | No | [] |

(13) If no to Q12 give reasons why this frequency of visit is not adequate.

.....

.....

.....

.....

(14) What is usually the topic for your individual meetings with the extension officer.

1. Discussion of problems facing my farming activities.
2. Demonstration of farming practices
4. Demonstration of proper use of agriculture inputs.
8. Discussion on new agriculture technology.

16. Others, specify.....

(15) Who sets the agenda for the above meetings?

1. Extension Officer []
2. Farmer []
4. Farmer and extension officer []

(16) Do you face any problem with regards to your maize farming activities

1. Yes []
2. No []

(17) During face-to-face discussions with the extension officer about your farming activities, are you able to contribute to the discussions.

1. Yes []
2. No []
3. Sometimes []

(18) Please give reasons for your answer to question 17.

.....

.....

.....

.....

(19) Do you, as an individual, visit the extension officer at his /her office?

1. Yes []
2. No []

(20) If yes to Q19, how often is this visit.

1. Daily []
2. Weekly []
3. Fortnightly []
4. Monthly []
5. Irregularly []

6. Others, specify.....

(21) What is usually your purpose for such visits to the extension officer?

1. To present my farming problems to him/her []
2. To seek advice on issues/problems relating to my farming activities.
4. To buy agriculture inputs.
8. To enquire about new information relating to agriculture.
16. Others,.....

.....

(22) If no to Q19, why don't you visit the extension officer at his/her officer?

1. The officer is too far from my field/home
2. He has never invited me to his/her officer
4. It has not been necessary to go to his officer
8. He pays me enough visits
16. Others.....

(23) Do you belong to a farmers' group?

1. Yes []
2. No []

(24) If no to Q23, why don't you belong to a farmers' group?

1. No farmers group has been initiated in my area
2. I am not interested in groups
4. I am okay with my farming activities so no need to join a group
8. Others.....

.....

(25) If yes to Q23, does the extension officer hold meetings/visit with your group?

1. Yes []
2. No []

(26) If yes to Q25 how often does the extension officer visit/hold meetings with the group?

1. Daily []
2. Weekly []
3. Fortnightly []
4. Monthly []
5. Irregularly []

6. Other.....

(27) Is the above frequency of extension officer's visit to your group adequate for the group members' farming activities.

1. Yes []
2. No []

(28) What is usually the agenda for your group meetings with the extension officer?

1. Presentation of our farming problems to him/her
2. Demonstration of agricultural practices
4. Education on agricultural practices
8. Sale of agricultural inputs to us.
16. Meetings with other agricultural services personnel.
32. Introduction of new agricultural technology to us.
64. Others.....

.....

(29) During group meetings with the extension officer, are you, as an individual able to express your views on your farming activities?

1. Yes []
2. No []
3. Sometimes []

(30) If no to Q29, please give reasons.

1. I feel shy at group meetings []
2. I usually don't have anything to say []
4. I am not given the chance, by the group members to contribute
8. The extension officer does not give me the chance to contribute
16. The topics usually discussed are irrelevant to my situation
32. Others.....

.....

- (31) Does your group (or group executives) visit the extension officer at his/her office?
1. Yes []
 2. No []

- (32) If yes to Q31, how often is this visit.

1. Daily []
2. Weekly []
3. Fortnightly []
4. Monthly []
5. Irregularly []
6. Others _____

- (33) What is usually your group's purpose for such visits

1. To present problems facing the group to the extension officer.
2. To present farming problems to the officer
4. To receive agricultural advice from the extension officer
8. To purchase agricultural inputs on behalf of group members.

16. Others, _____

- (34) Please list all the technical problems (disease, pest, soil, low yield) that you have identified on your maize farm.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

(35) Has the extension officer ever identified a technical problem on your maize farm?

- | | | |
|----|-----|-----|
| 1. | Yes | [] |
| 2. | No | [] |

(36) If yes to Q35 please list the problems that the extension officer identified on your maize farm

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

(37) When you are confronted with a technical problem (pest, low soil fertility, disease) on your maize farm, what efforts do you make to solve it?

1. I try to solve it myself
2. I report the problem to the extension officer at his/her office
4. I discuss the problem with other farmers
8. I wait till the extension officer visits me at my field/home and tell him.
16. I invite the extension officer to my field/home to see discuss the problem with his/her.
32. I do not make any efforts (indifferent to technical problems)
64. Others _____

(38) Generally what efforts does the extension officer make to help you solve your technical problems on your maize farm?

1. He visits me regularly on my field/home to discuss the problem.
2. He makes some technical recommendations to me
4. He presents my problem at group meetings for other farms to provide possible solutions.
8. He makes no effort about my technical problems
16. Others _____

39) Generally do you have confidence in the extension officer(s) as an agricultural advisor(s) to you on your farming activities?

1. Yes []
2. No []
3. Indifferent []

40) If no to Q39, please give reasons

1. His recommendations are usually not applicable to my situation
 2. He does not understand my problems
 4. He is never prepare to learn from me
 8. Others _____
- _____

ii) Technology Transfer

41) Has an extension officer ever done a demonstration/testing of maize production technology (e.g. fertilizer application, high yielding maize varieties etc.) on your farm?

1. Yes []
2. No []

- (42) If yes to Q41, please list the technologies that were demonstrated/tested on your farm; the resources/inputs that you provided; the part you played in that demonstration/testing; whether you are currently using the technology; and reasons for using or not using the technology.

Technology demonstrated/tested	Resources/inputs provided by farmer	Part Played by farmer	Usage of technology Yes/No	Reasons for using/ not using technology
1.				
2.				
3.				
4.				
5.				

- (43) Are you aware of any demonstration/testing of a maize farm production technology that the extension officer did for farmers in your district (apart from any on your farm).

1. Yes ☐
2. No ☐

- (44) If yes to Q43, please list the technologies that have been demonstrated/tested by the extension officer in your district, the resources/inputs that you provided; the part you played in that demonstration/testing; whether you are currently using the technology and reasons for using or not using the technology.

Technology demonstrated/tested	Resources/inputs provided by farmer	Part Played by farmer	Usage of technology Yes/No	Reasons for using/ not using
1.				
2.				
3.				
4.				
5.				

- 15) Please indicate your awareness and sources of awareness of the following maize production practise/inputs.

Technology	Awareness Yes/No	Source of Awareness	
		Extension officer	Others, Specify
(i) <u>Maize Varieties</u> - Dobidi - Okomasa - Aburotia - Abelehi - Golden crystal - Safita - 2 - Kawantie			
(ii) <u>Fertilizer</u> - NPK - Amonium Phospate - Urea			
(iii) Row planting			
(iv) <u>Weedicide</u> - Gramaxone			
(v) <u>Insecticide</u> - Fostovin			
(vii) Others			

46. Please list all the maize farming practices and inputs that you are currently handling on your maize farm; specify who introduced it to you; and why you are using it.

Farming technique/ input	Introduced Extension Officer	by Others	Reasons for using it
1.			
2.			
3.			
4.			
5.			
6.			

47. Please list other maize production practices/ inputs that you have used in the past; give reasons why you stopped using them.

Farming Practice/input	Reasons for stopped usage
1.	
2.	
3.	
4.	
5.	

- (48) Have you ever rejected a recommendation by the extension officer with regards to your maize farming practices.

1. Yes []
2. No []

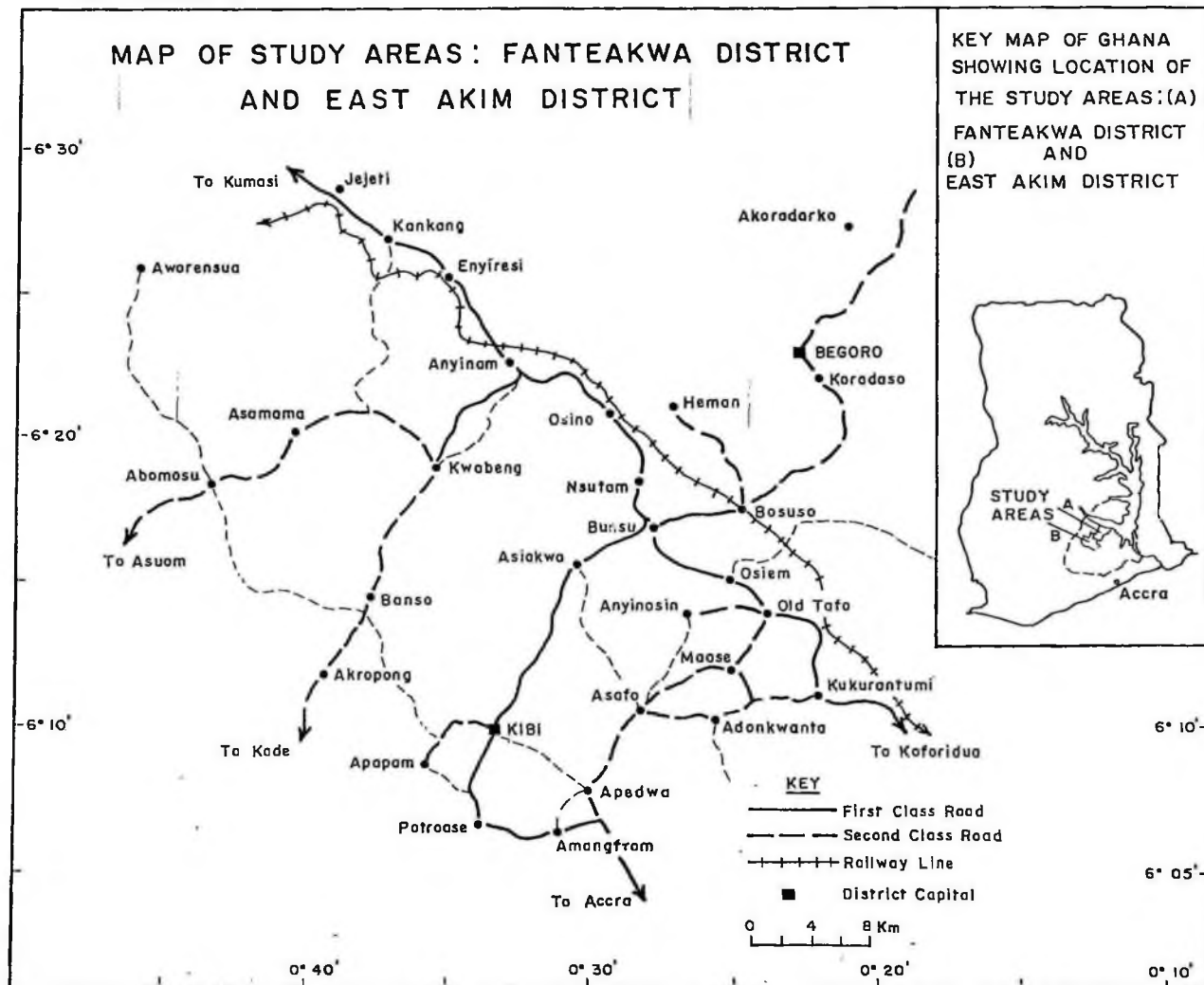
(49) If yes, list the recommendations and give reasons why you rejected them

Extension Officer's recommendations	Reasons for rejecting it
1.	
2.	
3.	
4.	
5.	

(50) Generally what things do you take into consideration when deciding whether or not to use recommended practices by the extension officer?

1. My ability to purchase things needed to make enable me practice what has been recommended
2. Whether other farmers are using it
4. Whether the extension officer held discussions with me on my farming problems before making the recommendations.
8. My past experience with other recommendation by the extension officer.
16. Others, _____

APPENDIX B



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