

**DISSEMINATION OF INFORMATION ON SOIL FERTILITY MANAGEMENT  
STRATEGIES TO FARMERS: A STUDY OF FARMERS IN ADA WEST AND  
KWAEBIBIREM DISTRICTS IN GHANA**



**ERIC BOANSI AGYEKUM**

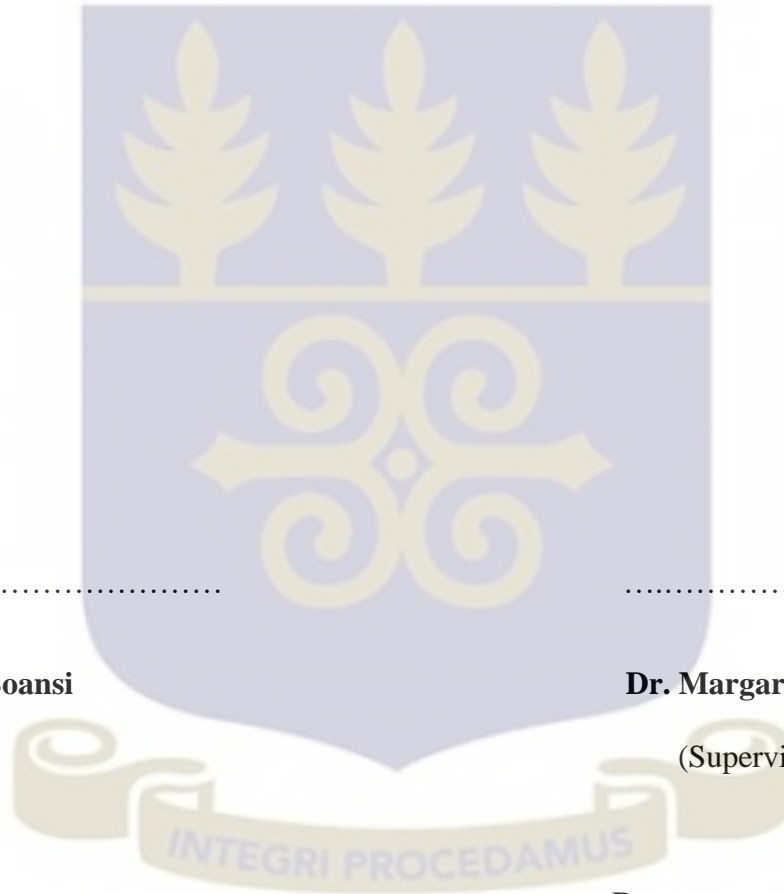
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PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MPhil  
COMMUNICATION STUDIES DEGREE**

**INTEGRI PROCEDAMUS**

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## DECLARATION

I declare that except for references to other people's work which have been duly acknowledged, this dissertation is a result of my own research conducted at the Department of Communication Studies, University of Ghana, Legon. This work was supervised by Dr. Margaret Ivy Amoakohene.



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**Eric Agyekum Boansi**

**Dr. Margaret Amoakohene**

(Student)

(Supervisor)

Date.....

Date.....

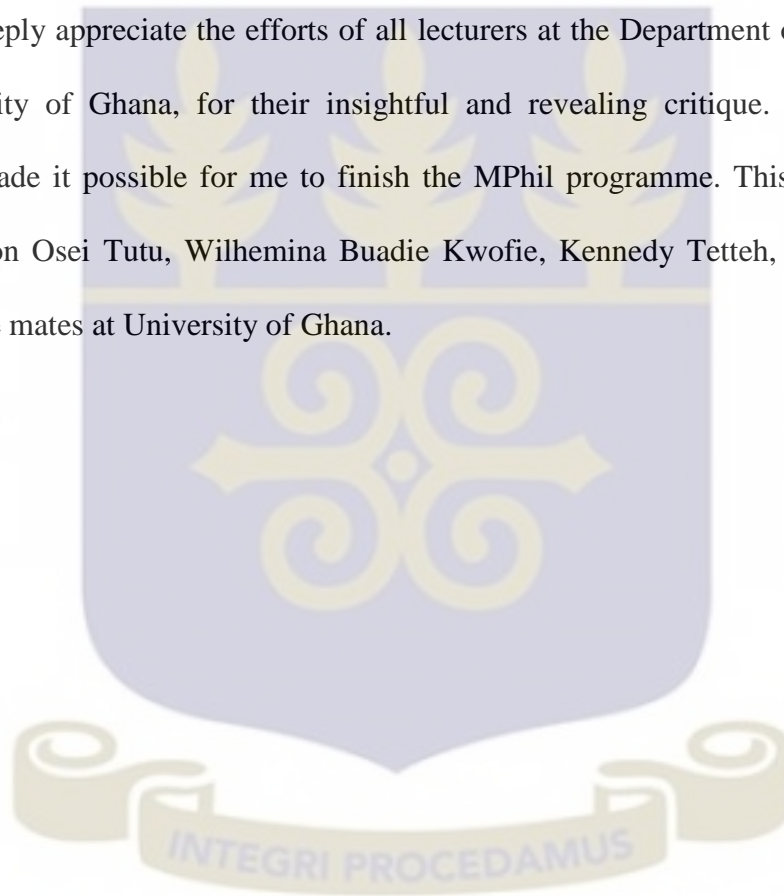
## **DEDICATION**

I dedicate this study to my father, Nicholas Addae Agyekum, my mother, Hannah Asante and my sister, Charlotte Dedaa Agyekum. Their immense support and love cannot be likened to anything else in this world.



## ACKNOWLEDGEMENT

My sincerest appreciation goes to God for seeing me through this programme successfully. I wish to extend my warmest gratitude to my supervisor, Dr. Margaret Amoakohene, for her patience, moral and intellectual support. This project would not have been a success without her informed contribution. This project was born out of a bigger research project called *ORM4SOIL*, which was sponsored by FiBL, Switzerland. I thank them immensely for funding this dissertation. I deeply appreciate the efforts of all lecturers at the Department of Communication Studies, University of Ghana, for their insightful and revealing critique. Special thanks to everyone who made it possible for me to finish the MPhil programme. This includes, but not limited, to Benson Osei Tutu, Wilhemina Buadie Kwofie, Kennedy Tetteh, Abubakr Ibrahim, and all my course mates at University of Ghana.



## ABSTRACT

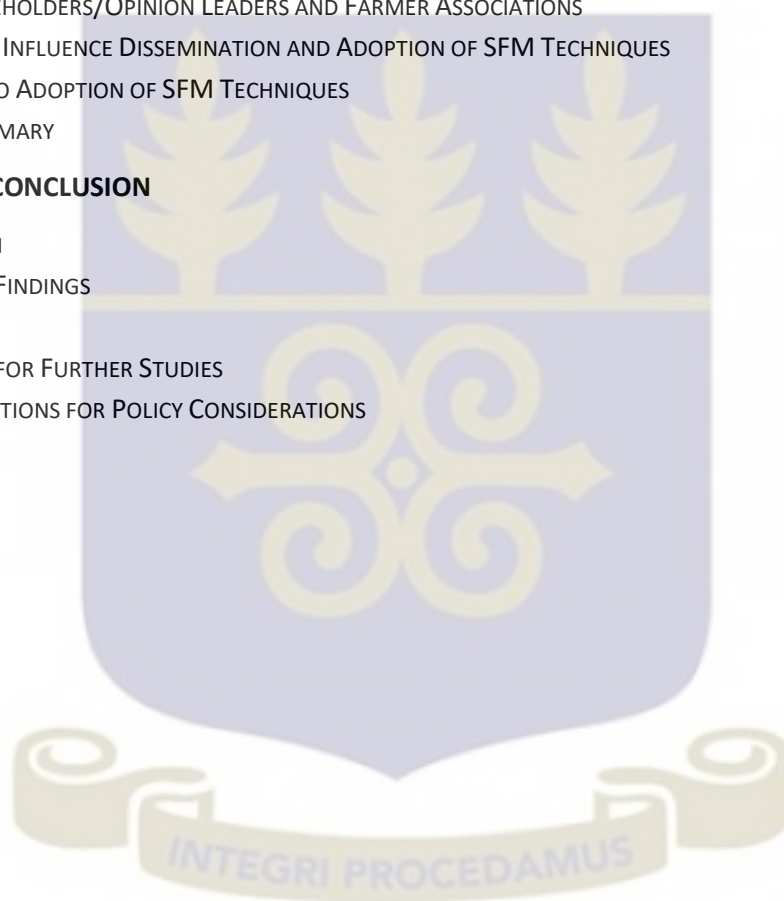
This study was undertaken to examine the factors that influenced the dissemination and adoption of soil fertility management (SFM) strategies to farmers in rural areas. It further assessed the communication channels that were deployed to spread information on SFM. This study was conducted in two separate districts – Kwaebibirem in the Eastern Region and Ada West in the Greater Accra Region – to compare findings from two different climatic zones. The diffusion of innovation and the media richness theories were utilized as the underpinning theoretical frameworks for this study. The mixed method approach, involving survey and in-depth interview, was adopted for the purposes of data collection. Survey was used to collect data from farmers while the in-depth interview was used to collect information from extension agents, district directors of agriculture and opinion leaders. The study found that information on soil fertility management was not enough to influence uptake of SFM technologies. This finding was more profound in Ada West district. Furthermore, it was identified that farmers sought information on soil fertility primarily through their colleagues, extension officers and radio. Farmers in Kwaebibirem district used the mass media to seek SFM information more than their counterparts in Ada West. The challenges that impeded SFM adoption included inadequate information, financial constraints, unfavourable land tenure systems among others. The study concluded with the suggestion that extension agents must intensify efforts at improving farmers' knowledge on SFM through effective dissemination approaches such as regular radio discussion, frequent field visit and use of accessible channels of communication.

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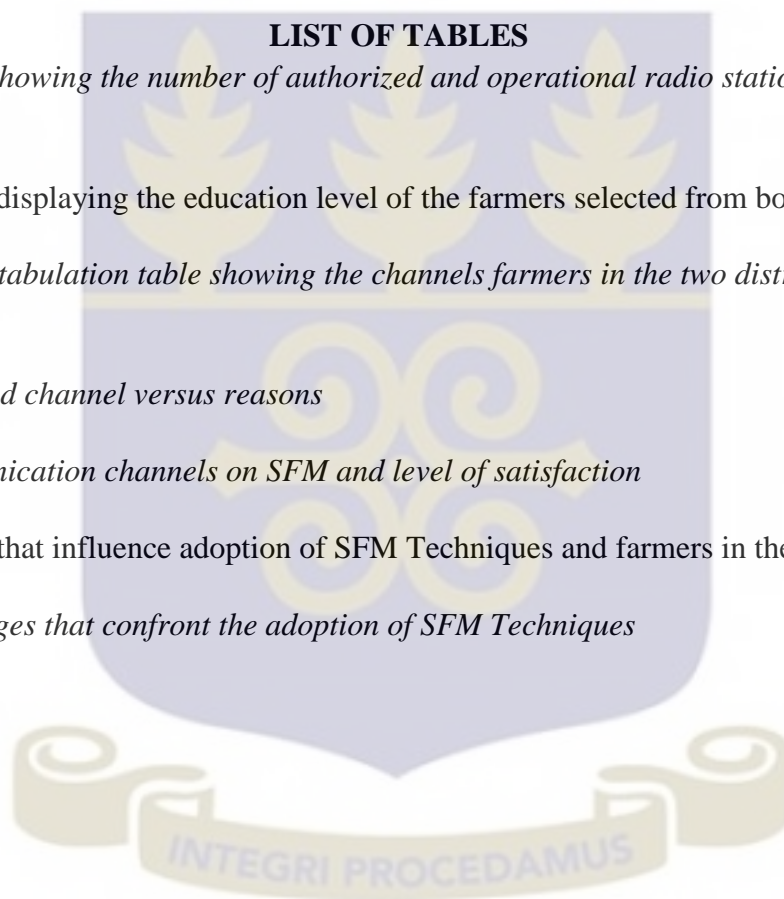


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## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.0 Introduction**

The chapter presents a brief overview of the agricultural sector and the soil fertility situation in Ghana, and how farmers are unable to access information that would equip them with ideas on proper soil fertility management strategies (Chapoto, Sabasi & Asante-Addo, 2015). The problem statement sub-section of this chapter identifies gaps in existing research on soil fertility and communication, and how the current study will fill those gaps. The primary aim of this study was to examine how communication influenced adoption of soil fertility management (SFM) by farmers in rural areas. Pursuant to the main objective, the study also sought to examine the communication channels that are used to disseminate the information to the farmers. This study is expected to contribute to existing knowledge on soil fertility management and adoption, with the goal of promoting appropriate SFM technologies for use by farmers.

#### **1.1 Background Statement**

Agriculture plays a vital role in the economic development of Ghana because it is considered, in addition to industry and services, as the three key sectors of the economy. The 2010 population census by Ghana Statistical Service (GSS) shows that agriculture's contribution to total employment is estimated to be 42%. However, prior to the 2010 census, the agricultural sector employed 55% of the labour force in Ghana (Breisinger, Diao, Thurlow & Al-Hassan, 2008). This downward trend is attributable to numerous challenges associated Ghana's agricultural sector. The problems include lack of, and insufficient credit facilities to farmers, declining soil fertility, inadequate supply and distribution of farm inputs (including soil fertility management inputs), unfavourable climatic and weather conditions, inadequate storage and marketing

facilities, poor infrastructure, disconnect between farmers and researchers, unfavourable land acquisition and land tenure system (Chapoto, Sabasi & Asante-Addo, 2015; Al-Hassan, 2008; Kombiok, Safo & Quansah, 2005).

Studies (Adjei-Nsiah, Saïdou, Kossou, Sakyi-Dawson & Kuyper, 2004; Sanchez, 2002) show that out of the problems facing the agricultural sector, soil fertility degradation resulting from deforestation, improper farming practices, poor land tenure systems, climate change and bush fires, significantly threaten food security. It is considered as the single most important constraint to food security in Sub-Saharan Africa (Verchot, Place, Keith & Jama *et al*, 2007; Sanchez & Swaminathan, 2005).

Dogbe, Dzomeku, Yahaya, Siise, Krofa, & Awuakye (2015) state that the best way to tackle the problem of poor soil fertility is to promote adoption of good soil fertility management (SFM) strategies by farmers. These SFM techniques are discovered and developed by researchers, companies and individuals who do not have direct access to farmers at all times. This is why agricultural extension agents (AEAs), the mass media and other means of communication are required to transfer these strategies to farmers (Ariyo, Ariyo, Okelola, Aasa, Awotide, Aaron, & Oni, 2013; Musa, Githeko & El-Siddig, 2011). Mass media channels (newspaper, radio and television) possess the capacity to create awareness and elevate the knowledge of farmers on new and existing methods of soil fertility (Nazari & Hassan, 2011). “The strength of rural radio as an extension tool lies in its ability to reach illiterate farmers and provide them with information relating to all aspects of agricultural production in a language they understand” (Chapman, Blench, Kranjac-Berisavljevic, & Zakariah, 2003, p.3).

Communication also influences adoption of SFM technologies. Access to timely and accurate information equips farmers with adequate knowledge and skills to address the problems posed by soil infertility (Adolwa, Esilaba, Okoth & Mulwa, 2013). This confirms the assertion by Musa, Githeko and El-Siddiq (2011) that communication increases the adoption rate of modern farm practices because the knowledge gained moves farmers to try the soil fertility innovations. It is imperative that agricultural research, a source of knowledge, technology and innovations (Sitawa *et al.*, 2010), reach farmers to influence their decision making. Poor communication between researchers and farmers as well as improper technology dissemination systems have been noted to account for the non-adoption of agricultural innovations (MoFA, 2011; Al-hassan, 2012; Osei & Entsua-Mensah, 2003).

Despite the discovery and development of many soil fertility technologies, adoption continues to be low (Chapoto, Sabasi & Asante-Addo, 2015). One of the reasons for the low adoption is inadequate awareness of the technologies (Muchai, Muna, Mugwe, Mugendi, & Mairura, 2014). Considering the enormous role communication plays in the dissemination and adoption of agricultural innovations, this study was conducted to investigate how information on SFM techniques are delivered to farmers. The study sites were farming communities in Kwaebibirem and Ada West districts in the Eastern and Greater Accra regions of Ghana respectively.

## **1.2 Soil Fertility in Ghana**

A fertile soil is a type of soil that is able to support plant growth (Chapoto, Sabasi & Asante-Addo, 2015). Land degradation is considered as a major threat to soil fertility because it depletes soil nutrients (Forster, Adamtey, Messmer, Pfiffner, Baker, Huber & Niggli, 2013; Gyasi,

Karikari, Kranjac-Berisavljevic, & Vordzogbe, 2006). The problem of land degradation poses serious threats to the growth of food and cash crops in sub-Saharan Africa (Muchai, *et al*, 2014), and Ghana is no exception because it has one of the highest rates of soil nutrient depletion in Africa (International Food Policy Research Institute, 2015).

The issue of deteriorating soil fertility spreads throughout the six agro-ecological zones of Ghana, namely: high rainforest, forest-transition, semi-deciduous forest, coastal savanna, Guinea savanna and Sudan savanna (Bationo, 2015). Each zone has its distinct soil fertility properties but the “extent of nutrient depletion is widespread in all the agro-ecological zones with nitrogen and phosphorus being the most deficient nutrients” (IFPRI, 2015, p.16). The Sudan, Guinea and coastal savannas, and the forest-savanna transition are the most prone to soil fertility (Gyasi *et al*, 2006). This means that farmers in Ada West, located in the coastal savannah zone, constantly battle soil infertility. Relatively, the soil infertility is mild in Kade in the rain forest belt (Nyalemegbe & Koomson, 2012). Nonetheless, soil infertility threatens farmers in both districts.

From the foregone, it appears tackling the causes of soil infertility remains crucial to the development of agriculture. Forster *et al* (2013) lists weakening of soil organic matter, loss of nutrients, soil erosion, degradation of soil structure among others as the main causes of poor soils in Ghana. According to Abimah (2002), farmers’ response to declining soil fertility had been to abandon lands with poor soils to a better land. This practice is known as shifting cultivation, but expansion in human population does not make this method ideal for dealing with soil infertility. Adoption of organic and inorganic SFM approaches is considered as the most viable way of addressing the challenge of land degradation. Organic soil fertility techniques involve the use of

organic matter, manure, planting of cover crops, practising mulching, agro-forestry, crop rotation and conservation agriculture. The inorganic fertilizers are artificially-manufactured chemicals which contain nutrients that support crop growth. Vanlauwe and Giller (2006) note the need to combine the applications of chemical fertilizer and organic resources. This approach is known as integrated soil fertility management (ISFM). Dogbe *et al* (2015) view integrated use of organic manure and chemical fertilizers as promising in providing greater stability in soil fertility and production.

However, evidence (Chapoto, Sabasi & Asante-Addo, 2015) suggests that farmers are not adopting any of these SFM approaches on a larger scale. Generally, fertilizer usage in Africa is the lowest in the world, a situation which has been cited as one of the main factors hindering agricultural growth in sub-Saharan Africa (Chapoto *et al*, 2015). Many reasons which include lack of access to credit, lack of knowledge on fertilizer use and high prices of fertilizers have been ascribed to this low use of fertilizer (Gregory & Bumb 2006; Marenya & Barret 2009). Chapoto *et al* (2015) also claim that fertilizer programmes do not address the specific needs of farmers in certain areas. Another problem that accounts for the low patronage of SFM is limited access to necessary SFM techniques (Etyang, Okello, Zingore, Okoth, Mairura, Mureithi, & Waswa, 2014).

### **1.3 Problem Statement**

As already indicated, soil fertility is an important issue which has implications for the improvement of the agricultural sector in Ghana. Effective communication and dissemination strategies are essential to facilitate the adoption of SFM techniques. While Adjei-Nsiah *et al*

(2006) observed that the uptake of SFM techniques were marred by poor communication between extension officials and farmers in Ghana, Adolwa, Okoth, Mulwa, Esilaba, Mairura & Nambiro (2012) also posited that lack of access to timely and accurate information was a major impediment to in Kenya. Empirical studies are, thus, necessary to examine the key roles communication plays in this endeavour.

Adolwa *et al* (2012) note that there are very few academic studies on the role of communication in addressing the soil fertility decline in the sub-Saharan sub-region. The available related literature on the dissemination of SFM techniques, and agricultural innovations in general, underscore the vital significance of mass media, extension agents and community-based channels. Evidence from related studies (Ariyo *et al*, 2013; Nwanko & Orji, 2013; Nazri *et al*, 2012; Chapman *et al*, 2003) suggests that radio is the most popular and effective mass medium for communicating innovations to farmers. Even though these studies were separately conducted in different areas and at different times (Chapman *et al* in Ghana, Nazri *et al* in Iran and, Ariyo *et al* and Nwanko and Orji in Nigeria), each shows that rural radio plays an active role in the information dissemination process. It is, therefore, important to replicate this study in Ada West and Kwaebibirem districts to add to the existing studies.

It is worthy of note that the study by Chapman *et al* (2003) was conducted in the Northern Region of Ghana, which is in a different ecological zone from Ada West and Kwaebibirem districts. Nsiah-Gyabaah (2003) conducted a similar study in the forest-transition belt of Ghana and found extension agents and NGOs as the main stakeholders in soil fertility innovation diffusion, contrary to the findings of Chapman *et al* (2003). Considering the view by IFPRI

(2015) that every vegetation zone has distinct soil fertility needs, it is important to study how farmers in Kwaebibirem in the rain forest zone and those in Ada West in the coastal savannah zone seek information about SFM. This would help establish a nationwide perspective on how farmers in all the ecological zones in Ghana seek information on SFM.

Other studies (Muchai *et al*, 2014; Ndilowe, 2013; Obidike 2011) have confirmed extension agents as conduits for conveying research-induced innovations from government and researchers to farmers. In these studies, participatory and interpersonal extension approaches were preferred to the linear model of information transmission. In spite of farmers' preference for more interactive extension services, Al-hassan (2012) and Ramirez (1997) found the linear model, also known as transfer of technology, as the most popular form of extension. This study sought to identify the type of extension service AEAs use to disseminate information on SFM to farmers.

The current study also sought to examine the factors that enable adoption of SFM techniques. Except Chirwa (2005), related studies on soil fertility in Ghana were limited to the role of communication in disseminating SFM strategies to farmers. The present study went further to fill that gap by examining the factors that promote the adoption and non-adoption of these technologies. It further investigated the role of stakeholders and opinion leaders in the adoption of soil fertility management practices.

#### **1.4 Research Objectives**

The major goal of the research was to assess the role communication plays in the adoption and use of soil fertility techniques in Ghana. Specifically, the study sought to:

1. Identify the communication channels that are used to communicate information on soil fertility management methods to farmers
2. Assess farmers' preferred communication channels for delivering SFM information to farmers
3. Ascertain the role opinion leaders and farmer-based groups play in the dissemination of information on, and adoption of, soil fertility management strategies
4. Investigate the factors that influence or impede the dissemination and adoption of SFM techniques

### **1.5 Research Questions**

1. To what extent does communication channels influence the dissemination and adoption of SFM methods in Ghana?
2. What specific messages on SFM are disseminated and how do the information influence uptake of SFM techniques?
3. To what extent do farmer groups or associations influence the adoption and use of improved soil fertility?

### **1.6 Scope of Study**

The overriding aim of the study was to promote the adoption and usage of soil fertility practices among rural farmers in Ghana. In line with the general objective, this study assessed the different communication channels that were employed in the dissemination of SFM technologies to the farmers. The study areas were selected communities in Kwaebibirem district in the Eastern region and Ada West district in the Greater Accra region of Ghana. The Ada West district is

found within the Lower Volta Basin. Kasei (2009) describes the Lower Volta Basin area as a semi-arid and sub-humid zone which is highly vulnerable to rainfall and climate change. Again, deforestation, land degradation and high population growth rate abound in the area (Kasei, 2009). On the other hand, the Kwaebibirem district is found in the rain forest vegetation cover of Ghana. The area is noted for heavy rains which either washes off nutrients or pushes them beyond the roots of the crops for proper growth. This presents soil fertility challenges to the farmers. It was for these reasons that the study focused on these two districts.

### **1.7 Significance of Study**

The study was significant because very few researches on communication of SFM technologies have been conducted in Ghana and in sub-Saharan Africa (Adolwa et al, 2012). Therefore, the current study added to the existing literature and provided different perspective to the subject matter. This study could equip extension officers with ideas on how to choose appropriate communication channels to communicate messages about SFM to farmers. The study could be used by policy makers and the Ministry of Food and Agriculture (MoFA) to implement effective communication strategies for maximum impact.

### **1.8 Organization of the Study**

This study is organized into seven chapters. Apart from this introductory chapter, which has been dealt with, chapter two and three focused on the literature review and the theoretical framework. Chapter four addressed the methodology and methodological issues comprising research design, source of data used, population, sampling techniques and sample selection, data collection technique and instruments. Chapter five presented data while chapter six discussed the findings.

Chapter seven talked about summary, limitations, conclusions and recommendations for the study.



## **CHAPTER TWO**

### **THEORETICAL FRAMEWORK**

#### **2.0 Introduction**

The diffusion of innovation and media richness theories underpinned this study. Agriculture is one sector which is exposed to innovations such as improved seeds, new farming methods, soil fertility techniques, fertilizers and chemicals for controlling diseases and weeds. To this end, Sahin (2006) refers to the diffusion of innovations (DOI) theory as the most appropriate model for investigating the adoption of agricultural technologies. DOI was used to explain how innovations are transferred to farmers through certain communication channels. For this study, soil fertility management techniques were identified as the innovations that were disseminated to farmers for adoption and subsequent use on their farms. The theory explained how communication is deployed to facilitate adoption of SFM techniques in the research areas. DOI was also used to explain the role of opinion leaders in the dissemination and adoption of SFM practices.

The second theory used for this study was the media richness theory which assessed the appropriateness of the existing channels of communication in conveying messages on SFM to farmers in the rural areas. The theory was used to examine how accessible, demonstrable, credible and trustworthy a communication channel is. The choice of this theory was driven by the aims and objectives of the study and reviews of related materials.

#### **2.1 Diffusion of Innovation (DOI) Theory**

DOI was postulated by Everret Rogers, a communications scholar, in 1984. The theory evolved out of the works of American rural sociologists which centred on how rural folks in the 1940s

embraced new ideas, and the complexities that were associated with the innovations (Simin & Janković, 2014). Rogers (2003) defines diffusion as the process through which an innovation is communicated via certain channels over time among members of a social system. Rogers describes diffusion as a special type of communication which involves the transfer of messages concerned with new ideas. Drawing on Rogers's analysis of diffusion, communication is not viewed as a one-off event but a process which involves constant interaction among the actors. In the context of this study, communication becomes a process in which extension agents, farmers and other stakeholders create and share information in order to reach a mutual understanding about soil fertility management.

Per the definition of diffusion, there are four major elements of the theory. They are the innovation, communication channels, time and the social system. Rogers posits that the adoption of an innovation is highly dependent on how these elements interact and relate to one another.

### **2.1.1 Innovation**

Rogers (2003) defines an innovation as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption”. The end goal of every innovation is to cause a change or a shift from an old practice to a new one (Sahin, 2006). Rogers is of the view that it would be simplistic to view all innovations as new because the perceived newness of a technology differs significantly from an individual to the other. This study assumes that not all farmers are entirely ignorant of the various SFM innovations. It is the contention of this researcher that on the back of the perceived newness of SFM methods, possibly, there could be three categories of farmers: those who are actually using the technologies; the farmers who are familiar with the methods but have not adopted yet; and the farming group that is totally unaware of these technologies.

Obviously, the three groups of farmers are expected to have different knowledge level and willingness to adopt SFM techniques. Rogers (2003) outlines five factors that influence the rate of adoption. They are relative advantage, compatibility, complexity, trialability and observability.

#### **2.1.1.1 Relative Advantage**

This explains how an innovation is perceived to be better than the idea it replaces (Robinson, 2009; Rogers, 2003). This can be measured through the satisfaction users derive from the innovation. According to Rogers, the more an innovation yields good results, the more rapid its rate of adoption will be. By extension, any technique which has the potential of adequately addressing the problem of soil infertility has a higher chance of adoption among farmers.

#### **2.1.1.2 Compatibility**

A new technology which is consistent with existing values, past experiences, and needs of potential adopters has a higher adoption rate and vice versa. This is how the principle of compatibility operates. For instance, it is important for change agents to investigate whether a community accepts cow dung as an organic soil fertility technique before persuading farmers to adopt it. Adoption becomes low when the technique violates the social norms of the target group. It is important to test whether the technology is compatible with the soil in the area. Effective collaboration between change agents and communal leaders is the key to solving the challenges that arise out of compatibility.

#### **2.1.1.3 Complexity**

This feature explains the extent to which an innovation is perceived as difficult to understand and use. Generally, new ideas that are simpler to understand will be adopted more rapidly than those that require the adopter to go through laborious processes. Effective communication is

paramount to ensure farmers have complete understanding of the SFM techniques. Skilled and eloquent extension agents are needed to decode messages and transmit them in a clearer and coherent manner that enables comprehension.

#### **2.1.1.4 Trialability**

An innovation which can be tried on a limited basis before adoption on a larger scale can be described as trialable. According to Rogers (2003), any innovation that is trialable represents less uncertainty to the individual who is considering it for adoption. This does not directly relate to the current study.

#### **2.1.1.5 Observability**

Observability is the when the results of an innovation are easily noticed by others. An innovation whose results are visible have higher adoption rate. This is because such visibility stimulates peer discussion of the new idea, as friends and neighbours of an adopter ask for more evaluative information about it (Rogers, 2003). Farmers who have tried soil fertility can advise their colleague farmers to adopt because it worked for them. On the other hand, farmers with soil problems can also inquire from their neighbours for ideas on how enrich their soil with nutrients. On this score, soil fertility results are highly observable, but it requires communication between the adopter and the potential adopter to determine the eventual action of the latter. This is where the local network of communication becomes relevant.

#### **2.1.2 Communication Channels**

The second element under DOI is communication channel. The diffusion of soil fertility strategies to farmers is a process that is enabled by communication channels. Rogers (2003) defines communication as “a process in which participants create and share information with one another in order to reach a mutual understanding” (p. 5). In diffusion context, communication is

a process that involves an individual who possesses knowledge of, or has experience with, an innovation, and another individual who does not have knowledge of the new idea. The two units are joined by a communication channel.

The selection of a communication channel has implications for the success or failure of the diffusion process because an inaccessible channel signifies doom for the progress of an innovation (Sahin, 2006). Rogers (2003) identifies mass media and interpersonal communication channels as the two most influential channels for spreading innovations. Rogers predicts that interpersonal channels (face-to-face) are more effective at persuading an individual to adopt a new idea because interpersonal channels link two or more individuals who are closer and share similar educational, social and economic characteristics. Rogers (2003) cites the concept of 'homophily' to support his claim. Homophily is described as the degree to which individuals who interact are similar in certain attributes, such as beliefs, education, social status, and the like (Rogers, 2003).

Realistically, diffusion cannot occur in a homophily situation. Rogers (2003) is of the opinion that diffusion is almost impossible when both the sender and the receiver have same level of technical competence. He therefore, proposed heterophily which brings together a more technically competent change agent and a less exposed individual. However, heterophily has the tendency to breed ineffective communication especially when the change agent cannot speak the local language, and also does not understand the social structure of the community. This explains why diffusion of innovation sometimes involves opinion leaders who serve as change agents due to their conversance with the communal norms and the respect they command from the target

group. According to Sahin (2006), Rogers further categorizes channels as localite and cosmopolite. Localite channels are the local and interpersonal communication networks while all mass media channels are cosmopolite because they guarantee communication beyond the social system. Rogers (2003) states that mass media and cosmopolite channels are more important for creating initial awareness while localite and interpersonal channels are more effective for persuading potential adopters.

This study sought to establish whether interpersonal/ localite or mass media/ cosmopolite were more effective communication channels. It further established if the heterophily or homophily concept were applicable in the case of SFM diffusion to farmers. This directly addressed the study's aim to identify communication channels that are employed in the dissemination of information on soil fertility management.

### **2.1.3 Time**

Time is the third element of the diffusion of innovation theory. Rogers (2003) observes that many communication studies on diffusion of innovation ignore the time factor, although he is of the view that “diffusion is a process that occurs over time” (p.113). Leaning on Rogers's argument, it means that time is an aspect of every activity in the diffusion process. The time element in diffusion is important for determining the innovation decision process and the classification of adopters (Smith, 2009; Rogers, 2003).

In this study's context, the time factor was even more crucial as farmers mostly worked based on seasons and the rainfall pattern. The time element determines what soil fertility innovation must be practiced and at what time. When the appropriate technology is determined, the time further

influences the kinds of messages that can be disseminated to the farmers. It is therefore, inappropriate to suggest to farmers to use cow dung during the rainy season because the rains are capable of washing them away. In this case, the time shapes the narrative of the communication and further highlights the appropriate technology to be used at the time. The various manifestations of the time factor, as advanced by Rogers, are explained below.

### **2.1.3.1 The Innovation-Decision Process**

The innovation-decision process is the process through which an individual passes from first knowledge of an innovation to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. This process is conceptualized through five main steps: knowledge, persuasion, decision, implementation and confirmation.

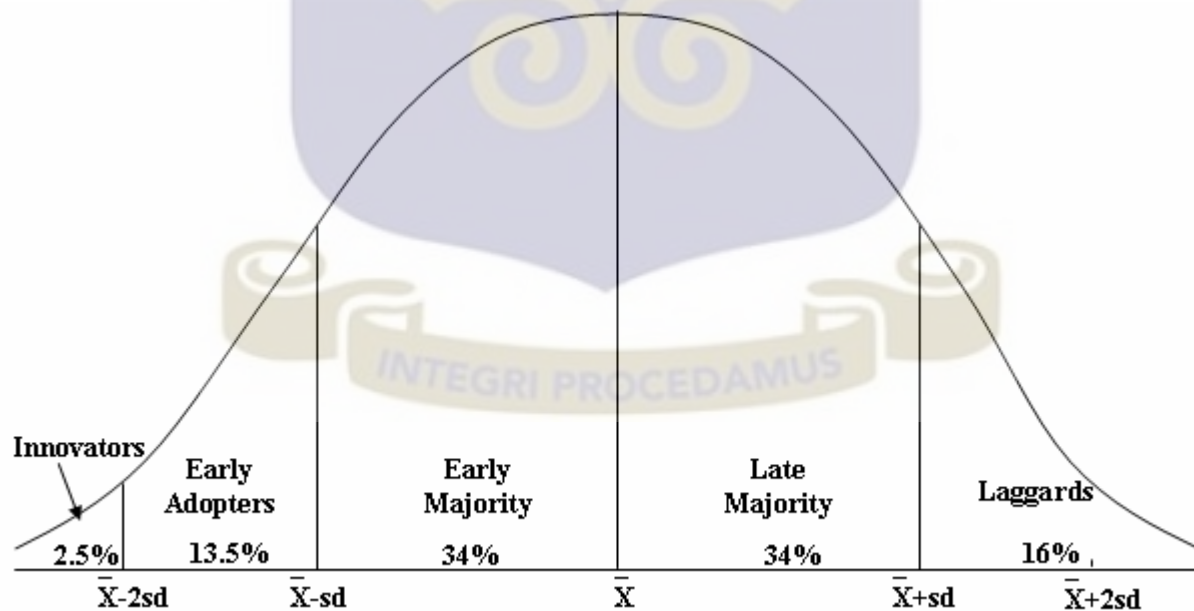
- a. “Knowledge occurs when an individual is exposed to the innovation's existence and gains some understanding of how it functions” (Rogers, 2003, p.20). At this stage, a farmer becomes aware that there are strategies for improving soil fertility and gains understanding on how they are used for maximum benefit. Mass media channels are often employed at this stage due to their capacity to reach many people at the same time.
- b. “Persuasion occurs when an individual forms a favourable or unfavourable attitude toward the innovation” (Rogers, 2003, p.20). Based on the knowledge gained, the farmer begins to seek additional information on the advantages and disadvantages of the various techniques. The farmer can then decide to adopt or not to. Interpersonal communication plays important roles here, as the farmer is more likely to ask a colleague farmer in order to develop the necessary attitude towards the technology.

- c. “Decision occurs when an individual engages in activities that lead to a choice to adopt or reject the innovation” (Rogers, 2003, p.20). Still in the information-seeking and information-processing stage, the farmer seeks for information that will reinforce their position that the SFM techniques are worth adopting.
- d. “Implementation occurs when an individual puts an innovation into use” (Rogers, 2003, p.20). Convinced by the information on the need to improve the quality of the soil, the farmer applies the techniques on the farm, in anticipation of the perceived benefits associated with using organic soil fertility technologies. The farmer still interacts with the extension agents and other innovative farmers for direction.
- e. “Confirmation occurs when an individual seeks reinforcement of an innovation decision that has already been made, but he or she may reverse this previous decision if exposed to conflicting messages about the innovation” (Rogers, 2003, p.21). At this stage, it is important to provide information to commend the farmer for adopting the innovation. This stage also requires the extension or change agent to monitor closely developments on the farm to ensure that farmers do not get distracted by conflicting messages from neighbouring farmers who did not adopt the technologies.

Rogers (2003) emphasizes that these stages are information-seeking and information-processing activity that often involves adopters constantly seeking information. It is therefore, advisable for the change agent to devise means of communication that will ensure effective communication in an efficient and convenient manner. Rogers further explains that although these stages are time-ordered, not all farmers who adopt soil fertility practices go through all of them. There are some who could skip persuasion and decide immediately after gaining knowledge and understanding.

### 2.1.3.2 Classification of Adopters

Rogers (2003) opines that adoption of innovations happens in a time sequence because not all individuals adopt innovations at the same time; there are some who adopt the innovation far earlier than others. Therefore, the theory has categorized all adopters into five based on the time of adoption. It is worthy of note that the time of adoption is influenced by many variables, in which communication features prominently. It is generally believed that early adopters have access to the mass media and are highly exposed to information, hence they are more likely to become aware of an innovation. Rogers (2003) calls this group of people “cosmopolite” while those who resort to local interpersonal communication channels are called “localites”. Because not all members adopt innovations at the same time, Rogers (2003) classifies adopters into five categories, namely: innovators, early adopters, early majority, late majority and laggards.



**Figure 1: Categories of Adopters**

(Source: Rogers 2003)

The figure above depicts the innovativeness of the adopters with respect to their time of adoption. The earlier an individual adopts an innovation, the more innovative they are seen to be and vice versa.

#### **2.1.4 Social System**

Rogers (2003) defines a social system as “a set of interrelated units that are engaged in joint problem solving to accomplish a common goal”. The members or units of a social system may be individuals, formal and informal groups or organizations, and/or subsystems who work to ensure the welfare of the entire members of the social system. The members of the social system are bound by common societal norms and values, and ruled by a common chief and traditional council. It is the commonality of their beliefs that binds the system towards achieving a common goal. It is worthy of note that diffusion does not occur in a vacuum but rather takes place within a social system. This means the adoption or rejection of an innovation is highly dependent on the prevailing social structure and norms that govern a particular social system. Rogers (2003) is opinion that the social system influences diffusion of innovations through its social structure, norms, opinion leaders and communal leaders.

##### **2.1.4.1 Social Structure**

In explaining how the social structure and norms affect diffusion, Rogers (2003) explains that diffusion can never be successful without clear understanding of the structures within the social system. Rogers views the social structure as the patterned arrangement of units in a system. The organization of the social structure will determine whether the system is highly organized or formal, completely informal or combination of both.

The social structure can facilitate or impede the diffusion of an innovation in a system. It is therefore important for change agents to study the social system carefully before embarking on any diffusion activity. The social structure has demonstrated to be a major influence on the choice of communication channels in a diffusion scenario. With respect to this study, the social system consists of selected communities in Ada West and Kwaebibirem districts. The two districts have different cultural orientation and differ in other aspects. Through this principle, this study will establish which social structure exists in each of the communities in the districts and the respective dominant communication channels.

#### **2.1.4.2 System Norms**

Norms are the established cultural, traditional and religious values that determine the pattern of behaviour for members of a social system. They define a range of tolerable behaviour and serve as a guide or a standard for the members of a social system. Rogers (2003) suggests that if the norm in the social system accord respect to their chiefs and elders, then the change agents can be opinion leaders and communal leaders. When the system does not attach premium to communal leaders, then the interpersonal networks and the mass media can be activated to diffuse the innovation. Essentially, the norms influence the communication of innovation. Again, religious norms could bar members of a certain community from adopting some innovations.

The land tenure system in a particular area can serve as a hindrance or catalyst to the adoption of soil fertility technologies. In view of that, this study sought to find out the extent to which land ownership influence the adoption and uptake of soil fertility strategies.

### 2.1.4.3 Opinion Leaders and Change Agents

As established above, some community members, based on their norms, give maximum respect to their leaders, thereby elevating them into opinion leaders' status. This makes it necessary to examine the main roles opinion leaders play in the dissemination of information on innovations to individuals in a social system. As has been indicated, not all individuals occupy the same position in a community, and since some individuals hold higher positions and command greater respect, diffusion experts think these are the best people to use as change agents. They are opinion leaders whose opinions hold sway over a larger proportion of the populace because they command followers in the community.

Rogers (2003) identifies four main characteristics of opinion leaders, and explains that they: are more exposed to all channels and sources of communication, they are more acquainted with the world beyond their social system, have higher social status, and are more innovative. People who seek to introduce innovation into a certain community often meet with the opinion leaders, hence most information mostly diffuse from them through the informal interpersonal communication networks to other people. Since opinion leaders are more accessible and seen as models of social behaviour, the diffusion of an innovation from them to the rest of the community occurs through interpersonal communication network.

The communities in the two districts for this study have chiefs and elders, in addition to other elected political personnel like assemblymen and women, unit committee members, members of parliament (MPs) and district chief executives (DCEs). This study sought to find out the role these leaders play in the dissemination of information on soil fertility practices to farmers in their respective localities.

### **2.1.5 Application of Diffusion of Innovation in Related Studies**

Numerous studies have used the diffusion of innovation theory to understand how farmers react to information concerning new agricultural technologies. For instance, Simin and Janković (2014) applied the diffusion of innovation theory to assess how farmers adopted organic farming. Similarly, Ndilowe (2013) investigated how farmers received messages on conservation agriculture in Malawi using DOI theory. In fact, conservation agriculture is one of the organic SFM techniques which helps protect nutrients in the soil. Moore (2014) used the theory to study how farmers in Northern Ghana were adopting and adapting to land and water conservation techniques on their farms. In all, these studies prove that the theory is equally useful for the current study which sought to, among other things, find out the reasons behind the adoption and non-adoption of SFM methods, and the role communication plays in the process.

### **2.2 Media Richness Theory (MRT)**

The media richness theory (MRT) was postulated by Daft and Lengel in 1984 to offer empirical insight into how communication channels are able to convey “richer” information to people. MRT is considered as one of the most widely accepted theories on media use (Dennis, Valacich, Speier & Morris, 1998). El-Shinnawy and Markus (1997) aver that MRT is the most prominent theory for studying the rationale behind people’s choice of communication channels. This theory is anchored on the principle that the effectiveness of a communication channel can be determined by ranking them on richness scale. This is because not all communication channels have the same information processing capacity.

Daft and Lengel (1987) offer four main criteria for determining the richness of a channel: (1) capacity for immediate feedback; (2) capacity of the channel to have a personal focus; (3)

capacity to transmit multiple cues, and; (4) language variety (Saeed, Yang & Sinnappan, 2008). Based on these criteria, a five-step continuum was developed to rank various media channels from rich to lean. The channels that were used are face-to-face interaction, telephone calls, letters, written documents and numeric documents. From the continuum, face-to-face communication was identified to convey the richest information while numeric documents conveyed the least rich information.

Another major concern of the theory was to identify the most appropriate communication channel suitable for reducing uncertainty and resolving equivocality. Leaning on early scholarly works (Miller & Frick, 1949; Shannon & Weaver), Daft and Lengel (1986) defined uncertainty as the absence of information or the presence of inadequate information. Uncertainty is caused by lack of information which leads to ignorance, hence as information increases, uncertainty decreases. Therefore, communication channels are needed to bridge the gap by conveying the required amount of information to the individual tasked to perform a duty (Saeed, Yang & Sinnappan, 2008). As the amount of information processed increases, the level of uncertainty decreases (Daft & Lengel, 1986). Appropriate media required to reduce uncertainty are those that facilitate the exchange of large amounts of accurate, objective, or numerical data (Daft & Lengel, 1986).

Equivocality, on the other hand, refers to ambiguity and the existence of multiple, conflicting interpretations (Daft & Lengel, 1986). High equivocality results in confusion and misunderstanding. Daft and Lengel (1987) opine that communication channels that enable

immediate feedback, non-verbal cues and adequate demonstrations are more appropriate for reducing equivocality.

This theory was useful assessing the effectiveness of the various communication channels that were used to communicate with farmers in rural areas in Ghana. And based on the principles of this theory, suggestions were made for the selection of appropriate 'richer' channels for disseminating information on improved soil fertility management practices to farmers.

### **2.2.1 Criticisms**

MRT is criticised for not explaining the richness of email and other electronic communication channels (Mandal & McQueen, 2013). Recent empirical investigations have raised questions about media richness theory's applicability to these new media (Dennis *et al*, 1998).

Another criticism suggests that media choice appears to be affected by a plethora of factors other than the ability of the medium to convey rich information (Rice, 1992). For instance, the availability of the channel to the sender and the receiver, and ability of the sender to use that medium (King, Hartman & Hartzel; Rice & Shook; Zmud *et al* cited in Dennis *et al*, 1998) are also key factors for the selection of a channel. Even the ability of the channel to reach many people also influences selection.

### **2.2.2 Application of MRT to the Study**

One major aim of this study was to examine the capacities of communication channels in delivering information on SFM to farmers. The current study would draw on the assumptions of

this theory to make recommendations for adoption of appropriate communication channels for disseminating SFM techniques.

### **2.3 Chapter Summary**

This chapter examined the theoretical frameworks that underpinned this study and how they relate to the present study. It discussed the major tenets of the diffusion of innovation theory and the media richness theory.



## **CHAPTER THREE**

### **LITERATURE REVIEW**

#### **3.0 Introduction**

This chapter rigorously reviewed related scholarly materials on the subject matter of the study. The materials under this chapter were culled from academic journals, conference proceedings, dissertations and books written on communication and agriculture. To make sense of the findings of the related literature, the first section of the chapter was devoted to the various communication and extension approaches that are used to engage farmers on technology transfer. In line with the research objectives, the related studies were grouped under the following main sub-themes: adoption and dissemination of SFM techniques, use of mass media channels in disseminating agricultural innovations, farmers' sources and channels of information on agricultural innovations and factors that enhance or impede adoption of agricultural innovations.

#### **3.1 Approaches to Agricultural Information Dissemination**

Since independence, the agricultural extension services directorate of the Ministry of Food and Agriculture (MoFA) has been performing the function of informing farmers on agricultural innovations and developments in Ghana (Amezah & Hesse, 2002). The creation of the directorate was a response to the improvement in general agricultural production, productivity and sustainability which required farmers to access new technologies from time to time (MoFA, 2011). Other institutions, such as non-governmental organizations (NGOs), produce buying companies such as COCOBOD and the mass media also provide extension services to farmers in Ghana.

The process of sharing agricultural innovations with farmers is characterized by several approaches which determine the various means through which AEAs engage farmers. The approaches are broadly categorized as top-down, participatory, commodity and mass media approaches (Kwadzo, 2014; Kumeh, 2013; MoFA, 2011; Davis, 2008). The educational model proposed by Paulo Freire is also crucial for studying information dissemination to rural farmers.

### **3.1.1 Top-down Approaches**

Top-down extension services approaches involve farmers who are passive consumers of information from extension agents. They are also known as the linear or transfer of technology models (Ramirez, 1997) due to the vertical flow of information from researchers, technocrats and government through extension agents to farmers, without any real interaction between the farmers and the rest of the people in the chain. Some approaches under the top-down system are general agricultural extension (GEA) and Training and Visit (T&V) (Kwadzo, 2014).

#### **3.1.1.1 General Agricultural Extension (GEA)**

This is the traditional extension system practised mainly by AEAs located in the districts, regional and national headquarters of MoFA. It was the first extension service approach which was adopted from the British after Ghana's independence. It was originally conceived to "extend" research-based knowledge to farmers in the hinterlands to improve their and to increase the productivity of subsistence farmers (Davis, 2008, p.16). This approach is anchored on the assumption that small-scale farmers are not using available farming technologies, hence the need to inform them (Kwadzo, 2014). Agricultural innovations are determined by government and later disseminated to farmers throughout the country. GEA is relatively easy to control by central

government and ideal for the implementation of national agricultural developmental programmes. This approach has been criticized for lacking two-way communication and for failing to tailor information to the agricultural needs of farmers within a certain locality.

### **3.1.1.2 Training and Visit (T&V)**

The T&V system is another top-down model which was promoted by the World Bank to replace the general agricultural extension approach. T&V was first adopted in Ghana in 1978 to address some weaknesses associated with the earlier extension approach (Amezah & Hesse, 2004). This approach is characterized by frequent in-service training for AEAs, fixed number of visits to farmers and improved extension management (Kwadwzo, 2014; MoFA, 2011). T&V is credited for improving the knowledge and technical competence of extension agents, thereby making extension more effective than before (MoFA, 2011). Again, this system led to agricultural growth, improved linkage between research findings and their application by farmers (Gautam, 2000). Due to its linear nature, T&V has variously been criticized and described by terms such as a ‘tongue-in-cheek’, ‘talk and vanish’ and ‘tragic and vain’ model (Anderson, Feder, & Ganguly, 2006 cited in Davis, 2008, p.19).

### **3.1.2 Participatory/Decentralized Approach**

Extension services started off as a top-down model but the weaknesses associated with it led to the introduction of the participatory models. The participatory or decentralization methods ensure active collaboration between farmers and AEAs. The role of the extension agents is to facilitate interaction among farmers and empower them to analyze their own problems and seek solutions to them (Kumeh, 2013). Under these systems, farmers are the principal decision makers in defining goals, planning, implementing and evaluating activities (MoFA, 2011). Examples are

farmer field school (FFS), farmers' study circles or cooperatives, and participatory rural appraisal.

### **3.1.2.1 Farmer Field School (FFS)**

This is one of the main models under the participatory approach. It followed calls by many for a more participatory approach to extension since the previous ones were unidirectional and did not encourage active participation of farmers. "FFS is a participatory method of learning, technology development, and dissemination based on adult-learning principles such as experiential learning" (MoFA, 2011, p.16). FFS originated from Asia, and later introduced in Ghana in mid-1990s.

Under this system, farmers meet regularly at a demonstration site throughout an entire cropping season to learn. They learn through observation of field activities, by discussing in groups what they have observed, and by hands-on management of the field from pre-planting to harvest (MoFA, 2011). Through group interactions, participants sharpen their decision-making abilities and are empowered by learning leadership, communication and management skills. Some of the participating farmers are selected to receive additional training so as to be qualified as farmer-trainers, who then take up training responsibilities. Through constant interaction and engagement, farmers' technical competence and confidence are strengthened. FFS have shown remarkable impact in terms of pesticide reduction, increases in productivity, knowledge gain among farmers, and empowerment (Davis, 2008). The main weakness of this approach is the high cost associated with the intense training activities.

### **3.1.2.2 Study Circles and Cooperatives**

Study circles, much more informal than FFS, provide opportunities for group exploration and learning, to gain knowledge on whatever topic members decide. A group of farmers, usually producers of a common farm produce, meet regularly, with no external “expert” (although resource persons or facilitators may be called in occasionally). Davis and Place (2003) describe this model as farmer-to-farmer extension because it allows farmers to learn and solve their own problems. The group sometimes solicits for credit facilities and inputs from financial institutions and government.

### **3.1.3 The Commodity Approach**

This approach is mostly organized by NGOs and private sector companies. These organizations sponsor farmers by providing farm inputs and technologies, credit facilities, extension services, quality management (standards) and marketing services (MoFA, 2011). In return, farmers sell their produce to the company which partnered them. It usually focuses on cash crops such as cocoa, coffee, rubber, oil palm and citrus. These companies could be private (multinational) companies, processing plants, semi-autonomous government agencies or farmer co-operatives. In Ghana, produce buying companies (PBCs) like the Ghana Cocoa Board (COCOBOD) and Olam Ghana adopt the commodity approach with cocoa farmers. Oil palm farmers also get this support from companies such as Benso Oil Palm Plantation (BOPP) and Twifo Oil Palm Plantation (TOPP) while the Ghana Rubber Estates Limited (GREL) and Ghana Cotton Company Limited (GCCL) also run this outgrower scheme with farmers in the rubber and cotton industry respectively.

Under this system, information from extension agents directly fit the production needs of farmers, and therefore, the messages tend to be appropriate. There is better coordination, with timely research and marketing innovations delivered to farmers. However, in some cases, the profit motive of the sponsoring company overrides the interest of the farmer, and can lead to unfavourable terms and conditions which in turn breed conflict. The outgrower system also works through cash crop producer associations like Oil Palm Producers association, Citrus Farmers association as well farmer cooperatives.

### **3.1.4 Paulo Freire's Educational Models**

Paulo Freire's concept of education was proposed in the 1950s when he studied peasant farmers in Brazil (Kwadzo, 2014). The study culminated in the publication of a book titled "The Pedagogy of the Oppressed" in 1970 in which Freire opined that the poor have been socialized to live in a "culture of silence", with their only source of information being the one that is determined by the hegemonic powers of the day (Bhattacharya, 2011). Freire was of the view that education should not reduce learners into positions of powerlessness but instead empower them to take charge of their lives. His philosophy was not only been useful to classroom teaching and learning but in all situations that require the transfer of knowledge from one person to another (Rugut & Osman, 2013). This shows that Freire's models are applicable in the transfer of knowledge from extension agents to farmers. These models have been the motivation for the introduction and improvement of adult education, literacy programmes and many other non-formal system of education (Bhattacharya, 2011). Freire advanced two models – banking and problem posing – to explain how education is carried out.

The banking model advances the notion that teachers only “deposit” knowledge into the minds of learners, just as empty bank accounts are open to deposits. This analogy influenced the name “banking model” because according to Freire, learners were considered as “empty bank accounts that should remain open to deposits made by the teacher” (Kwadzo, 2014, p.65). This model of education projects the people or learners as ignorant and passive while the teachers are seen as “pillars of knowledge; they know everything and students know nothing” (Aliakbari & Faraji, 2011, p.78). Freire argued that the primary aim of banking education was to condition people into accepting the cultural, social, political status quo of the dominant culture, without questioning the source of the ideas and the logic behind (Rugut & Osman, 2013). This made it easier for the dominant group (oppressors) to dominate and control the people (the oppressed). Freire criticized this model for turning the masses into passive objects, incapable of initiating their own moves to seek knowledge through alternative means (Rugut & Osman, 2013; Saleh, 2013).

The banking education model has semblance with the general extension and training and visit approaches of extension because under all these models, farmers were required to “memorize” ideas from extension agents and transplant them onto their farms (Kwadzo, 2014). Information was not customized to the agricultural needs of farmers; extension agents just forwarded messages from the top to farmers (Davis, 2008).

To address the weakness of the banking concept of education, Freire proposed the problem posing model which is also known as the empowerment model. This model of education requires effective dialogue between the teacher and the learners. Freire was of the view that through

dialogue, the teacher and learner are both empowered to discuss and analyze their experiences, feelings and knowledge of the world together (Kwadzo, 2014; Rugut & Osman, 2013). The teacher actively engages their learners to participate and find solutions to the problems that confront them. Kwadzo (2014) prefers to call the teachers under this model as facilitators because they asked thought-provoking questions that required critical thinking from the people to become conscious of their reality. Freire called this ‘conscientization’ (Rugut & Osman, 2013) while Aliakbari & Faraji (2011) describes it as critical consciousness. Freire explained that as the people construct their own knowledge from their realities, they will be empowered to liberate themselves from the oppression fostered by the banking model (Saleh, 2013). This approach relates to the formation of farmer study groups and associations where farmers help themselves through exchange of ideas.

The various models espoused under the participatory and Paulo Freire’s educational models fall under a broader development communication model called “Participatory Communication”. It is defined as:

planned activity, based on the one hand on participatory processes, and on the other hand on media and interpersonal communication, which facilitates a dialogue among different stakeholders, around a common development problem or goal, with the objective of developing and implementing a set of activities to contribute to its solution, or its realization, and which supports and accompanies this initiative (Bessette, 2004, p.8).

It is a form of development communication which emerged in the 1980s, and emphasized the need for beneficiaries to be involved in the development programmes that are meant for them. The main focus of the participatory communication model is decentralization of power from the

centre to the periphery. Hence, participatory development communication assumes that individuals should be active in development programmes and processes; they could contribute ideas, take the initiative and articulate their needs and problems while, at the same time, asserting their autonomy (Boafo, 2006). Mefalopulos (2005) argues that any development communication intervention needs to be based on a participatory model in order to be sustainable. Participatory communication involves interpersonal channels such as group meetings, open dialogue, workshops, localized media, interactive posters (Hemer & Tufte, 2005)

### **3.1.5 Mass Media Approach**

Radio, television, newspapers and recently the Internet also play important roles in terms of agriculture extension. The mass media work in diverse ways. They can be used as tools for advertising farming inputs by companies, as advocacy platforms for the adoption of certain agricultural innovations or as channels for educating farmers on proper farming techniques through in-studio discussions or phone-ins. Among the mass media channels, Kumeh (2013) singles out radio as the most influential mass medium for agricultural purposes in Ghana because it “has potential for extension in terms of reach and relevance” (p.15). Other studies have confirmed that the relevance of radio in terms of diffusing innovations to farmers (Nwanko & Orji, 2013; Adolwa *et al*, 2012; Nazri *et al*, 2012; Chapman *et al*, 2003). The prevalence of radio in almost every district in Ghana makes it an ideal platform when disseminating information to farmers. Statistics from the national communications authority (NCA) show that as of the end of the fourth quarter of 2015, there were 412 authorized radio stations (NCA, 2015). The table below shows a regional distribution of the stations.

**Table 1: A table showing the number of authorized and operational radio stations in each region in 2015**

REGION	Total Authorised	Public	Community	Campus	Foreign	Commercial	Total No. In Operation	Total No. not in Operation
Ashanti	<b>53</b>	2	4	2	1	44	43	10
Brong-Ahafo	<b>57</b>	3	5	2	-	47	50	7
Central	<b>29</b>	2	8	3	-	16	25	4
Eastern	<b>35</b>	2	6	1	-	26	32	3
Greater Accra	<b>48</b>	2	6	3	3	34	45	3
Northern	<b>40</b>	7	12	1	-	20	24	16
Upper East	<b>16</b>	2	4	1	-	9	12	4
Upper West	<b>17</b>	2	8	1	-	6	9	8
Volta	<b>45</b>	3	10	1	-	31	27	18
Western	<b>72</b>	5	5	2	1	59	46	26
<b>Total</b>	<b>412</b>	<b>30</b>	<b>68</b>	<b>17</b>	<b>5</b>	<b>292</b>	<b>313</b>	<b>99</b>

Source: National Communications Authority (2015)

There are 63 television stations in Ghana (NCA, 2015) but television is not a popular source of agricultural information to farmers in Ghana (Dame, 2011). This is in spite of the fact that television has an advantage over radio due to its visual appeal. A study shows that farmers prefer to seek weather reports from television than other mass media sources (Dame, 2011).

### **3.2 Related Studies on the Use of Mass Media in the Dissemination of Agricultural Innovations**

This section reviewed the following studies to identify the exact mass media platforms that were commonly used by farmers to access agricultural innovations in general.

Chapman et al (2003) examined the impact of vernacular rural radio programmes on farmers' level of knowledge or understanding of soil and water conservation (SWC) techniques in Northern Ghana. Three radio stations that broadcast in six major languages in the Northern and Upper East regions were chosen for the study. A total of 60 farmers, 10 from each of the six

languages, were selected from six major towns in the two regions. The farmers were requested to listen to specific radio programmes on SWC on these three stations in their own language.

Questionnaires were distributed to the farmers on three occasions. The first one was a baseline study prior to the radio broadcast whereas the second set of questionnaires were administered to the farmers in the course of the broadcast to find out how well the farmers understood the content of the programmes. The final questions were distributed after harvest to find out how many of the farmers applied the advice gained on radio to their farms.

Findings of the first set of questionnaires showed that farmers actively practised most of the SWC techniques, particularly tree planting and composting, on their farms. The second round of questionnaires also showed that 75% of the respondents understood the content of the programme very well while 83% said they believed the content to be true. The study also found that farmers preferred radio drama programmes that are performed by local actors in their own language. Results of the final evaluative questionnaires showed that farmers' knowledge and understanding of SWC had greatly improved after listening to the radio broadcasts. The findings of this study suggested that effective use of radio programmes can boost the knowledge base of farmers on specific farm innovations.

Nazri, Hassan, Parhizkar, Hassanpour and Yasin (2012) based their study on the effectiveness of broadcast media (radio and television) in the dissemination of agricultural knowledge to farmers in two provinces of Iran. Three hundred and twenty two (322) farmers were selected from six communities, three from each province, to partake in a "pretest-posttest experimental design".

The farmers were randomly assigned to radio and television programmes on agriculture. In the pre-test stage, farmers' knowledge on certain agricultural practices was tested. The results were noted and kept for comparison after their exposure to the media programmes. A post-test questionnaire was administered to the farmers after the broadcasts.

The results showed that farmers did not possess adequate knowledge on certain agricultural practices but after exposure to the media content, their knowledge level increased significantly. The study also established that farmers with higher levels of education had better understanding of agriculture after the broadcast intervention. The results further showed that farmers who were exposed to television content were slightly more knowledgeable than their radio counterparts. This study confirmed broadcast media as effective tools for increasing farmers' knowledge and subsequent adoption of innovative farming methods.

Nwanko and Orji (2013) also found radio and television as the most effective media channels that influenced adoption of agricultural innovations. The study assessed the contributions of mass media to agricultural technology adoption in Owerri Agricultural Zone of Imo State, Nigeria. Multistage random sampling was adopted to select 60 farmers from six communities. Posters and Internet were the least popular media platforms for agricultural innovation among the farmers. The study findings also showed that mass media channels were able to reinforce previously known agricultural innovation and reached various people at the same time. According to Nwanko and Orji (2013), some of the disadvantages associated with mass media included: lack of opportunity for immediate feedback, lack of detailed media messages and inability of the messages to address farmers' specific needs.

The findings of Ariyo *et al* (2013) did not differ considerably from the above studies, as radio and television, especially the former, were found to play important role in the dissemination of agricultural issues to farmers in Kaduna State in Nigeria. A random sampling technique was used to select ten farmers from each of the 12 wards in the study area to make up a total number of 120 farmers as the sample size. Data was collected through structured questionnaires which were analysed through descriptive statistical tools such as frequency tables, percentage, mean, and Chi-square. The study disclosed that telephone, print media and internet were not popular means of receiving information among farmers in the study area. The study further revealed that factors such as illiteracy, low income, lack of credit facilities, and inadequate/erratic power supply were the main challenges to effective dissemination of agricultural technologies. The study suggested that agricultural programmes on radio and television should be broadcast in the local languages of the farmers to enable them understand the content effectively.

### **3.3 Related Studies on the Use of ICTs in Disseminating Agricultural Information**

Nudanu (2013) found that agricultural extension agents (AEAs) rarely used mobile phones and internet when they engaged farmers. This was identified in a study that surveyed AEAs in the Ga East and Tema municipal districts of Ghana. While 80% of the extension agents owned and had access to a computer, only 43.3% had access to the Internet. Mobile phones were mainly used to communicate orally with farmers, family and friends while less than half used them for text messages. Nudanu (2013) further found that more than half of AEAs use e-mail but very few of them used it to communicate with farmers.

In Sudan, Musa, Githeko & El-Siddig (2011) found that farmers avoided using internet and phones because of the associated high cost and unstable connectivity. Through a survey of 120 farmers, observation and interviews, the study found that internet and mobile phones were the least effective media. On the contrary, radio and television were identified as the most effective channel. Musa, Githeko & El-Siddig (2011) explained that radio was ranked highest because it is inexpensive, portable, easily accessible and can attract variety of stations.

Omotesho, Ogunlade and Lawal (2012) examined the factors that influenced agricultural extension officers' access to ICT Kwara State, Nigeria. The emphasis on ICT was borne out of the perceived usefulness of ICT for delivering accurate and timely information to farmers (Nkwocha et al, 2009) and the large pool of information that exist on the internet. 79 AEAs were chosen for this study. Structured questionnaire was used to collect data. From the findings, none of the AEAs had computers in their offices while only 11.4% of the extension agents had personal computers of their own; only 2.5% of these personal computers were connected to the internet. The findings of this study showed how poorly ICT tools were used in extensive services. The findings of the study further showed that high cost of ICT equipment and internet access, inadequate supply of electricity and low technical know-how were the main challenges that constrained extension officers from using ICT.

Lucky and Achebe (2013) also explored how ICTs were deployed as means of communicating new ideas to farmers through a survey of farmers in Cameroon. The results of the study showed that agricultural information were channeled mainly through mass media channels like radio and television while extension agents employed interpersonal mode of communication with farmers.

The farmers also received information on farming through informal interactions with other farmers. The finding further showed the low level deployment of ICT in information dissemination in the agricultural sector as a result of high illiteracy among farmers and poor communication infrastructure.

From the aforementioned studies under this section, the use of ICTs in extension and information delivery to farmers is low. Both farmer and extension agents prefer to use traditional means of communication instead of the media offered by the Internet. This situation is further entrenched by the high cost of ICTs, unreliable connectivity and illiteracy.

### **3.4 Related Studies on how Farmers Access Agricultural Innovations**

Adolwa *et al* (2012) undertook a study in Vihiga and Siaya districts in Western Kenya to evaluate the communication channels used to disseminate information on integrated soil fertility management (ISFM) to farmers. The diffusion of innovation theory was used to theoretically underpin the study. Questionnaires were distributed to 120 farmers who were sampled in a systematic random manner from available lists of farmers in the two districts. After the data analysis, the study found that radio and farmer field days were regarded by the farmers as the two most accessible, reliable, informative and comprehensible communication channels. The study further found that socio-economic factors such as farmers' income, education level and district of residence significantly influenced access to ISFM information and knowledge, and subsequent uptake. The study concluded with a suggestion that farmer field days and farmer groups should be promoted as vehicles for transmitting agricultural information.

In an ascending order, radio, television and posters were identified by Obidike (2011) as the main sources of agricultural information to farmers in Nsukka Local Government Area in Nigeria. 100 farmers were surveyed for this study. The study also revealed that soil management techniques were the most frequently-disseminated messages to the farmers. Concerning the constraints that impeded access to information, the respondents said poor road networks prevented extension agents from visiting the rural areas to share knowledge with the farmers. Another problem was the lack of effective communication skills on the part of extension officers.

Spurk *et al* (2013) studied the information-seeking behaviour of small scale farmers in Kenya by examining how farmers were informed on new methods of farming. Hinged on the uses and gratification theory, the study examined the information needs of farmers against the ones delivered to them. Additionally, Spurk *et al* (2013) sought to investigate the frequency, quality, appropriateness and shortcomings of information received by farmers. To this end, 600 farming households were surveyed. The study showed that farmers' most trusted source of information are those from their colleagues. It was found that majority of the respondents chose radio as the most accessible media channel followed by mobile phone and television. The study also found out that the highly educated farmers preferred television and mobile phones.

Isaya (2015) investigated sources of agricultural information used by women farmers in Tanzania, the types of information they acquired and the innovations they have adopted as a result of information acquired. The study was underpinned by the diffusion of innovation theory. A total of 300 farmers were sampled for the study, which adopted survey as the research method. The study found radio, extension agents and neighbouring farmers as the main sources of

agricultural information. Information on cultivation methods was the most dominant message often disseminated to farmers, followed closely by information on seed varieties. Fertilizer use was the fourth most frequent information shared with farmers.

Gebbru (2013) also examined how smallholder farmers in Oromia state of Ethiopia used communication channels to seek agricultural information. The uses and gratification and diffusion of innovation theories were used to explain how farmers choose the channels that best satisfied their needs and delivered up-to-date information on agricultural innovations on time. 120 small-scale farmers were randomly selected from five communities to partake in the study. The results indicated that interpersonal communication with neighbours and extension agents were the most accessible channels of communication. Regarding the mass media channels, radio was chosen as the most accessible and frequently used. In an ascending order, extension agents, radio and friends/neighbors were perceived as important information channels by the sampled households. Relevance of the information and trustworthiness of the source were the main factors that influenced farmers' usage of certain channels.

### **3.5 Related Studies on Adoption of Agricultural Innovations**

Chirwa (2005) examined the adoption of fertilizers among farmers in Southern Malawi. The study was conducted on the back of several interventions by the Malawian government to promote adoption of fertilizers by farmers. The data used in this study were collected through a questionnaire administered to 156 households in the Machinga district in southern Malawi. The study found that only 54.5% of the sampled farming households used fertilizers on their farms.

In addition, it also found that large scale farmers used fertilizers far more than smallholder farmers who thought it was not be economically efficient to apply fertilizers.

Hähnke (2007) studied the diffusion of agricultural innovations and the factors that influenced adoption and non-adoption among 80 randomly selected farming households in Northern Vietnam. The diffusion of innovation theory by Everett Rogers was the main theory that was used in this study. Data was gathered through a structured questionnaire which contained questions on farmers' socio-economic characteristics, sources and channels of information and the types of innovations available for adoption.

The study established that most of the agricultural technologies centred on new crop varieties, manure and mineral fertilizer, pesticide application and improved farming practices. The study findings further showed that most soil preparation and conservation techniques diffused slowly, in spite of the fact that most of the farmers had knowledge about these methods. The factors that influenced adoption were quality of innovation, education and exposure to sources such as extension agents, neighbours and the media. Reasons for non-adoption also differed from one technology to the other but the universal reasons were inadequate information, lack of technical know-how and lack of credits to finance the technologies. Concerning the sources of information, interpersonal contacts with extension agents, neighbours and colleague farmers were ranked higher than mass media channels such as radio and television.

### 3.6 Related Studies on Adoption and Dissemination of SFM Techniques

Nsiah-Gyabaah (2003) examined the adoption pattern of agricultural innovations, which included SFM strategies. The study was conducted in the forest-savannah transition zone in the Brong Ahafo region of Ghana. Thirty farmers and five farmers were surveyed and interviewed respectively for data collection purposes. The study found that extension agents and NGOs were the main media for disseminating information to farmers. The farmers revealed that extension services were mostly directed at large scale farmers than the subsistence vegetable farmers.

Vanlauwe *et al* (2010) explored the factors that influence the adoption of integrated soil fertility management (ISFM) practices in Sub-Saharan Africa. Through a thorough analysis of the soil fertility dissemination situation in many African countries, the researchers explained that communities with poor soils adopt ISFM techniques more and faster than those with a relatively better soil. In addition, the study found that widespread dissemination of information on soil fertility is another effective way of moving farmers use ISFM practices. The dissemination process was mainly facilitated by extension agents but the diffusion of the innovation was carried out by the local people and respected members of the society.

Muchai *et al* (2014) investigated the factors considered by agricultural extension agents in selecting communication channels to disseminate soil fertility information in the central highlands of Kenya. Structured questionnaires were used to elicit information from 105 extension agents. The findings showed that extension agents often use group approaches such as demonstration and farmer field school to promote the uptake of soil fertility techniques. In disseminating information on SFM, extension agents considered the communication preference

of their target group. Information on soil fertility and conservation was found to be low, as only 11.4% of extension agents confirmed that they teach farmers on how to conserve their soil. Extension service was hindered by the lack of resources such as motorbikes and materials for demonstration to farmers. The findings further showed that the Kenyan Ministry of Agriculture and local authorities were the most active stakeholders in soil fertility management.

Etyang *et al* (2014) analyzed the role of agro input dealers in disseminating ISFM techniques to farmers in Kenya. The researcher argued that agro-input dealers make inputs more easily accessible to rural-based smallholder farmers, so it was important to assess the specific role played they play in communicating SFM practices and information to smallholder farmers. Data gathered from 144 agro-input dealers showed that more than half of agro-input dealers were aware of ISFM techniques. The input dealers revealed that they sometimes played the role of extension agents by offering advisory services on the type, and method of application of the various ISFM techniques. However, farmer field days, on-farm demonstrations and public gatherings were identified as the most popular communication channels for obtaining ISFM information.

Ndilowe (2013) evaluated how farmers receive messages on conservation agriculture, which is a form of soil fertility management, in Malawi. The study was underpinned by the development communication theories of diffusion of innovation and modernization. Applying the purposive sampling approach, 41 respondents, comprising communication officers, extension agents and farmers were selected. Focus group discussions and interviews were used to gather data from the study subjects. The study established that farmers preferred to receive information from

extension agents, colleague farmers and during farmer field days. According to respondents, these means of communication guaranteed immediate feedback, which improved knowledge and understanding of conservation agriculture. Conversely, the study found that broadcast media channels, like radio, were not popular among the farmers.

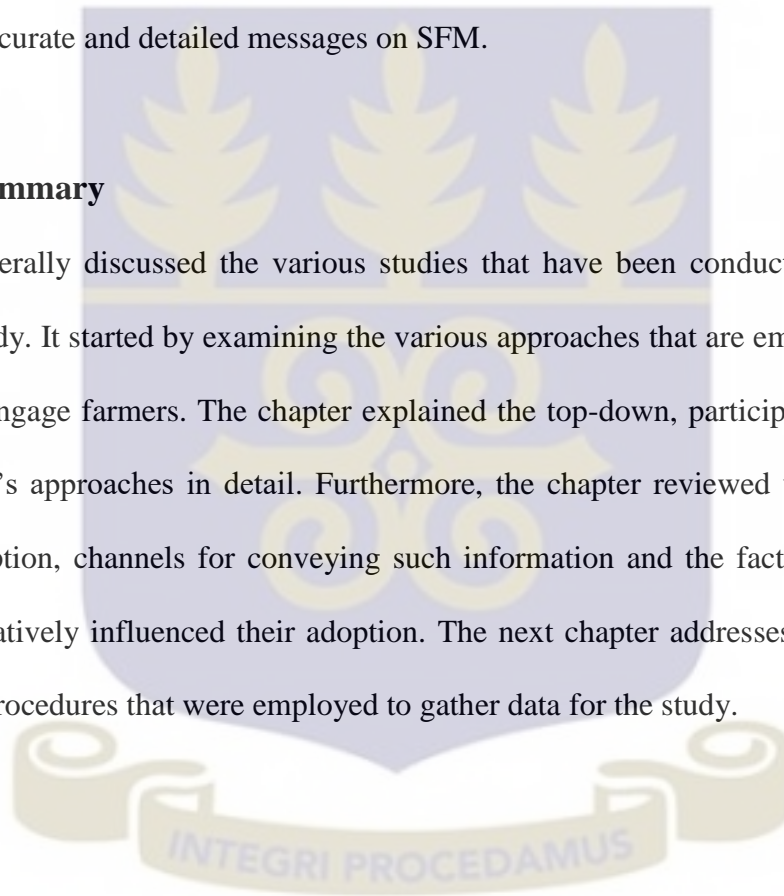
Another study related to soil fertility information dissemination in Ghana was by Moore (2014). He explored how farmers responded to messages on Sustainable land and Water Management (SWLM) project in West Mamprusi, Ghana. The diffusion of innovation theory was used to underpin the study. Thirty farmers were purposively sampled to partake in five focus group discussions while six others (extension agents, lead farmers and agricultural officials) were also interviewed.

The findings of the study were that farmers who had adopted the SWLM technology viewed the messages associated with it as very useful for solving their problems on the farms. Personal contact with agricultural extension agents, farmer to farmer extension, demonstration blocks and field visits, and electronic channels such as mobile phones and video clips/information vans were mainly used to disseminate the information to the farmers. Face-to-face communication with extension agents was the most frequently used method. The study further found that due to the ability of face-to-face communication to deliver in-depth information and the opportunity to seek clarity, farmers perceived them as the best channel. In spite of their preference for interpersonal interaction with AEAs, the farmers complained that AEAs were not always available. Again, the study found out that the cost of air time prevented the project managers from using radio as the means of disseminating information to the farmers.

These studies have shown that farmers who have poorer soil nutrients are more inclined to seek information and adopt SFM practices. The Ministry of Agriculture, opinion leaders, NGOs and the mass media are the stakeholders who facilitate the adoption of SFM techniques. From the above studies, extension agents tend to use group and participatory approaches like FFS and demonstrations while some farmers also rely on local interpersonal networks and agro-input dealers to gain accurate and detailed messages on SFM.

### **3.7 Chapter Summary**

This chapter generally discussed the various studies that have been conducted on the subject matter of this study. It started by examining the various approaches that are employed by various stakeholders to engage farmers. The chapter explained the top-down, participatory, mass media and Paulo Freire's approaches in detail. Furthermore, the chapter reviewed various studies on soil fertility adoption, channels for conveying such information and the factors that positively affected and negatively influenced their adoption. The next chapter addresses the methodology and the various procedures that were employed to gather data for the study.



## **CHAPTER FOUR**

### **METHODOLOGY**

#### **4.0 Introduction**

The fourth chapter of the study discussed the data collection procedures and how the respondents were selected from the two districts. Specifically, the mixed method approach, comprising survey and in-depth interview, was used to collect quantitative and qualitative data respectively from the farmers and other stakeholders. Questionnaires were first distributed to the farmers to identify popular communication channels for obtaining SFM information and the factors that influence the adoption of SFM technologies. The questionnaire also asked the farmers to identify stakeholders who are actively involved in SFM-related activities in their communities. The stakeholders constituted the sample for the in-depth interview. One hundred and five (105) farmers from ten communities, five from each district, partook in the survey. The sample size for the survey was relatively small because data from the interviews with eight stakeholders was added to complement the findings.

#### **4.1 Research Sites**

The proposed sites for the project are the Ada West and Kwaebibrem districts in Ghana's Eastern and Greater Accra regions respectively.

##### **4.1.1 Ada West**

The study was carried out in five communities in the district: Toflopko, Tugakope, Bonikope, Afidenyigba and Addokope. Sege is the district capital of the Ada West District, which was decoupled from the former Dangbe East District in the Greater Accra Region in 2012. The district has a total land size of about 323.721 square kilometres. According to the Ghana

Statistical Service (2010), the total population of the district is 59,124, comprising 48.3% males and 51.7% females. Per the statistics from the Ghana Statistical Service (2010), majority of the household population live in extended family household than nuclear family households. According to the 2010 census, agriculture is the main economic activity in the area, employing 60% of the total labour force of the district. 80% of the households that are engaged in agriculture are from the rural areas. The most main agricultural activity in the district is crop farming, followed by livestock farming.

#### **4.1.2 Kwaebirem District**

The Kwaebirem district has a total population of 113,721. Males constitute 49% and females represent 51%. According to the 2010 population and housing census (PHC), 42.7% of the total population reside in urban areas and 57.3% in rural areas. Agriculture is the main economic activity in the district. Farmers in the district are actively engrossed in both subsistence and commercial food and cash crop production. Oil palm, cocoa and citrus is the major traditional cash crops cultivated. This explains why 70% of households in the district are engaged in agriculture (Ghana Statistical Service, 2010).

#### **4.2 Research Design**

“Research design refers to the procedures researchers follow to complete their study from start to finish” (Mgedezi, 2012, p.52). The research design defines the guidelines for the selection of respondents, procedures for data collection and analysis of findings (Babbie, 2009). The research design adopted for the study was the mixed method approach. This is a combination of both quantitative and qualitative research approaches which enabled the researcher collect sufficient

and rich data for the study (Wimmer & Dominick, 2011). Specifically, the study employed survey and in-depth interviews. Creswell (2003) advances the view that using the mixed method in a study helps limit the weaknesses inherent in any single method. The mixed method approach was important because this study required a survey of farmers to understand how they received and utilized information on SFM while the in-depth interviews were necessary for exploring in detail the issues that emerged from the survey.

### **4.3 Quantitative Approach**

Quantitative research is a form of research which involves the collection of data through numbers, statistical diagrams and figures (Babbie, 2009). This type of research involves much larger number of subjects, and allows the researcher to explain, predict and control a phenomenon (Leedy, 2001). The results of quantitative studies are generalizable to the population of the study (Wimmer & Dominick, 2011). This makes data from quantitative studies more objective because it reduces researcher's biases substantially (Babbie, 2009).

The specific quantitative approach used for this study was the survey method. Survey is a research method which uses questionnaires or structured interviews to gather data, with the aim of generalizing findings to a larger population (Creswell, 2003). Goodwin (2002) defines a survey as a method which describes, explains and predicts the behaviour, perception and attitude of respondents after posing a series of questions about a particular topic. According to Creswell (2003), surveys enable researchers to examine relationships between individual's view and their socio-economic characteristics. In addition, surveys are easy to administer, relatively quick and

convenient to analyze (Wimmer & Dominick, 2011). Respondents for the survey were farmers from the selected communities in the two districts.

#### **4.3.1 Population and Sampling**

Because the survey could not study all farmers in the two districts, a sampling technique was employed to select the respondents for the survey. Therefore, the population for the survey was all farmers in the two research sites. The multistage sampling method was used to sample 105 farmers who constituted the sample size. Multistage sampling is a sampling approach which involves the use of different sampling technique at each stage of the sampling process (Bursac *et al*, 2007). To this end, five communities were randomly selected from each of the districts. In Ada West, the farmers were selected from the following towns/villages: Toflokpo, Bonikope, Addokope, Tugakope and Afiadenyigba. The farmers in Kwaebibrem were also identified from Pramkese, Amoaku, Twumuso, Boadu and Salom. The simple random sampling approach was employed to identify these towns.

The stratified sampling approach was then used to sample farmers from each of the communities. Under this technique, respondents are put into strata and a specific number of participants are subsequently drawn from each stratum (Wimmer & Dominick, 2011). In the context of this study, farmers were categorized into three strata: small, medium and large scale. Small scale farmers were operationally defined as farmers with a farm size between one acre and two acres. Medium scale farmers had a land size of three to five acres while the ones with more than five acres were ranked large scale. Equal numbers of farmers were selected from each stratum. The rationale behind this was to establish how farmers with varying farm sizes access information on

SFM techniques. In the end, 45 farmers, comprising 15 small scale, 15 medium scale and 15 large scale, were selected from Ada West district while 60 farmers, 20 from each of the above farm groups, came from Kwaebibirem district. More farmers were selected from the latter site because of its superior population advantage. In all, 105 farmers constituted the sample size for the quantitative study.

#### **4.3.2 Data Collection Instrument**

Structured questionnaires were used to gather information from farmers. The questionnaires captured demographic characteristics of farmers, their source of information on general agricultural information and that of SFM techniques. The questionnaires further elicited information about the frequency with which information on SFM techniques were disseminated and the exact issues discussed with farmers. The questionnaire was strictly close-ended to enable easy statistical analysis and, to complement the open-ended questions on the interview guide. The questionnaires were interviewer-administered because the farmers could not read and write. The researcher translated the questions from English to the farmers' local languages (Ga, Ga-Adangme and Twi).

#### **4.3.3 Data Analysis**

The Statistical Package for the Social Scientist (SPSS) software and the Excel spreadsheet were used to analyse the data. Frequency tables, bar graphs and charts were used to illustrate farmers' responses. The research questions and objectives did not merit advanced statistical tools, as simple charts and tables were enough to illustrate the findings of the study. The charts were used to describe and explain the various variables such as preference for channels, quality and

quantity of information, adoption of SFM techniques and the stakeholders involved in SFM activities. Cross-tabulation of variables was undertaken to compare two variables, particularly findings from the two research sites.

#### **4.4 Qualitative Approach**

The qualitative research method used for this study was in-depth interview. An interview is “a purposive conversation to elicit response, information or answers to an issue” (Wimmer and Dominick, 2006, p.135). Interviews help unearth unspoken information and provide rich research material for understanding the phenomenon being studied. Bell (1999) describes interview as a unique technique which assists to "put flesh on the bones of responses" and “can provide information that a written response could conceal” (p.135). This method was chosen to gain detailed insights into the factors that influence adoption of SFM techniques, understand the approaches used by AEAs to disseminate information to farmers and to identify relevant stakeholders. Subjects for the informants were stakeholders. Not all the stakeholders were farmers but they were sampled based on their direct involvement in soil fertility management in their communities. The subjects were extension agents, lead farmers, assembly members and chiefs.

##### **4.4.1 Population and Sampling**

The purposive sampling method was used to select the stakeholders for the study. Purposive sampling is a non-probability sampling technique which deliberately selects respondents and subjects who are capable of giving the required information (Wimmer & Dominck, 2011). This means “the respondents or elements are intentionally selected based on certain characteristics or qualities to meet the needs and requirements of the study” (Opoku-Amankwa, 2009. p, 18). The criterion for the selection of stakeholders was that they must have been chosen by the farmers as

involved in the uptake of SFM techniques. The individual must have the capacity to provide most information to achieve the objectives of the research. A total of two people were selected out of seven for the interviews.

Using the purposive sampling technique, eight stakeholders, five from Kwaebibirem and three from Ada West districts, were selected. For the Kwaebibirem district, the extension agent in charge of Pramkese, Amuaku and Twumusu was chosen. The deputy district director of agriculture, chief of Pramkese and an agro-input dealer who sells fertilizers, weedicides, pesticides and farm equipment at Kade were also selected purposively for the study. A produce buying company manager and a lead/ contact farmer, both from Pramkese also partook in the study. The team leader for the extension agents, assemblyman for Addokope and a contact farmer from Afiadenyigba were also selected from Ada West. These individuals were deemed to be playing important roles in the adoption of SFM techniques, according to the farmers.

#### **4.4.2 Data Collection Instrument and Procedure**

Semi-structured interview guides were used to gather the data. The questions centred on topics pertaining to the communication channels used in SFM information delivery, the role of external stakeholders and the factors that enhance and impede the adoption of SFM technologies. The aims and objectives of this study influenced the wording of the questions on the interview guide. The questions were formulated before the actual field work commenced. However, the semi-structured interview guide allowed the researcher to ask follow-up questions based on the responses of the interviewees. The interviews were audio-recorded and transcribed at a later time.

The interviews with stakeholders from Ada West and Kwaebibirem districts were conducted in August and November respectively. Averagely, each interview lasted for one and a half hours. The surveys were done before the interviews because the stakeholders were identified from the outcome of the survey. Initial contact was made to these stakeholders to book appointments for the actual interviews. Some of the interviewees spoke English whereas others spoke the local dialect. The interviews were held in the offices and homes of the respondents. To ensure the credibility and reliability of the data, member checking was incorporated as a quality assurance measure. This technique requires researchers to update interview participants on the progress of the study, to seek clarification and gather additional data to fill some identified gaps in the data.

#### **4.4.3 Data Analysis**

Thematic analysis was used to analyse the transcribed data from the interviews. Thematic analysis is often used to analyse data in primary qualitative research (Thomas & Harden, 2007). Braun and Clarke (2006) also view thematic analysis as a foundational method for qualitative analysis. According to Ryan and Bernard (2003), thematic analysis deals with identifying and describing clear and latent ideas by analysing meaning and recurring themes that arise from the data. The generation of the themes was guided by the objectives of the study. The study adopted the Ryan and Bernard (2003) four-step procedure of generating themes: reading and understanding the data, editing raw data, generating textual codes for coding data, and converting and categorising codes into themes.

Based on Ryan and Bernard's approach, the following thematic areas emerged out of the study: media channels, channels for disseminating SFM information, role of stakeholders, extension

service approaches, factors that enable adoption and factors that challenge the use of SFM methods.

#### **4.5 Validity and Reliability of Data Collection Instruments**

The data collection instruments went through some processes to ensure validity and reliability. The first validity and reliability measure was a review by the academic supervisor, which brought about considerable modifications to the initial questionnaire and interview guide designed for the study. The instruments were subsequently modified to reflect suggestions made by the dissertation supervisor. In addition, a pilot study was conducted among ten farmers in Ada West district to pre-test the questionnaire. Lessons from the pilot study helped the researcher to further improve the questionnaire.

#### **4.6 Ethical Issues and Considerations**

Ethical issues are crucial in research because they guide the researcher on what is permissible and what is not and thus were mandatory for the researcher to observe. Ethical issues observed included informed consent, confidentiality of information, privacy and anonymity of respondents. This study was conducted in an ethical manner, with strict adherence to the ethical guidelines approved by University of Ghana.

#### **4.6 Demographic Characteristics of Respondents**

There were slightly more male respondents (54.3%) than their female counterparts (45.7%). Thirty five (35) respondents were selected from each of the following categories of farmers:

small scale, medium scale and large scale. The rest of the demographic data are presented in the tables below:

Table 4.1: A table displaying the number of the farmers selected from both districts

District	Frequency	Percentage
Ada West	45	42.9%
Kwaebibirem	60	57.1%
Total	105	100%

Source: Field Survey, 2015.

From table 4.1, more farmers were selected from Kwaebibirem district than those in Ada West

Table 4.2: A table displaying the age of the farmers selected from both districts

Age	Frequency	Percentage
18 – 25	2	1.9
26-35	14	13.3
36- 50	63	60.0
Above 50	26	24.8
<b>Total</b>	<b>105</b>	<b>100.0</b>

Source: Field Survey, 2015.

Table 4.2 shows that a quarter (25%) of the respondents were above fifty years while majority (60%) were between the ages of 36 to 50. The rest of the respondents were 35 years and below.

**Table 2: A table displaying the education level of the farmers selected from both districts**

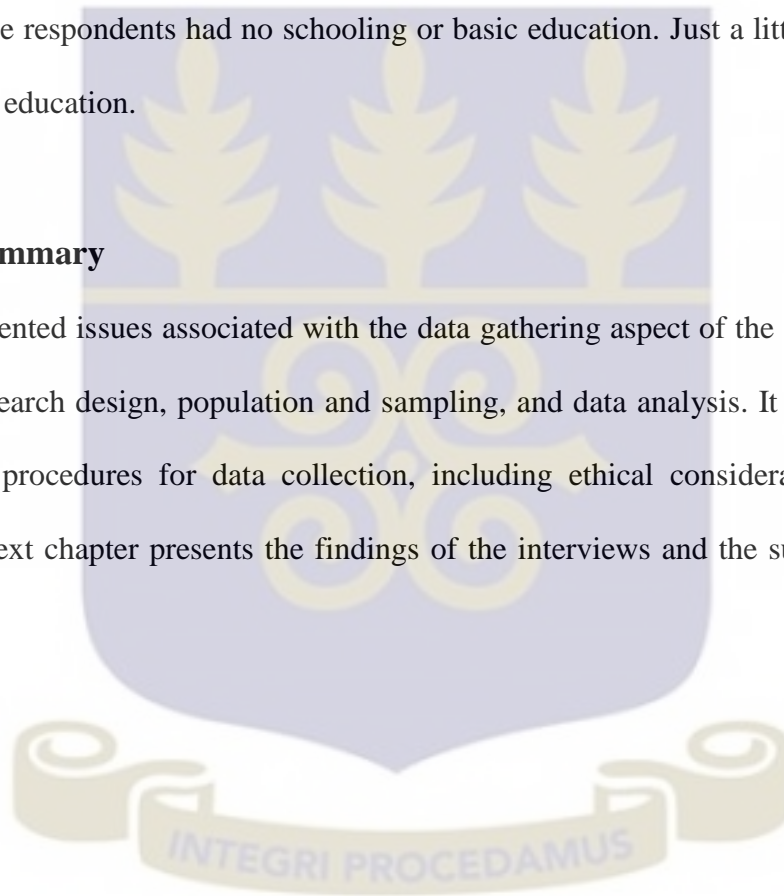
<b>Educational Level</b>	<b>Frequency</b>	<b>Percentage</b>
No schooling	48	45.7
Basic school	47	44.8
SSS (O-level/A-level)	10	9.5
<b>Total</b>	<b>105</b>	<b>100.0</b>

Source: Field Survey, 2015.

Nearly 90% of the respondents had no schooling or basic education. Just a little below 10% had secondary school education.

#### **4.7 Chapter Summary**

This chapter presented issues associated with the data gathering aspect of the study. The chapter examined the research design, population and sampling, and data analysis. It also discussed the instruments and procedures for data collection, including ethical considerations and quality assurance. The next chapter presents the findings of the interviews and the survey discussed in this chapter.



## CHAPTER FIVE

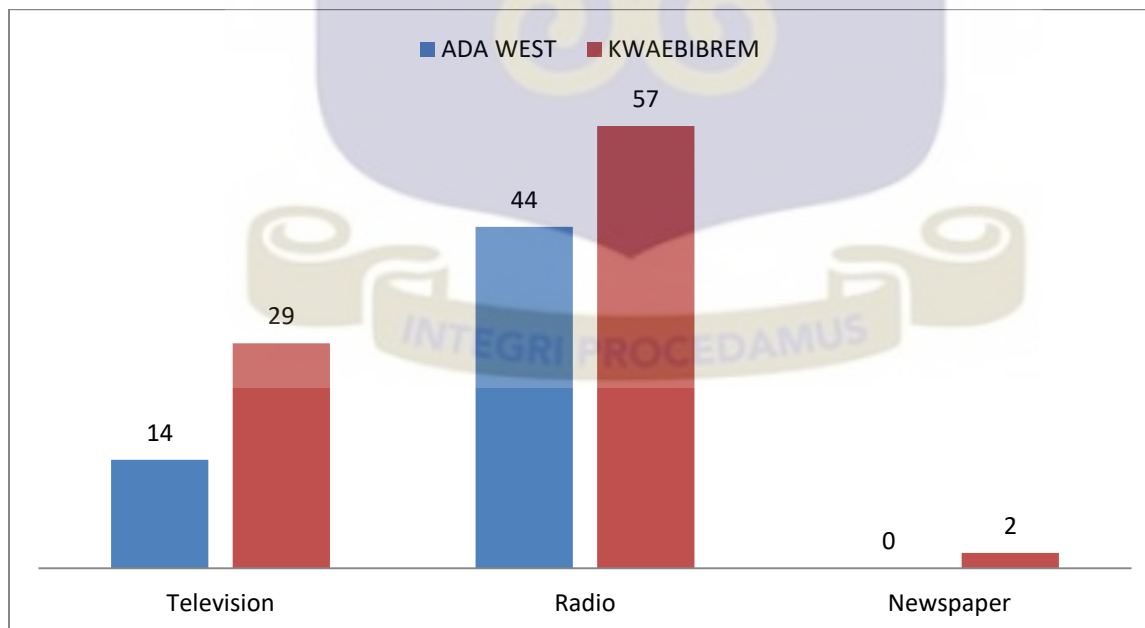
### FINDINGS

#### 5.0 Introduction

This chapter presents findings from the questionnaires and semi-structured interview guides that were distributed to the respondents. The findings of the quantitative design (questionnaires) were presented through frequency tables, simple percentages and charts. Again, cross-tabulated tables were used to depict findings that examined the relationship between two variables on the questionnaire. According to Wimmer and Dominick (2011), presenting quantitative data with tables and graphs makes it easier for interpretation and understanding. All the 105 questionnaires were retrieved for analysis. Findings of both quantitative and qualitative data were put under one common theme for easy interpretation.

#### 5.1 Mass Media Used by Farmers in Ada West and Kwaebibirem Districts

*Figure 2: A table showing the media channels used by farmers in the two districts*



Source: Field Survey, 2015.

Fig 5.1 shows radio is the most popular media channel among farmers from both districts; 96% of them used radio to seek various kinds of information. The second most common mass media is television, which more than two out of five farmers use. Farmers in Kwaebibirem use television more than their counterparts in Ada West. Only two farmers read newspapers.

The findings of the interviews also confirmed radio as the most popular mass medium in the Kwaebibirem district. The findings from the interviews showed that farmers in Kwaebibirem are more exposed to the media than their colleagues in Ada West. Farmers in Kwaebibirem predominantly rely on *Obourba FM* for news and information on current affairs and agriculture. Other popular radio stations in the district are *Agoo FM*, *Peace FM*, *Adom FM* and *Oman FM*. The interview respondents noted that some of the farmers own Multi TV satellite dish which enable them to access many television stations, with *UTV*, *Adom TV*, *TV3* and *GTV* being the most common among them. In Ada West, *Radio Ada*, (a local FM station) and *Obonu FM* were the two popular radio stations. These two stations broadcast in Ga-Adangme, which is the native language of the people in the district. Other radio stations mentioned by the interviewees include *Peace FM* and *Radio Gold*. *GTV*, *TV3* and *UTV* were also identified as the most popular television channels among farmers in Ada West.

The contact farmers from both districts said majority of their colleagues consume media content mostly in the evenings after close of work while a few listen to radio on their farms through the mobile phone. It was gathered that the farmers use radio for news and information purposes while their television programme choices are mostly entertainment-oriented. Programmes often watched and listened to include news, talk shows, sports, comedy, religious programmes,

marriage counselling and sometimes agricultural information. The farmers do not use newspapers and the Internet because of illiteracy, accessibility challenges and financial constraints. It was further established from the interviews that farmers' accessibility to, and utilization of mass media content are influenced by their economic conditions. In other words, richer and large scale farmers consume more mass media content than their contemporaries because they are able to afford radio and television sets.

## **5.2 Farmers' Sources of Information on General Agricultural Innovations**

The study found that majority (76.2%) of the farmers receive agricultural information from their colleagues, followed by extension agents (63.8%) and radio (57%). Some of the farmers also depend on farmer groups and associations, farmer field days and townsquare public gatherings to access information on agriculture. The survey findings also projected that more farmers (65%) in Kwaebibirem use radio for agricultural purpose than those in Ada West (46.7%). The study further found that information on agricultural chemicals such as weedicides, pesticides and herbicides are most frequently shared with farmers. Out of eight agricultural messages presented to farmers, information on the application of SFM techniques was ranked as the fifth most frequently disseminated.

### 5.3 Sources of Information on Soil Fertility Management

*Table 3: A cross-tabulation table showing the channels farmers in the two districts use to access SFM information*

Source/Channel	Farm Location		Total
	Ada West	Kwaebibirem	
Radio	12 33.3%	24 66.7%	<b>36</b> <b>100%</b>
Extension Agent	18 46.2%	21 53.8%	<b>39</b> <b>100%</b>
Colleague Farmer	28 44.4%	35 55.6%	<b>63</b> <b>100%</b>
Farmer Field School	3 42.9%	4 57.1%	<b>7</b> <b>100%</b>
Farmer Based-Groups	11 44.0%	14 56.0%	<b>25</b> <b>100%</b>
Opinion Leaders	3 37.5%	5 62.5%	<b>8</b> <b>100%</b>
Agro-Shops/PBCs	4 21.1%	15 78.9%	<b>19</b> <b>100%</b>
Personal Experience	6 40.0%	9 60.0%	<b>15</b> <b>100%</b>
Public Gathering	1 25.0%	3 75.0%	<b>4</b> <b>100%</b>
Total	86	130	216

Source: Field Survey, 2015.

Colleague farmers (29.1%), extension agents (18.1%) and radio (16.7%) are the three most popular channels among farmers in the two districts. More farmers in Kwaebibirem district (66.7%) use radio to seek information on SFM than their contemporaries in Ada West (33.3%). The table further shows that respondents from Ada West use extension agents and their colleague farmers slightly lower than the ones in Kwaebibirem. Whereas nearly four out of five (78.9%) respondents from Kwaebibirem gain ideas from agro-input dealers and PBC marketers, just a little above 20% of the farmers from Ada West use this channel to seek information on SFM.

## 5.4 Preferred Communication Channel and Reasons

Table 4: Preferred channel versus reasons

Channel	Reasons for Channel Preference							Total
	Accessi ble	Conveni ent	Cheap	Demonstr able	Credib le	Informa tive	Immediate Feedback	
Radio	4 4.1%	2 3.9%	2 5.0%	4 15.4%	4 5.0%	2 7.4%	5 11.9%	23
Extension Agent	22 22.7%	8 15.7%	14 35.0%	6 23.1%	30 37.5%	11 40.7%	10 23.8%	101
Colleague Farmers	46 47.4%	24 47.1%	19 47.5%	7 26.9%	23 28.8%	8 29.6%	17 40.5%	144
Farmer Field School	2 2.1%	5 9.8%	1 2.5%	3 11.5%	0 0.0%	2 7.4%	1 2.4%	14
Farmer-Based Groups	5 5.2%	4 7.8%	1 2.5%	5 19.2%	4 5.0%	4 14.8%	1 2.4%	24
Agro- Shops/PBCs	11 11.3%	6 11.8%	1 2.5%	1 3.8%	12 15.0%	0 0.0%	3 7.1%	34
Personal Experience	7 7.2%	2 3.9%	2 5.0%	0 0.0%	7 8.8%	0 0.0%	5 11.9%	23
<b>Total</b>	<b>97</b> <b>100%</b>	<b>51</b> <b>100%</b>	<b>40</b> <b>100%</b>	<b>26</b> <b>100%</b>	<b>80</b> <b>100%</b>	<b>27</b> <b>100%</b>	<b>42</b> <b>100%</b>	<b>363</b>

Source: Field Survey, 2015.

Colleague farmers recorded the highest response in terms of farmers' preference for communication channels for communicating SFM information; nearly two out of five (39.6%) respondents chose colleague farmers, followed by extension agents (27.8%). More than one-third (37.5%) of the farmers prefer extension agents because they are credible while a little below 30% chose colleague farmers because of their credibility. In terms of accessibility, half (47.7%) and a little below a quarter (22.7%) prefer colleague farmers and extension agents. A total of 22.3% of the farmers prefer information from farmer-based groups, agro-chemical shops and their personal experience. Convenience (71.4%) and demonstrability (43%) are the two main reasons why

farmers prefer FFS. Accessibility (26.7%) and credibility (22%) are the two main reasons that influence farmers' choice of communication channels while the ability to convey enough information (informative) is the least of reasons for farmers' preferred communication channels choice.

With regard to the channels for communicating SFM techniques, the interview findings did not vary significantly from that of the quantitative study. The interviews revealed that radio, extension agents and colleague farmers are the most popular channels used by farmers to access information on soil fertility management. Information gathered from the interviews showed that farmers in Ada West derive a great deal of information on agriculture from *Radio Ada*. The contact farmer from the district noted that the radio station furnishes farmers with SFM-related information such as companies that deal in fertilizers (both organic and inorganic) and their contact details, how to apply fertilizers, advertisements by agribusinesses among others. The lead farmer from Kwaebibirem district also elaborated the importance of radio in sharing SFM information:

There is this FM station called *Obourba FM* plays very active roles when it comes to informing farmers on agricultural issues, which of course includes soil fertility. They have a programme that is specially-tailored for farming. The programme is called *Akuafo Mmo*, and is aired every Friday evening. They invite chief farmers, extension agents, agricultural officers and other people to come to the studio to share ideas on farming-related topics. They open the phone lines for people to call in and ask all the questions they need and also seek clarity. I must say that the programmes has been of great service to us all.

The lead extension officer from Ada West also demonstrated the efficacy of radio in the quote below:

As much as farmers depend on us [extension agents] for information, they also get informed through the radio. For instance, on the issue of soil fertility, most of the agro-chemical shops that sell inorganic fertilizers and other organic fertilizers,

such as cow dung, advertise on radio to inform the farmers. By so doing, farmers not only get informed on soil fertility, but also get additional information on where to buy these products, since they are rare sometimes. The extension agents are not enough and this is not a problem confined to only this district; it is nationwide. So we resort to the radio stations as a way of reaching out to many farmers. To be honest, it is impossible to visit all the farmers in their homes and on their farms, considering our number. That is why we use radio to complement our efforts. We don't go on air often because the station [Radio Ada] is privately-owned so we lobby the programmes managers to get access to be on air. So far per the feedback we have received from the farmers, it seems the radio outreach is going on well. Sometimes we are compelled to buy airtime to talk to the farmers through radio but since we don't have funds for that, we are unable to be on air consistently.

The contact farmer in Ada West confirmed the point made by the extension officer in the preceding quote. He said the demand for cow dung exceeds supply, a situation which results in the shortage of the material. To this end, farmers in the area monitor radio closely to get information on where to obtain this organic fertilizer product. According to the lead farmer, extension agents who are unable to visit the communities, use radio to educate farmers adequately. He however, added that the farmers prefer face-to-face engagement with extension agents, instead of radio.

Apart from radio, extension agents are commonly used by farmers to acquire information on SFM. The deputy director of agriculture in Kwaebirem and the head of extension services at Ada West explained that extension agents adopt different approaches in their engagements with farmers. The approaches commonly used by extension agents are interpersonal engagements, group discussions, townsquare gathering, and farmer field days or demonstrations. The interviewees confirmed that farmers prefer the face-to-face interaction to any other approach.

We are aware that the extension agents in this area are few but we still expect them to visit our farms one-on-one [*sic*]. They [the extension

officers] devote attention to you [the farmers] when they come to the farm, so by the time they leave, you would have gained a lot from them than when they decide to meet us in groups at the information centre. Personal visit to the farm allows them [extension agents] to acquaint themselves with the progress of the farm and also verify at firsthand whether you are practising the methods or you are doing a different thing. I think they should do more of that than when they decide to meet us in groups. (Source: Lead Farmer, Kwaebibirem).

The extension agents also engage farmers through farmer field schools or demonstrations. With this system, which is more common in the Kwaebibirem district, farmers are schooled on proper farming practices, including effective and efficient management of soil fertility. In Amuaku and Pramkese in the Kwaebibirem, there is a demonstration site, a small piece of land, which is specifically allocated for practical demonstration of farming technologies to farmers. The extension agent in charge of the area said that even though this is one of the most effective strategies of agricultural extension, very few farmers show interest in it while the participating ones are either late, absent or inactive.

The interviews further revealed that most farmers gain a lot of information from their colleagues and from their personal experiences. From the interviews, neighbouring farmers are important medium for transmitting soil fertility information because of their proximity, accessibility and to some extent, their reliability, according to the lead farmer in Pramkese (Kwaebibirem). Because agriculture is the main economic activity in the chosen communities, a lot of conversations involving farmers focus on farming. He said some of his colleague farmers trust the advice they get from their fellow farmers more than trained experts like extension agents.

Through conversations, we gather ideas from each other. A farmer could be passing by another farm, all he needs to do is to shout their names and conversation ensues. Some also visit the homes of their colleagues for advice on how to manage the fertility of their soil. Farmers see each other more often than they do with extension agents, so the tendency to seek information from them is high. There are some farmers who genuinely need the services of extension agents

but because the agents are not enough to attend to them all the time, they seek advice from their fellow farmers. There is also the perception that soil fertility and other farming techniques from extension agents are ineffective and can deplete the nutrients in the soil. The farmers, therefore, prefer to stick to their tried-and-tested practices and also observe from their colleagues. Instead of consulting other farmers and extension agents, some farmers depend on their farming experience. In fact, we all do this because experience is the best teacher. (Lead farmer, Pramkese).

As established by the interviews, informal conversation between farmers is the most popular method of knowledge transfer in the two research sites. The lead farmer from Ada West said advice given to one farmer is equivalent to advising ten others because “the farmer you know also knows another farmer with whom they trade ideas”. This means when a farmer receives an idea from a source, they in turn transfer the message to another farmer who also informs another. This is the chain of information dissemination in the communities. The deputy director of agriculture in the Kwaebibirem district said they depend on these local interpersonal communication networks to diffuse ideas to farmers. He however, expressed misgivings about the effectiveness of this method:

When you leave the message in the hands of farmers, trust that they will be well spread to almost every farmer in the locality. That is how effective and important the local network of communication and the farmers are. But the fact is that the message is often distorted. I think it is because the messages are orally transmitted. Assuming a farmer did not understand the information well enough but he goes on to share his half-baked knowledge with others. It becomes like we often hear ‘garbage in, garbage out’. In the end, the farmers end up being misinformed. This pushes the farmers further away from embracing the technologies we are advocating.

Moreover, farmer associations and groups also remain a major information source to many farmers. The farmer associations are groups of farmers who come together to address matters of their own interest. According to the interviews, farmers belonging to these groups meet fortnightly and sometimes monthly to discuss issues of mutual interest, particularly farming-

related issues such as soil fertility management. Some of the associations and credit unions found in the towns studied in Ada West are Eagle Farmers Association, Madagbe Farmers Association; With Jesus Group; Livestock Farmers Association and Mantsekope Credit Union. Some of the farmer groups in Kwaebibirem are Akatenye Association, Cocoa Abrabopa Group, Senya Farmers Association (defunct), Citrus Farmers association, Kronkron Ma Awurade, Biakoye Association and Shared Number One Cocoa Farmers.

The lead farmers in both districts said they do not discuss soil fertility issues often; their main topics centre on harvesting, pricing of farm produce and sources of funds to commence farming. The lead farmer in Afiadenyigba in Ada West stressed the importance of farmer groups in the quote below:

We form groups mainly because the banks prefer to give credit facilities to only farmers who belong to an association. The MoFA people also prefer working with the associations than with individual farmers, though a lot of us farmers wish that they visit us individually on our respective farms. Sincerely speaking, soil fertility is not a major subject of discussion during the meetings. But whenever there are soil fertility matters, the focus is mostly on the declining soil fertility in this area and how they are unable to support proper plant growth and bumper harvest. We lament the problems and sometimes offer solutions, when we can.

Agro-chemical shops and produce buying companies (PBCs) are important sources of information to farmers in the two districts, as revealed by some of the respondents. Agro-input shops are the businesses that sell agricultural products such as weedicides, pesticides, organic and inorganic fertilizers as well as farm equipment like cutlasses, knapsack sprayers, footwear and many others. PBCs are the business organizations that buy farm produce, especially cash crops like cocoa, coffee and rubber, from farmers. Managers of these businesses are skilled in the application of the chemicals and fertilizers, so farmers tap into their knowledge. PBCs and agro-

shops are more common in Kwaebibirem than you find in Ada West. Manager of a cocoa PBC located in Pramkese, who is popularly called “Cocoa Krakye” (Cocoa Expert), had this to say:

The nature of our work brings us into contact with farmers more than even the agric officers. When they [farmers] come, they ask us all manner of questions, ranging from pricing of farm produce, soil fertility to fertilizer application. I advise farmers on the right quantity of chemicals to mix before spraying. I teach them the latest technologies in farming and introduce them to new fertilizers.

The agro-input dealer at Kade in the Kwaebibirem district also explained the role he plays regarding soil fertility in the area:

We sell all kinds of farm inputs here. Fertilizers are also part. The fertilizers come in different sizes and types. Some of the farmers are completely ignorant of the appropriate fertilizer to apply and when. Sometimes the famers have only heard that *Asaase Wura* is very good for the soil but they lack knowledge of the quantity and the process of application. When this happens, they fall on us. We tell them that, “hey, this one [the fertilizer] works best on this soil; this one [the fertilizer] is suitable for this crop”.

In all, the interviews established that most information farmers gain on SFM are primarily derived from their neighbouring farmers, either at the group level or through interpersonal conversations, and extension agents. The interviews show that NGOs in the two districts are not directly involved in soil fertility management.



## 5.5 Frequency of Information Flow

Table 5.3: *Cross-tab of SFM Communication Channels versus frequency of Information Flow*

Channels on SFM	Frequency			Total
	Very Often	Often	Rarely	
Radio	0 0.0%	9 25.0%	27 75.0%	36 100.0%
Extension Agent	0 0.0%	9 23.1%	30 76.9%	39 100.0%
Colleague Farmer	13 20.6%	24 38.1%	26 41.3%	63 100.0%
Farmer Field School	0 0.0%	4 57.1%	3 42.9%	7 100.0%
Farmer Based-Groups	0 0.0%	11 44.0%	14 56.0%	25 100.0%
Opinion Leaders	0 0.0%	0 0.0%	8 100.0%	8 100.0%
Agro-Shops/PBCs	6 31.6%	8 42.1%	5 26.3%	19 100.0%
Personal Experience	3 20.0%	4 26.7%	8 53.3%	15 100.0%
Public Gathering	0 0.0%	0 0.0%	4 100.0%	4 100.0%
<b>Total</b>	<b>14</b>	<b>36</b>	<b>55</b>	<b>105</b>

Source: Field Survey, 2015.

Table 5.3 shows that generally more than half (52.3%) of the information on SFM are rarely disseminated. The table further demonstrates that one-third (31.6%) of the information from agro-input shops and PBCs (75%) are disseminated very often, with colleague farmers and personal experience each gaining 20% very often responses. More than three-fourth of the

information on SFM technologies from extension agents (76.9%) and radio (75%) are rarely communicated to farmers. Public gathering and opinion leaders are the most infrequently-used channels, as indicated by all the respondents.

## 5.6 Specific SFM Information Communicated to Farmers

Table 5.4: A cross-tab on communication channels and specific information on SFM

Channel/ Source	Specific SFM Technique						Total
	Where To Purchase Fertilizers	Kind Of Technique To Use	When And How To Apply	Associated Challenges	Associated Benefits	How To Maintain And Improve Soil Fertility	
Radio	17 22.7%	22 29.3%	14 18.7%	1 1.3%	9 12.0%	12 16.0%	75 100%
Extension Agent	19 22.1%	19 22.1%	15 17.4%	6 7.0%	15 17.4%	12 14.0%	86 100%
Colleague Farmer	20 14.0%	21 14.7%	22 15.4%	25 17.5%	31 21.7%	24 16.8%	143 100%
Farmer Field School	0 0.0%	0 0.0%	6 46.2%	0 0.0%	0 0.0%	7 53.8%	13 100%
Farmer Based-Groups	0 0.0%	9 20.0%	7 15.6%	4 8.9%	5 11.1%	20 44.4%	45 100%
Opinion Leaders	6 42.9%	8 57.1%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	14 100%
Agro-Shops/PBCs	11 22.9%	4 8.3%	6 12.5%	6 12.5%	13 27.1%	8 16.7%	48 100%
Personal Experience	6 20.7%	10 34.5%	3 10.3%	5 17.2%	5 17.2%	0 0.0%	29 100%
Public Gathering	2 33.3%	4 66.7%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	6 100%
Total	81	97	73	47	78	83	459

Source: Field Survey, 2015.

Table 5.4 presents a cross-tabulation between the specific aspect of SFM that are communicated to farmers and the channels that facilitate the act. From the table, information on the types of SFM techniques available, how to maintain and improve soil fertility and places where SFM techniques can be purchased were the top three issues that were disseminated to farmers. Nearly

30% (specifically 29.3%) of the information on the types of SFM techniques were communicated through radio, a little more than one-fifth of the respondents (21.7%) used colleague farmers to access information on benefits associated with using SFM techniques while 22.1% used extension agents to get information on where to buy fertilizers.

The interviews with the extension agents showed that information on SFM revolve around soil infertility causes such as bushfires, deforestation, soil erosion and poor rainfall pattern. The agents teach farmers to adopt coping strategies to mitigate their impact on the soil. Other aspect of the information disseminated to farmers is the kind of SFM technique to adopt and the instructions that comes with its use. Extension agents and agro-input dealers mainly perform this function. Messages on the type of soil that supports specific plant growth, the nutrients contained in a fertilizer and specific fertilizer suitable for a crop are also communicated to farmers. When asked to state whether or not farmers are adequately informed on soil fertility, the participants indicated the available information on SFM is not enough. They therefore, appealed for more attention to be paid to soil fertility because the soils in the areas are declining at a faster rate.

From the interviews, it seems farmers' knowledge on SFM techniques application is low. The contact farmer in Afiadenyigba in the Ada West district attributed this to the lack of access to readily-available information on soil fertility to farmers. The extension agent in Pramkese was also of the opinion that the farmers do not seek the appropriate information on SFM. He contended that the farmers prefer to take advice from their colleagues "who are also clueless".

## 5.7 Satisfaction with Channels for Conveying SFM Issues

*Table 5: Communication channels on SFM and level of satisfaction*

Channel	Satisfaction With Information				
	Very Satisfied	Satisfied	Somewhat Satisfied	Not Satisfied	
Radio	6 9.5%	7 17.5%	12 15.4%	11 31.4%	36
Extension Agent	3 4.8%	9 22.5%	21 26.9%	6 17.1%	39
Colleague Farmer	24 38.1%	9 22.5%	18 23.1%	12 34.3%	63
Farmer Field School	3 4.8%	3 7.5%	1 1.3%	0 0.0%	7
Farmer Based-Groups	7 11.1%	5 12.5%	7 9.0%	6 17.1%	25
Opinion Leaders	2 3.2%	1 2.5%	5 6.4%	0 0.0%	8
Agro-Shops/PBCs	13 20.6%	4 10.0%	2 2.6%	0 0.0%	19
Personal Experience	5 7.9%	1 2.5%	9 11.5%	0 0.0%	15
Public Gathering	0 0.0%	1 2.5%	3 3.8%	0 0.0%	4
<b>Total</b>	<b>63</b> <b>100%</b>	<b>40</b> <b>100%</b>	<b>78</b> <b>100%</b>	<b>35</b> <b>100%</b>	<b>216</b>

Source: Field Survey, 2015.

According to table 5.5, almost one-third (29.1%) and more than one-third (36.1%) of the farmers are very satisfied and somewhat satisfied with the delivery of information on soil fertility respectively. The rest of the farmers are satisfied (18.5%) and not satisfied (16.2%). Nearly 40% of the farmers who are very satisfied acquire SFM information from their colleague farmers while one out of five very satisfied farmers (20.6%) get the information from Agro-input shops and PBCs. One out of ten farmers and just about the same number of farmers who are very satisfied gain information on SFM via farmer-based groups and radio. Out of the farmers who are satisfied, 22.5%, 22.5% and 17.5% use colleague farmers, extension agents and radio

respectively to seek information on SFM practices. Among the farmers who are somewhat satisfied, 26.9% rely on extension agents, nearly a quarter (23.1%) use colleague farmers, 15.4% use radio and a little more than one-tenth (11.5%) use personal previous experiences. With the farmers who are not satisfied, 34.3% uses colleague farmers while 31.4% uses radio.

## 5.8 Factors that Influence Adoption

**Table 6: Factors that influence adoption of SFM Techniques and farmers in the two districts**

Factors	Farm Location		Total
	Ada West	Kwaebibirem	
Availability Of Information	14 18.4%	25 24.8%	39
Previous Experience With The Technique	22 28.9%	33 32.7%	55
Ease Of Use Of The Technique	6 7.9%	8 7.9%	14
Poor Soil Fertility	24 31.6%	21 20.8%	45
None Of The Above	3 3.9%	5 5.0%	8
Other	7 9.2%	9 8.9%	16
<b>Total</b>	<b>76</b> <b>100%</b>	<b>101</b> <b>100%</b>	<b>177</b>

Source: Field Survey, 2015.

From table 5.6, a little above half (52.4%) of the respondents said their previous encounter with an SFM technique influence to continually use it. This means when a strategy is proven to be efficient in replenishing lost nutrients and improving the soil, farmers are more likely to patronize it. Close to a quarter (24.8%) of the respondents from Kwaebibirem were motivated to use SFM techniques because of the availability of adequate information while just below 20% of the farmers in Ada West chose this factor. Poor soils compelled nearly one-third (31.6%) of the

farmers in Ada West to use SFM techniques, against only a little more than one-fifth (20.8%) of their compatriots from Kwaebibirem district. Below one-tenth (7.9%) of the respondents also use SFM technologies because of they were easy and convenient to use.

The interviews established that the availability of adequate information is a major catalyst for the adoption SFM techniques. The extension agent in Pramkese in the Kwaebibirem district said the presence of detailed information improves the knowledge of farmers on the type of fertilizers to use, when and how to use the fertilizers. He was of the opinion that the knowledge propels the farmers to embrace the fertilizers. The quote below captures this point succinctly:

Farmers who partake in our sessions and constantly engage us tend to have increased yield than those who do not. My interactions with them have led me to the conclusion that those who do not use SFM techniques are either unaware of these technologies or simply do not have any idea on how to put these techniques to practice. You might also think that they will engage their fellow farmers but not all farmers discuss farming issues with their neighbours. Pride, accusations of witchcraft and backbiting lead them to stick to the old methods of fertilizing the soil.

The lead farmer in Pramkese also said, “If the techniques are made available to farmers, and there is intense awareness creation on the capabilities of these techniques, farmers will openly adopt them and use”. Another enabling factor is poor soils. The interviews showed that farmers with deteriorating soil fertility problems are more inclined to use SFM techniques than those with a relatively better soil. Those farmers use the products out of necessity, and seem to have no choice. The agro-input dealer in Kade threw more light on this:

The only time farmers feel the need to buy fertilizers is when they record low harvests. Then they run here asking for all sorts of fertilizers to boost their soil for bumper harvest. Prior to that, all advice to them to use fertilizers are met with resistance and counter-arguments.

The third factor that enhances adoption of soil fertility strategies is improved fertilizers. According to the lead farmers, farmers who derive maximum benefit from a certain SFM technique are motivated to continue using them while those who reap fewer benefits avoid using them. They explained testimonies of successful soil fertility technologies are shared with other farmers, and that is how the innovation spreads. In effect, as much as the farmers' previous use of the product was successful, they will continue to use and recommend to others. Other factors that enable adoption of SFM techniques are availability, ease of use and low cost of the SFM techniques.

## 5.9 Challenges to Adoption

*Table 7: Challenges that confront the adoption of SFM Techniques*

Challenges	Farm Location		Total
	Ada West	Kwaebibirem	
Lack Of Information	8 10.7%	7 7.4%	15
Tedious And Difficult To Apply	18 24.0%	24 25.3%	42
Expensive	28 37.3%	31 32.6%	59
Unavailability Of Technique	16 21.3%	15 15.8%	31
Improved/Good Soil	1 1.3%	10 10.5%	11
Communal Practices	4 5.3%	6 6.3%	10
None Of The Above	0 0.0%	2 2.1%	2
<b>Total</b>	<b>75</b> <b>100%</b>	<b>95</b> <b>100%</b>	<b>170</b>

Source: Field Survey, 2015.

Table 5.7 illustrates that majority (34.7%) of the respondents who avoided the uptake of SFM techniques based their decision on high cost associated with the methods; 37.3% of the farmers from Ada West, as against 32.6% from Kwaebibirem faced this challenge. About a quarter of respondents from each district indicated that the difficulty with which SFM techniques are implemented posed a challenge to their adoption. Below two out of five (18.2%) farmers viewed scarcity of SFM methods as the main averse factor that affects their adoption of SFM strategies. More farmers in Kwaebibirem (10.5%) were discouraged from using SFM techniques because they have good soils on their farms; just 1.3% of the farmers from Ada West also gave this reason. More farmers from the latter site bemoaned the problem of shortage of SFM materials than those from the former district.

The findings of the interviews are similar to the survey findings. For instance, the major challenge to the dissemination and subsequent adoption of SFM techniques is financial constraints. The contact farmers in each of the districts said farmers complain a lot about the high cost of fertilizers. This problem was very peculiar in the Ada West district where cow dung is common among farmers there. The high cost of the products is compounded by transportation and labour costs associated with the SFM techniques. The contact farmer in the district elaborated this difficulty in the quote below:

If I want to buy cow dung for my farm, I need to rent a tractor to transport the product from Sege to my farm. In addition, I need labourers who will help me apply them on the field. I also need the tractor to plough the organic fertilizer into the soil. The cost of extra labour and rental of farm implements, coupled with transportation costs and the actual price of the product make it a bit unbearable for farmers. How many farmers can afford this? It does not mean that we do not like fertilizers but the cost deters us from purchasing at all times.

Apart from financial constraints, there is the problem of shortage because demand exceeds supply. The lead farmer in Ada West elaborated that the cow dung is not in always in abundant supply, hence they are compelled to plant without it. He said this affects the quantity of their yield. The problem of shortage is not limited to only organic fertilizers, as the inorganic fertilizers are also occasionally unavailable. The shortage also results in price hikes. Farmers are also discouraged from using SFM techniques because some of them are labour intensive. According to the lead farmers, some of the laborious SFM techniques require excessive application of manpower, which can be both costly and tiring. Some of the fertilizers also require the user to follow stringent instructions that are hard to follow by an ordinary illiterate farmer. This is especially so for inorganic fertilizers that require precise measurements.

Additionally, some of the fertilizers, especially the inorganic ones, have negative consequences on the growth of the soil, according to the lead farmers and the extension agents. They said this prevents them from adopting the technologies on a larger scale because they have far reaching consequences on the soil. The organic fertilizers, as said by the lead farmer from Afiadnyigba, also have their negativities:

When we use cow dung, we realize that it makes weeds grow faster on the farm. These weeds compete with the crops for the few nutrients in the soil. The smell is also very repulsive, so most farmers, especially the women are not enthused when they apply them to their field.

Another challenge the interviews revealed was the inadequacy of information on alternative and innovative ways of improving soil fertility in the two districts. Some of the farmers are not aware of alternative means of fertilizing their soils, so they are left to depend on the old methods of replenishing lost nutrients to the soil. This challenge can be addressed through intense education

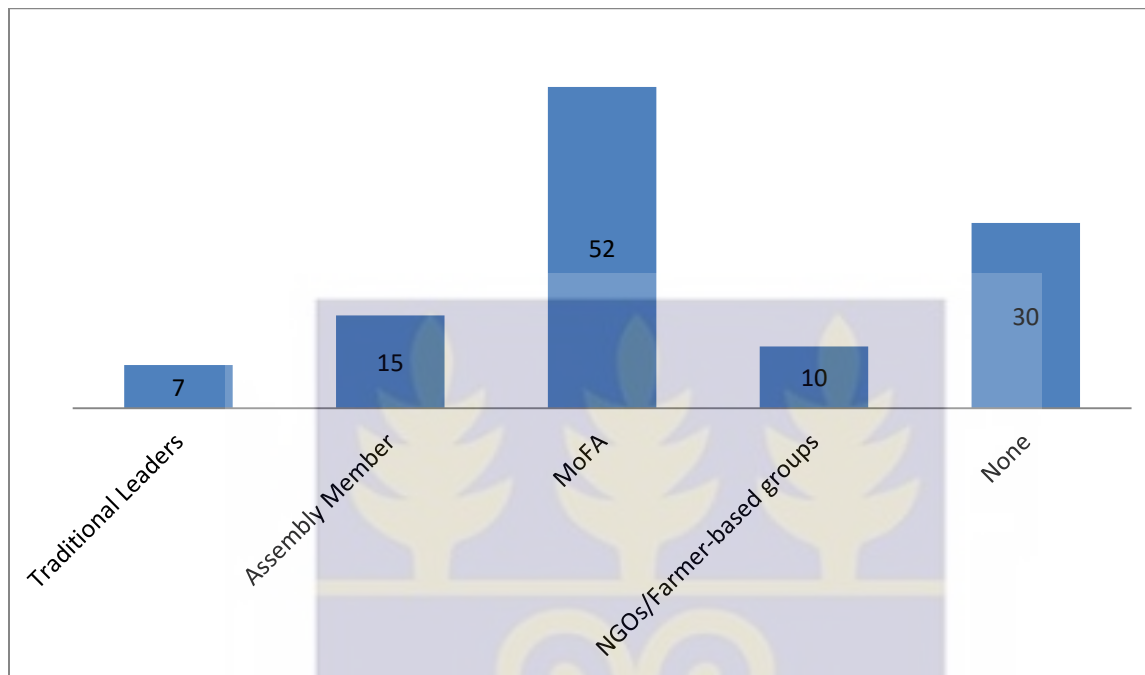
and campaigns but the inadequacy of extension agents to carry out this mandate makes the problem continues to prevail.

Unfavourable weather conditions do not also help in using SFM techniques. According to the interviewees, irregular rainfall pattern ensures that farmers are unable to correctly time when to apply fertilizers. For instance, excessive rains either wash the fertilizer from the surface of the soil or push the nutrients far beyond the reach of the roots of the crops. Another shortcoming to the adoption of agricultural innovations is unfavourable land tenure agreements. The assemblyman in Addokope said this challenge impeded farmers from investing in fertilizers and other SFM techniques because of the fear that the land owner can take their lands back from them at any time. They therefore, work with the original nutrients in the soil, which are almost depleted and insufficient to support plant growth.

Finally, the contact farmers noted that the extension agents also have poor communication between the extension agents and farmers. The contact in Pramkese in the Kwaebibirem district said the extension agent in the area is not very fluent in Twi, the local dialect. He said the extension combines Twi with English in his interaction with farmers. This situation prevents illiterate farmers from understanding what the agent says.

## 5.10 Stakeholders/Opinion Leaders Involved in SFM

*Figure 3: A graph displaying the stakeholders involved in SFM Techniques*



Source: Field Survey, 2015.

The Ministry of Food and Agriculture (MoFA) is the most active stakeholder involved in the dissemination and uptake of SFM technologies; almost three out of five (58.4%) of the respondents chose the sector ministry. One out of six (16.9%) farmers mentioned assembly members while only 7.9% chose traditional leaders as the most active stakeholders in the adoption of SFM techniques. Members of Parliament (MPs), district chief executives (DCEs) and religious leaders are not involved in SFM activities. One-third (33.7%) of the farmers said none of these institutions and individuals are involved in the SFM.

Expectedly, the interviews indicated that the government, through the Ministry of Food and Agriculture, was identified as the most active institution as far as the dissemination of soil fertility management strategies is concerned. As the ministry tasked with the mandate of

ensuring agricultural development, it is not surprising to see them take centre stage in promoting effective SFM techniques, said the lead farmer in Ada West. Interviewees from Kwaebibirem also affirmed that MoFA is instrumental in the improvement and transformation of agriculture in their area. The ministry's extension service directorate carries out the responsibility of propagating issues related to soil fertility to farmers. They also teach farmer ways of conserving soil nutrients and fertilizer application.

Some of the interviewees said local political authorities (assemblymen and unit committee members) and traditional leaders in the selected communities of both districts are somehow involved in soil fertility management activities. These community leaders help gather their people around the townsquare for meetings on SFM-related information. However, the extension agents said they prefer to work through contact farmers because they have a more direct access to farmers than the traditional authorities. In addition, not all farmers attend the townsquare meetings called by the traditional leaders.

The interviews further uncovered that district chief executives (DCEs) and members of Parliament (MPs) in the two districts are not instrumental in influencing the uptake of soil fertility technologies. A quote from an assemblyman in Ada West demonstrates this:

One would expect that the DCE and the MP who have more resources than assemblymen will take the initiative of spearheading agricultural development but they do not. They only show up during electoral seasons to canvass for votes, and that is it. They make promises that they will provide inputs to fertilize our soils just to get the votes, and afterwards there is no show from them [*sic*].

Farmers in the Kwaebibirem district also experience similar situation.

The MP and the DCE are sleeping on the job as far as agriculture is concerned. This town is a major hub for cocoa production but the political leaders are not helping us with the necessary resources to improve production. I only hear that it

is government (MoFA) that has a free mass spraying and fertilizer distribution programme. But even with that, there is nepotism and favouritism. Only supporters of the governing political party are given these free inputs which are meant for every farmer in this locality (source: Chief, Pramkese).

However, the allegation of discrimination in the distribution process was rebuffed by the manager of the PBC in Pramkese. He explained that the farmers who refused to follow the laid-down instructions for the free mass spraying and fertilizer distribution programme were those that did not benefit.

It is not true that some farmers are deliberately exempted from the mass spraying exercise. I am a farmer as well, so I benefit substantially from the programme. We were directed by the agric officers to come together as a group because they do not deal with individual farmers. Only few of us complied with the directive, and formed associations. The average membership of a group was about eight farmers. Farmers who did not form were overlooked. That is how come they claim some people were selected based on their political affiliation. It could be true but to the best of my knowledge, this is the main reason.

Essentially, the interviews showed that MoFA is the most active institution with regards to soil fertility management. Opinion leaders such as chief farmers, agro-chemical sellers and “cocoa krakye” (PBC manager) are also actively involved in matters relating to soil fertility decline. The least concerned groups of people are local political and traditional leaders, MPs and DCEs.

### **5.11 How Extension Agents Engage Farmers on SFM**

The extension agents use different ways to communicate with farmers. Some of the approaches identified by the interviews include mass media, demonstrations, farmer field schools, communal outreaches, interpersonal methods, training programmes among others. Some of the techniques have been discussed in the previous section. According to the extension agents who were interviewed in both districts, when they enter a community for the first time, they identify the traditional leaders, assembly members and the contact farmers. The contact farmer is a respected

and well-versed farmer who serves as liaison between farmers and extension agents. The agents said they prefer working through contact farmers because the farmers respect them and often go to them for farming ideas.

The contact farmer is a farmer himself, so he understands the challenges of farming better than the assemblymen, chiefs and religious leaders. Not all the traditional leaders are farmers, and the chiefs and his elders are not always in the good books of the farmers due to land disputes and other internal conflicts. But when we channel our efforts through contact farmers, we avoid these problems that come with the traditional leaders. The contact farmer first receives us and takes us to the rest of the farmers. He mobilizes his friends [who are also farmers], and introduces them to us [the extension agents] (Source: Deputy Agric Director, Kwaebibirem district).

There were accusations of nepotism and favouritism against the lead/contact farmers. The extension agents said they receive complaints that the contact farmers organize only their cronies to benefit from the services of the extension agents, instead of bringing all farmers in the community together. The allegations peak during the distribution of farm inputs, which are sometimes channeled through these contact farmers. However, the contact farmer in Pramkese, Kwaebibirem, refutes this assertion:

The agric officers often deal with farmer groups and associations. This simply means that non-group farmers in the town do not benefit from the services and inputs from the government. That is not fault because I try to inform all farmers as much as possible. When the officers contact me, we beat the metal to inform everyone about it. Only few shows up. So how do you expect me to distribute farm inputs to farmers who have not even undergone training on how to use the fertilizer? I work with instructions from the agric officers. As for those accusations, I hear all the time. They are untrue. If the farmers want to gain ideas from the extension agents, they should just show up at the meetings, join the farmer field school, and visit the agric office often. If you are not doing any of these, the agric officers cannot work with you.

The extension agents also organize capacity-building seminars, workshops and other training programmes for the farmers. The extension agents said this event type gets the lowest turnout.

Extension agents also employ the following means to reach farmers: farmer field schools, townsquare meetings, farm visits, group interaction and mass media. These approaches have been discussed in the preceding sections under this chapter. Emphasizing on the role of the group interaction, the lead extension agent in Ada West explained that:

Numerically, we are very deficient. Because of that, we are not able to meet every farmer in the communities. The best way to address this challenge is to ensure that all the farmers come together for us to address them as a unit. We believe that when farmers come together, naturally a leader will emerge. We use the leaders who have better understanding of farming to build the capacity of their colleagues. This is how important the grouping is. We bring them together in the spirit of understanding and smooth exchange of ideas.

The extension agents engage farmers in face-to-face encounters. This takes place at the homes of the farmers or visit to the farms. They added that the farmers are also able to reach them through mobile phone to seek further clarity and advice. The extension agents also explained that they use the mass media, especially radio, to create awareness on a mass scale before embarking on communal outreaches and field work activities. This approach guarantees them acceptance and cooperation with the farmers, as most of them had already heard about the issues on radio prior to the engagement with the agricultural officers. The deputy chief agriculture officer in Kwaebibirem deliberated on the factors they consider before using a channel or an approach:

Number one: the farmers. The choice of channel is dictated by the farmers because they are the recipients of the message, so we cannot use a channel they don't use. If we do so, we won't reach them. We survey the communities first to know their means of communication. We formulate our strategy based on the outcome of the survey. Number two: availability of funds. Here, ask: can the money available support the channels we want to use? If the answer is no, we change plans. Three, the message or product we want to send across to the farmers. Some of the messages require demonstrations, so obviously we cannot use the mobile phone or radio; we need to be on the ground.

## 5.12 Chapter Summary

This chapter presented the findings of the quantitative and the qualitative study. The findings both designs show that farmers acquire SFM information from multiple channels, but the most popular ones are neighbouring farmers, extension agents and radio. Although these channels are playing important roles in disseminating and influencing SFM techniques adoption, it appears farmers have low knowledge on these practices.



## CHAPTER SIX

### DISCUSSION

#### 6.0 Introduction

This chapter discusses the findings in relation to the research objectives, theoretical framework and the literature reviewed that underpinned this study. The diffusion of innovation (DOI) and media richness theories guided this study while a review of related scholarly materials on the dissemination and adoption of agricultural innovations was also undertaken. The discussion sought to confirm whether the findings of the present study are theoretically grounded in the assumptions of the aforementioned theories and also whether they confirm or contravene findings of earlier related studies on the subject.

#### 6.1 Communication Channels for Disseminating SFM Techniques

The dominance of rural radio as a major source of information to rural settlers was confirmed in this study (just as Lucky & Achene, 2013; Omotesho, Ogunlade & Lawal, 2012 also found in their respective studies). The farmers in Kwaebibirem and Ada West districts respectively depend on two local stations, *Obourba FM* and *Radio Ada*, for news and current affairs as well as issues related to agriculture, including soil fertility management. Earlier finding by Chapman et al (2003) that farmers prefer radio programmes that are broadcast in their local language by local people also confirms the reasons why farmers in Kwaebibirem district prefer to listen to ‘Akuafɔ Mmo’ on *Obourba FM*. It also confirms that the concept of homophily, as highlighted in the diffusion of innovation theory, is applicable to farmers’ selection of mass media content.

The popularity of radio for disseminating SFM technologies is comparable to Kumeh (2013) who singled it out as the most dominant mass medium for agricultural purposes in Ghana. The

findings further corroborate studies by Nwanko & Orji (2013) in Nigeria, Ariyo et al (2013) in Nigeria and Adolwa *et al* (2012) in Kenya. Illiteracy, accessibility and financial constraints are the reasons for the disuse of the Internet and newspapers to seek knowledge on SFM and other agricultural activities. Studies in other African countries (Lucky & Achene, 2013; Nudanu, 2013; Omotesho, Ogunlade & Lawal, 2012) validate this assertion.

The most popular means of acquiring information on SFM was interpersonal conversation with other farmers (farmer-to-farmer extension). The second most important communication channel was face-to-face interaction with AEAs. Studies by Isaya (2015), Moore (2014), Ndilowe (2013) and Spurk *et al* (2013) confirm this finding. Extension agents utilized mass media to create general awareness about SFM strategies and deploy interpersonal communication to facilitate adoption. This is similar to the postulations of Rogers (2003) under the diffusion of innovation theory. Additionally, Rogers's position that rural folks who use 'cosmopolite' channels are more exposed to innovations than those who rely on 'localite' channels was consistent with the findings of this study.

Some farmers also used interpersonal communication to seek information from agro-input dealers and PBC personnel. The presence of in-input dealers as key information channels for SFM messages was also found by Etyang *et al* (2014) in their study. It also demonstrates the commodity approach to extension (MoFA, 2011). Although Nsiah-Gyabaah (2003) found that NGOs in the forest-savannah transition belt of Ghana were involved in promoting the adoption of SFM technologies, the findings of the present study differ.

Agricultural officers also organized farmer field schools, demonstrations, townsquare meetings and capacity building workshops to improve the knowledge of farmers on SFM methods and application. The training programmes and workshops demonstrates the training and visit approach of extension while farmer field schools, study circles and farmer cooperatives indicate that AEAs apply Pablo Freire's empowerment and participatory models of agricultural extension approach (Kwadzo, 2014; Adolwa *et al*, 2012). The evidence from this study suggests that extension agents have departed from top-down extension approaches to more participatory methods, as earlier found by Kwadzo (2014), Rugut & Osman (2013) and Davis (2008).

## **6.2 Preferred Communication Channels for Disseminating SFM Techniques**

The farmers preferred to obtain information on SFM through interpersonal means of communication like conversation with neighbouring farmers and face-to-face encounter with AEAs. This is similar to the findings of these studies: Moore (2014), Gebru, (2013) and Ndilowe (2013). The farmers prefer to seek knowledge from their colleagues because they are easily accessible, credible and convenient (Spurk *et al*, 2013). Some of the farmers also said extension agents are credible and trustworthy, as found by Adolwa *et al* (2012) in their study in Kenya. The findings of the current study agree with Isaya (2015) and Moore (2014) whose studies showed that interpersonal communication channels guarantee immediate feedback.

The media richness theory ranks face-to-face (interpersonal) communication as the best channels for conveying richer information. The theory further explains that face-to-face discussion is the best way of reducing ambiguity in messages because they allow for demonstration through body language cues such as gestures and facial expressions. This reduces ambiguity and increases

shared understanding, as highlighted in the theory (Daft & Lengel, 1986). The findings of this study affirm the assertions of the theory.

The reliance on other farmers and extension agents demonstrates Rogers's concept of homophily and heterophily respectively. According to Rogers (2003), people in 'homophilous' situations share similar common socio-economic, cultural beliefs and language, hence it is easier for them to exchange ideas. In this study, majority of the farmers said they prefer getting information from other farmers than any other source because of their availability and trustworthiness. Heterophily was also manifested in this study. Rogers (2003) explained that in 'heterophilous' situations, farmers seek information from a more technically competent person. In this study, farmers' reliance on AEAs, who are well-versed with SFM knowledge, amply demonstrates this concept. Earlier study by Muchai *et al* (2014) indicates that AEAs prefer communication channels that are popularly used by majority of the members of the communities. This assertion explains why farmers preferred seek information on SFM on *Obourba FM* and *Radio Ada* because of the language commonality (Ariyo *et al*, 2013).

Some of the farmers also chose group and participatory communication methods such as farmer field schools and on-farm demonstrations as their favourite channels for acquiring messages on SFM. These platforms are preferred on account of their convenience and ability to enable demonstration of SFM techniques to farmers on the field. The finding partly supports Etyang *et al* (2014) who found farmer field days, on-farm demonstrations and public gatherings as farmers' preferred medium for obtaining ISFM information. Again, Freire's model of empowerment also

becomes important because group communication equip farmers with practical knowledge and sound leadership skills (Kwadzo, 2014).

It is worthy of note that not all the studies confirmed interpersonal communication as the preferred medium for communicating with farmers. For instance, Ariyo *et al* (2013) found that farmers preferred to get informed on agricultural innovations through radio, television, telephone and newspapers. Adolwa *et al's* (2012) finding that radio and farmer field days were the two most accessible, reliable and informative channels is at variance with findings of this study.

### **6.3 Specific SFM Messages Communicated to Farmers**

Most of the messages farmers receive on SFM centre on the benefits associated with the adoption of the various SFM techniques, the kind of SFM technique suitable for certain crops and where to purchase the techniques. This varies from Muchai *et al* (2014) whose study in Kenya uncovered that most information farmers receive on soil fertility relates to soil conservation strategies. Similar to the study by Isaya (2015) in Tanzania, the current study found that information on fertilizer use and adoption is very low. Conversely, studies by Obidike (2011) in Nigeria and Hanke (2007) in Vietnam do not confirm this finding.

### **6.4 Role of Stakeholders/Opinion Leaders and Farmer Associations**

Ghana's Ministry of Food and Agriculture is the most active institution in ensuring soil fertility management and conservation. Most of the ministry's activities on soil fertility are implemented by AEAs whose major mandate is to educate farmers on techniques of soil fertility conservation.

The finding supports earlier study by Nsiah-Gyabaah's (2003). Muchai *et al* (2014) also found that the Kenyan Ministry of Agriculture is also actively involved in soil fertility issues.

AEAs in Ada West and Kwaebibirem districts use assemblymen, traditional authorities and lead farmers to influence farmers to adopt SFM techniques. This confirms the opinion leadership concept in the diffusion of innovation theory (Rogers, 2003). The contact farmers serve as liaisons between farmers and the extension agents while the assemblymen and traditional authorities help mobilize members of the community for meetings and activities on soil fertility.

### **6.5 Factors that Influence Dissemination and Adoption of SFM Techniques**

Most farmers considered the quality of SFM techniques before adopting them. The findings suggest that as long as a SFM technique was compatible with the soil and guaranteed improved yield, farmers would continue to use it. This is similar to Hähnke (2007) whose study in Vietnam showed that farmers are more open to innovations that are of high standards. This finding has implications for the diffusion of innovation theory. The theory opines that these five characteristics influence the extent to which an innovation would be adopted – relative advantage, complexity, compatibility, trialability and observability (Sahin, 2006; Rogers, 2003). From the findings, relative advantage is the most influential factor in terms of the adoption of SFM methods. According to the farmers, when a SFM technique proves to be right for the soil, they recommend it to other farmers as well. This shows that interpersonal communication is more effective at facilitating the adoption of SFM techniques.

Vanlauwe *et al's* (2010) assertion that farmers, who have access to adequate information, adopt more modernized ways of farming was validated in the present study. Hähnke (2007) also confirmed the findings of this study by establishing that there is a positive correlation between adoption of SFM practices and exposure to sources such as extension agents, neighbours and the mass media. However, Chirwa (2005) established that there was no relationship between adoption and availability of information, a deviation from the findings of this study. From the current study, farmers prefer easy-to-use SFM methods. This illustrates the diffusion of innovation theory which is premised on the assumption that an innovation that is easy to use has higher chances of adoption.

Farmers in Ada West have poorer soils, hence they are more pressed to use SFM techniques than their counterparts in Kwaebibirem. According to the diffusion of innovation theory, farmers with needs are more open to innovations that address their challenges. It also confirms the study by Gyasi *et al* (2006) that soils in the Sudan, Guinea and coastal savannas, and the forest-savanna transition zones are the most prone to soil fertility. Since Ada West is located in the coastal savannah ecological zone, it is no surprise that their farmers are actively seeking more information on SFM techniques. As Rogers (2003) posits, seeking information leads to knowledge, while knowledge also translates into adoption.

## **6.6 Challenges to Adoption of SFM Techniques**

Hähnke (2007) mentioned inadequate information, lack of technical know-how and lack of credits to purchase fertilizers as the main threats to the adoption of SFM. The findings of the present study confirm Hähnke's study. Another deterrent to the adoption of SFM techniques is the intense labour that is associated with their application on the farm. For instance, farmers who

use cow dung complain that the application of this technique can be so cumbersome that it dissuades farmers from using them. This demonstrates the “complexity” component of the diffusion theory. The complexity feature explains individuals avoid innovations that are difficult to understand and use. It also demonstrates the equivocality component of the media richness theory.

Another impediment to the adoption of SFM techniques is shortage of SFM products. It was found that at certain times, demand for the commodity exceeds supply; this is similar to Etyang *et al* (2014) who found that limited access to necessary agro-inputs is the main cause non-adoption of agricultural innovations in Kenya. Another problem identified by this study was the unfavourable land tenure systems which sometimes dissuade farmers from investing heavily in SFM techniques. IFPRI (2015) also made similar findings in their study. It also affirms the postulations of the diffusion of innovation theory that societal norms and practices can sometimes impede adoption of new ideas.

Just as Obidike (2011) found, bad road networks and poor communication skills on the part of extension officers impede the smooth transfer of information to farmers. For instance, this study found that the extension agent in Pramkese in Kade is not very fluent in the Akan language. This presents communication challenge between him and the farmers. Adolwa *et al* (2012) also found similar challenge in Kenya.

## 6.7 Chapter Summary

This chapter discussed the findings of the study in relation to the research objectives, theories and the related materials. The discussion revealed that the findings of the current study support components of the diffusion of innovation and media richness theories. Additionally, the findings of the study also supported and contravened findings of earlier related studies (Ariyo *et al*, 2013; Chirwa, 2005)



## CHAPTER SEVEN

### CONCLUSION

#### 7.0 Introduction

This is the concluding chapter of the study. It presents the summary of the findings, the limitations, suggestions and recommendations for policy consideration.

#### 7.1 Summary of Findings

This study sought to identify the communication channels that are used to communicate SFM information to farmers in rural areas. It further analyzed the factors that influence or impede the adoption of SFM methods. The findings of the study largely confirmed the tenets of DOI and media richness theories which underpinned the study. The study uncovered the following findings: The most popular medium for conveying SFM techniques were colleague farmers, extension agents and radio. The findings further showed that farmers preferred interpersonal communication channels to mass media platforms. This was because interpersonal channels are accessible to farmers, credible, demonstrable and ensure immediate feedback. The finding supports the assumption of the media richness theory that individuals use rich medium because they engage all the senses of humans. In terms of the specific SFM messages that are communicated to farmers, the study found that most of the information highlights the benefits associated with the various SFM technologies and discuss less about the weaknesses or side effects.

It was further revealed that farmers are motivated to use SFM products that enrich the soil and consequently lead to bumper harvest. Again, the study uncovered that farmers in the Ada West district use SFM techniques more because their soils are poorer and unable to sustain plant

growth on their own. Conversely, financial constraints, shortage of fertilizers and complexities associated with SFM products deter farmers from using these technologies.

## **7.2 Limitations**

Every study encounters drawbacks, and this was not an exception. The instruments adopted for the study were questionnaires and semi-structured interview guides written in English. The task of translating from English to local languages for the understanding of farmers was arduous. This dragged the sessions with the farmers, as farmers became tired at a point. The sample size for the quantitative study was relatively small, although the findings were supplemented with data from the interviews.

## **7.3 Suggestions for Further Studies**

Future studies should examine farmers' knowledge, attitude and perception of the various soil fertility management techniques. Such studies would help uncover the specific SFM techniques often used by farmers, farmers' experiences with these techniques and their knowledge of them. This will give a complete picture of the soil fertility situation in Ghana. In furtherance of this objective, similar studies should be replicated in other ecological zones to have a national idea of how information on SFM are disseminated to farmers, just as Chapman et al (2003) and Nsiah-Gyabaah (2003) have done in the Savannah and Savannah-Forest transitional belts respectively.

## **7.4 Recommendations for Policy Considerations**

Based on the findings of the study, the following recommendations were made:

- a. Extension agents must employ participatory extension approaches such as farmer field days and farmer groups to equip farmers with practical knowledge on how to use SFM techniques. This suggestion is also line with the view of Adolwa *et al* (2012).
- b. Accessible and convenient communication channels should be used to deliver information on SFM to farmers.
- c. There should be effective collaboration between extension agents and communal/opinion leaders. The opinion leaders are able to mobilize farmers better than extension agents who are mostly new to the community.
- d. To improve the rate of adoption, instructions on the application of fertilizers must be well explained to farmers.
- e. Farmers must be informed of the negative consequences of the SFM techniques. This study established that most of the information on SFM highlight the positive aspects of the techniques and talk less of the weaknesses.
- f. Frequent training programmes should be held for contact/lead farmers to expand their knowledge on SFM techniques. This is because the study found that they play active roles in issues related to soil fertility.
- g. This study found that information on soil conservation was low. It is therefore recommended that more efforts must be directed at teaching farmers strategies on how to conserve nutrients in the soil.
- h. The rate at which information on SFM flow is relatively low compared to other agricultural innovations. Extension agents must, as a matter of urgency, intensify campaigns to ensure that farmers are well updated on soil fertility technologies.

- i. Farmers must be encouraged to work in groups, as it encourages discussion and exchange of knowledge.
- j. In line with Chapman (2003) and Ariyo *et al* (2013), this study recommended that agricultural programmes on radio and television should be broadcast in the local languages of the farmers to enable them understand the content effectively.
- k. Manufacturers of SFM products must produce quality fertilizers that yield optimum results to farmers. the findings of this study suggest that farmers avoid technologies that do not address their problems adequately.

## **7.5 Conclusion**

This study was conducted to find out the communication channels that were used to spread information on SFM to farmers. It also aimed at identifying the factors that work to ensure the adoption or avoidance of SFM methods. From the findings, it appears extension agents were departing from the top-down unidirectional mode of information delivery to more participatory methods. The introduction of farmer field schools, townsquare gatherings and capacity-building workshops for farmers demonstrates this assertion. As espoused in the tenets of the media richness theory, farmers prefer to use communication channels that guarantee immediate feedback and allow for demonstration. It explains why interpersonal communication channels, farmer field schools and on-farm demonstrations feature strongly on farmers' list of preferred communication channels (Ariyo et al, 2013).

Farmers in Ada West have serious soil infertility challenges. To this end, they depend on SFM techniques more than their colleagues in Kwaebibirem do. It is therefore, important for extension agents and other relevant institutions to increase farmers' level of knowledge on soil fertility. It

is even more important because Rogers (2003) posits that lack of inadequate information is the most important reason that accounts for farmers' disuse of innovations. This study further showed that farmers are willing to adopt quality soil fertility techniques which give them value for their money.



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## APPENDIX

### QUESTIONNAIRE

#### Demographic and background data of respondents

<b>1) Age</b>	18 – 25	26 – 35	36 – 50	Above 50
<b>2) Educational Level</b>	No schooling	Basic school (middle school)	SSS/SHS (O-level/A-level)	Tertiary
<b>3) Sex</b>	Male	Female		
<b>4) Farm size</b>	Small scale (one to two acres)	Medium scale (three to five acres)	Large scale (above five acres)	
<b>5) Location of farm</b>	Sege	Kade		

6) What media channels do you use regularly?

Television [  ] Radio [  ] Newspaper [  ] Internet [  ] Other [  ]

7) Where do you get information on general agricultural innovation? (you can tick more than one medium)

Source	Tick
1. Radio	
2. Television	
3. Newspaper	
4. Internet	
5. Extension agent (interpersonal)	
6. Colleague farmers (including friends/neighbours)	
7. Farmer field school/Demonstration site	
8. Farmer groups/associations	
9. Opinion leaders	
10. Agro-shops/produce buying companies	

11. Personal experience	
12. Demonstration site	
13. Public gathering (townsquare)	

8) What type of agricultural information are shared with farmers?

1. Agro-chemicals (Herbicides, pesticides and weedicides) [ ]
2. Soil fertility management techniques and application [ ]
3. Types of soil and the best soil type for planting [ ]
4. Introduction of improved seedlings [ ]
5. Crop disease treatment and control [ ]
6. Livestock disease treatment and control [ ]
7. New methods of farming [ ]
8. Introduction of new animal vaccines and drugs [ ]
9. Other [ ]

9) What is/are your source(s)/channel(s) of information on soil fertility management strategies?

Channel	Tick
1. Radio	
2. Television	
3. Newspaper	
4. Internet	
5. Extension agent (interpersonal)	
6. Colleague farmers (including friends/neighbours)	
7. Farmer field school/Demonstration site	
8. Farmer groups/associations	
9. Opinion leaders	
10. Agro-shops/produce buying companies	
11. Personal experience	
12. Demonstration site	

13. Public gathering (townsquare)	
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10) How often do you receive information on soil fertility from the following sources/channels?

1. Very often [  ]
2. Often [  ]
3. Rarely [  ]
4. Never [  ]

11) What is your favourite channel/source of information for receiving information on soil fertility from these sources?

Channel	Tick
1. Radio	
2. Television	
3. Newspaper	
4. Internet	
5. Extension agent (face-to-face/interpersonal)	
6. Colleague farmers (including friends/neighbours)	
7. Farmer field school/demonstration site	
8. Farmer groups/associations	
9. Opinion leaders	
10. Agro-shops/produce buying companies	
11. Personal experience	
12. Demonstration site	
13. Public gathering (townsquare)	

12) What factors account for your choice of communication channel/source of information on soil fertility?

Reason	Tick
1. Accessible	
2. Convenient	
3. Cheap	
4. Allows for Demonstration	
5. Credible/Trustworthy	
6. Informative	
7. Immediate feedback	

13) What specific information are disseminated on soil fertility?

1. Where to purchase fertilizers [ ]
2. The kind of SFM technique to us [ ]
3. When and how to apply the technique [ ]
4. Challenges associated with the use of the technique [ ]
5. Benefits of adopting SFM techniques [ ]
6. How to maintain and improve soil fertility [ ]

14) How satisfied are you with the quantity and quality of information on soil fertility?

1. Very satisfied [ ]
2. Satisfied [ ]
3. Somewhat satisfied [ ]
4. Not satisfied [ ]

15) What factors influence you to adopt soil fertility management techniques?

1. Availability of reliable adequate information [ ]
2. Experience with the technique [ ]
3. Ease of use of the technique [ ]
4. Poor soil fertility [ ]
5. None of the above [ ]
6. Other [ ]

16) What factors deter you from accessing and using soil fertility management strategies?

1. Inadequate/lack of information [ ]
2. Tedious and difficult to apply [ ]
3. Expensive [ ]
4. Unavailability of techniques [ ]
5. Good soil [ ]
6. Communal practices such as land tenure system [ ]
7. None of the above [ ]

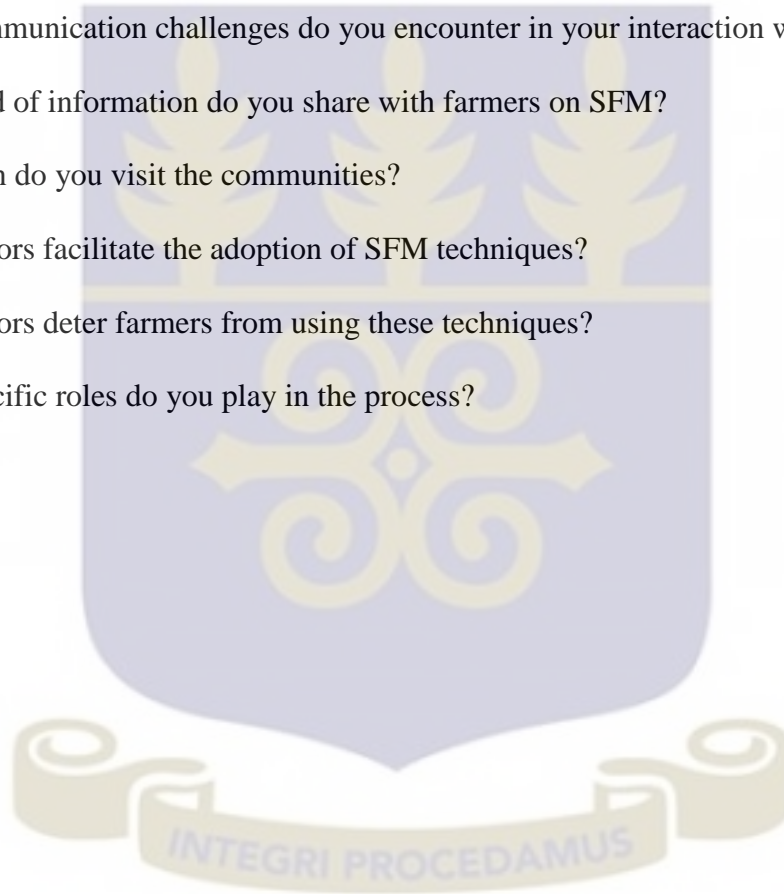
17) Which of the following stakeholders are actively involved in soil fertility management?

1. Traditional leaders [ ]
2. Assembly member & unit committee members [ ]
3. DCE [ ]
4. MP [ ]
5. MoFA [ ]
6. Religious leaders [ ]
7. NGOs [ ]
8. Other [ ]

## APPENDIX B

### Question Guide for Extension Agents and Officers

1. What communication channels do you use to interact with farmers?
2. Which of the channels do you prefer?
3. Why do you prefer these channels?
4. How do you collaborate with traditional leaders in the communities?
5. What communication challenges do you encounter in your interaction with the farmers?
6. What kind of information do you share with farmers on SFM?
7. How often do you visit the communities?
8. What factors facilitate the adoption of SFM techniques?
9. What factors deter farmers from using these techniques?
10. What specific roles do you play in the process?



## APPENDIX C

### Question Guide for Assemblyman, Chief, Agro-input dealer and PBC Manager

1. What roles do you play in terms of ensuring soil fertility in this area?
2. What kinds of information are disseminated to farmers?
3. What channels are used to communicate this information?
4. Are farmers receiving a lot of information on SFM? Why?
5. What factors help in the adoption of SFM?
6. What challenge impeded the adoption of SFM?
7. How often do farmers come to you for advice on soil fertility?

