USE OF VEGETABLE CULTIVATION TECHNOLOGIES BY THE FARMERS

A Thesis

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MASTER OF SCIENCE IN AGRICULTURAL EXTENSION AND INFORMATION SYSTEM

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CERTIFICATE

This is to certify that the thesis entitled **"Use of Vegetable Cultivation Technologies by the Farmers"** submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **Master of Science in Agricultural Extension and Information System**, embodies the result of a piece of bona fide research work carried out by **Md. Ahaduzzaman**, Registration No. **06-02118** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

I further certify that any help or source of information, received during the course of this investigation has been duly acknowledged.

Dated:
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The Author

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ABSTRACT

The main purpose of the research work was to determine the use of vegetable cultivation technologies by the farmers. Attempt was also made to explore the relationship between selected characteristics namely age, education, farm size, annual income, availability of inputs, year of experience of vegetable production, innovativeness, training exposure, risk orientation of the farmers and their use of vegetable cultivation technologies in vegetable cultivation. Data were collected randomly from selected 112 farmers of twelve villages of Haibatpur union of Sadar Upazila under Jessore District by using a presented interview schedule. Appropriate scales were developed in order to measure the variables. Descriptive statistics such as mean, standard deviation, range and percentage were used to describe the variables. The highest proportion (81.3 percent) of the farmers had medium use while 9.8 percent had low use and only 8.9 percent had high use of vegetable cultivation practices. Correlation test revealed that education, farm size, annual income, innovativeness and training exposure had positive relationship with their use of vegetable cultivation technologies i n **vegetable cultivation**, **while age** and

farming experience had negative relationship with their use of vegetable cultivation technologies.

CHAPTER 1
INTRODUCTION

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INTRODUCTION

1.1 General Background

Bangladesh, in full The People's Republic of Bangladesh, a republic of South Asia, in the north-eastern portion of the Indian subcontinent, bordered on the west, north, and east by India, on the southeast by Burma (Myanmar), and on the south by the Bay of Bengal. Bangladesh is a developing country crowded with the population about 150 million in the area of 147,570 square kilometers (56,977 square miles). About 88.45% of the population lives in rural areas and the total number of agriculture labour households has been recorded at 8.93 million which accounts for 31.13% of total households. Out of the total agriculture labour households, only 0.27% is in urban areas and 30.86% is in rural areas.(BBS,2008)

Bangladesh has an overwhelmingly agricultural economy. Now Agriculture accounts for 19.29% of its gross domestic product (GDP) in 2013, and absorbs 63% of the country's labor force. Sustained government investment in irrigation facilities, rural infrastructure, agricul-tural research, and extension services has helped Bangladeshi farmers achieve

dramatic increases in agricultural production. The process of agricultural production is, however, underpinned by the increasing use of agrochemicals and multiple cropping. And while significant production transformation has been achieved and food production has more than doubled since independence in 1971, these have mostly supported the country's large population base rather than uplifting the living standards of the average citizen. Food security still remains a major development issue. Thus, the government of Bangladesh has called for a departure from "rice-led" growth to a more diversified production base that includes several non-rice crops (Hoque 2000).

Vegetable any herbaceous plant whose fruit, seeds, roots, tubers, bulbs, leaves etc is used as food. Nearly 100 different types of vegetable comprising both local and exotic type are grown in Bangladesh.

Vegetable is important for nutritional, financial, and food security in Bangladesh. However, the availability of vegetable is only about 1/5th of the recommended requirement of 200 g/person/day.

Vegetable production in Bangladesh has increased between 1980 and 2003, with an average annual growth rate of 2.8%. Most of this growth can be attributed to area expansion (2.6%) and only a small share to yield increases (0.2%). Current yields are 5.8 t/ha, as compared to 5.7 t/ha in 1980. However, it is misleading to discuss yields for aggregates of vegetables, as the mix of crop within the aggregate group may have changed significantly over time. Total production in 2003 was 1.74 million metric tons. The share of area under vegetable cultivation in total arable land has nearly doubled from 1980 to 2002, from 1.9% up to 3.6%. The production of vegetables has also increased from about 1.47 million metric tons in 2002-03 to about 1.89 million metric tons in 2006-07. The area under vegetable farming increased from about 1,71,830 ha to about 1,95,951 ha during 2009-10. Likewise, the production of vegetable also increased from about 1.09 million metric tons to about 1.29 million metric tons during that period. Now Vegetable production in Bangladesh is 132.21 million metric tons in 2012-2013.

However, summer vegetable cultivation is constrained by adverse climate and pest attacks. The major winter vegetables are cabbage, cauliflower, tomato, brinjal, radish, hyacinth bean, bottle gourd, etc while major summer vegetables are pumpkin, bitter gourd, teasle gourd, ribbed gourd, ash gourd, okra, yard-long bean, and Indian spinach

among others. Some vegetables like brinjal, pumpkin, okra, and red amaranth are found to grow in both the seasons.

Vegetables can be identified as a significant one for this economy for its noteworthy contribution in raising the foreign exchange earnings and occupies an important position among the items exported from Bangladesh. Vegetables contribute 3.2% of the agricultural Gross Domestic Product (BBS, 2009). Bangladesh earned US $ 41.11 million from export of agricultural products in 2003-2004, which contributed 0.54% to total export earnings (BER, 2008).

Export volumes for fruit and vegetable products, though modest in relative terms (about $US16.5 million in 2002), have been rising rapidly in the recent past (export volumes in 2000 were five times those of 1990). Fresh fruits and vegetables are mostly exported through members of the Bangladesh Fruits, Vegetables and Allied Products Exporters' Association. The Association had a total of 252 members in 2001, approximately 25 of whom are reportedly active in exporting activities (Hossain 2004). Although vegetable production has increased over the years, its contribution to ex-port earnings in Bangladesh continues to be marginal (Figure 4). Main crops exported are yardlong bean, taro, and several gourds (teasle gourd, bitter gourd, bottle gourd, ridged gourd, and white gourd). Most exports are destined to the United Kingdom and the Middle East (United Arab Emirates, Saudi Arabia, Qatar, Kuwait and Oman), all countries with a large population of Bangladeshi migrant workers (Quasem 2003).

Bangladesh is one of the major horticultural countries in South Asia (Ali. 2000: 1). Agriculture, including horticulture, is the largest single sub-sector of the economy, accounting for about 13 percent of the country's GDP (Government of Bangladesh, 2006: 67). Several studies have pointed out that there is considerable potential for growing horticultural crops in Bangladesh (FAO, 1997; Ateng, 1998; Bouis, 2000; Shahabuddin and Dorosh, 2002; Alam, 2005). Farmers who are engaged in the production of vegetables often earn higher incomes than those engaged in the production of cereal crops alone (Weinberger and Lumpkin, 2005: 10). Vegetables like egg plant, radish, cabbage, cauliflower, and pumpkin gave returns at least three times higher than rice (Ateng, 1998: 12). In addition, the economic returns in terms of domestic resource cost at export parity also indicate that there is a comparative advantage in the production

of vegetables in Bangladesh (Shahabuddin and Dorosh, 2002: 13). Therefore, the natural and comparative advantages of Bangladesh create promising opportunities for the sector (ADB, 2004: 6).There have been several studies of the possibility of horticultural sector improvement in Bangladesh. Most of them have highlighted the potential of horticultural crops like vegetables (Weinberger and Genova II, 2005; Ali, 2000), and the comparative advantages of horticulture (Ateng, 1998; Shahabuddin and Dorosh, 2002).

Moreover, studies of vegetables have also been conducted by various reputed organizations, emphasizing aspects of marketing (for example, CARE, 2001; UNDP, 2005). In the agribusiness value chain, one clear tendency is for concentration at the processing stage to promote increasing scale in production units (Humphrey and Memedovic, 2006: 32). Yet, a comprehensive examination of the performance of vegetable production for business development in Bangladesh still remains elusive.

Vegetables compared to other food items provide low cost nutrition source. It can be produced even small amount of land and also in homestead area. It can be grown within a short time period and more than one crop can be grown within a crop season. There are a large number of vegetables having different varieties, which can be grown throughout the year. However, the largest numbers of vegetables are grown in the winter season. Vegetables are generally labour intensive crops and thus offer a considerable promise for generating increased rural employment opportunities. Climate and soil of Bangladesh is very much suitable for growing vegetables round the year.

Vegetable production can be increased if appropriate technologies used by the farmers who are in the primary unit for adoption of improved practices. Information source play an important role to transfer the message of use agricultural technologies from source to the vegetables growers. DAE has been trying to increase crop production in the field as well as homestead garden especially through cultivation of vegetable. BARI (Bangladesh Agricultural Research Institute) also trying to increase vegetable production. Progress in production of vegetable of our country is not up to the expectation marked. Hence, one may assume that the message of use of vegetable cultivation technologies has not yet been properly conveyed to the farmers and that the rate of diffusion of new knowledge is inadequate. A sound system of communication for the effective flow of scientific information from its source to the ultimate users has become a burning question (Rogers,1962).To increase the agricultural production the use of agricultural technology are important one. In addition the immediacy and effectiveness of technology diffusion

are greatly demanded the flow information should be understandable, well interpreted, accepted and liked by the vegetable growers.

1.2 Statement of the problem

In view of the overall discussion, an attempt was made to undertake a piece of research entitled "Use of vegetable cultivation technologies by the Farmers". The economic problem of agriculture in Bangladesh is low productivity of agriculture leads to low income for the agricultural procedure. Due to low income, necessary steps cannot be made for improving productivity and procurement of improved quality seed. The availability of quality seed could increase yield of vegetable drastically.

It is necessary to have a clear understanding that the use of vegetable production technologies in vegetable production. The main purpose of the study was to determining the use of vegetable cultivation technologies by the farmers and identifying the vegetable cultivation technologies are being used by the farmers. The study aimed at providing information regarding the following queries:

1. What is the extent of use of vegetable cultivation technologies in vegetable cultivation?
2. What are the characteristics of the farmers who cultivate vegetables?
3. What are the relationships between the selected characteristics of the farmer and their use of vegetable cultivation technologies?

1.3 Specific Objectives:

In view of the problems as stated above, the following specific objectives were set to give an appropriate track to the research work-

1. To determine and describe the use of vegetable cultivation technologies by the farmers
2. To determine and describe the selected characteristics of the vegetable farmer. The characteristics were:
    - Age
    - Education

- Farm size
- Annual income
- Credit Availability
- Farming experience
- Training exposure
- Innovativeness
- Problem faced

3. To explore the relationships between the selected characteristics of the farmer and their use of vegetable cultivation technologies

1.4 Justification of the study

Bangladesh is an agro-based country. About 88.45 percent of the people are living in rural areas and they are directly or indirectly involved in vegetable cultivation. The farmers of the country are the centre point of agriculture. They are closely involved with vegetable cultivation technologies in vegetable cultivation. But they have no sufficient knowledge on the use of vegetable cultivation technologies by the farmers. In other side, vegetable cultivation technologies increase yield and production. Many government and non-government organizations are working in Bangladesh in the field of agriculture as well as vegetable production. The farmers are the ultimate users of modern technologies such as fertilizers, hybrids, agro-chemicals and irrigation water etc.

The present study was dealing with the farmers to know the use of vegetable cultivation technologies. This study was a modest attempt to find out the suitable vegetable cultivation technologies such as different variety of vegetable, IPM, weedicide, power tiller etc and the extent of participation of farmers in those activities. The findings from the study may be helpful to the researcher for further studies of similar nature and to the extension personnel who are directly involved in different agricultural development programmers and to the planners for making effective plans. The study will also aid extension workers to learn the production problems of the vegetables and therefore they

will able to give suggestions to the farmers related to various aspects of vegetable cultivation.

1.5 Scope of the study

The present study was designed to have an understanding of use of vegetable cultivation technologies by the farmers and to explore its relationship with their selected characteristics.

Particularly, the finding of the study will be pertinent to Haibotpur Union, Sadar Upazilla under Jessore district. Nevertheless, the findings may also be applicable to other areas of Bangladesh where socio-cultural, economical and the psychological condition do not differ much than those of the study area. The findings of the study will be helpful to the extension workers and planners for preparation of programmers for rapid diffusion of vegetable cultivation technologies in vegetable cultivation among the farmers. At last, it is assumed that the recommendation of the study will be helpful in formulating extension policy makers to improve their technique and strategy of action. It would also helpful to the rural people to generate rural employment and to improve environmental condition and the rural economy.

1.6 Limitation of the study

In order to make the study convenient and meaningful for the research purpose, imposing some limitations were essential. The limitations are as follows:

I. The study was conducted in Haibotpur Union Sadar upazilla of Jessore district.
II. The study was limited mainly use of technologies in vegetable cultivation.
III. There are various aspects in the process of vegetable production. It was not possible to study the use of technologies related to all the aspects of vegetable production in a single study. In this study, the researcher studied the use of technologies by the farmers in respects of vegetable production.
IV. Among many characteristics of the vegetable growers but only 9 were selected for investigation of this study.
V. The researcher had to depend on the data furnished by the selected respondents during interview with them.

VI. Conceptually, use of technologies of the farmers was determined from the respondents opinion collected through their statements.

In order to gather the information for the study, the researcher was dependent on the data provided by the selected respondents during data collection.

1.7 Statement of Hypothesis

According to Karlinger (1973), a hypothesis is a conjectural statement of the relation between two or more variables. A null hypothesis states that there is no relationship between the concerned variables. The following null hypothesis was undertaken for the present study:

There is no relationship between the selected characteristics of farmers and their use of vegetable cultivation technologies by the farmers. The related characteristics are age, education, farm size, annual income, credit availability, farming experience, training exposure, innovativeness and problem faced.

1.8 Assumption of the Study

An assumption is the supposition that an apparent fact or principle is true in the light of available evidence (Goode and Hatt, 1952). The researcher had following assumptions while undertaking this study:

I. The respondents selected for the study were able to supply appropriate responses to the questions included in the interview schedule.
II. The responses provided by the respondents were reliable. They conveyed the truth about their sincerity and awareness.
III. Opinions and views provided by the respondents included in the sample were the representative views and opinions of the whole population of the study area.
IV. The researcher who acted as interviewer was adjusted to social and environmental condition of the study area. Hence the data collected by him and the respondent are free from bias.
V. The environmental conditions of the farmers were more or less similar throughout the study area.

1.9 Definition of Terms

For clarify of understanding certain terms frequently used in the study are defined and interpreted as follows.

Age: Age of a respondent is defined as the span of his life and was operationally measured by the number of years from his birth to the time of interview.

Education: Education referred to the ability of the respondents to read and write or having formal education received up to a certain standard. Education was measured on the basis of class a farmer had passed from formal education institution.

Farm size: Farm size referred to the cultivated area either owned by the farmer or obtained from other on borga system, the area being estimated in terms of full benefit and half benefit to the farmer respectively. The self cultivated owned land and cultivated area taken as lease or mortgage from others was recognized as full benefit.

Annual income: The term annual income refers to the total earning of the respondent himself from agriculture, livestock, fisheries and other accessible sources (business, service, daily labour etc.) during a year. It was expressed in Taka.

Farming experience: It means the experience which one gains from farming activities directly. Farming experience of vegetable farmers was measured in years which he gained from involvement in farming activities.

Training exposure: It was used to refer to the completion of an activity by the farmer which was offered by the government, semi-govt. or non-government organization (s) to improve the knowledge & skills of farmers for better performing an agricultural job.

Innovativeness: Innovativeness is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system (Rogers, 1995). It was measured on the basis of time dimension.

Problem faced: Problem referred to a difficult situation about which something to be done. It referred to the extent of problems faced by a respondent in vegetable cultivation in terms of social, technical, economical, marketing and psychological problems.

Technology: In narrow sense, technology is the way of doing anything. Technology is the combination of knowledge, inputs and all the management practices used for producing and otherwise managing a given crop, crop-mixture, live-stock, fish production or other farm activities.

Vegetable: The term vegetable, in this study, referred to the edible parts of plants (root, stem, leaf, fruit etc.) which are eaten as cooked food or green salad.

Vegetable cultivation: Vegetable cultivation includes the different steps of vegetable production, harvesting, processing, conservation and marketing of vegetables**.**

Vegetable Growers: Vegetable growers are those who cultivate vegetable commercially.

CHAPTER 2

REVIEW OF LITERATURE

CHAPTER 2

REVIEW OF LITERATURE

The purpose of this Chapter is to review of literature having relevance to the present study. The researcher made an elaborate search of available literature for the above purpose. But there is hardly any study dealing with the relationship of the characteristics of vegetable farmer and their use of vegetable cultivation technologies by the farmers and the relationship with their selected characteristics. The research attempted to search the literatures on a number of studies have been conducted on the use of vegetable cultivation technologies by the farmers. Therefore, the finding of such studies related to the extent of use and past study exploring relationships of the characteristics of the farmers with their use of vegetable cultivation technologies have been cited in this chapter.

This Chapter is divided into three major sections. The first section deals with general literature regarding farmers' use of vegetable cultivation technologies. The second section deals with the research finding relating to the relationship of the farmers use of vegetable cultivation technologies with their selected characteristics. The third section deals with the conceptual frame work of the study.

2.1 General review of the study

Hossain (1971) carried out a research study on the adoption of four improved practices in Gouripur of Mymensingh district. The practices were (i) plant protection measure, (ii) recommended variety of paddy, (iii) line transplanting and (iv) recommended dose of fertilizers. It revealed that among the respondent farmers 57.40 percent adopted plant protection measure, 35 51 percent adopted recommended variety of paddy, 25.36 percent adopted line transplanting and J 1 .52 percent adopted recommended dose of fertilizers.

Rahman (1974) studied the adoption of IR-20 variety of paddy in Bhabakhali union of Mymensingh District. He found that 29 percent of the growers had medium apoption of IR-20 while 31 percent of the growers did not adopt the innovation.

Ahmed (1977) studied the extent of adoption of three specific practices of Jute cultivation in noapara union of Faridpur District. He observed that among the respondent farmers 98 percent adopted the recommended varieties of Jute, 72 percent adopted plant protection measures and 49 percent adopted recommended dose of fertilizers.

Hossain (1983) studied the extent of adoption of HYY rice as transplanted aman and other related aspect in Bhabalhali union of Mymensingh District. He observed that among the respondent farmers, 54 percent had high adoption of HYY rice and 46 percent had medium adoption of HYY rice as transplanted aman.

Rahman (1986) conducted a research study on the extent of adoption of four improved practices which were, use of fertilizers, line sowing, irrigation and use of insecticides in transplanted a man rice cultivation in two village of Mymensingh District. lt revealed that 22 percent of the farmers adopted all the four practices compared to 49 percent adopted three practices, 22 percent adopted two practices, 5 percent adopted one practices and only 2 percent adopted of the four practices.

Karim and Mahboob (1986) conducted a study on the adoption of high yielding variety of wheat in Kuhtia Union of Mymensingh District. They observed that 74.0 percent of the farmers adopted HYY wheat cultivation to varying extent while the remaining 26 0 percent were non adopter.

Sobhan (1975) studied on the extent of adoption of ten winter vegetables namely tomato. radish, lettuce and potato in Boilar union of Mymensingh District. Over all winter vegetable adoption scores of the farmers could range from 0 to 140. Over all adoption scores indicated that 27 percent of the farmers did not adopted winter vegetables cultivation while 28 percent had low adoption and 55 percent high adoption.

Haque (1984) investigated the research of the extent of adoption of improved practices in sugarcane cultivation in selected areas of Jessore District. He observed that 62.75 percent respondent growers adopted early time of planting, 60.75 percent of the respondent growers adopted recommended dose of fertilizer and 54.9 percent respondent growers adopted trench method.

Kher (1992) was conducted a study on improved wheat cultivation practices selected villages of Rajouri block. He found that 72 percent of respondent had medium level of adoption, 17 percent had low level of adoption and 11 percent had high level of adoption.

Singh et al. (1992) undertook a study in India on factors affecting the adoption of improved sugarcane production technology. They observed that majority of sugarcane growers had the medium level of adoption and were partial adopters of scientific recommendations of sugarcane production technology.

Hasan (1996) found in his study that the highest proportion (44 percent) of the respondents perceived the existence of medium adoption, compared to 26 percent low adoption and 30 percent high adoption in respect of selected agricultural technologies.

Podder (1999) concluded a research study on the adoption of Mehersagar banana by the farmers. He found 47 percent of the respondent had medium adoption compared to 14 percent having low and 39 percent having high adoption.

Bembridge and Wiliams (1990) studied the personal , sociological, socio-psychological and communication characteristics that influence the adoption of maize practice in farmer support programme in South Africa. The study revealed that less than 50% of the farmers who adopted practices were implementing them according to recommendation and man y did not have a clear concept that the practices were interrelated.

Haider et al. (200 l) observed that one-third (37 percent) of the farmers fell in low adopter category compared to 32.5 percent in optimum adopter 23.5 percent above optimum adopter and only 7 percent had non-adopter on Nitrogenous fertilizer. In respect of extent of phosphoric fertilizer two thirds (68 percent) of the farmers belonged to non adopter category compared to 23 percent having above optimum adopter, 5 percent optimum adopter and only 4 percent had below optimum adopter of phosphoric (P) fertilizer. In respect of extent of potassic fertilizer three quarters categories compared to 1 0 percent falling bellow optimum adopter, 8 percent optimum adopter and only 3 percent above optimum adopter of potassic (K) fertilizer.

Aurangojeb (2002) studied on the extent of adoption of integrated farming technology by the rural women in RDR S. He observed that the highest proportion of rural women (64%) used high level, (28%) of the women used medium level and only 8% used low level integrated homestead farming technologies.

Islam (2002) conducted a study on adoption of modern agricultural technologies by the farmers of Sandwip. The study revealed that 69 percent of the farmers had medium adoption while 13 percent had low adoption and 18 percent had high adoption of modern agricultural technologies.

2.2 Relationship between farmers selected characteristics and use of vegetable cultivation technologies

2.2.1 Age

Pathak and Sasmal (1992) observed that there was a positive and significant relationship between the age of the marginal farmers and their adoption of jute technology. Similar findings were observed by Ali *et a/.* (1986), Singh and Rajedra(l990), Okoro and Obibuaka (1992) and Kashem and Hossain (1992) in their respective studies.

Nair (1963) found in his study age as one of the factors that influenced the farmers participation process in improved technologies and farm practices.

Sarker (1997) observed that there was no significant relationship between age and adoption of improved potato cultivation practices. Similar findings were observed by Karim and Mahaboob (1986), Rahman (1986) and Chowdhury (1997) in their studies.

Veeranna (2000) found that the majority (66%) of the respondents had medium level of adoption followed by low (22%) and high (12%) levels of adoption of scientific goat rearing practices. The extent of adoption was 61.33%. Two traits viz age and knowledge of scientific rearing practices had positive and highly significant relationship with adoption of scientific goat rearing practices.

Ali (2004) found that there was no relationship between age of the farmers and adoption of aquaculture technologies by them.

Hossain (2003) revealed that farm size of the farmers had a significant and positive relationship with their adoption of modern Bore rice cultivation practices.

Haque (2005) conducted a study to determine the relationship of farmers' characteristics with their adoption of modern rice varieties in Sadar upazila of Mymensing District reported that age of the rice growers were not related with the adoption of rice varieties.

Rahman (2005) found that there was no relationship between ages of the farmers with their adoption of modern rice varieties.

2.2.2 Education

Hossain (1981) in his study found that there was no relationship of education of the farmers with their adoption of improved practices.

Hossain (1983) in his study found a significant and positive relationship of education of the farmers with their adoption of the selected four improved farm practices.

Hoque (1985) in his study found that education on cane growers significantly influenced the adoption of improved practices in cane cultivation in the study area.

Rahman (1986) in his study found that education had significant and positive relationship with the adoption of improved farm practices.

Ali *et al.* (1986) in their study found that education had highly significant and positive relation with adoption of improved sugarcane production technologies.

Hossain (1991) in his study found a significant and positive relationship of education of the wheat growers with their adoption of improved farm practices.

Sarker (1997) conducted a study to determine the relationship between selected characteristics of potato growers and their adoption of improved potato cultivation practices in five villages of Comilla district.
He found that education of potato growers had significant relationship with their adoption of improved potato cultivation practices.

Chowdhury (1997) found positive significant relationship between the education of the farmers and their adoption of selected BINA technologies. Similar results were found by

Halim (1985), Islam (1993), Hoque (1993), Hossain et al. (1997), Pal (1995), and Ali et al. (1986).

Alam (1997) observed that the level of education of the farmer had a positive and significant relationship with the use of improved farm practices. Sarker (1997) and Chowdhury (1997) also found similar findings about the relationship between education and adoption of improved technologies.

Islam (2003) conducted a study "Adoption of organic manures". He found that there was a positive and significant relationship between education of the farmers and adoption of organic manures.

Sardar (2002) found that the education of the farmers had significant positive relationship with their adoption of IPM practices.

Hossain (2003) concluded that education of the farmers had a significant and positive relationship with their adoption and modern Bore 1ice cultivation practices.

Haque (2005) revealed that education of the farmers had a significant and positive relationship with their adoption of modem rice varieties.

2.2.3 Farm size

Alam (1997) studied the use of improved farm practices in rice cultivation by the farmers. The findings of the study showed that the farm size had a significant relationship with their use of improved farm practices in rice cultivation. Hossain (1981) and Mustafi *et a/.* (1987) also reported the similar fmdings.

Chowdhury (1997) conducted a research study on adoption of selected BINA technologies by the farmers. He indicated that farm size had strongly positive significant relationship with the adoption of selected BINA technologies. Rahman (1986), Okoro *et al.* (1992), Hoque (1993), Khan (1993) and Sarkar (1997) observed similar findings.

Islam (1993) in his study found that farm size had a significant positive relationship with adoption of improved practices.

Muttalab (1995) in his study observed that farm size of the farmers had a positive relationship with the adoption of improved potato farmers and showed positive and significant effect.

Islam (2003) in his study found that there was a positive and significant relationship between farm size of the farmers and adoption of organic manures.

Haque (2005) conducted a study to determine the relationship of farmers' characteristics with their adoption of modern rice varieties in Sadar upazila of Mymensing district. He reported that farm size of the rice growers had significant and positive relationship with the adoption of modem rice varieties.

2.2.4 Annual Income

Alam (1997) observed a positive and significant relationship between annual income of the farmers and the use of improved farm practices in rice cultivation.

Chowdhury (1997) found significant positive relationship between annual income and adoption of selected BINA technologies. Rahn1an (1986), Okoro *et at.* (1992), Islam (1993), Khan (1993) and Sarkar (1997) observed that similar result.

Pal (1995) in his study found a positive significant relationship between income of the farmers and their adoption of recommended practices in sugarcane cultivation.

Islam (2002) conducted a study on adoption of modem agricultural technologies by the fanners of Sandwip. He observed that he annual income of the farmers had no relationship with their adoption of modern agricultural technologies.

Aurangozeb (2002) conducted a study on adoption of integrated homestead farming technologies by the rural women in RDRS. He found that there was a positive significant

relationship between annual income of the respondent and their adoption of integrated homestead farming technologies.

Islam (2003) in his study found that there was a positive and significant relationship between family income of the farmers and adoption of organic manures.

Hossain (2003) revealed that annual income of the farmers had a significant relationship with their adoption at modern Boro rice cultivation practices

Rahman (2003) conducted a study on environmental impacts of modern agricultural technology diffusion in Bangladesh: an analysis of farmers' perception and their determinations. He found that annual income of the farmers had a positive relationship with their modem agricultural technologies diffusion in Bangladesh.

Haque (2005) conducted a study to determine the relationship of farmers' characteristics with their adoption or modem rice varieties in Sadar upazila of Mymensing district. Annual income of the rice growers had significant and positive relation with the adoption of modern rice varieties.

2.2.5 Credit availability

Ellis (2000) mentioned that financial capital refers to savings, loans and credits whilst social capital take account of social relations and networks such as co-operatives and farmer associations. These resources or assets from the bases and means for attaining household food security.

FAO (1994) reported that the direct consequence of small farmers' lack of access to land and membership in rural organizations is their lack of access to credit. Land is usually required as collateral for loans, on the one hand, and, on the other, credit schemes are often channeled through rural organizations to their members. This is a serious obstacle to improving women's agricultural productivity, as without credit women farmers are

unable to buy inputs, such as seeds, fertilizers and improved technologies, or to hire labor. Paradoxically, numerous studies have shown that women are more likely than men to repay loans. A study of FAO in the year of 1990 on credit schemes in Kenya, Malawi, Sierra Leone, Zambia and Zimbabwe showed that women received less than 10 percent of credit directed to smallholders and only 1 percent on total credit to agriculture.

2.2.6 Farming experience

Chowdhury (1996) conducted a study in Nowabgonj, Dhaka on the factor affecting adoption behavior of Boro rice growers. He reported that farming experience significantly influenced farmers in accepting production technology.

Hoque (1993) in his study found that farming experience had negative significant relationship with their adoption of improved practices in sugarcane cultivation.

Sarkar (1995) in his study observed that farming experience had no relationship with their use of communication media for receiving agricultural information.

Alam (1996) in his study observed that there was no relationship between the farming experience of the farmers and their awareness regarding homestead deforestation.

Sarkar (1997) found that farming experience of potato growers had no significant relationship with their adoption of improved potato cultivation practices.

2.2.7 Training exposure

Haque (2003) found that training received of the respondent had positive significant relationship with their practices in farmers' adoption of modern maize cultivation technologies.

Islam (2002) conducted a study on farmers' knowledge and adoption of ecological agricultural practices under the supervision of Proshika. He found that agricultural

training exposure of the farmers had no significant relationship with their adoption of ecological agricultural practices.

Verma et al. (1989) found there was significant change in attitude of rural women from before training to after training in improved home making tasks. They said that due to gain in knowledge the attitude became more favorable.

Hossain (1981) showed that proper training raise the knowledge and skill level of participants significantly.

2.2.8 Innovativeness

Moulik *et a/.* (1996) observed that innovation proneness significantly influenced the adoption of nitrogenous fertilizers among the farmers. They stated that it was in simple term that the more a cultivator exhibited a general tendency towards accepting innovations, the higher would be his adoption score.

Rahman (1973) found a positive relationship between modernism and adoption of farm practices.
He defined modernism as leading for a new experience or opener to innovation. So, modernism as used by him as synonymous with the innovation proneness of present study.

Sharma and Sonona (1983) observed higher average innovativeness among contact farmers than the non contact farmers. They also found that contact farmers adoption of innovations differed significantly with their variation in innovativeness.

Islam (2002) conducted a research study on adoption of modern agricultural technologies by the farmers of Sandwip. He found that innovativeness of the farmers had significant and positive relation hip with their adoption of modern agricultural technologies.

Rahman (2005) found that the innovativeness of the farmers had no significant relationship with their adoption of modern rice varieties.

2.2.9 Problem faced

Hossain (1983) studied adoption of HYV rice by the rice farmers in Bhabakhali union under Mymensingh district. The findings indicated no relationship between community problem awareness and adoption of HYV rice.

Kashem and Hossaion (1992) studied adoption behaviour of sugarcane farmers. The study revealed a positive relationship between community problem awareness and adoption of sugarcane farmers.

Muhammad (1974) studied adoption of insect control measures. The study indicated a positive relationship between community problem awareness and adoption of inset control measures.

Rahman (1995) in his study identified problems faced by farmers' in cotton cultivation. Non-availability of quality seed in time, unfavorable and high cost of fertilizer and insecticides, lack of operating capital, not getting fair weight and reasonable price according to grade, affects of cattle in cotton field, lack of technical knowledge, lack of storage facility, stealing from field at maturity stage, and late buying of raw cotton by Cotton Development Board were identified as major problems of cotton farmers in Mymensingh district.

Salam (2003) in his study identified constraints in adopting environmentally friendly farming practices. Top six identified constraints according to their rank order were: i) low production due to limited use of fertilizer (ii) lack of organic matter in soil, (iii) lack of Govt. support for environmentally friendly farming practices, (iv) lack of capital and natural resources for integrated farming practices, (v) lack of knowledge on integrated farm management and (vi) unavailability of pest resistant varieties of crops.

2.3 A Conceptual Framework of the Study

In scientific research, selection and measurement of variables constitute an important task. The hypothesis of a research while constructed properly consists at least two important elements i.e. “a dependent variable” and “an independent variable”. A dependent variable is a factor that appears, disappears or varies as the researcher introduces, removes or varies the independent variables.

The conceptual framework of Rosenberg and Hovland (1960) was kept in mind while making structural arrangements for the dependent and independent variables. This study is concerned with the use of vegetable cultivation technologies by the farmers in vegetable cultivation. Thus the use of vegetable cultivation technologies was the dependent variable and 9 selected characteristics of the owners were the considered as the independent variables. Use of vegetable cultivation technologies in vegetable cultivation of an individual may be influenced and affected through interacting forces of many independent variables. It is not possible to deal with all independent variables in a single study.

Therefore, it was necessary to limit the independent variables, which included age, education, farm size, experience in vegetable farming, , annual income, credit availability , training exposure, Innovativeness, problem faced in vegetable cultivation.

In the light of foregoing discussion, a conceptual framework has been developed for this study, which is diagrammatically shown in the Figure 2.1

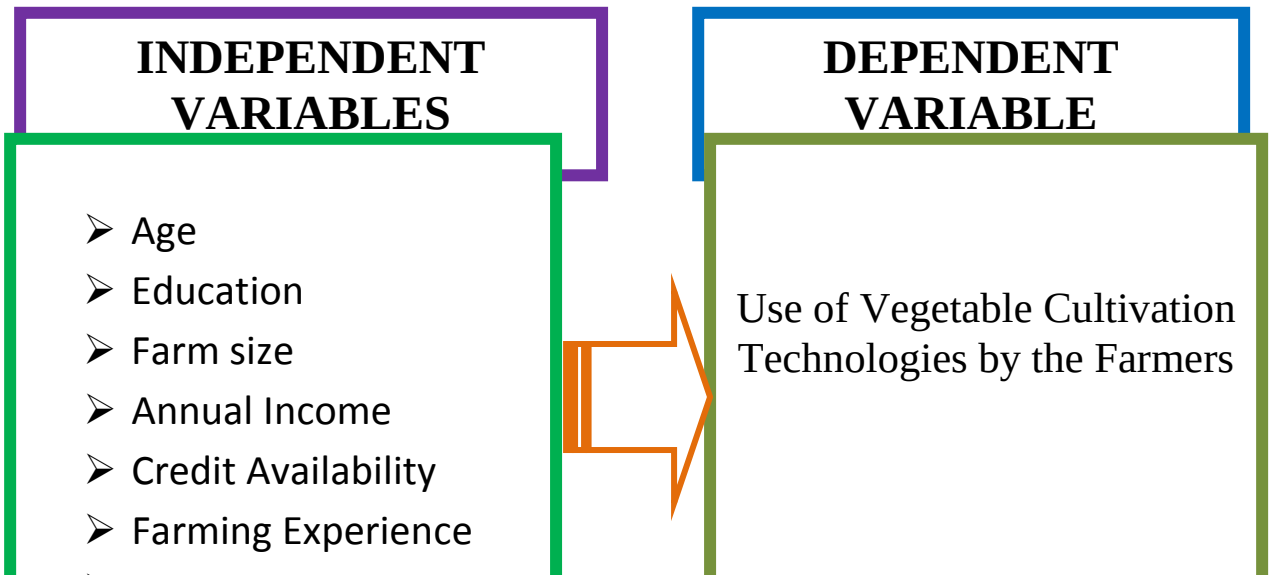

Fig.2.1 A Conceptual Framework of the Study

Fig.2.1 A Conceptual Framework of the Study

CHAPTER 3
METHODOLOGY

CHAPTER 3
METHODOLOGY

Methods and procedures used in conducting research need very careful consideration. Methodology should be such that enables the researcher to collect valid information and to analyze them properly to arrive at correct decisions. The methods and procedures followed in this research are described in this chapter.

3.1 Locale of the Study

Jessore District was purposively selected as the locale of the study. There are 8 upazillas in the district. Among those Jessore Sadar upazilla was selected randomly for this study. Jessore Sadar upazilla is one of leading upazilla in vegetable cultivation .The researcher is very familiar with the local of the study area from his childhood. The map of Haibatpur union under Jessore district showing the study area is presented in fig 3.1

Figure 3.1: A map showing Haibatpur union under Jessore district

3.2 Population and Sample

Considering time and budget the study was conducted in selected area of Haibotpur union of 'Sadar Upazila' under 'Jessore' District. The farmers of 12 selected villages were constituted as the population of the study. Out of related 1125 vegetable farmers a sample of 112 (10% of 1125) were selected randomly as the sample population for this study. Besides this, a reserved list of 20 vegetable farmers was prepared taking randomly for each village for use when the vegetable farmers under samples were not available during data collection.

Table 3.1 Distribution of the vegetable farmers constituting the population, Sample and reserve list in different villagers in Haibatpur Union

Name of Villages	No. of farmers		Reserve List
	Population	Sample	
Manikdi	225	22	3
Boro haibotpur	120	12	2
Choto hoibatpur	40	4	1
Natuapara	155	16	3
Lalitadaho	145	14	2
Mathurapur	105	11	2
Shahbajpur	70	7	1
Somospur	42	4	1
Nischintopur	36	4	1
Baliaghat	82	8	2
Doherpara	63	6	1
Rahomatpur	42	4	1
Total	**1125**	**112**	**20**

3.3 Instrument of Data Collection

In order to collect valid and reliable data from the farmers interview schedule (questionnaire) was designed keeping the objectives in mind. Simple and direct questions and different scales were used to obtain information. Both open and closed form questions were

designed to obtain information relating to qualitative variable which was finally be measured by ranking score. The interview schedule was pre-tested with 10 sample respondents from the study area. Questions were asked systematically and explanations were made whenever it is necessary. The respondents were interviewed at their leisure time so that they can give accurate information in a cool mind.

3.4 Data Collecting Procedure

Data were collected through personal interviewing by the researcher himself. The researcher made all possible efforts to establish rapport with the respondent so that they could feel ease and comfort to response the questions in the schedule. Necessary steps were taken to explain the purpose of the study to the respondents and their answers were recorded sincerely. If any respondent felt difficulty in understanding any question, care was taken to help him getting understood. The researcher did not face any serious problem in data collection. The data collection took 31 days from 25th June to 25th July, 2013. The collected data were complied, tabulated and analyzed. Qualitative data were converted into quantitative form by means of suitable scoring whenever needed.

3.5 Variables of the study

A variable is any characteristics, which can assume varying or different values in successive individual cases (Ezekiel and Fox, 1959). An organized piece of research usually contains at least two important variables viz., dependent and independent variables. But, it is very difficult to deal with all the factors in a single study. Taking the relevant available literature, discussion with teachers, experts and research fellows in the relevant field and considering the time and resources available to the researcher, variables were selected. Use of vegetable cultivation technologies was considered as the dependent variable of the study. The researcher selected nine characteristics of the respondent as the independent variables.

The characteristics includes age, education, farm size, annual income, availability of inputs, year of experience of vegetable production, innovativeness, training exposure and problem faced .

3.6 Measurement of Variable

In order to conduct study in accordance with the objectives, it was necessary to measure the selected variables. This selection contains procedure for measurement of both dependent and independent variables of the study. The procedures followed in measuring the variables are presented below.

3.6.1 Measurement of Independent Variables

The selected characteristics of the respondent farmers constituted the independent variables of the study. To keep the research within the manageable sphere, 9 independent variables were selected for the study. The procedures of measurement of the selected variables were as follows:

Age

The age of an individual is one of the important factors pertaining to his personality make up (Smith and Zope, 1970) which can play an important role in her adoption behavior. Age of the respondents was measured in terms of actual years from their birth to the time of interview.

Level of education

Education was measured as the ability of an individual vegetable farmer to read and write or formal education (school/college) completed up to a certain standard. It was expressed in terms of year of schooling. A score of one (1) was assigned for each year of schooling completed. For example, if the respondent passed the SSC examination his education score was given as 10, if passed the final examination of class seven, his education score was given as 7, if the respondent did not know how to read and write, his education score was given as ‘0’ (zero). A score of 0.5 (half) was given to that respondent who could sign his name only.

Farm size

Farm land is the most important capital of a farmer and the farm size has influence on many personal characteristics of a farmer. Farm size of the farmer was measured by the land area possessed by him. Data obtained in response to questions under item No. 3 of the interview schedule formed the basis for determining the farm size of the respondent. Here, farm size was computed by using the following formula:

Farm size = $A_1 + A_2 + A_3 + \frac{1}{2}(A_4 + A_5)$

A_1 = Homestead Area (A_1)

A_2 = Own land under own cultivation (A_2)

A_3 = Land taken from others on borga system(A_3)

A_4 = Land given to others on borga system (A_4)

A_5 = Land taken from others on lease (A_5)

The unit of measurement was hectares.

Annual income

Annual income of a respondent was measured on the basis of total yearly earning from agriculture and other sources (service, business, daily labour etc.) by the respondent himself and other family members. The value of all the agricultural products encompassing crops, livestock, fisheries, fruits, vegetables etc. were taken into consideration. For calculation a score, of one (1) was assigned for each one thousand taka of income.

Credit availability

Credit availability of vegetable farmers referred to the amount of money received by him as loan from different sources mentioned in item no.5 of the interview schedule. It was expressed in taka. A score of 1 was given for each thousand taka.

Farming experience

In a measuring score of one (1) was assigned for each year of working experience of a respondent either in his own farm or to that of his parents.

Training exposure

Training exposure was determined by the total number of days a respondent received training in his/her entire life on vegetable cultivation from different organizations. In a measuring score of 1 was assigned for each days of training.

Innovativeness

Innovativeness is the degree to which an individual adopts an innovation relatively earlier than other members in a social system (Rogers, 1995). In this study, innovativeness of a respondent was measured on the basis of the period of 10 improved vegetable technologies. Score was assigned on the basis of time required by an individual to adopt each of the technology in the following manner:

Period of adoption	**Assigned score**
Within one year	4
Within 2 years	3
Within 3 years	2
Within 4 years	1
Not at all	0

Innovativeness score of a respondent farmer was obtained by adding her scores for adoption of all the 10 improved vegetable technologies. Innovativeness of a respondent farmer could range from 0 to 40, where '0' indicating low innovativeness and 40 indicating very high innovativeness.

Problem faced

Vegetable farmers in the study area might have faced various types of problem in the way of adopting selected vegetable practices. But the researcher gained an experience through personal contact regarding common problem faced by the respondents before collection of data. Besides, the researcher also gained some experience through consultation with experts and reviewing previous research findings. Finally, the researcher prepared a list of 12 possible problems in this regard. A scale was prepared to indicate the extent to which each of the 12 problems was applicable in the case of a respondent. The responses were obtained through a 4 point scale "high", "medium", "low" and "not at all" and weights were assigned to these responses as 3, 2, 1 and 0 respectively.

Extent of problem	Score system
High	3
Medium	2
Low	1
Not at all	0

The weights of responses of the entire problem they faced were added together to obtain the problem faced score. Thus, the score of a respondent could range from 0 to 36, where zero indicating low problem and 36 indicating very high problem.

3.6.2 Measurement of dependent variable

Use of vegetable cultivation technologies by the farmers in vegetable cultivation was the dependent variables in this work. It was measured by using 4 point rating scale. The respondents were asked to indicate their use of 12 vegetable cultivation recommended technologies.

Scoring techniques

The method of assigning scores to the four alternatives in each statement was as follows:

Extent of use	Scores assigned
Frequently	3
Occasionally	2
Rarely	1
Not at all	0

The Extent of use scores of a respondent was measured by adding all 12 technologies as shown in item no 11 of the Interview schedule. Thus the extent of use scores of a

respondent could range from 0 to 36, 0 indicating low use of technologies and 36 indicate highest use of vegetable cultivation technologies in vegetable cultivation.

3.7 Statement of Hypothesis

A set of hypotheses was formulated for empirical testing. The following null hypothesis was formulated to test the relationships of 10 independent variables with use of vegetable cultivation technologies by the farmers:

"There is no relationship between use of vegetable cultivation technologies by the farmers and each of the independent variables of the study."

3.8 Data Processing and Analysis

3.8.1 Compilation of data

After completion of field survey, data from all the interview schedules were coded, compiled, tabulated and analyzed in accordance with the objectives of the study. In this process, all responses in the interview schedule were given numerical coded values. Local units were converted into standard units and qualitative data were converted into quantitative data by assigning suitable scores whenever necessary. The responses of the questions in the interview schedule were transferred to a master sheet to facilitate tabulation

3.8.2 Categorization of data

For describing the different characteristics and their use of technologies, the respondents were classified into several categories. These categories were developed by considering the nature of distribution of data, general understanding prevailing in the social system and possible observed scoring system. The procedure for categorization of data in respect of different variable is elaborately being discussed while describing those variables in chapter 4.

3.8.3 Statistical technique

The analysis was performed using SPSS (Statistical Package for Social Sciences) computer package. Descriptive analyses such as range, number, percentage, mean,

standard deviation were used whenever possible. Pearson's Product Moment Co-efficient of Correlation (r) was used in the order to explore the relationship between the concerned variables. Throughout the study, at least five percent (0.05) level of probability was used as basis of rejecting a null hypothesis.

CHAPTER 4
RESULT & DISCUSSION

CHAPTER 4

FINDINGS AND DISCUSSION

In this Chapter, the findings of the study and interpretation of the results have been presented according to the objectives of the study. This Chapter has been divided into four sections. The first section deals with the selected individual characteristics of the farmers while the second section deals with the extent of use vegetable cultivation technologies in vegetable cultivation. The third section deals with the relationships between the farmers selected characteristics and their extent of use of vegetable technology. Finally, in the fourth section, the problems being faced by the farmers in using technologies in vegetable cultivation.

4.1 Selected Characteristics of the Farmers' (Independent variables)
In this section the findings of the farmers' selected characteristics have been discussed. The selected characteristics are 1) Age, 2) Education, 3) Farm size,
4) Annual income, 5) Credit availability, 6) Farming experience, 7) Training exposure, 8) Innovativeness and 9) Problem faced

4.1.1 Age

Age of the respondent farmers was found to range from 18 to 60 years. The average age was 40.00 years with the standard deviation 9.63. Based on their age, the farmers were classified into three categories as shown in Table 4.1.1

Table 4.1.1 Distribution of the vegetable farmers according to their age

Categories	Vegetable farmer (n=112)		Mean	SD
	Number	Percent		
Young(Upto 30)	26	23.2	40.00	9.63
Middle-aged (31-50)	72	64.3		
Old(Above 50)	14	12.5		
Total	112	100		

Data furnished in Table 4.1.1 indicate that the highest proportion 64.3 percent of the respondents fell in the middle age, while 23.2 and 12.5 percent belonged to young and old age categories respectively. However, data also revealed that 87.50 percent of the respondents in the study area were young to middle aged. Young people are generally receptive to new ideas and things. However, they might have valuable opinion in regard to use of vegetable cultivation technologies.

4.1.2 Education

The education score of the respondents ranged from 0 to 18 with the average of 6.78 and standard deviation 4.07. Based on their score, the farmers were classified into four categories as shown in Table 4.1.2

Table 4.1.2 Distribution of the vegetable farmers according to their education

Categories	Vegetable farmer(n=112)		Mean	SD
	Number	Percent		
Illiterate/can sign only(upto .5)	22	19.6	6.78	4.07
Primary level (1-5)	14	12.5		
Secondary level (6-10)	66	58.9		
Above secondary level (above 10)	10	8.9		
Total	112	100		

The data indicate that the majority 58.9 percent of the farmers had secondary level of education while 12.5 percent farmers had primary level of education, 19.6 percent illiterate and 8.9 percent higher level of education. The literacy rate of the country is 65.5 percent (Anonymous, 2003). Thus the findings revealed that the literacy rate in the study area seems to be higher than the national average. Education develops mental and psychological ability of average person to understand, decide and adopt new practices and ideas. Hence, it is expected that education is one of the important factors in determining the extent use of use of vegetable cultivation technologies by the farmers.

4.1.3 Farm size

The farm size of the farmers in the study area varied from 0.04-1.39 ha. The average score was 0.344 ha. With the standard deviation 0.265. Based on their score, the farmers were classified into four categories as shown in Table 4.1.3

Table 4.1.3 Distribution of the vegetable farmers according to their farm size

Categories	Vegetable farmer (n=112)		Mean	SD
	Number	Percent		
Marginal farm(up to 0.2)	42	37.5	0.344	0.265
Small farm((>0.2-1.00)	63	56.3		
Medium farm((>1.00-1.80)	7	6.3		
Large (>1.80)	0	0		
Total	112	100		

The Table 4.1.3 shows that the highest proportion 56.3 percent of the respondents belonged to small farm size, compared to having 6.3 percent Medium and 37.5 percent Marginal farm respectively. The majority of the farmers had either medium or large farms. Thus most (93.8 percent) of the farmers were in the categories of marginal and small farms.

4.1.4 Annual income

Annual income score of the respondents ranged from 20 to 600 (in thousands) with an average of 129.65 and standard deviation 101.60. On the basis of the annual income, the respondents were classified into three categories as shown on Table 4.1.4.

Table 4.1.4 Distribution of the vegetable farmer according to their annual income

Categories	Vegetable farmer (n=112)		Mean	SD
	Number	Percent		
Low income (20-200)	96	85.7	129.65	101.60
Medium income(201-380)	11	9.8		
High income (above 380)	5	4.5		
Total	112	100		

Data presented in Table 4.1.4 indicate that the highest proportion 85.7 percent of the respondent to low medium annual income, while 9.8 percent had medium income and 4.5 percent had high income. As a result, the most 95.5 percent of the respondents in the study area were low to medium income earners.

The average income of the respondents in the study area was much higher than the average per capita income of the country i.e. 378 U.S. dollar (BBS, 2004). This might be due to the fact that the respondents in the study area were not only engaged in agriculture but also earn from other sources, such as service, business etc. Higher annual income of the respondents allow them to invest more in farming operations which ultimately leads them to come in contact with media. Therefore, it can be inferred that the more the annual income possessed by the respondent, the higher would be favorable extent of use of recommended technology in vegetable cultivation. Hossain (2003) found the similar kind of results in his study.

4.1.5 Credit availability

The score of credit received by the respondents ranged from 0 to 125(in thousands) with a mean of 19.33 and standard deviation 28.62. Based on their score, the farmers were classified into three categories as shown in Table 4.1.5

Table 4.1.5 Distribution of the vegetable farmer according to their credit availability

Categories	Vegetable farmer (n=112)		Mean	SD
	Number	Percent		
Low (upto 40)	89	79.4	19.33	28.62
Medium (41-80)	17	15.2		
High (above 80)	6	5.4		
Total	112	100		

On the basis of credit received, the respondents were divided into three categories. Data furnished in the Table 4.1.5 indicate that the highest proportion 79.4 percent of the small farmers had low credit received while 15.2 percent had medium credit received and the rest 5.4 percent of them had high credit received.

Small farmers mainly get credit facilities from different non-government organizations like Grameen Bank, Bangladesh Rural Advancement Committee (BRAC), Association for Social Advancement (ASA), Usha etc. which are engaged in micro-credit programs. In the present study, it was found that most of the small farmers were less affiliated with these organizations and this is why their amount of credit received was low. High standard deviation of the credit received score indicates that the scores of the credit received were highly fluctuated.

Farming experience score of the farmers ranged from 2 to 40. The average score was 18.16 with the standard deviation 9.41. On the basis of their farming experience, the farmers were classified into three categories as shown in Table 4.1.6

Table 4.1.6 Distribution of the vegetable farmer according to their farming experience

Categories	**Vegetable farmer (n=112)**		**Mean**	**SD**
	Number	**Percent**		
Low (upto 10)	30	26.7	18.16	9.41
Medium (10-25)	63	56.3		
High (above 25)	19	17.0		
Total	112	100		

Data presented in Table 4.1.6 indicate that the highest proportion 56.3 percent of the farmers had medium experience followed by 26.7 percent low experience and 17 percent high experience in farming activities. The findings of the study indicate that the (83.0 percent) of the farmers possessed either low or medium farming experience. This finding suggested that the farmers of the study area have better orientation about the recommended technologies of vegetable cultivation and may influence them to make favorable decision towards the use of vegetable cultivation technologies.

4.1.7 Training exposure

Training received score of the respondents was found to be varying from 0 to 3 days with an average of 0.61 and standard deviation of 0.997. Based on their score, the farmers were classified into two categories as shown in Table 4.1.8

Table 4.1.7 Distribution of the ginger growers according to their training exposure

Categories	Vegetable farmer(n=112)		Mean	SD
	Number	Percent		
No training exposure(0)	74	66.1	0.61	0.997
Low training exposure (1-3)	38	33.9		
Total	112	100		

The Table 4.1.8 indicate that the majority of the farmers had no training exposure that comprises about 66.1 percent and 33.9 percent farmers have low training exposure.

4.1.8 Innovativeness

The observed innovativeness scores of the respondents ranged from 10-35. The average being 21.49 and standard deviation were 4.95. Based on the score, the farmers were classified into three categories as shown in Table 4.1.9

Table 4.1.8 Distribution of the vegetable farmer according to their innovativeness

Categories	Vegetable farmer (n=112)		Mean	SD
	Number	Percent		
Low (10-18)	23	20.5	21.49	4.95
Medium (19-27)	72	64.3		
High (above 27)	17	15.2		
Total	112	100		

Data presented in Table 4.1.9 indicate that overwhelming majority 64.3 percent of the respondents had medium innovativeness as compared to 15.2 percent had high and 20.5 percent had low innovativeness. Data also revealed that majority 84.8 percent of the respondents were under medium to low innovativeness. The innovativeness also refers to proneness of an individual to accept new ideas and practices.

4.1.9 Problem faced

The observed problem faced scores of the respondents ranged from 19-37. The average being 29.57 and standard deviation were 3.27. Based on the score, the farmers were classified into three categories as shown in Table 4.1.10

Table 4.1.9 Distribution of the vegetable farmer according to their problem faced

Categories	Vegetable farmer (n=112)		Mean	SD
	Number	Percent		
Low (19-25)	11	9.8	29.57	3.27
Medium (26-31)	68	60.7		
High (above 31)	33	29.5		
Total	112	100		

Data presented in Table 4.1.10 indicate that 60.7percent of the respondents had medium problem faced as compared to 29.5 percent had high and 9.8 percent had low problem faced. Data also revealed that majority 90.2 percent of the respondents were under medium to high problem faced.

4.2 Dependent Variable

As noted earlier (Chapter 3), the use of vegetable cultivation technologies was considered as the dependent variable of the study.
Observed practices of use scores of the farmers ranged from 19 to 47 against the possible range of 0 to 36. The average and standard deviation were 34.90 and 4.15 respectively. Based on the possible scores, the farmers were classified into three categories as shown as Table 4.2.

Table 4.2 Distribution of the vegetable farmer according to their use

Categories	Vegetable farmer (n=112)		Mean	SD
	Number	Percent		
Low use (upto 30)	11	9.8	34.90	4.15
Medium use (31-40)	91	81.3		
High use (above 40)	10	8.9		
Total	112	100		

Data contained in the Table 4.2 indicate that highest proportion 81.3 percent of the farmers had medium use of vegetable cultivation technologies where 9.8 percent and 8.9 percent had low and high use of vegetable cultivation technologies.

4.3 Relationships between the Selected Characteristics of the Farmers and Their Use of Vegetable Cultivation Technologies

This section deals with the relationships of 9 selected characteristics of the farmers (the independent variables) with their extent of use vegetable cultivation technologies by the farmers (the dependent variable). The characteristics include Age, Education, Farm size, Annual income, Credit availability, Farming experience, Training exposure, Innovativeness and Problem faced.

Pearson's product moment correlation co-efficient 'r' has been used to test the hypotheses concerning the relationships between the dependent and independent variables. Five percent (0.05) and one percent (0.01) level of significance was used as the basis for acceptance or rejection of a hypothesis. Statistically significant and insignificant relationships were observed when the computed value of 'r' was higher and lower than the tabulated value respectively. The result of co-efficient of correlation between the independent and dependent variables were presented in the table 4.3. However, the results of interrelationships among different independent and dependent variables are presented in *Appendix-II*.

Table 4.3 Co-efficient of correlation showing relationships between the selected characteristics of the farmers and their use of vegetable cultivation technologies (N = 112)

Selected characteristics (independent variables)	**Correlation co-efficient (r) (use of vegetable cultivation technologies)**
1. Age	-0.223*
2. Education	0.288**
3. Farm size	0.298**
4. Annual income	0.260**
5. Credit availability	0.109^{NS}
6. Farming experience	-0.255**
7. Training exposure	0.339**
8. Innovativeness	0.245**
9. Problem faced	-0.127^{NS}

NS = Not significant
* = Significant at 0.05 level Tabulated value of 0.05 level = 0.183
** = Significant at 0.01 level Tabulated value of 0.01 level = 0.242
d.f = 110

4.3.1 Age and their use of vegetable cultivation technologies by the farmers

The relationship between age of the vegetable farmers and their use of vegetable cultivation technologies was examined by testing the null hypothesis, “there is no relationship between the age of the vegetable farmers and their use of vegetable cultivation technologies”. The computed value of ‘r’ was found -0.223 as shown in table 4.3 which was less than the tabulated value of ‘r’ (0.183) with 110 df at 0.05 level of probability. Hence, the concerned null hypothesis could be rejected. Therefore, it can be concluded that the age of the farmers had negatively significant relationship with their use of vegetable cultivation technologies.

4.3.2 Education and their use of vegetable cultivation technologies by the farmers

The relationship between education of the vegetable farmers and their use of vegetable cultivation technologies was examined by testing the null hypothesis, “there is no relationship between the education of the vegetable farmers and their use of vegetable cultivation technologies”. The computed value of ‘r’ was found 0.288 as shown in table 4.3 which was greater than the tabulated value of ‘r’ (0.242) with 110 df at 0.01 level of probability. Hence, the concerned null hypothesis could be rejected. Therefore, it can be concluded that the education of the farmers had highly positive significant relationship with their use of vegetable cultivation technologies.

4.3.3 Farm size and their use of vegetable cultivation technologies by the farmers

The relationship between farm size of the vegetable farmers and their use of vegetable cultivation technologies was examined by testing the null hypothesis, “there is no relationship between the farm size of the vegetable farmers and their use of vegetable cultivation technologies”. The computed value of ‘r’ was found 0.298 as shown in table 4.3 which was greater than the tabulated value of ‘r’ (0.242) with 110 df at 0.01 level of probability. Hence, the concerned null hypothesis could be rejected. Therefore, it can be concluded that the farm size of the farmers had highly positive significant relationship with their use of vegetable cultivation technologies.

4.3.4 Annual income and use of vegetable cultivation technologies by the farmers

The relationship between annual income of the vegetable farmers and their use of vegetable cultivation technologies was examined by testing the null hypothesis, “there is no relationship between the annual income of the vegetable farmers and their use of vegetable cultivation technologies”. The computed value of ‘r’ was found 0.260 as shown in table 4.3 which was greater than the tabulated value of ‘r’ (0.242) with 110 df at 0.01 level of probability. Hence, the concerned null hypothesis could be rejected. Therefore, it can be concluded that the annual income of the farmers had highly positive significant relationship with their use of vegetable cultivation technologies.

4.3.5 Credit availability and their use of vegetable cultivation technologies by the farmers

The relationship between credit availability of the vegetable farmers and their use of vegetable cultivation technologies was examined by testing the null hypothesis, “there is no relationship between the credit availability of the vegetable farmers and their use of vegetable cultivation technologies”. The computed value of ‘r’ was found 0.109 as shown in table 4.3 which was less than the tabulated value of ‘r’ (0.183) with 110 df at 0.05 level of probability. Hence, the concerned null hypothesis could not be rejected. Therefore, it can be concluded that the credit availability of the farmers had no significant relationship with their use of vegetable cultivation technologies.

4.3.6 Farming experience and their use of vegetable cultivation technologies by the farmers

The relationship between farming experience of the vegetable farmers and their use of vegetable cultivation technologies was examined by testing the null hypothesis, “there is no relationship between the farming experience of the vegetable farmers and their use of vegetable cultivation technologies”. The computed value of ‘r’ was found -0.255 as shown in table 4.3 which was less than the tabulated value of ‘r’ (0.242) with 110 df at 0.01 level of probability. Hence, the concerned null hypothesis could be rejected. Therefore, it can be concluded that the annual income of the farmers had highly negative significant relationship with their use of vegetable cultivation technologies.

4.3.7 Training exposure and their use of vegetable cultivation technologies by the farmers

The relationship between training exposure of the vegetable farmers and their use of vegetable cultivation technologies was examined by testing the null hypothesis, “there is no relationship between the training exposure of the vegetable farmers and their use of vegetable cultivation technologies”. The computed value of ‘r’ was found 0.339 as shown in table 4.3 which was greater than the tabulated value of ‘r’ (0.242) with 110 df at 0.01 level of probability. Hence, the concerned null hypothesis could be rejected. Therefore, it can be concluded that the training exposure of the farmers had highly positive significant relationship with their use of vegetable cultivation technologies.

4.3.8 Innovativeness and their use of vegetable cultivation technologies by the farmers

The relationship between innovativeness of the vegetable farmers and their use of vegetable cultivation technologies was examined by testing the null hypothesis, “there is no relationship between the innovativeness of the vegetable farmers and their use of vegetable cultivation technologies”. The computed value of ‘r’ was found 0.245 as shown in table 4.3 which was greater than the tabulated value of ‘r’ (0.242) with 110 df at 0.01 level of probability. Hence, the concerned null hypothesis could be rejected. Therefore, it can be concluded that the innovativeness of the farmers had highly positive significant relationship with their use of vegetable cultivation technologies.

4.3.9 Problem faced of the farmers and their use of vegetable cultivation technologies by the farmers

The relationship between problem faced of the vegetable farmers and their use of vegetable cultivation technologies was examined by testing the null hypothesis, “there is no relationship between the problem faced of the vegetable farmers and their use of vegetable cultivation technologies”. The computed value of ‘r’ was found -0.127 as shown in table 4.3 which was less than the tabulated value of ‘r’ (0.183) with 110 df at 0.05 level of probability. Hence, the concerned null hypothesis could not be rejected. Therefore, it can be concluded that the problem faced of the farmers had no significant relationship with their use of vegetable cultivation technologies.

CHAPTER 5

SUMMERY & FINDINGS

CHAPTER 5

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

5.1.1 Selected characteristics of the farmers' (Independent variable)

The major findings of the study are summarized below:

Age:

The highest proportion 64.3 percent of the respondents fell in the middle age, while 23.2 and 12.5 percent belonged to young and old age categories respectively

Education:

The majority 58.9 percent of the farmers had secondary level of education while 12.5 percent farmers had primary level of education, 19.6 percent had illiterate/can sign only and 8.9 percent had higher level of education.

Farm size:

The highest proportion 56.3 percent of the respondents belonged to small farm size, compared to having 6.3percent had small and 37.5 percent having marginal farm respectively.

Annual income:

The highest proportion 85.7 percent of the respondent had low annual income, while 9.8 percent had medium income and 4.5 percent had high income.

Credit availability:

The highest proportion 79.5 percent of the farmers had low credit received while 15.2 percent had medium credit received and the rest 5.4 percent of them had high credit received.

Farming experience:

The highest proportion 56.3 percent of the farmers had medium experience followed by 26.8 percent had low experience and 17 percent had high experience in farming activities.

Training exposure

The majority of the farmers have no training experiences that comprises about 66.1 percent and 33.9 percent farmers had low training experiences.

Innovativeness

The majority 64.3 percent of the respondents had medium innovativeness as compared to 15.2 percent had high and 20.5 percent had low innovativeness.

Problem faced

The majority 60.7 percent of the respondents had medium problem faced as compared to 29.5 percent had high and 9.8 percent had low problem faced.

Use of technologies

Highest proportion 81.3 percent of the farmers had medium use of vegetable cultivation technologies where 9.8 percent and 8.9 percent had low and high use of vegetable cultivation technologies.

5.1.2 Relationships between the selected characteristics of the respondents and their use of vegetable cultivation technologies.

Ten null hypotheses were developed and tested to explore the relationship between

Nine selected characteristics of the farmers and their use of vegetable cultivation technologies. Credit availability and Problem faced had no significant relationship with their use of vegetable cultivation technologies at 0.05 level of probability.

5.2 Conclusions

Based on the findings and its logical interpretation the following conclusions have been drawn:

For increasing the yield of vegetable, the farmers need to use all the vegetable cultivation technologies to a higher extent. This study revealed that 81.3 percent of the vegetable farmers had medium use of vegetable cultivation technologies. These facts lead to conclude that farmers had a satisfactory level of use of vegetable cultivation technologies.

1. The findings indicate that majority 87.50 percent of the respondents in the study area were young to middle aged. The age of the farmers had negatively significant relationship with their use of vegetable cultivation technologies in vegetable cultivation. It may, therefore be concluded that the extension workers should concentrate their works with all age categories of farmers.

2. Education of the farmers had a significant positive relationship with their use of vegetable cultivation technologies in vegetable cultivation. It may be concluded that a farmer had high education higher of using a new technology rather than a farmer having low education.

3.The findings indicate that the farmers who use vegetable cultivation technologies had significant positive relationships with their farm size, annual income, training exposure. So, it may be concluded that more farm size, annual income, more training of the farmer more their use of vegetable cultivation technologies.

4. Findings indicate that farming experience of the farmers had negative significant relationship with their use of vegetable cultivation technologies. It may be concluded that the higher farming experience of the farmers, the lower was their use of vegetable cultivation technologies.

5. Credit availability and problem faced had no significant relationship with the use of vegetable cultivation technologies by the farmers. Although these are an important factor for the use of vegetable cultivation technologies by the farmers for getting increased yield. So, it may be concluded that these are not the only considerable factor for the use of vegetable cultivation technologies.

6. Innovativeness of the farmers had a significant positive relationship with their use of vegetable cultivation technologies. This means that higher the innovativeness of the farmers with different technologies, higher the extent use of vegetable cultivation technologies.

5.3 Recommendation

5.3.1 Recommendations for policy implications

Based on the findings and conclusions of the study, the following recommendations have been made:

1. The level of use of vegetable cultivation technologies by the farmers in vegetable cultivation was encouraging. However, there is a need of efforts for wide use of vegetable cultivation technologies by the vegetable farmers.

2. In view of the absence of any relationship between the age of the farmers and their use of vegetable cultivation technologies in vegetable cultivation, it is recommended that the extension worker should work with the farmers of young and middle aged groups to promote the cultivation of vegetable. However, they will have to work more with comparatively larger member of middle aged farmers as majority of the farmers to this age group.

3. It may be recommended that special attention should be given by the extension providers to the illiterate farmers and primary educated farmers, so that they become aware about the benefit of use of vegetable cultivation technologies for vegetable production.

4. It may be recommended that agricultural extension agencies especially the DAE and relevant NGOs should critically review their training programmes and make sound provisions so that the farmers understand the use of vegetable cultivation technologies for vegetable production.

5.4 Recommendations for further study

The present study which mainly highlights some aspects of particular dimensions (use of vegetable cultivation technologies for vegetable production) of agricultural development, So it is suggested that concerned agencies should undertake further studies in order to have a deeper insight into the various aspects of the use of vegetable cultivation technologies for vegetable production. The aspects for future study are presented below:

1. The present investigation explored the relationships of the ten characteristics of the vegetable growers with their use of vegetable cultivation technologies for vegetable production. Further research may be conducted by taking other characteristics to observe relationships with their use of vegetable cultivation technologies for vegetable production.

2. The present study was conducted in twelve villages of Haibotpur union in Sadar upazila under Jessore district. So, similar studies may be undertaken in other parts of the country to verify the findings of the present study.

3. The present study was concern only with the use of vegetable cultivation technologies for vegetable production. It is therefore suggested that future studies should include innovations, adoption, practice, knowledge and attitude and so on.

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APPENDICES

Appendix - I

(English Version of the Interview Schedule)
Department of Agricultural Extension and Information System
Sher-e-Bangla Agriculrural University, Dhaka-1207

Interview schedule for collection of data to determine
USE OF VEGETABLE CULTIVATION TECHNOLOGIES BY THE FARMERS

Name of the respondent : ---------- Sl. No. ----------

Father's Name : ---------- Date : ----------

Village : Upazilla :

Union : District :

Please answer the following questions

1. Age

What is your present Age?---------- Years.

2. Level of Education

a) Can not read and write : ----------

b) Can sign only : ----------

c) I read up to class: ----------

d) I passed ---------- class

3. Farm size

Please indicate area of your lands according to use

Sl. No.	Use of land	Farm size	
		Local unit	Hectare
1	Homestead area (A_1)		
2	Own land under own cultivation (A_2)		
3	Land taken from others on borga system(A_3)		
4	Land given to others on borga system (A_4)		
5	Land taken from others on lease (A_5)		
	Total		

Total farm size = $A_1 + A_2 + {}^1/_2 (A_3 + A_4) + A_5$

4. Annual Income

Please state the income from different sources during the last one year

A. Income from Agriculture

Sl. No.	Sources of income	Total price (Tk)
1	Crops	
2	Vegetables	
3	Fruits	
4	Fisheries	
5	Livestock	
6	Nursery	
	Total Taka	

B. Income from other sources

Sl. No.	Sources of income	Monthly income (Tk)	Annual income (Tk)
1	Business		
2	Services		
3	Day labour		
4	Others (if any)		
	Total Taka		

Total income: A + B = ----------Taka

5. Credit availability:

Did you receive credit in last year? Yes ( ) No ( )

If 'yes', please mention the sources of receiving your credit and amount of credit

Sl. No.	Sources of credit	Amount of credit (Tk.)
1	NGOs	
2	Banks	
3	Money lenders	
4	Neighbors	
5	Relatives	
6	Others	
	Total	

6. Farming experience:

How long you have been involved in farming directly? ----------years

7. Training exposure

Do you have participated any training?

Yes …….. No. ……..

If yes, mention the following information

Sl. No.	Subject of training	Duration of training (Days)

8. Innovativeness

Please furnish your information about the extent of use of the following technologies

Sl. No.	Name of technology	Duration of use				
		Never used	Within 1 year	1-2 years	2-3 years	After 3 years
1)	Cultivation of hybrid variety of vegetables					
2)	Use of improved seed for vegetable cultivation					
3)	Use of resistant variety of vegetables					
4)	Practice of crop rotation					
5)	Use of zinc and sulphur contained chemical fertilizer					
6)	Use of Integrated Pest Management in crop cultivation					
7)	Use of bio-fertilizer to increase soil fertility					
8)	Use of weedicide					
9)	Use of vermicompost					
10)	Mixed vegetable cultivation					

9. Problem faced

Please mention the extent of problem that you faced during use and application of vegetable technologies:

Sl. No.	Problems	Extent of Risk			
		Not at all	Low	Medium	High
1)	Lack of capital				
2)	High rate of fertilizer				
3)	High rate of seeds				
4)	Unable to store vegetable for long time				
5)	Natural calamity				
6)	Good seeds are not available in time				
7)	Co-operation of Block Supervisor				
8)	Attack of pests in Vegetable				
9)	Falling market price of crops in production season				
10)	High price of agricultural labour in season				
11)	Lack of high technology				
12)	Lack of proper knowledge about improved cultivation practices				

10. Use of Vegetable Cultivation Techn

Please mention the use of the following technologies

Sl. No.	Name of the technologies	Extent of Use			
		Frequently (3)	Occasionally (2)	Rarely (1)	Not at all (0)
1.	Organic Fertilizers				
	i. Cow dung				
	ii. Green manure				
	iii. Compost				
	iv. Farm yard manure				
2.	Chemical Fertilizers				
	i. Urea				
	ii. TSP				
	iii. DAP				
	iv. MP (Potash)				
	v. Zinc fertilizer				
3.	Use of Chega variety of Brinjal				
	Use of Bengle queen variety of Brinjal				
4.	Use of Top green variety of Bitter gourd				
5.	Use of Murshidabad variety of Pointed Gourd				
6.	Use of Laltir variety of Sweet Gourd				
7.	Use of Dwarf variety of Lady's finger				
8.	Use of weedicide				
9.	Use of Guti Urea				
10.	Use of shallow tube well				
11.	Use of Power tiller				
12.	Use of IPM				

Thank you for your kind co-operation in data collection

Signature of interviewer & Date: ……..

Appendix - II

Variables	X1	X2	X3	X4	X5	X6	X7	X8	X9	Y
X1	-									
X2	**-0.552****	-								
X3	**-0.41**	**0.425****	-							
X4	**0.000**	**0.414****	**0.755****	-						
X5	**-0.060**	**0.118**	**0.132**	**0.062**	-					
X6	**0.787****	**-0.524****	**0.044**	**0.002**	**0.050**	-				
X7	**-0.350****	**0.324****	**0.162**	**0.032**	**0.210***	**-0.325****	-			
X8	**-0.004**	**0.312****	**0.428****	**0.377****	**0.181**	**-0.003**	**0.139**	-		
X9	**0.117**	**-0.291****	**-0.378****	**-0.380****	**0.000**	**0.219***	**-0.263****	**-0.234***	-	
Y	**-0.223***	**0.288****	**0.298****	**0.260****	**0.109**	**-0.255****	**0.339****	**0.245****	**-0.127**	-

*Correlation is significant at 0.05 level of probability
** Correlation is significant at 0.01 level of probability
Tabulated value of 0.05 level = 0.183
Tabulated value of 0.01 level = 0.242
d.f = 110

Independent variables

X1 = Age
X2= Education
X3= Farm size
X4= Annual income
X5= Credit availability
X6= Farming experience
X7= Training exposure
X8= Innovativeness
X9= Problem faced

Dependent variable

Y= Use of Vegetable Cultivation Technologies