PROBLEMS FACED BY THE FARMERS IN USING AGRICULTURAL MACHINERIES

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CERTIFICATE

*This is to certify that the thesis entitled "**PROBLEMS FACED BY THE FARMERS IN USING AGRICULTURAL MACHINERIES**" submitted to the department of Agricultural Extension and Information System, Faculty of Agriculture, Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka in partial fulfillment of the requirements for the degree of Master of Science (M.S.) in Agricultural Extension, embodies the result ofa piece of bona fide research work carried out by **MD. ABIR ALI, Registration No. 19-10238, Email: abirali053@gmail.com, Contact number: 01728483191** 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, as has been availed of during the course of this investigation has been duly acknowledged by the Author.

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DEDICATED
TO
MY BELOVED
PARENTS

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ABBREVIATIONS

BADC	Bangladesh Agricultural Development Corporation
BARI	Bangladesh Agricultural Research Institute
BRRI	Bangladesh Rice Research Institute
BBS	Bangladesh Bureau of Statistics
DAE	Department of Agricultural Extension
GDP	Gross Domestic Product
MoA	Ministry of Agriculture
PFI	Problems Facing Index
SAAO	Sub Assistant Agriculture Officer
SAU	Sher-e-Bangla Agricultural University
SPSS	Statistical Package for Social Sciences

PROBLEMS FACED BY THE FARMERS IN USING AGRICULTURAL MACHINERIES

ABSTRACT

The main purpose of the study was to determine the extent of problems faced by the farmers in using agricultural machineries. The study was carried out in Uthrail union of Sadar upazila and 6 no. Nijpara union of Birganj upazila under Dinajpur district. One hundred and eighteen (118) farmers were selected as sample from an updated list of 1183 farmers. Data were collected by a pre-tested interview schedule during 15 April 2022 to 15 May 2022. Simple and direct questions with different scales were used to obtain information. Problems were measured by constructing 5-point rating scale. Co-efficient of correlation (r) was computed to explore the relationships between the eleven selected characteristics of the farmers and their problems faced in using agricultural machineries. The highest problems faced by the farmers was 'Fragmented land' (PFI=401). The second important problems faced by the farmers was observed 'High price of machineries' (PFI=383). The 3rd important problems faced by the farmers was observed 'High price of fuel' (PFI=359). Majority (70.3 percent) of the farmers had medium problems faced, 16.1 percent had low problems faced and 13.6 percent had high problems faced in using agricultural machineries. Among eleven selected characteristics education, farm size, annual income, knowledge on agricultural machineries and use of agricultural machineries of the farmers had negative significant relationships with their problems faced in using agricultural machineries. However, age, family size, farming experience, training received, agricultural extension media contact and attitude of farmers towards using agricultural machineries had no significant relationships with their problems faced in using agricultural machineries. Findings leads to conclude that socio-economic characteristics have influence on problems faced by the farmers in using agricultural machineries and concerned authority should take necessary action to reduce problems of the farmers associated with agricultural machineries focusing on those significant influencing characteristics.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Bangladesh agriculture is currently faced with range of problems like ageing farmers, feminization of agriculture, farm labor shortage, shrinking land, degradation of natural resources, soaring prices, and vulnerability to climate change. In the face of these problems, we need knowledge intensive green revolution that combines advances in science and agricultural engineering with the unique traditional knowledge to make agriculture more environmentally resilient (ESCAP Social and Economic Survey, 2016). According to BBS (2019), agriculture contributes a leading part for gaining the Gross Domestic Production (GDP) target which is 14.23% in 2019-20 in Bangladesh. Most of the people are involved in agriculture sector which employs 40.6% of total national employment (BBS, 2019) and on average 0.31 hectors owned by a small farm holder (Mottaleb *et al.,* 2016). For the 160 million people, Bangladesh still can achieve self-sufficiency in food but it is getting harder day by day. Aus. was cultivated in 0.94 million hectares in 2016 which was 0.70 million hectares in 2015 (Majumder *et al.,* 2016). Farming systems through farm mechanization and production intensification offer a range of productivity, socio-economic, and environmental benefits to producers, food value chain sectors, and society in general. Mechanization enables farm family members not only to increase farm productivity via production intensification in some cases expansion, but also to seek off-farm employment opportunities (Houmy *et al.,* 2013).

The early growth of agricultural mechanization in Bangladesh was facilitated by a focus on small-scale machinery adaptable to its socio-economic context. The second phase of growth was linked with imported machinery coupled with local production of sparer parts. The present and third phase of farm mechanization in Bangladesh is a factorial of many public and private initiatives fostered by the 'National Agricultural Mechanization Policy' drafted in 2020 (MoA. 2020). The level and appropriate choice of farm mechanization has direct effects on the farm productivity (Fuad and Flora, 2019). Despite proven benefits, the adoption of farm mechanization in the country has been slow. Although policy changes have taken place in the country, societal realities are still there as constraints. The most prominent wall against mechanization has been

discussed as the small and fragmented land holdings where large machineries cannot be used efficiently (Alam and Khan, 2017). This problem is further aggravated when these fragmented lands are used to cultivate variety of crops. As a result, a single machine cannot be employed for a specific job in an area. Variable machine requirements at a particular season are hauling back wider mechanization process in the country. Moreover, local manufactures are still using old school techniques in their workshops and are reluctant to invest in precision manufacturing technology.

The demand of effective agricultural machinery including combine harvester, reaper, rice transplanter, power thresher, power weeder, power sprayer, drier, potato digger, maize sheller, and fertilizer distributor is increasing day by day. Besides imports, local machinery manufacturers meet 20% demand of agricultural machinery in Bangladesh. The government has taken an initiative to hand over 56,000 agricultural machineries to the farmers through a mega project worth Tk 3,020 crore (30.2 billion USD) started in 2020. In the project, the government will patronize the local machinery manufacturers for building capacity so that they will be more productive and self-dependent. Farmers and service providers will get an opportunity to purchase agricultural machinery in the haor area at 70% subsidy and 50% subsidy in other areas (Seraj, 2020). In the project, the government has aimed to reduce post-harvest losses of crops, including the main crop rice, by up to 15%, save 50% time in cultivation time and cut costs by 20% (Parvez and Byron, 2020).

Government incentives in this sector has been found to be inadequate (Faruque, 2012) and the scientific community agrees that significant improvements can be made by supporting local entrepreneurs. On the financial side, over the last decade, farmers access to the banking system has been significantly widened through mainstream banks participation in the SME window. However, investment into new machines has not received any significant boost. This signifies the fact that motivational extension works are needed in the farming community so that the adoption process is hastened (Rahman *et al.*, 2021). The market size for agricultural machineries consistently expanded over time, and the quality of the products was now very important. Many of the local entrepreneurs produced sub-standard machineries and sold to the farmers at the lowest price, which created a negative impact among the farmers (Islam, 2018).

1.2 Statement of the Problem

Agricultural mechanization is the application of machines in the production process in agriculture ranging from land clearing, tilling, planting, harvesting among others, to maximize productivity, reduce time at work and meet up with food demand of the society (Amadi and Ekezie, 2016). Despite benefits majority of the farmers have not really key into this system or techniques as majority are subsistence farmers who cultivate about less land usually scattered over a wide range area and due to financial constraints. Farm mechanization is the main plank of modern agriculture. Many developed countries revolutionized by using farm mechanization, which resulted in tremendous production and productivity gains. However, the conditions under which it was introduced in those countries differ greatly from Bangladesh context (Faruk, 2019).

Mechanization in Bangladesh is always associated with some inherent drawbacks like, fragmented lands, poor buying capacity of farmers, lack of quality machines for farm operation, inadequate knowledge of the users about machines and insufficient awareness building activities (Islam, 2009). The presence of small and fragmented lands is a key factor in the low development rate of agricultural mechanization systems. If the cultivatable lands are fragmented and located long distances from the owner's house and each other, it increases transport costs. About 84.39% of the rural households are small having 50-249 decimals of land (BBS, 2017) and even this small landholding is fragmented into several plots, make the efficient use of small and medium size PTs, tractors, transplanter, reapers, mini-combine harvesters and other machinery difficult and lead to the problem of frequent turning and make the operation time-consuming, tedious and expensive (Islam, 2018). The force of population on land is rising progressively, the solution lies in mechanizing agriculture, which would realize the goal of reaching aimed food gains production in Bangladesh. The problems hindering the process of agricultural mechanization in Bangladesh needed to be identified, as mechanizing agriculture would realize the goal of achieving targeted food production in Bangladesh. The researcher attempted the present study to seek answer to the following research questions: -

1. What are the selected characteristics of farmers?

2. What are the extents of problems faced by the farmers in using agricultural machineries?

3. What are the relationships between the selected characteristics of the farmers and their problems faced in using agricultural machineries?

1.3 Specific Objectives of the Study

1. To describe the selected characteristics of the farmers;
2. To determine the extents of problems faced by the farmers in using agricultural machineries; and

To explore the relationships between the selected characteristics of the farmers and their problems faced in using agricultural machineries.

1.4 Justification of the Study

Problems faced by the farmers in using agricultural machineries is an important issue for the farmers. Major problems may be fragmented lands, high price of agricultural machineries, lack of quality machines for farm operation, lack of knowledge of the users about using agricultural machineries and lack of awareness regarding agricultural machineries. Due to problems faced in using agricultural machineries, agricultural mechanization is in morbid condition all Bangladesh. In this circumstance, farmers count economic loss with grief. However, there are some innovative and venturesome farmers who confront the problems with the help of extension service and applying their own experiences. Farmers of Dinajpur district faced problems in using agricultural machineries and what mechanism is used against what problems? So, the experiences of problems confrontation by farmers of Dinajpur district could be leaning avenue for other the farmers of other districts. Considering the above-mentioned points, the researcher become highly interested to conduct research entitled **'**Problems faced by the farmers in using agricultural machineries**.'**

1.5 Assumptions of the Study

An assumption is the supposition that an apparent fact or principle is true in the light of the available evidence (Goode, 1945). In this study, the following assumptions were taken into consideration while undertaking this study.

i. The respondents selected for this study were competent enough to provide proper responses to the questions included in the interview schedule.

ii. The views and opinions furnished by the respondents were the representative views and opinion of all the farmers of that area.

iii. The responses furnished by the respondents were valid and reliable.

iv. The data collected by the researcher was free from bias.

v. The researcher acting as the interviewer was well adjusted to the society and environment of the study area. Hence, the data collected from the respondents were free from bias.

vi. The findings of the study will have general applications to other parts of the country with similar personal, socio-economic, and cultural conditions of the study area.

vii. Data were normally and independently distributed.

viii. The sampling procedures followed for this study, the analysis of data and interpretations etc. were free from all biases.

1.6 Limitations of the Study

Considering the time, money, and other resources available to the researcher and to make the study meaningful, it became necessary to impose certain limitations as noted below:

i. The research was conducted on Sadar upazila and Birganj upazila of Dinajpur district.

ii. The characteristics of the respondents in the study area were many and varied but only 11 characteristics were selected for examining their contribution on use of Agricultural Machinery.

iii. Data were collected from the selected farmers furnished by them from their memory during interview.

iv. For some cases, the researcher faced unexpected interference from the over interested side-talkers while collecting data from the target populations.

However, the researcher tried to overcome the problem as far as possible with sufficient tact and skill.

1.7 Definition of Important Terms

For clarity of understanding several key terms used through the study are defined below:

Machine refers to mechanical or electrical device that transmits or modifies energy to perform or assist in the performance of human task.

Agricultural machineries refer to the machines used in agricultural practices to reduce human labor and enhance field crop. Major agricultural implements include harvesters, drag, disk harrows, cultivators, seed drill, harrows, spade, plough, etc.

Farmers are the persons who were involved in farming activities. They participated in different farm and community level activities like crops, livestock, fisheries, other farming activities etc. In this study crop growers were treated as farmers.

Age of a farmer referred to the span of his/her life in years from his/her birth at the time of interview.

Education referred to the ability of the respondents to read and write or having formal education received up to a certain level from educational institute at time of interview. It was measured on the basis of classes a farmer has passed from a formal educational institution.

Family size refers to the number of persons in the family.

Farm size referred to the cultivated area either owned by the farmer or obtained from others 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. In this study farm size was measured in hectare.

Annual income referred to the total amount of money earned by the earning members of a farm family from agriculture, livestock, fisheries and other accessible sources (business, service, daily labor etc.) during a year. It was expressed in Thousand Taka.

Farming experience refers to the years of experience achieved by a farmer through years of farming activities. It was measured by the number of years of farming by the respondent.

Training received referred to the total number of days attended by the farmers in his life in institutional training on agricultural mechanization. It was measured by the number of days of training received by the respondent.

Agricultural extension media contact referred to an individual exposure to different information sources and personalities relate to agriculture for dissemination of new technologies.

knowledge on agricultural machineries referred to the extent of facts or information about agricultural machineries.

Attitude of farmers towards using agricultural machineries refers to one's feeling towards the use of agricultural machines in various aspects of farming activities.

Use of agricultural machineries refers to the level of use of agricultural machineries from land preparation to post-harvest operation.

Problem faced in practicing agricultural machineries meant any difficult situation which require some actions to minimize. The term problems faced referred to different problems faced by the farmers in using agricultural machineries.

Respondents refers to the randomly selected people considered to be representative of the population are known as respondents. They are the people from whom a social research worker usually gets most data required for his research. In this study the respondents were the village level farmers.

CHAPTER 2

REVIEW OF LITERATURE

In this chapter, reviews of the related literature to the study are presented. The researcher intensively searched internet, websites, available books, journals, and printed materials from different sources of home and abroad. It may be relevant here to mention that a good number of research activities concerning problems faced by the farmers in using agricultural machineries.

However, the literatures have been organized into following four sections to set the context of the study:

First section : Reviews of literature relevant to general context of problems

Second section : Reviews of literature relevant to problems in agricultural mechanization

Third section : Reviews of literature related to selected characteristics of the farmers with their problems

Fourth section : The conceptual framework of the study

2.1 Reviews of Literature Relevant to General Context of Problems

Arafat (2018) found that the highest proportion (63.3 percent) of the farmers had medium problem faced in guava marketing, while 22.8 percent had high, and 13.9 percent had low problem faced. Guava selling in time is the top problem for the guava farmers and this was followed by non-availability of skilled labor during guava marketing.

Islam (2017) revealed that highest proportion (71.70 percent) of the farmers had medium problem faced in bean production, while 16.04 percent had high, and 12.26 percent had low problem faced. Among various problems faced by the farmers non-availability of quality pesticides was the highest followed by non-availability of quality fertilizers. Lack of irrigation was the least important problem.

Kamal (2017) found that the majority (72.38 percent) of the farmers faced medium problem while 11.43 percent faced low problem and 16.19 percent faced high problem in wheat cultivation. Based on Problem Faced Index, it was observed that “Low market price of wheat” ranked first followed by “Difficulty in getting loan from Bank”, “High

Price of wheat seed", "Shortage of quality seeds", "High price of fertilizer or Pesticide" were the major five problems in wheat cultivation.

Rijk (2016), most farmers raised issues that mechanization has replaced labour thereby putting some farmers out of work, high capital is required for mechanized farming, agricultural mechanization is a male-dominated technology, farm areas are in fragment therefore cannot encourage the use of machine among others.

Hossain (2016) revealed that the highest proportion (66.10 percent) of the respondent had medium problems in vegetable production, 18.30 percent had low problems and 15.6 percent had high problems in vegetable production. According to Problems Faced Index (PFI), high cost of labor (367), lack of knowledge about post-harvest technologies (364) and high fluctuation in price (365) were highest extent of problems in case of input problems, technical problems and marketing problems in vegetable production respectively.

Mortuza (2015) found that more than two third (67.10 percent) of the respondents faced medium problem in maize production activities and 19.50 percent faced low problems and 13.40 percent faced high problems.

Rahman (2015) observed that more than half (67.4%) of the respondents faced medium problem in jackfruit commercialization activities, while 18.6 percent faced high problems and only 14 percent faced low problems.

Baten (2014) in his study found that the majority (73.3 %) of the farmers faced medium problem in cotton cultivation, while 16.4 percent low and 10.3 percent high problem in cotton cultivation.

Lamidi and Akande (2013) noted that land tenure system and access to capital have a major setback to the use of mechanization by farmers in Nigeria.

Noman (2012) conducted a study on constraints and scope for practicing sandbar cropping technology in riverine areas of Bangladesh. He found that low price during peak period of pumpkin, attack of insect and pathogen, lack of irrigation facilities, rotting of immature pumpkin in the field, difficult to find out soil layer, requiring more labor in pumpkin cultivation in sandbar etc. are main problems.

FAO (2009) noted that most farmers tend not to welcome the idea of the use of machine in farming which may be attributed to some challenges affecting them in farming including affordability, availability, and lack of maintenance and repair service.

2.2 Reviews of Literature Relevant to Problems in Agricultural Mechanization

Sanaullah *et al.* (2021) conducted in their study found that socio-economic attributes put impact on farm mechanization. The study exposed that illiteracy of the respondents, lack of trained machinery operators, access of roads to the farm, adequate capital and costly inputs were some of the problems plaguing the use of agricultural mechanization in the rural area.

Moniruzzaman *et al.* (2021) conducted a study on determinants of small-scale mechanization for potato farming and the results shows that only around 13% of the respondents were high adopters. The adoption of potato farm mechanization was influenced by education, spouse education, farm size, and training. Marginal effect analysis suggested that farm size and training decrease the likelihood of being in the low adopter's category, respectively, by 13.2% and 10%, while increases the likelihood of being in the high adopter's category by 7.5% and 5.7%.

Muhammad Rashed Al Mamun *et al*. (2018) conducted a study on identification of hindrances to adapt agricultural machinery in selected areas of Bangladesh. In his study the result shows that farmers were thinking that fragmented land, high machinery price, lack of maintenance, inadequate extension service, poor transportation, lack of loan service and big machinery size is the main drawback for mechanization respectively. The result also shows that farmers' financial, social and cropping system condition does not suit properly.

Makini *et al.* (2017) conducted a study and found that several problems in rice and banana production, processing, and marketing affect the value chain actors, thus limiting adoption of mechanization. In this study results shows that land preparation, high cost of the operation, difficulties in transporting reapers and threshers, machinery import policy and low awareness on available machinery.

Yohanna *et al.* (2011) in their study on mechanization problems of small farmers found various levels of agricultural machineries use in the various farm operations as follows:

land clearing (21.54%), tillage (24.62%), planting (3.85%), spraying (86.15%), weeding (3.08%) and harvesting (40%).

Tekwa *et al.* (2010) disclosed that there was a higher concentration of traditional technologies among the farmers compared to mechanization.

2.3 Review of Literature Related to Relationship between Selected Characteristics of the Farmers with their Problems

2.3.1 Age and problems

Arafat (2018) found that age had non-significant relationship with their problems faced in guava marketing.

Islam (2017) revealed that age of the bean farmers had significant positive relationship with their problems faced.

Kamal (2017) found that age of the farmers had no significant relationship with their problems faced in wheat cultivation.

Hossain (2016) revealed that age of the farmers had no significant contribution to their problems faced in vegetable production.

Mortuza (2015) found that age had no significant relationship with their problems faced in maize cultivation.

Baten (2014) revealed that age had no significant relationship with their problems faced in cotton cultivation.

Noman (2012) found that there was positive relationship between age and problems of sandbar cropping technology.

2.3.2 Education and problems

Moniruzzaman (2021) found that the level of education had a positive relationship with their determinants of small-scale mechanization for potato farming.

Arafat (2018) found that level of education had significant negative contribution with their problems faced in guava marketing.

Islam (2017) revealed that education of the bean farmers had significant negative relationship with their problems faced.

Kamal (2017) found that education of the farmers had significant negative relationship with their problems faced in wheat cultivation.

Hossain (2016) revealed that level of education of the farmers had significant contribution to their problems faced in vegetable production.

Mortuza (2015) found that level of education had no significant relationship with their problems faced in maize cultivation.

Baten (2014) revealed that education had significant negative relationship with their problems faced in cotton cultivation.

Noman (2012) found a positive relationship between educational qualification and problems of sandbar cropping technology.

Parvez (2009) observed that educational qualification had negative significant relationship with constraints faced by the farmers in small scale aquaculture.

2.3.3 Family size and problems

Arafat (2018) found that family size had non-significant relationship with their problems faced in guava marketing.

Kamal (2017) found family size of the farmers had no significant relationship with their problems faced in wheat cultivation.

Hossain (2016) revealed that family size the farmers had no significant contribution to their problems faced in vegetable production.

Mortuza (2015) found that family size had no significant relationship with their problems faced in maize cultivation.

Baten (2014) revealed that family size had significant negative relationship with their problems faced in cotton cultivation.

Noman (2012) found that there was negative relationship between family size and problems of sandbar cropping technology.

Parvez (2009) found a positive significant relationship between family size and problems faced by the farmers in small scale aquaculture.

2.3.4 Farm size and problems

Moniruzzaman (2021) found that farm size had a positive significant relationship with their determinants of small-scale mechanization for potato farming.

Arafat (2018) found that farm size had non-significant relationship with their problems faced in guava marketing.

Islam (2017) revealed that farm size of the bean farmers had non-significant relationship with their problems faced.

Kamal (2017) found farm size of the farmers had significant negative relationship with their problems faced in wheat cultivation.

Hossain (2016) revealed that, effective farm size of the farmers had significant contribution to their problems faced in vegetable production.

Parvez (2009) found in his research work that there was no significant relationship between farm size and problems faced by the farmers in small scale aquaculture.

2.3.5 Annual income and problems

Arafat (2018) found that annual family income had non-significant relationship with their problems faced in guava marketing.

Islam (2017) revealed that annual family income of the bean farmers had no significant positive relationship with their problems faced.

Kamal (2017) found annual family income of the farmers had significant negative relationship with their problems faced in wheat cultivation.

Hossain (2016) revealed that annual family income of the farmers had significant contribution to their problems faced in vegetable production.

Mortuza (2015) found that annual family income had no significant relationship with their problems faced in maize cultivation.

Baten (2014) revealed that annual family income had no significant relationship with their problems faced in cotton cultivation.

Noman (2012) found that there was negative relationship between annual income and problems of sandbar cropping technology.

Parvez (2009) found in his research work that there was negative significant relationship between annual income and problems faced by the farmers in small scale aquaculture.

2.3.6 Farming experience and problems

Sanaullah (2021) revealed that, farming experience of the farmers had significant contribution to their problems faced in farm mechanization.

Hossain (2016) revealed that, farming experience of the farmers had no significant contribution to their problems faced in vegetable production.

2.3.7 Training received and problems

Moniruzzaman (2021) found that training had a positive significant relationship with their determinants of small-scale mechanization for potato farming.

Arafat (2018) found that agricultural training exposure had significant negative contribution with their problems faced in guava marketing.

Islam (2017) revealed that training exposure of the bean farmers had significant negative relationship with their problems faced.

Kamal (2017) found training exposure of the farmers had significant negative relationship with their problems faced in wheat cultivation.

Hossain (2016) revealed that training exposure of the farmers had significant contribution to their problems faced in vegetable production.

Mortuza (2015) revealed that training exposure on maize cultivation had significant and negative relationship with their problems faced in maize cultivation.

Baten (2014) revealed that training exposure had significant negative relationship with their problems faced in cotton cultivation.

Noman (2012) found that there was negative relationship between training received and constraints of sandbar cropping technology.

2.3.8 Agricultural extension media contact and problems

Arafat (2018) found that agricultural extension media contacts had significant negative contribution with their problems faced in guava marketing.

Islam (2017) revealed agricultural extension media contact of the bean farmers had significant negative relationship with their problems faced.

Kamal (2017) found agricultural extension media contact of the farmers had significant negative relationship with their problems faced in wheat cultivation.

Hossain (2016) revealed that level of agricultural extension media contact of the farmers had significant contribution to their problems faced in vegetable production.

Mortuza (2015) revealed that agricultural extension media contact had significant and negative relationship with their problems faced.

Baten (2014) revealed that agricultural extension media contact had significant negative relationship with their problems faced in cotton cultivation.

Parvez (2009) found in his research work that there was negative significant relationship between agricultural extension media contact and problems faced by the farmers in small scale aquaculture.

2.3.9 Knowledge on agricultural machineries and problems

Mortuza (2015) revealed that knowledge on maize cultivation had significant and negative relationship with their problems faced in maize cultivation.

Baten (2014) revealed that knowledge on cotton cultivation had significant negative relationship with their problems faced in cotton cultivation.

Parvez (2009) found in his research work that there was negative significant relationship between knowledge of aquaculture and problems faced by the farmers in small scale aquaculture.

2.3.10 Attitudes of farmers towards using agricultural machineries and problems

Sarker (2002) found in his study that attitude of farmers using agricultural machineries had a positive significant relationship with their problems.

Habib (2000) also found that attitude of farmers using agricultural machineries had a positive significant relationship with their problems.

2.3.11 Use of agricultural machineries and problems

Sanaullah (2021) revealed that use of agricultural machineries by the farmers had significant contribution to their problems faced in farm mechanization.

Yohanna (2011) revealed that use of agricultural machineries by the farmers had significant contribution to their problems faced in farm mechanization

Tekwa (2010) found that there was significant relationship between use of agricultural machines to their problems faced in agricultural mechanization.

2.4 Conceptual Framework of the Study

Conceptual framework is a type of transitional theory that attempt to connect all features of investigation. It can act like maps that give consistency to experimental inquiry. Because conceptual frameworks are potentially so close to experimental inquiry, they take different forms depending upon the research question or problem (Wikipedia, 2012). Problems is something that impedes the normal development and progress. This study is concerned with the problems faced by the farmers in using agricultural machineries. The problems faced by farmers in using agricultural machineries was the focus issue and eleven selected characteristics of the respondents were considered as selected characteristics. Problems of an individual may be affected through interacting forces of many personal selected characteristics. It is not possible to deal with all issues in a single study. It was, therefore, necessary to limit those as age, education, family size, farm size, annual income, farming experience, training received, agricultural extension media contact, knowledge on agricultural machineries, attitude of farmers towards using agricultural machineries and use of agricultural machineries.

Considering the foregoing discussion and review of literature, a conceptual framework has been developed for this study, which is diagrammatically shown in the Figure 2.1

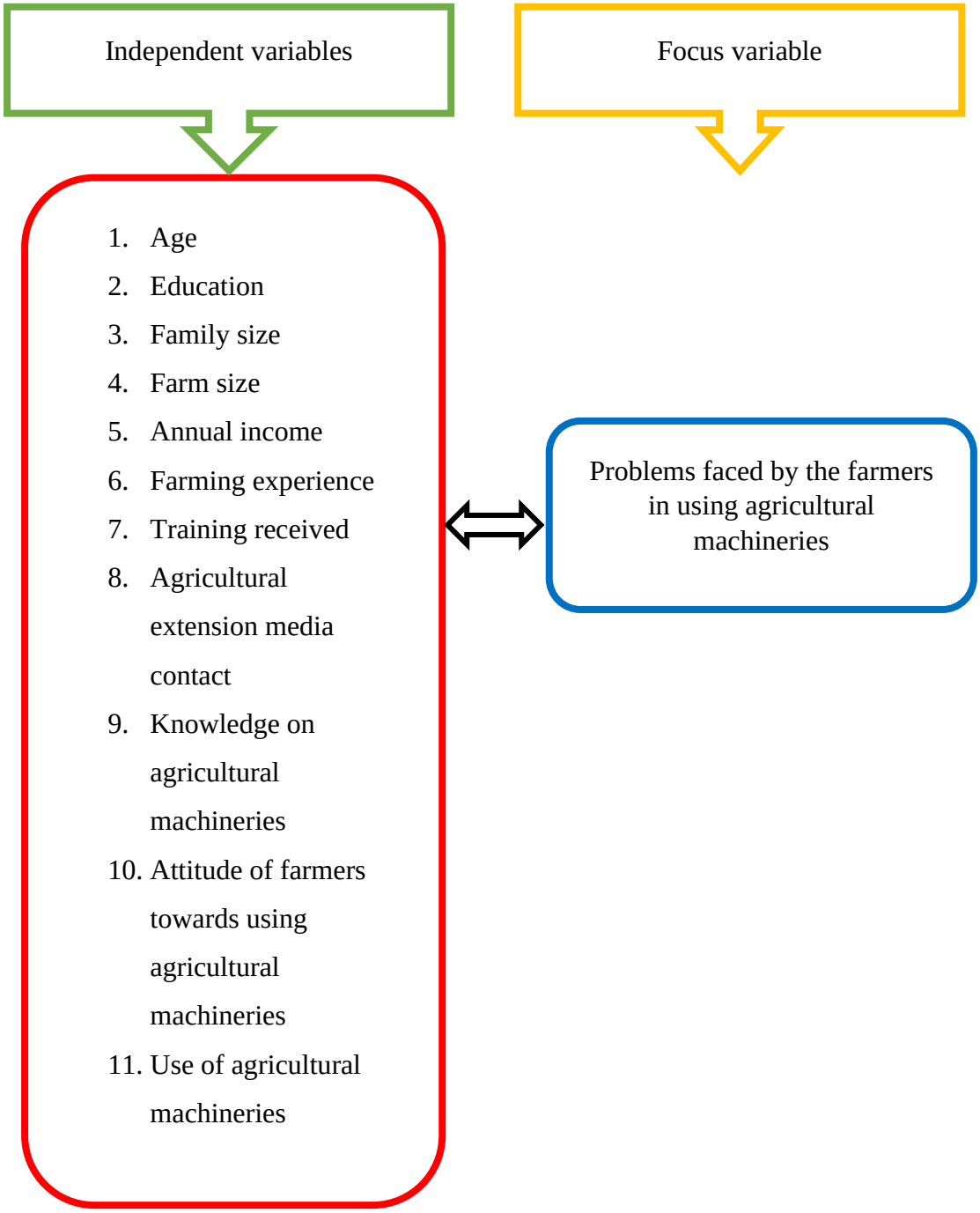

Figure 2.1 Conceptual Framework of the Study

CHAPTER 3

MATERIALS AND METHODS

In any scientific research, methodology deserves a very careful consideration. Methodology enables the researcher to collect valid information and to analyze the same properly to arrive at correct decisions. The methods and procedures followed in conducting this research are being described below.

3.1 Locale of the Study

The study was conducted in Uthrail union of Sadar upazila and 6 no. Nijpara union of Birganj upazila under Dinajpur district. There are 13 upazilas in Dinajpur district. Among these, in both Sadar upazila and Birganj upazila agricultural crops like rice, wheat, maize, vegetables are intensively cultivated along with plantation. Most of the farmers of these area are directly or indirectly engaged in agricultural activities and few people are service holders and businessmen. The geographical location of Sadar upazila is at 25°30´ to 25°45´ north latitudes and 88°30´ to 88°45´ east longitudes. Sadar upazila is bounded by Khansama and Kaharole upazila of Dinajpur district in the north, West Bengal of India in the south, Chirirbandar upazila in the east and Biral upazila in the west. The geographical location of Birganj upazila is at 25°59´ north latitudes to 88°33´ east longitudes. Birganj upazila is situated at the middle of Dinajpur and Thakurgaon district. Birganj upazila is bounded by Debiganj upazila of Panchagarh district in the north, Kaharole upazila of Dinajpur district in the south, Khansama upazila of Dinajpur district in the east and Sadar upazila of Thakurgaon district in the west. A map of Dinajpur district including its upazilas as well as Bangladesh (inset) and a map of Sadar upazila and Birganj upazila of Dinajpur district showing the study area in Figure: 3.1, 3.2 and 3.3, respectively.

3.2 Population and Sample

The farmers of Sadar upazila and Birganj upazila of Dinajpur district were the target population of the study. Sadar upazila and Birganj upazila of Dinajpur district was purposively selected due to investigator's familiarity of the area, language, and culture of the people. There are ten unions in Sadar upazila. Among them Uthrail union was selected purposively. Two villages of Uthrail union were selected purposively. An updated list of 569 farmers was collected from Upazila Agriculture Office. Out of them

a sample of 57 farmers (About 10 percent) was selected by proportionate random sampling method which is 10 percent of the population. There are eleven unions in Birganj upazila. Among them 6 no. Nijpara union was selected purposively. Two villages of 6 no. Nijpara and union were selected purposively. An updated list of 614 farmers was collected from Upazila Agriculture Office. Out of them a sample of 61 farmers (About 10 percent) was selected by proportionate random sampling method which is 10 percent of the population. Total number of populations from both Sadar and Birganj upazila is 1183 farmers and total number of samples is 118 farmers (About 10 percent) were selected by proportionate random sampling method which is 10 percent of the total population. Simultaneously a reserve list of 12 (10 percent of total sample size) farmers was prepared so that these farmers could be used for interview in case of unavailability of any farmer included in the original sample despite utmost effort during collection of data.

Table 3.1 Union and village wise distribution of the population and sample

Name of the Upazila	Name of the Union	Name of the Village	Population	Sample	Reserve list
Sadar Upazila	Uthrail	Sadipur	311	31	3
		Muradpur	258	26	3
Birganj Upazila	6 No. Nijpara	Dariapur	371	37	4
		Syedpur Kalani	243	24	2
Total=			1183	118	12

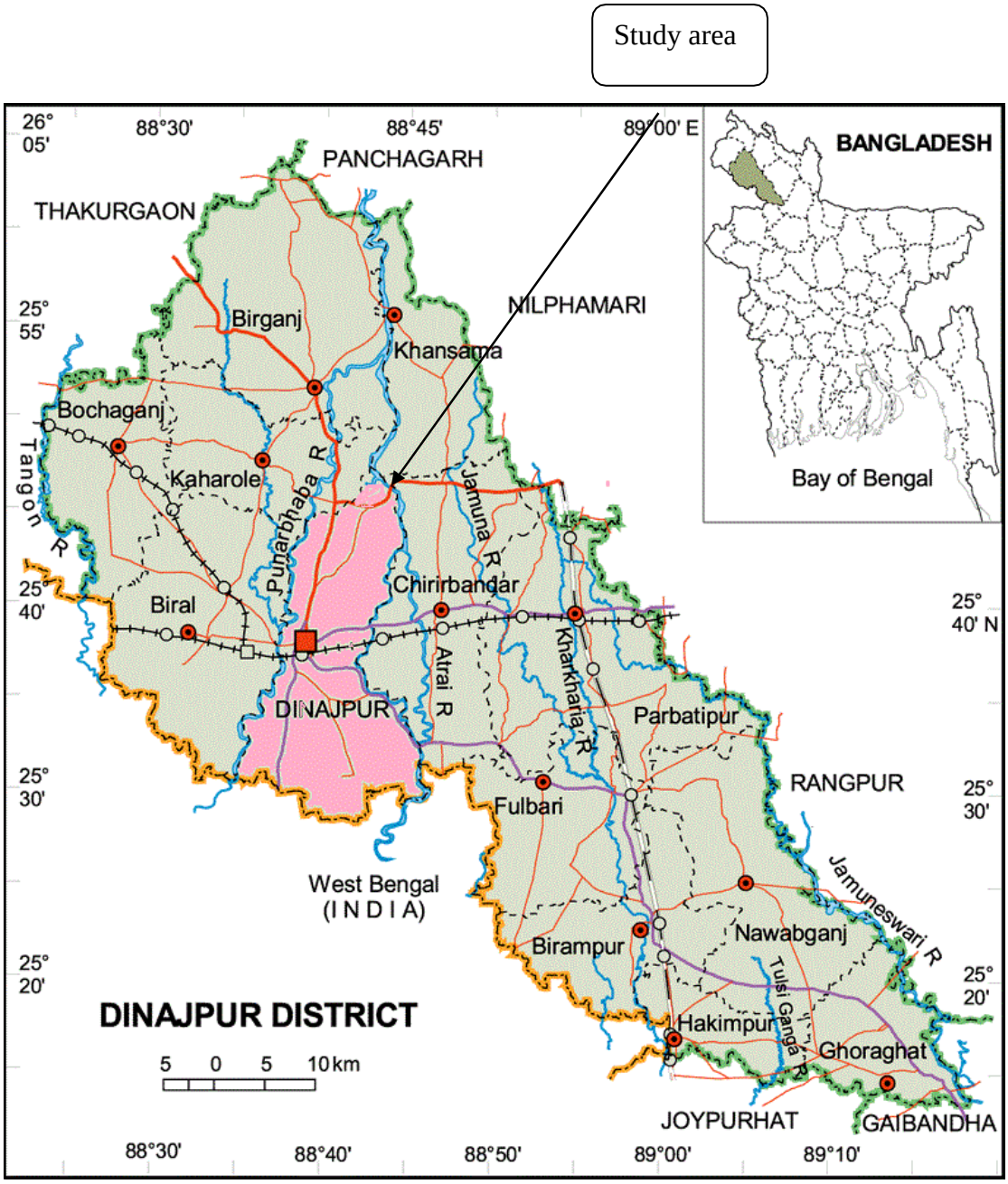

Figure 3.1 Map of Dinajpur District

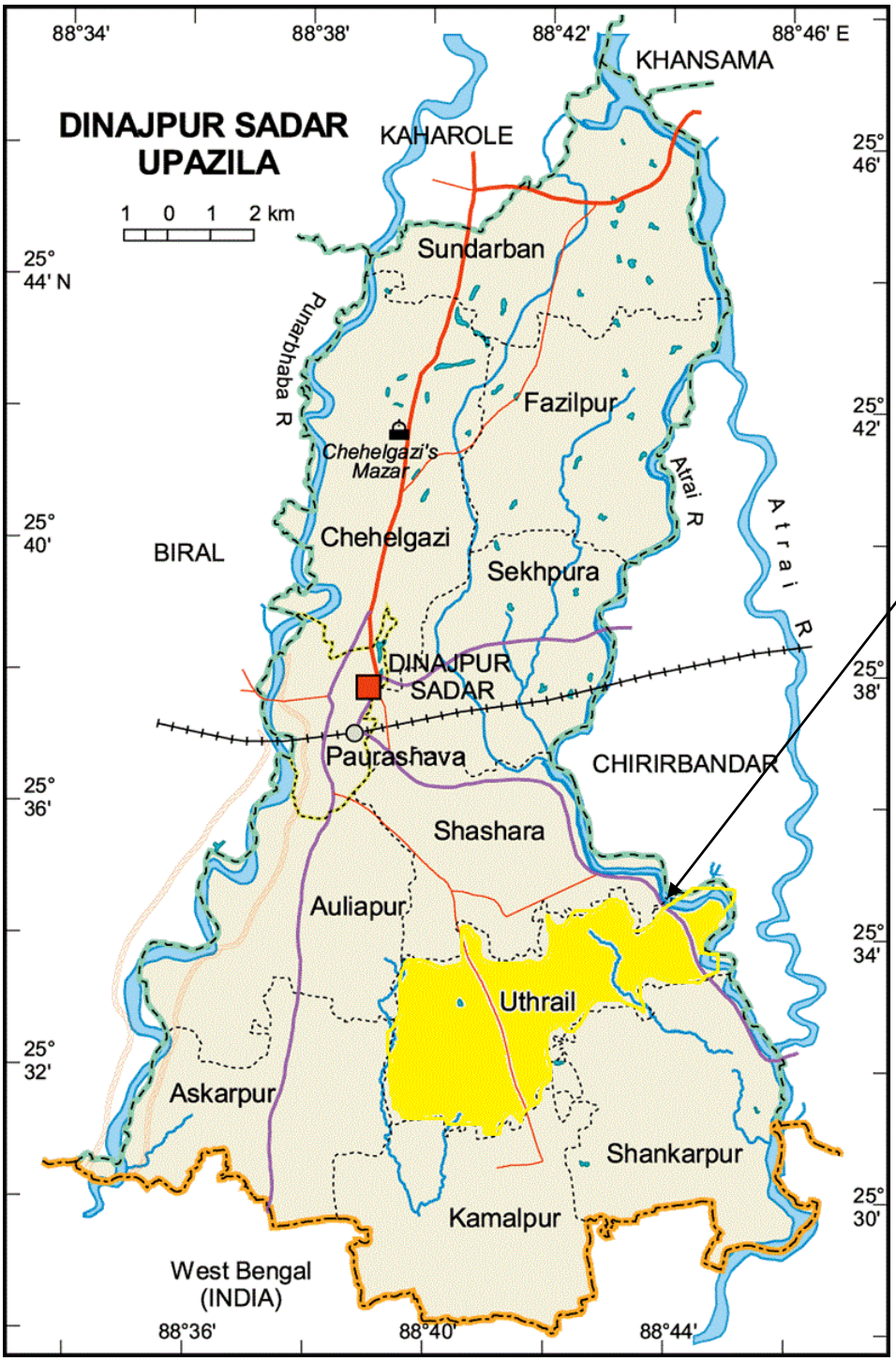

Figure 3.2 Map of Dinajpur Sadar Upazila showing the study area

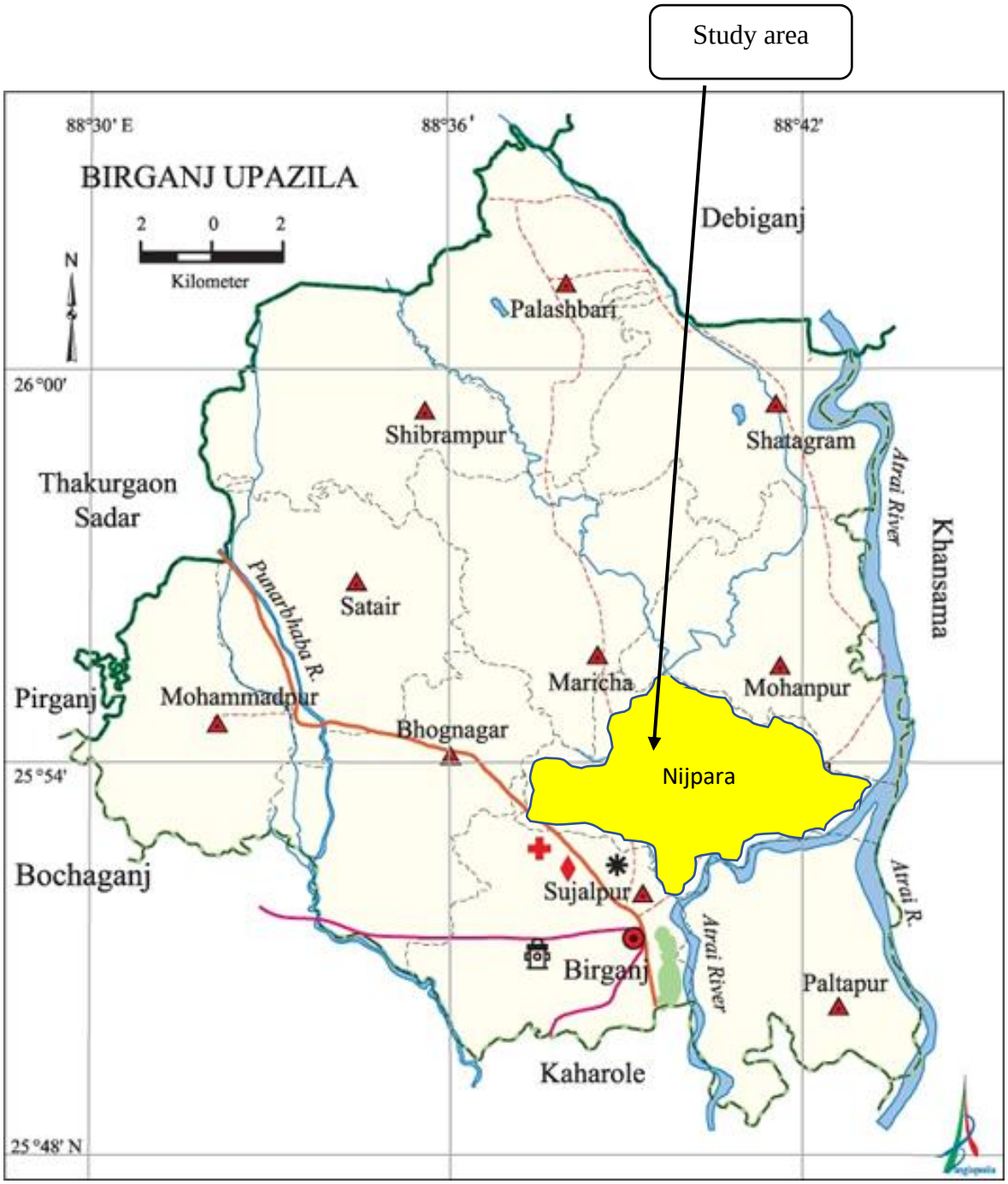

Figure 3.3 Map of Dinajpur Birganj Upazila showing the study area

3.3 Research Instrument

To collect relevant data for the study, a structured interview schedule was prepared keeping the objectives in mind. The questions and statements contained in the schedule were simple, direct, and easily understandable by the respondents. The schedule contained closed form of questions. A draft interview schedule was prepared in advance before using the same for collection of data. The draft schedule was pre-tested with 10 respondents selected from the study areas. This pre-test facilitated the researcher to identify faulty questions in the draft schedule and necessary corrections, addition and adjustment was made afterwards in the schedule based on the pre-test results.

3.4 Measurement of Selected Characteristics of the Farmer

The eleven characteristics of the respondents namely age, education, family size, farm size, annual income, farming experience, training received, agricultural extension media contact, knowledge on agricultural machineries, attitude of farmers towards using agricultural machineries and use of agricultural machineries are the selected characteristics of this study. The measurement procedure of these selected characteristics discussed below.

3.4.1 Age

Age of the respondent was measured in terms of years from his/her birthday to the time of interview which will be found based on response. A unit score was assigned for each year of one's age. The characteristic appears in the item no. 1 in the interview schedule (Appendix A).

3.4.2 Education

Education was measured as the ability of an individual farmer to read and write, or formal education received up to a certain standard. Education of the respondents was measured in terms of one's year of schooling. One score was given for passing each level in an educational institution (Mondol, 2009). For example, if a respondent passed the final examination of class V his/her education score was taken as five (5). If a respondent did not know how to read and write, his education score was given as '0'. A score of 0.5 was given to that respondent who could sign his/her name only. The characteristic appears in the item no. 2 in the interview schedule (Appendix A).

3.4.3 Family size

Family size was measured by the total number of members in the family of a respondent. The family members included the respondent himself, his wife, children, and other dependent members who lived and ate together. A unit score was assigned for each member of the family. If a respondent had five members in his/her family, then family size score was given as 5 (Khan, 2004). The characteristic appears in the item no. 3 in the interview schedule (Appendix A).

3.4.4 Farm size

Farm size was measured by the area of the raised land in which the household of the respondent had its entire dwelling unit including homestead area under cultivation (Goswami, 2016). It was expressed in hectare. The total areas of land thus obtained have been considered as farm size of the respondent. The characteristic appears in the item no. 4 in the interview schedule (Appendix A). It was measured using the following formula:

Farm size = A+ B+$\frac{1}{2}$ (C + D) + E+ F

Where,

A = Homestead (including garden and fallow land)

B = Own land under own cultivation

C = Land given to others on borga

D = Land taken from others on borga

E = Land taken from others on lease/ mortgage

F = Others(pond, poultry yard etc.)

3.4.5 Annual income

Annual income of a respondent was measured based on total yearly earning by the respondent himself/herself and other family members. The value of all the sources encompassing On farm agriculture source (rice, wheat, jute, vegetable, fruits, pulses and others) and others source (fisheries and livestock) and Off farm source (business, services, daily labor, remittence, day labour and others) etc. were taken into

consideration. For calculation of income score, one (1) was assigned for each one thousand takas of income. The characteristic appears in the item no. 5 in the interview schedule (Appendix A).

3.4.6 Farming experience

Farming experience refers to the years of experience achieved by a farmer through years of farming activities. It was measured by the number of years of farming by the respondent. A unit score was assigned for each years of farming experience. The characteristic appears in the item no. 6 in the interview schedule (Appendix A).

3.4.7 Training received

Training received was determined by the total number of days of training received by the farmers from any organization during the last three years. If a respondent took three days training on agricultural machineries from GOs, NGOs or any other organization, then his training exposure score was 3 and so on. The characteristic appears in the item no. 7 in the interview schedule (Appendix A).

3.4.8 Agricultural extension media contact

Agricultural extension media contact may be defined as one's extent of exposure to different extension media. Each respondent was asked to indicate the extent of his contact with each of the selected media. With four alternative responses as regularly, occasionally, rarely, and never basis and scores were assigned as 3, 2, 1 and 0 respectively (Goswami, 2016). The agricultural extension media contact score of a respondent was measured by summing up his/her scores for contact with all the selected media. Thus, possible extension contact score could range from zero (0) to 30, where zero (0) indicated no extension contact and 30 indicated the highest level of extension contact. The characteristic appears in the item no. 8 in the interview schedule (Appendix A).

3.4.9 Knowledge on agricultural machineries

knowledge on agricultural machineries referred to the extent of facts or information about agricultural machineries. It was measured with the answers of some selected questions and assigned scores were 2, 3, 4 and 5 according to question variation. For correct answer respondents were given full marks and for partial answer respondents

were given partial marks. If, the respondents are unable to give answer then he or she gets zero marks. Knowledge on agricultural machineries was measured by summing up his/her scores for answer with all the selected questions. Thus, possible knowledge on agricultural machineries score could range from zero (0) to 50, where zero (0) indicated no knowledge on agricultural machineries and 50 indicated the highest level of knowledge on agricultural machineries. The characteristics appears in the item no. 9 in the interview schedule (Appendix A).

3.4.10 Attitude of farmers towards using agricultural machineries

Attitude of farmers towards using agricultural machineries refers to one's feeling towards the use of agricultural machines in various aspects of farming activities. Attitude of a respondent towards using agricultural machineries was measured by developing an attitude scale. Five-point Likert scale method of summated ratings was used to find out the respondents "attitude towards using agricultural machineries". Twelve (12) statements expressing positive and negative feelings towards using agricultural machineries were constructed. A statement was considered positive if it indicated a favorable attitude towards using agricultural machineries. If the case was reverse, it was considered as a negative statement. Out of these twelve statements six were positive and six were negative. Scoring was done by assigning 5, 4, 3, 2 and 1 scores to the five alternative responses as "strongly agreed", "agreed", "no opinion", "disagreed", and "strongly disagreed" respectively in case of a positive statement. Reverse score was assigned for a negative statement. However, attitude towards using agricultural machineries of a farmer was obtained by summing up his/her scores for all twelve (12) statements in item no. 10 of the interview schedule (Appendix A). Attitude score, thus, obtained for a respondent could range from 12 to 60, where 12 indicate very unfavorable attitude and 60 indicate highest level of favorable attitude.

3.4.11 Use of agricultural machineries

Use of agricultural machineries refers to the level of use of agricultural machineries from land preparation to post-harvest operation. A good numbers of agricultural machineries are being used by the farmers who engaged in farm mechanization. Based on pre-test experience and through consultation with relevant experts, 18 agricultural machineries were considering for this study. The respondents were asked to indicate their extent of use of these 18 agricultural machineries with four alternative responses

as regularly, occasionally, rarely and never and weights were assigned to the alternative responses as 3, 2, 1 and 0 respectively. Use of agricultural machineries score of the respondents were computed by summing up all the scores obtained by them from all the 18 agricultural machineries. Thus the possible range of use of agricultural machineries score was 0-54, while 0 indicated no use and 54 indicated highest use of agricultural machineries. The characteristics appears in the item no. 11 in the interview schedule (Appendix A).

3.5 Measurement of Focus Variable

Problems faced by the farmers in using agricultural machineries was focus variable of the study. Problems was measured by using of closed form of questions (item no.12, Appendix A). The farmers were asked to give their opinion on 12 selected problems which were identified during pre-testing of the questionnaire with consultation of supervisor and other expert. A five-point modified Likert scale was used for computing the problems score. Weights on responses against the 12 problems of the farmers were assigned as 4 for 'very high', 3 for 'high', 2 for 'medium', 1 for 'low', and 0 for 'not at all'. The weights of responses of all the problems faced by the respondents were added together to obtain the problems score. Thus, the possible problems score of the respondents could range from 0 to 48, where 0 indicating no problems while 48 indicating high problems faced by the farmers in using agricultural machineries. To ascertain the comparison among the problems, Problems Facing Index (PFI) was computed by using the following formula:

$$PFI = Pvh \times 4 + Ph \times 3 + Pm \times 2 + Pl \times 1 + Pn \times 0$$

Where,

PFI = Problems Facing Index

Pvh = Frequency of respondents mention the problems as 'very high'

Ph = Frequency of respondent mention the problems as 'high'

Pm = Frequency of respondent mention the problems as 'medium'

Pl = Frequency of respondent mention the problems as 'low'

Pn = Frequency of respondent mention the problems as 'not at all'

Where, the Problems Facing Index (PFI) value could range from 0 to 472. This means that 0 indicate no problems faced in using improved agricultural machineries and 472 means highest problems faced in using agricultural machineries.

3.6 Hypothesis of the Study

As defined by Goode and Hatt (1952) 'A hypothesis is a proposition, which can be put to a test to determine its validity.' It may prove correct or incorrect of a proposition. In any event, however, it leads to an empirical test. Hypotheses are always in declarative sentence form and they relate either generally of specifically variables to sentence form and they relate either generally or specifically variables to variables. Hypothesis may be broadly divided into two categories, namely, research hypothesis and null hypothesis.

3.6.1 Research Hypothesis

Based on review of literature and development of conceptual framework, the following research hypothesis was formulated: 'There were significant relationships between the selected eleven characteristics (i.e. age, education, family size, farm size, annual income, farming experience, training received, agricultural extension media contact, knowledge on agricultural machineries, attitude of farmers towards using agricultural machineries and use of agricultural machineries) of the farmers and their problems faced in using agricultural machineries. However, when a researcher tries to perform statistical tests, then it becomes necessary to formulate null hypothesis.

3.6.2 Null Hypothesis

Null hypothesis: 'There was no significant relationship between the selected eleven characteristics (i.e. age, education, family size, farm size, annual income, farming experience, training received, agricultural extension media contact, knowledge on agricultural machineries, attitude of farmers towards using agricultural machineries and use of agricultural machineries) of farmers and their problems faced in using agricultural machineries.

3.7 Collection of Data

Data were collected personally by the researcher himself through face-to-face interview. To familiarize with the study area and for getting local support, the

researcher took help from the local leaders and the field staffs of Upazila Agriculture Office. The researcher made all possible efforts to explain the purpose of the study to the farmers. Rapport was established with the farmers prior to interview and the objectives were clearly explained by using local language as far as possible. Data were collected during the period of 15 April to 15 May 2022.

3.8 Data Processing

After completion of field survey, all the data were coded, compiled and tabulated according to the objectives of the study. Local units were converted into standard units. All the individual responses to questions of the interview schedule were transferred into a master sheet to facilitate tabulation, categorization and organization. In case of qualitative data, appropriate scoring technique was followed to convert the data into quantitative form.

3.9 Categorization of Data

Following coding operation, the collected raw data from respondents were classified into various categories to facilitate the description of the variables. These categories were developed for each of the variables by considering the nature of distribution of the data and extensive literature review. The procedures for categorization have been discussed while describing the variables under consideration in Chapter 4.

3.10 Statistical Analysis

The Statistical Package for Social Sciences (SPSS) 25.0 computer program was used for analyzing the data. Various descriptive statistical measures such as frequency, number, percentage, mean, standard deviation and rank order was used for categorization and describing the variables. Pearson's Product Moment Correlation Coefficient (r) was used for testing the relationships between the concerned variables. At least 5.0 percent (P=0.05) level of probability was used as a basis for rejection of the null-hypotheses throughout the study.

CHAPTER 4

RESULTS AND DISCUSSION

The findings of the study and interpretations of the results have been presented in this chapter. These are presented in three sub-sections according to the objectives of the study. The first sub-section deals with the selected characteristics of the farmers, while the second sub-section deals with problems faced by the farmers in using agricultural machineries. In third section deals with the relationship between the selected characteristics of the farmers and their problems faced in using agricultural machineries.

4.1 Selected Characteristics of the Farmers

Eleven characteristics of the farmers were selected to find out their relationships with problems faced by the farmers in using agricultural machineries. The selected characteristics included their age, education, family size, farm size, annual income, farming experience, training received, agricultural extension media contact, knowledge on agricultural machineries, attitude of farmers towards using agricultural machineries and use of agricultural machineries. These characteristics of the farmers are described in this section.

Data contained in the Table 4.1 reveal the main features of the characteristics of the farmers in order to have an overall picture of these characteristics at a glance.

Table 4.1 Main features of the farmers (N= 118)

Characteristics	Scoring Method	Range		Mean	SD
		Possible	Observed		
Age	No. of year	Unknown	25-75	46.24	11.90
Education	Year of schooling	Unknown	0-17	7.82	5.28
Family size	No. of members	Unknown	2-12	5.52	2.02
Farm size	Hectare	Unknown	0.02-3.93	1.05	0.77
Annual income	(‘000’Tk)	Unknown	29-455	140.03	88.62
Farming experience	No. of year	Unknown	5-55	25.04	12.08
Training received	Days	Unknown	0-14	3.71	3.62
Agricultural extension media contact	Score	0-30	8-24	14.62	3.34
Knowledge on agricultural machineries	Score	0-50	25-46	33.92	5.75
Attitude of farmers towards using agricultural machineries	Score	12-60	29-52	42.48	4.79
Use of agricultural machineries	Score	0-54	20-45	33.11	7.16

4.1.1 Age

The observed age of the farmers ranged from 25-75 years with a mean of 46.24 year and standard deviation of 11.90. Based on their age, the farmers were classified into three categories according to Ministry of Youth and Sports, Bangladesh, 2008, such as “young aged” (≤35), “middle aged” (36-50) and “old aged” (≥51) (Table 4.2).

Table 4.2 Distribution of the farmers according to their age

Categories	Farmers		Mean	SD
	No.	Percent		
Young aged (≤35)	33	28.0	46.24	11.90
Middle aged (36-50)	42	35.6		
Old aged (≥51)	43	36.4		

(Ministry of Youth and Sports, Bangladesh, 2008)

About 36.4 percent of the farmers were old aged compared to 28.0 percent of them being young aged and 35.6 percent middle aged. Thus, more than fifty percent (63.6 percent) of the farmers were young to middle aged. Young people are generally interested to new ideas and things. They have a favorable attitude towards trying new ideas or technologies.

4.1.2 Education

The education score of the farmers ranged from 0-17, with the mean value of 7.82 and standard deviation of 5.28. Based on their level of education, the respondents were grouped into five categories according to Hoque, 2016 and Masud, 2007 such as- illiterate (0), can sign only (0.5), primary level (1-5), secondary level (6-10) and above higher secondary (>10). The distribution of the farmers according to their education is shown in Table 4.3.

Table 4.3 Distribution of the farmers according to their education

Categories	Farmers		Mean	SD
	No.	Percent		
Illiterate (0)	9	7.6	7.82	5.28
Can sign only (0.5)	14	11.9		
Primary level (1-5)	19	16.1		
Secondary level (6-10)	45	38.1		
Above secondary level (>10)	31	26.3		

(Hoque, 2016 and Masud, 2007)

About 38.1 percent of the farmers had education up to secondary level compared to 26.3 percent having higher secondary level education. About 16.1 percent of the farmers had education up to primary level, 11.9 percent of them can sign only and 7.6 percent of the farmers were illiterate. Thus, more than fifty percent (54.2 percent) of the farmers had education ranging from primary to secondary level. Education helps individuals to become rational, aware and to get helpful information to solve their daily working problems through different sources of information. It might help to improve their knowledge on improved agricultural implements. The discoveries recommend that education may be one of the variables for the respondents to change their demeanor towards agricultural machineries with the utilization of current farming advancements.

4.1.3 Family Size

The family size of the farmers ranged from 2 to 12 having mean value of 5.52 and standard deviation 2.02. Based on their family size, they were classified into three categories as small (≤4), medium (5-7) and large (≥8) family size. (Table 4.4)

Table 4.4 Distribution of the farmers according to their family size

Categories	Farmers		Mean	SD
	No.	Percent		
Small family (≤4)	41	34.7	5.52	2.02
Medium family (5-7)	59	50.0		
Large family (≥8)	18	15.3		

Results of Table 4.4 indicate that 50.0 percent of the farmers had medium sized families. On the other hand, 34.7 percent had small family and 15.6 percent had large family. Thus, more than fifty percent (65.3 percent) of the farmers had medium to large sized family. The national average family size in Bangladesh is 4.3 (BBS, 2019) which was less than the mean value of the present study (5.52). It is quite rational that incidence of joint family system in the study area might have also contributed to the large family size.

4.1.4 Farm Size

The farm size of the farmers ranged from 0.02 to 3.93 and the mean was 1.05 with standard deviation of 0.77. The farmers were classified into five categories based on their farm size as suggested by DAE (1999) as landless (≤0.02), marginal (0.021-0.20), small (0.21-1.00), medium (1.01-3.00) and large (≥3.01) as shown in Table 4.5.

Table 4.5 Distribution of the farmers according to their farm size

Categories	Farmers		Mean	SD
	No.	Percent		
Land less (≤0.02)	1	0.8	1.05	0.77
Marginal (0.021-0.20)	5	4.2		
Small (0.21-1.00)	64	54.2		
Medium (1.01-3.00)	44	37.3		
Large (≥3.01)	4	3.5		

(DAE, 1999)

Data presented in Table 4.5 that more than fifty percent (54.2 percent) of the farmers were under small farm size category followed by 37.3 percent, 4.2 percent, 0.8 percent and only 3.5 percent under medium, marginal, land less and large farm size category respectively. Farm size of individuals is being diminished step by step because of land fracture through age to age. To have a sensible way of life these farmers should have the option to have high return of harvests per hectare and increment their cultivation intensity. The discoveries recommend that farm size may be the main variable for the respondents to change their demeanor towards agricultural machineries with the utilization of current farming advancements.

4.1.5 Annual Income

Annual income score of the farmers ranged from 29 to 455, the mean being 140.03 thousand tk. and standard deviation 88.62. Based on their family income scores, the farmers were divided into three categories: low annual income (≤150), medium annual income (151-300) and high annual income (≥301). The distribution of the farmers according to their family income is shown in Table 4.6.

Table 4.6 Distribution of the farmers according to their annual income

Categories	Farmers		Mean	SD
	No.	Percent		
Low annual income (≤150)	82	69.5	140.03	88.62
Medium annual income (151-300)	22	18.6		
High annual income (≥301)	14	11.9		

The highest proportion (69.5 percent) of the farmers had low annual income, while 18.6 percent of them having medium annual income and 11.9 percent had high annual income. Thus, overwhelming majority (88.1 percent) of the farmers had low to medium annual income.

4.1.6 Farming experience

Farming experience of the farmers ranged from 5 to 55 and mean was 25.04 and standard deviation 12.08. Based on their farming experience scores, the farmers were divided into three categories: low (≤15), medium (16-40) and high (≥41). The distribution of the farmers according to their farming experience is shown in Table 4.7.

Table 4.7 Distribution of the farmers according to their farming experience

Categories	Farmers		Mean	SD
	No.	Percent		
Low experience (≤13)	22	18.6	25.04	12.08
Medium experience (14-37)	79	66.9		
High experience (≥38)	17	14.5		

(Mean ± SD)

The highest proportion (66.9 percent) of the farmers had medium experience, while 18.6 percent of them having low experience and 14.5 percent had high. Thus, overwhelming majority (85.5 percent) of the farmers had medium to low experience.

4.1.7 Training received

The observed training received scores of the respondents ranged from 0 to 14 with an average of 3.71 and a standard deviation of 3.62. Based on their observed training received scores, the farmers were classified into four categories: no (0), low (1-5), medium (6-10) and high (≥11). The distribution of the farmers according to their training received is shown in Table 4.8

Table 4.8 Distribution of the farmers according to their training received

Categories	Farmers		Mean	SD
	No.	Percent		
No training (0)	34	28.8	3.71	3.62
Low training (1-5)	54	45.8		
Medium training (6-10)	24	20.3		
High training (≥11)	06	5.1		

Results of Table 4.8 showed that about 45.8 percent of the farmers had low training received compared to 28.8, 20.3 and 5.1 percent no, medium, and high training received respectively. Training received fosters the farmers to information, expertise, and disposition in certain way.

4.1.8 Agricultural Extension Media Contact

The observed agricultural extension media contact scores of the farmers ranged from 8 to 24 against the possible range from 0 to 30, the mean and standard deviation were 14.62 and 3.34 respectively. Based on their agricultural extension media contact scores, the farmers were divided into three categories. Data presented in table 4.9 showed that majority proportion (67.8 percent) of the farmers had medium agricultural extension media contact compared to 17.8 percent of them had low agricultural extension media contact and 14.4 percent of them had high agricultural extension media contact.

Table 4.9 Distribution of the farmers according to their agricultural extension media contact

Categories (Mean ± SD)	**Farmers**		**Mean**	**SD**
	No.	**Percent**		
Low contact (≤11)	21	17.8	14.62	3.34
Medium contact (12-18)	80	67.8		
High contact (≥19)	17	14.4		

Thus, majority (85.6 percent) of the farmer had low to medium extension contact. This may be due to socio-economic conditions of the farmers. Extension contact is a very effective and powerful source of receiving information about various new and modern technologies. So, extension contact should be increased for betterment of our agriculture.

4.1.9 Knowledge on Agricultural Machineries

Farmers knowledge scores could theoretically range from 0 to 50. But their observed knowledge scores ranged from 25 to 46, the mean being 33.92 and standard deviation 5.75. Based on the theoretical scores, the farmers were classified into three categories as low knowledge, moderate knowledge and high knowledge.

Table 4.10 Distribution of the farmers according to their knowledge on agricultural machineries

Categories	**Farmers**		**Mean**	**SD**
	No.	**Percent**		
Low knowledge (≤28)	25	21.2	33.92	5.75
Moderate knowledge (29-40)	76	64.4		
High knowledge (≥41)	17	14.4		

(Mean ± SD)

Results of table 4.10 showed that majority (64.4 percent) of the farmers possessed moderate knowledge and 21.2 and 14.4 percent of the farmers possessed poor and good

knowledge on agricultural machineries respectively. It means that overwhelming majority (85.6 percent) of the farmers had poor to moderate knowledge.

4.1.10 Attitudes of Farmers Towards Using Agricultural Machineries

Attitude score of the respondents towards using agricultural machineries could theoretically range from 12 to 60. However, the observed ranged was 29 to 52 with mean of 42.48 and standard deviation of 4.79. Based on the attitude scores, the respondents were placed under four categories namely unfavorable, neutral, favorable and highly favorable attitude.

Table 4.11 Distribution of the farmers according to their attitude towards using agricultural machineries

Categories	Farmers		Mean	SD
	No.	Percent		
Unfavorable attitude (≤35)	20	16.9	42.48	4.79
Neutral attitude (36)	3	2.5		
Favorable attitude (37-48)	89	75.4		
Highly favorable attitude (49-60)	6	5.2		

Results of Table 4.11 reveal that majority (75.4 percent) of the respondents had favorable attitude towards using agricultural machineries and 16.9 percent, 2.5 percent and 5.2 percent of the respondents had unfavorable, neutral and highly favorable attitude towards using agricultural machineries.

4.1.11 Use of Agricultural Machineries

Use of agricultural machineries scores could theoretically range from 0 to 54. But their observed use scores ranged from 20 to 45, the mean was 33.11 and standard deviation was 7.16. Based on the use of agricultural machineries scores, the farmers were classified into three categories as low use, medium use and high use.

Table 4.12 Distribution of the farmers according to their use of agricultural machineries

Categories	Farmers		Mean	SD
	No.	Percent		
Low use (≤26)	32	27.1	33.11	7.16
Medium use (27-40)	70	59.3		
High use (≥41)	16	13.6		

(Mean ± SD)

Results of table 4.12 showed that majority (59.3 percent) of the farmers had medium use of agricultural machineries and 27.1 percent and 13.6 percent of the farmers had low and high use of agricultural machineries respectively. It means that overwhelming majority (86.4 percent) of the farmers had low to medium use of agricultural machineries. The discoveries recommend that use of agricultural machineries may be one of the variables for the respondents to change their demeanor towards agricultural machineries with the utilization of current farming advancements.

4.2 Problems Faced by the Famers in Using Agricultural Machineries

Farmers faced different kinds of problems in using agricultural machineries. From this study we found some problems as fragmented land, lack of quality machines, high price of machineries, lack of spare parts, maintenance problems of agri-machineries, lack of knowledge and skill on using agricultural machineries, lack of awareness regarding agri-machineries, lack of training program on agricultural machineries, lack of after sales service, mechanical troubles of locally manufactured agri-machineries, high price of fuel and lack of providing soft loan.

4.2.1 Overall Problems Faced by the Farmers in Using Agricultural Machineries

The problems faced by the farmers in using agricultural machineries scores ranged from 21 to 44, against the possible score 0 to 48. The mean and standard deviation were 33.54 and 7.34 respectively. The respondents were classified into three categories based on their problems faced in using agricultural machineries as low (≤24), medium (25-39) and high (≥40) as shown in Table 4.13.

Table 4.13 Distribution of the respondents to their overall problems faced by the farmers in using agricultural machineries

Categories	Respondents		Mean	SD
	No.	Percent		
Low problem (≤24)	19	16.1	33.54	7.34
Medium problem (25-39)	83	70.3		
High problem (≥40)	16	13.6		

(Mean ± SD)

Data presented in Table 4.13 shows that majority 70.3 percent of the farmers had medium problems faced, 16.1 percent had low problems faced and 13.6 percent had high problems faced in using agricultural machineries. The result due to that they had lack of training, medium economic condition, lack of technical knowledge on agricultural machineries etc.

4.2.2 Rank order of the farmers problems faced in using agricultural machineries

The farmers had mentioned their faced problems in using agricultural machineries. The percent distributions of the farmer for each of the problems are presented in Table 4.14 along with Problems Facing Index (PFI) and the ranked order of the challenges based on PFI. The PFI in using agricultural machineries ranged from 282 to 401 against the possible range 0 to 472.

Table 4.14 Rank order of the farmers problems faced using agricultural machineries

SL No.	Problems	Extent of problems					PFI	Rank Order
		Very High	High	Medium	Low	Not at all		
1	Fragmented land	78	20	12	5	3	401	1st
2	Lack of quality machines	43	32	22	15	6	327	5th
3	High price of machineries	65	28	16	7	2	383	2nd
4	Lack of spare parts	25	32	45	13	3	299	10th
5	Maintenance problems of agri-machines	30	40	35	11	2	321	7th
6	Lack of knowledge and skill on using agricultural machineries	45	34	23	12	4	340	4th
7	Lack of awareness regarding agri-machineries	42	32	22	15	7	323	6th
8	Lack of training program on agricultural machineries	32	34	40	10	2	320	8th
9	Lack of after sales service	26	28	42	19	3	291	11th
10	Mechanical troubles of locally manufactured agri-machineries	30	36	37	10	5	312	9th
11	High price of fuel	63	25	10	12	8	359	3rd
12	Lack of providing soft loan	25	27	42	17	7	282	12th

*PFI = Problems Facing Index

The data from the research revealed that the highest problems faced by the farmers was ‘Fragmented land’ (PFI = 401). The rural people are mostly poor and hardly possesses large amount of land for cultivation. Because of fragmented land farmers feels discourage to use agricultural machineries to avoid excessive cost for production. Farmers having large amount of land for cultivation uses agricultural machineries. But the number of such farmers is very limited.

The second important problems faced by the farmers was observed ‘High price of machineries’ (PFI = 383). The rural people are mostly poor and hardly can buy a costly

machine individually. Some well-to-do ranchers having a huge number of agricultural lands possess some expensive machines like, tractors, power tillers, power tiller operated seeders, combines etc. They utilize these machines in their own properties and furthermore work them on hiring basis in others lands and procure a considerable return. But the number of such farmers is very limited.

The 3rd important problems faced by farmers was observed on 'High price of fuel' (PFI = 359). Recently government has increased fuel prices to 42.5 percent (Diesel). Farmers usually rely on the rains to ensure that their fields are well supplied with water. But as they have had to irrigate the fields mainly by using diesel-run pumps, their production cost has gone up. The farmers are not economically solvent.

Lowest proportion of farmers faced problem on 'Lack of providing soft loan' (PFI = 282). The consequences might be due to high interest rate of loan and assuming yield misfortune happens, farmers face large difficulties to pay loan with exorbitant loan cost. The second lowest proportion of farmers faced problem on 'Lack of after sales service' (PFI = 291).

4.3 Relationship between the Selected Characteristics of the farmers and their Problems Faced in Using Agricultural Machineries

The purpose of this section is to explore the relationships between each of the selected characteristics of the farmers and their problems faced in using agricultural machineries. The selected characteristics constituted independent variables and as focus variable problems faced by the farmers in using agricultural machineries was considered. Pearson's Product Moment Correlation Co-efficient 'r' was used to test the null hypothesis concerning the relationship between the variables. The summary results of test of correlation coefficient are shown in Table 4.15. However, a correlation matrix for focus issue and selected characteristics were presented in Appendix B.

Table 4.15 Correlation between focus variable and selected characteristics

Focus issue	Selected characteristics	Correlation coefficient value(r)	Tabulated value of 'r' with 117 df	
			0.05 level	0.01 level
Problems faced by the farmers in using agricultural machineries	Age	-0.002	0.174	0.228
	Education	-0.246**		
	Family size	-0.032		
	Farm size	-0.627**		
	Annual income	-0.608**		
	Farming experience	-0.099		
	Training received	0.012		
	Agricultural extension media contact	-0.081		
	Knowledge on agricultural machineries	-0.232*		
	Attitude of farmers towards using agricultural machineries	-0.017		
	Use of agricultural machineries	-0.772**		

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

4.3.1 Age and problems faced in using agricultural machineries

According to the computed value of 'r' (-0.002) was smaller than the tabulated value (r = 0.174) with 117 degrees of freedom at 0.05 level as shown in Table 4.15. Hence, the concerned null hypothesis could not be rejected. The finding indicated that age of the farmers had no significant relationship with their problems faced in using agricultural machineries. Similar findings were also observed by Arafat (2018), Kamal (2017), Hossain (2016), Mortuza (2015) and Baten (2014). As there is no significant relationship between age and problems faced in using agricultural machineries, we can say that age is not associated with farmers problems in using agricultural machineries.

4.3.2 Education and problems faced in using agricultural machineries

According to the computed value 'r' (-0.246**) was larger than the tabulated value (r = 0.228) with 117 degrees of freedom at 0.01 level as shown in Table 4.15. Hence, the concerned null hypothesis could be rejected. The finding indicated that education of the farmers had negative significant relationship with their problems faced in using agricultural machineries. So, more educated farmers had faced less challenges in using agricultural machineries. Similar result also found by Arafat (2018), Islam (2017), Kamal (2017), and Baten (2014). So, we can say that if education level of farmers increases, they will face less problems and if education level decreases farmers will face more problems. Increase in farmers education level can enhances many aspects such as training, participation, extension contact and so on.

4.3.3 Family size and problems faced in using agricultural machineries

According to the computed value 'r' (-0.032) was smaller than the tabulated value (r = 0.174) with 117 degrees of freedom at 0.05 level as shown in Table 4.15. Hence, the concerned null hypothesis could not be rejected. The finding indicated that family size of the farmers had no significant relationship with their problems faced in using agricultural machineries. Similar findings were also observed by Arafat (2018), Kamal (2017), Hossain (2016) and Mortuza (2015). From the result found, we can say family size is not related with the problems faced by the farmers in using agricultural machineries.

4.3.4 Farm size and problems faced in using agricultural machineries

According to the computed value 'r' (-0.627**) was larger than the tabulated value (r = 0.228) with 117 degrees of freedom at 0.01 level as shown in Table 4.15. Hence, the concerned null hypothesis could be rejected. The finding indicated that farm size of the farmers had negative significant relationship with their problems faced in using agricultural machineries. Similar finding was also observed by Kamal (2017). So, we can say that, farmers possess less land faces more problems and farmers possesses more land faces less problems in using agricultural machineries. Farmers with less land faces more difficulty to use medium to large size machineries in field compared to large land farmers.

4.3.5 Annual income and problems faced in using agricultural machineries

According to the computed value 'r' (-0.608**) was larger than the tabulated value (r = 0.228) with 117 degrees of freedom at 0.01 level as shown in Table 4.15. Hence, the concerned null hypothesis could be rejected. The finding indicated that annual income of the farmers had negative significant relationship with their problems faced in using agricultural machineries. Similar findings were also observed by Kamal (2017), Noman (2012) and Parvez (2009). We can say that, farmers having more income faces less problems and farmers having less income faces high problems in using agricultural machineries. Farmers with low annual income face problems as they don't have enough money to use agricultural machineries to increase productivity.

4.3.6 Farming experience and problems faced in using agricultural machineries

According to the computed value 'r' (-0.099) was smaller than the tabulated value (r = 0.174) with 117 degrees of freedom at 0.05 level as shown in Table 4.15. Hence, the concerned null hypothesis could not be rejected. The finding indicated that farming experience of the farmers had no significant relationship with their problems faced in using agricultural machineries. Similar finding was also observed by Hossain (2016). Results shows that farming experience is not connected with the farmers problems in using agricultural machineries.

4.3.7 Training received and problems faced in using agricultural machineries

According to the computed value 'r' (0.012) was smaller than the tabulated value (r = 0.174) with 117 degrees of freedom at 0.05 level as shown in Table 4.15. Hence, the concerned null hypothesis could not be rejected. The finding indicated that training received of the farmers had no significant relationship with their problems faced in using agricultural machineries. So, we can say from the results that, training don't affect the problems faced by the farmers in using agricultural machineries.

4.3.8 Agricultural extension media contact and problems faced in using agricultural machineries

According to the computed value 'r' (-0.081) was smaller than the tabulated value (r = 0.174) with 117 degrees of freedom at 0.05 level as shown in Table 4.15. Hence, the concerned null hypothesis could not be rejected. The finding indicated that agricultural extension media contact of the farmers had no relationship with their problems faced in

using agricultural machineries. As agricultural extension media contact is not significant, we can say farmers level of agricultural extension media contact is not associated with the problems faced by the farmers in using agricultural machineries.

4.3.9 knowledge on agricultural machineries and problems faced in using agricultural machineries

According to the computed value ‘r’ (-0.232*) was larger than the tabulated value (r = 0.174) with 117 degrees of freedom at 0.05 level as shown in Table 4.15. Hence, the concerned null hypothesis could be rejected. The finding indicated that knowledge on agricultural machineries of the farmers had negative significant relationship with their problems faced in using agricultural machineries. Similar findings were also observed by Mortuza (2015), Baten (2014) and Parvez (2009). So, we can say famers having good knowledge about agricultural machineries faces less problems in using agricultural machineries and farmers having poor knowledge about agricultural machineries faces more problems in using agricultural machineries.

4.3.10 Attitude of farmers towards using agricultural machineries and problems faced in using agricultural machineries

According to the computed value ‘r’ (-0.017) was smaller than the tabulated value (r = 0.174) with 117 degrees of freedom at 0.05 level as shown in Table 4.15. Hence, the concerned null hypothesis could not be rejected. The finding indicated that attitude of farmers towards using agricultural machineries had no relationship with their problems faced in using agricultural machineries. From the findings of the study we can say attitude of farmers towards using agricultural machineries is not associated with the problems faced by the farmers in using agricultural machineries.

4.3.11 Use of agricultural machineries and problems faced in using agricultural machineries

According to the computed value ‘r’ (-0.772**) was larger than the tabulated value (r = 0.228) with 117 degrees of freedom at 0.01 level as shown in Table 4.15. Hence, the concerned null hypothesis could be rejected. The finding indicated that use of agricultural machineries of the farmers had negative significant relationship with their problems faced in using agricultural machineries. So, we can say that, if farmers use more agricultural machineries, they will face less problems and if famers use less

agricultural machineries, they will face more problems in using agricultural machineries.

CHAPTER 5

SUMMARY AND CONCLUSION

5.1 Summary of the Findings

The study was undertaken to describe the selected characteristics of the farmers, to determine the problems faced by the farmers in using agricultural machineries, to explore the relationship between selected characteristics of the farmers with their problems faced in using agricultural machineries. The study was conducted in Uthrail union of Sadar upazila and 6 no. Nijpara union of Birganj upazila under Dinajpur district. There are 13 upazilas in Dinajpur district. One hundred and eighteen (118) farmers were selected as sample from an updated list of 1183 farmers. Data were collected by a pre-tested interview schedule during 15 April to 15 May 2022. This chapter presents the summary of the major findings, conclusion, and recommendations of the study.

5.1.1 Selected Characteristics of the Farmers

The observed **age** of the farmers ranged from 25-75 years with a mean of 46.24 year and standard deviation of 11.90. About 36.4 percent of the farmers were old aged compared to 28.0 percent of them being young aged and 35.6 percent middle aged. The **education** score of the farmers ranged from 0-17, with the mean value of 7.82 and standard deviation of 5.28. About 38.1 percent of the farmers had education up to secondary level compared to 26.3 percent having higher secondary level education. About 16.1 percent of the farmers had education up to primary level, 11.9 percent of them can sign only and 7.6 percent of the farmers were illiterate. The **family size** of the farmers ranged from 2 to 12 having mean value of 5.52 and standard deviation 2.02. About 50.0 percent of the farmers had medium sized families. On the other hand, 34.7 percent had small family and 15.3 percent had large family.

The **farm size** of the farmers ranged from 0.02 to 3.93 and the mean was 1.05 with standard deviation of 0.77. About (54.2 percent) of the farmers were under small farm size category followed by 37.3 percent, 4.2 percent, 0.8 percent and only 3.5 percent under medium, marginal, land less and large farm size category respectively**. Annual income** of the farmers ranged from 29 to 455, the mean being 140.03 thousand tk. and standard deviation 88.62. The highest proportion (69.5 percent) of the farmers had low

annual income, while 18.6 percent of them having medium annual income and 11.9 percent had high annual income. **Farming experience** of the farmers ranged from 5 to 55 and mean was 25.04 and standard deviation 12.08. The highest proportion (66.9 percent) of the farmers had medium experience, while 18.6 percent of them having low experience and 14.5 percent had high experience.

The observed **training received** scores of the respondents ranged from 0 to 14 with an average of 3.71 and a standard deviation of 3.62. About 45.8 percent of the farmers had low training received compared to 28.8, 20.3 and 5.1 percent no, medium, and high training received respectively. The observed **agricultural extension media contact** scores of the farmers ranged from 8 to 24 against the possible range from 0 to 30, the mean and standard deviation were 14.62 and 3.34 respectively. The major proportion (67.8 percent) of the farmers had medium agricultural extension media contact compared to 17.8 percent of them had low agricultural extension media contact and 14.4 percent of them had high agricultural extension media contact.

The observed **knowledge on agricultural machineries** scores ranged from 25 to 46, the mean being 33.92 and standard deviation 5.75. About 64.4 percent of the farmers possessed moderate knowledge and 21.2 and 14.4 percent of the farmers possessed low and high knowledge on agricultural machineries respectively. The observed ranged of **attitude of farmers towards using agricultural machineries** was 29 to 52 with mean of 42.48 and standard deviation of 4.79. (75.4 percent) of the respondents had favorable attitude towards using agricultural machineries and 16.9 percent, 2.5 percent and 5.2 percent and of the respondents had unfavorable, neutral and highly favorable attitude towards using agricultural machineries. The observed **use of agricultural machineries** was ranged from 20 to 45, the mean was 33.11 and standard deviation was 7.16. majority. About (59.3 percent) of the farmers had medium use of agricultural machineries and 27.1 percent and 13.6 percent of the farmers had low and high use of agricultural machineries respectively.

5.1.2 Problems Faced by the Farmers in Using Agricultural Machineries

Farmers faced different types of problems in using agricultural machineries according to their socio-economic characteristics. In this study we observed some problems from our research had the finding as fragmented land, lack of quality machines, high price of machineries, lack of spare parts, maintenance problems of agri-machineries, lack of

knowledge and skill on using agricultural machineries, lack of awareness regarding agri-machineries, lack of training program on agricultural machineries, lack of after sales service, mechanical troubles of locally manufactured agri-machineries, high price of fuel and lack of providing soft loan.

5.1.2.1 Overall Problems Faced by the Farmers in Using Agricultural Machineries

The problems faced by the farmers in using agricultural machineries scores ranged from 21 to 44, against the possible score 0 to 48. The mean and standard deviation were 33.54 and 7.34 respectively. About 70.3 percent of the farmers had medium problems faced, 16.1 percent had low problems faced and 13.6 percent had high problems faced in using agricultural machineries.

5.1.2.2 Rank Order of Farmers Problems Faced in Using Agricultural Machineries

The PFI in using agricultural machineries ranged from 282 to 401 against the possible range 0 to 472. The highest problems faced by the farmers was 'Fragmented land' (PFI = 401). The second problems faced by the farmers was observed 'High price of machineries' (PFI = 383). The 3rd important problems faced by the farmers was observed on 'High price of fuel' (PFI = 359). Lowest proportion of farmers faced problems on 'Lack of providing soft loan' (PFI = 282). The 2nd lowest proportion of farmers faced problems on 'Lack of after sales service' (PFI = 291).

5.1.3 Relationship between the Selected Characteristics of the Farmers and their Problems Faced in Using Agricultural Machineries

Coefficient of correlation was computed to explore the relationship between the selected characteristics of the farmers with their problems faced in using agricultural machineries.

Correlation analyses indicated that among eleven selected characteristics education, farm size, annual income, knowledge on agricultural machineries and use of agricultural machineries of the farmers had negative significant relationships with their problems faced in using agricultural machineries. However, age, family size, farming experience, training received, agricultural extension media contact and attitude of farmers towards using agricultural machineries had no significant relationships with their problems faced in using agricultural machineries.

5.2 Conclusion

Based on the above findings the following conclusions were drawn:

1. 38.1 percent of the farmers had education up to secondary level and education of the farmers had negative significant relationships with their problems faced in using agricultural machineries. Therefore, it may be concluded that level of education of the farmers plays a vital role with the problems faced by the farmers in using agricultural machineries. Farmers with low education level face more problems compared to farmers with high education level.
2. 54.2 percent of the farmers had small farm size and farm size of the farmers had negative significant relationships with their problems faced in using agricultural machineries. Therefore, it may be concluded that farmers with small land size face problems as it's difficult to use medium or big size agricultural machineries in small or fragmented land and small land holders don't have enough road to bring the agricultural machineries for farm operations.
3. 69.5 percent of the farmers had low annual income and annual income of the farmers had negative significant relationships with their problems faced in using agricultural machineries. So, it might be concluded that low annual income holder farmers face more problems as they don't have enough money to buy or rent modern agricultural machineries to do their farm operations. On the hand, high annual income holder farmers face less problems as they have their own agricultural machineries which they use to do their own farm operations and also rent their machineries to other farmers and earn money that influences them to use agricultural machineries.
4. 64.4 percent of the farmers had moderate knowledge on agricultural machineries and knowledge on agricultural machineries of the farmers had negative significant relationships with their problems faced in using agricultural machineries. Therefore, it may be concluded that Therefore, it may be concluded that good knowledgeable farmers face less problems as they know the function, operation techniques of the agricultural machineries than low knowledgeable farmers on agricultural machineries.

5. 59.3 percent of the farmers had medium use of agricultural machineries and use of agricultural machineries of the farmers had negative significant relationships with their problems faced in using agricultural machineries. Therefore, it may be concluded that farmers who use more agricultural machineries get more crops and face low problems in using machineries compared with the farmers who use low use of agricultural machineries.
6. The highest problems faced by the farmers was 'Fragmented land' (PFI=401), second important problems faced by the farmers was observed 'High price of machineries' (PFI=386) and the 3rd important problems faced by the farmers was observed 'High price of fuel'(PFI=356).

5.3 Recommendation

Recommendations based on the findings and conclusions of the study have been

presented below:

5.3.1 Recommendation for Policy Implication

Recommendations based on the findings and conclusions of the study have been presented below:

1. Majority (83.9 percent) of the farmers had medium to high problems faced. So, it may be recommended government and private agricultural machineries companies like ACI Motors, METAL and ABEDIN Equipment should introduce agricultural mechanization concept through exhibition of modern agricultural machineries among the farmers to increase their farm productivity and minimize these problems.
2. The findings of the study indicated that education of the farmers had negative significant relationships with their problems faced in using agricultural machineries. Therefore, it may be recommended that government should take the special mass education program for the low educated and medium educated farmers for solving their problems.
3. The findings of the study indicated that farm size of the farmers had negative significant relationships with their problems faced in using agricultural machineries. Therefore, it may be recommended that government and large land owners should introduce community farming concept among farmers for solving their problems. In community farming small land owners will collaborate

with the large land owners from the tillage to harvesting operation of land and distribute the crops among them according to their land proportion. This will help to decrease the problems faced by the farmers in using agricultural machineries.

4. The findings of the study indicated that annual income of the farmers had negative significant relationships with their problems faced in using agricultural machineries. Therefore, it may be recommended that government should take the necessary steps like encourage bank, financial institutions and NGO to provide soft loan with lowest interest to farmers so they can do livestock, poultry and any kind of business besides farm activities to increase annual income of farmers to solve their problems.
5. The findings of the study indicated that knowledge on agricultural machineries of the farmers had negative significant relationships with their problems faced in using agricultural machineries. Therefore, it may be recommended that research institutions like BADC, BARI, BRRI and government institution DAE should take necessary steps like method demonstration, training, workshop on variety of agricultural machineries to increase knowledge on agricultural machineries of farmers to solve their problems.
6. The findings of the study indicated that use of agricultural machineries of the farmers had negative significant relationships with their problems faced in using agricultural machineries. Therefore, it may be recommended that private agricultural machineries manufacturing and importing companies like ACI Motors, METAL, ABEDIN Equipment should take the necessary steps to increase use of agricultural machineries of farmers through motivation, skill development in using agricultural machineries and giving subsidy to use agricultural machineries for solving their problems.

5.3.2 Recommendation for Further Study

1. The study was conducted in Uthrail union of Sadar upazila along with 6 no. Nijpara union of Birganj upazila under Dinajpur district. Findings of this study need verification by similar research in other parts of the country.
2. Problems faced by the farmers in using agricultural machineries was investigated. But such study may be conducted by taking into consideration of other factors.
3. Relationships of eleven characteristics of the farmers with their problems faced in using agricultural machineries. Further research should be conducted to

explore relationships of other characteristics of the farmers with their problems faced in using agricultural machineries.

4. It is difficult to determine the appropriate attitude of the farmers towards problems faced in using agricultural machineries. Measurement of problems of the farmers is not free from questions. More reliable measurement of the concerned variables is necessary for evaluating farmers problems and opinions.

CHAPTER 6

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APPENDIX-A

Department of Agricultural Extension and Information System

Sher-e-Bangla Agricultural University

An interview schedule of the research study entitled

Problems faced by the farmers in using agricultural machineries

Sl. No.: ……. Date: ……...

Name of the respondent: ……

Father's name : ……

Village : ……; Union: …….

Upazila : ……; District: ……...

(Please answer the following questions and put tick (√) whenever necessary. Your information will be kept confidential and will be used for research purpose only)

1. Age: What is your age? ☐ Years

2. Education: Mention your educational qualification.

a) Can't read and write ☐
b) Can sign name only ☐
c) Passed class.....

3. Family size: Please mention your total number of family members (including yourself).

Male		Female		Total=	

4. Farm size: Please indicate the area of land according to tenure status.

Sl. No.	Types of land	Land area	
		Local unit(Decimal)	Hectare
A.	Homestead		
B.	Own land under own cultivation		
C.	Land given to others on *borga*		
D.	Land taken from others on *borga*		
E.	Land taken from others on lease/mortgage		
F.	Others (pond, poultry yard etc.)		
Total= A+B+ $\frac{1}{2}$ (C+D) +E+F			

5. Annual income: Please state the income from following specific sources during the last year

Sl. No.	Source of income	Annual income(TK)
A. On farm income		
1	Agriculture	
2	Fisheries	
3	Livestock	
B. Off farm income		
1	Business	
2	Services	
3	Daily labor	
4	Remittance	
5	Others(if any)	
Total= (A+B)		

6. Farming experience: …….. Years

7. Training received: Have you received any training on agricultural machineries**?**

Yes ☐ No ☐

If yes, how many days? Answer: ☐ Days

8. Agricultural extension media contact: Please indicate the extent of your contact with following extension media.

Sl. No.	Extension media	Extent of contact			
		Regularly(3)	**Occasionally(2)**	**Rarely(1)**	**Never(0)**
A. Individual Contact					
1	Meet with Agriculture Extension Officer (per year)	≥6 ( )	3-5 ( )	1-2 ( )	0 ( )
2	Meet with SAAO (per 3 month)	≥6 ( )	3-5 ( )	1-2 ( )	0 ( )
3	Meet with ideal farmers (per 3 month)	≥6 ( )	3-5 ( )	1-2 ( )	0 ( )
4	Meet with NGO or development worker (per 3 month)	≥6 ( )	3-5 ( )	1-2 ( )	0 ( )
5	Meet with agricultural input dealer (per 3 month)	≥6 ( )	3-5 ( )	1-2 ( )	0 ( )

B. Mass Media Contact					
1	Listening agricultural program on Radio	Daily ( )	Weekly ( )	Monthly ( )	0 time/year ( )
2	Watching agricultural program on Television	Daily ( )	Weekly ( )	Monthly ( )	0 time/year ( )
3	Reading agricultural Publications like newspaper, poster, leaflet etc.	Daily ( )	Weekly ( )	Monthly ( )	0 time/year ( )
C. Group Contact					
1	Participation in farmers field day (per year)	3 ( )	2 ( )	1 ( )	0 ( )
2	Participation in Focused Group Discussion (FGD) program (per year)	3 ( )	2 ( )	1 ( )	0 ( )
Total= (A+B+C)					

09. Knowledge on agricultural machineries: Please answer the following questions

Sl. No.	Questions	Full marks	Obtained marks
1	What do you mean by agricultural mechanization?	2	
2	Mention name of five agricultural machineries	2	
3	Mention two machineries name that is used in land preparation	2	
4	Mention two types of pumps name that is used in irrigation	2	
5	Mention name of two machines that is used in sowing operation	2	
6	Mention name of two machines that is used in weeding operation	2	
7	Mention two sprayer name	2	
8	Mention name of five machines that is used in harvesting and post-harvesting operation	3	
9	State the functions of tractor and power tiller	3	

10	Describe the precautions of using spraying	3	
11	Describe the functions of rotavator	4	
12	Describe the functions of thresher	4	
13	Describe the major functions of combine harvester	4	
14	Discuss about the importance of agricultural mechanization?	5	
15	Discuss about the major problems of agricultural mechanization?	5	
16	How do you consider the role of government towards agricultural mechanization?	5	
Total		50	

10. Attitude of farmers towards using agricultural machineries: Please mention your degree of agreement with the following statements

Sl. No.	**Statements**	**Extent of agreement/ disagreement**				
		SA	**A**	**NO**	**D**	**SD**
1 (+)	The modern farming equipments and machineries are convenient for farming activities					
2 (-)	Agricultural mechanization is harmful for environment					
3 (+)	Use of modern farming equipments and machineries increases crop yield					
4 (-)	There is a lack of spare parts and service facilities for using agri-machineries					
5 (+)	Agricultural machineries makes easy to do farming activities					
6 (-)	Using modern farming equipments and machineries is more risky compared to traditional machineries					
7 (+)	Introduction of agricultural mechanization is a blessing for farmers					
8 (-)	It causes human health hazard.					
9 (+)	Using modern farming equipments and machineries reduces labor cost					

10 (-)	Maintenance and repairing cost of agricultural equipments and machineries is higher					
11 (+)	Agricultural mechanization solves the problem of labor shortage.					
12 (-)	Use of agri-machineries is expensive					

(N.B: SA= Strongly Agreed; A= Agreed; NO= No Opinion; D= Disagreed; SD=Strongly Disagreed)

11. Use of agricultural machineries: Mention your level of use of agricultural machineries from land preparation to post-harvest operation-

Sl. No.	Operation	Name of the machinery	Extent of practice			
			Regularly(3)	Occasionally(2)	Rarely(1)	Never (0)
1	Land preparation and sowing	Power tiller				
		Tractor				
		Country plough				
		Drum seeder				
		Trans planter				
2	Irrigation	Low lift pump				
		Deep tube well pump				
		Shallow tube well pump				
3	Land weeding	Hand weeder				
		Mechanical weeder				
4	Spraying	Hand operated sprayer				
		Knapsack sprayer				
5	Harvesting and post-harvesting	Hand sickle				
		Reaper				
		Combine harvester				
		Power thresher				
		Pedal thresher/ Open drum thresher				
		Winnower				

12. Problem faced by the farmers in using agricultural machineries: Please mention the extent of the following problems faced in using agricultural machineries

Sl. No.	Problems	Extent of problem				
		Very High (4)	**High (3)**	**Medium (2)**	**Low (1)**	**Not at all (0)**
1	Fragmented land					
2	Lack of quality machines					
3	High price of machineries					
4	Lack of spare parts					
5	Maintenance problems of agri-machineries					
6	Lack of knowledge and skill on using agricultural machineries					
7	Lack of awareness regarding agri-machineries					
8	Lack of training program on agricultural machineries					
9	Lack of after sales service					
10	Mechanical troubles of locally manufactured agri-machineries					
11	High price of fuel					
12	Lack of providing soft loan					

Thank you for your nice cooperation.

_____

Signature of the interviewer

APPENDIX B

Correlation Matrix between Focus Variable and Selected Characteristics of the Farmers

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	Y
X_1	1											
X_2	-0.247**	1										
X_3	0.151	-0.266**	1									
X_4	-0.129	0.297**	0.121	1								
X_5	-0.094	0.322**	0.051	0.951**	1							
X_6	0.778**	0.187*	0.121	-0.098	-0.088	1						
X_7	-0.161	0.096	-0.098	0.079	0.135	0.167	1					
X_8	0.044	0.249**	-0.011	0.108	0.098	0.029	0.057	1				
X_9	-0.120	0.788**	-0.082	0.324**	0.304**	-0.054	0.056	0.246**	1			
X_{10}	-0.096	0.123	-0.105	-0.022	-0.016	-0.167	0.040	0.091	0.047	1		
X_{11}	-0.164	0.237**	0.146	0.681**	0.667**	-0.021	0.035	0.006	0.229*	-0.022	1	
Y	-0.002	-0.246**	-0.032	-0.627**	-0.608**	-0.099	0.012	-0.081	-0.232*	-0.017	-0.772**	1

**, Correlation is significant at the 0.01 level, *, Correlation is significant at the 0.05 level.

X_1= Age

X_2= Education

X_3= Family size

X_4= Farm size

X_5= Annual income

X_6= Farming experience

X_7= Training received

X_8= Agricultural extension media contact

X_9= Knowledge on agricultural machineries

X_{10}= Attitude of farmers towards using agricultural machineries

X_{11}= Use of agricultural machineries

Y = Problem faced by the famers in using agricultural machineries