PROBLEMS FACED BY THE FISH FARMERS IN THAI KOI CULTURE

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DEDICATION

DEDICATED TO MY BELOVED FATHER

AND RESPECTED GRAND MOTHER

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CERTIFICATE

This is to certify that the thesis entitled **"PROBLEMS FACED BY THE FISH FARMERS IN THAI KOI CULTURE"** submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **Master of Science in Agricultural Extension and information system**, embodies the result of a piece of bona fide research work carried out by **Md. SAZZADUR RAHMAN**, Registration **No. 20-11129** under my supervision and guidance. To the best of my knowledge, no part of the thesis has been submitted for any other degree or diploma.

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

Dated: December, 2021
Dhaka, Bangladesh

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The Author

LIST OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS AND GLOSSARY

BOD Biological Oxygen Demand

DoF Department of Fisheries

DO Dissolved Oxygen

et.al. All Others

FAO Food and Agriculture Organization

GO Governmental Organisation

GDP Gross Domestic Product

FSY Fisheries Statistical Yearbook

PFI Problem Faced Index

NGO Non-Governmental Organisation

SPSS Statistical Package for Social Science

PROBLEMS FACED BY THE FISH FARMERS IN THAI KOI CULTURE

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ABSTRACT

Thai Koi is one of the most important aquaculture fish species for its production and popularity among the people in Bangladesh. The objectives of this study were to determine the extent of problems faced by the fish farmers in Thai Koi culture and to explore the contribution of selected characteristics of the farmers on their problems faced in Thai Koi culture. The study was conducted with randomly selected 115 Thai Koi fish farmers in Mutagachha upazila under Mymensingh district. A pre-tested interview schedule was used to collect data from the respondents during 24th May, 2022 to 25th June, 2022. Problems faced in Thai Koi culture was the dependent variable and its was measured by on basis of problem faced scores. The majority, 60 percent of the farmers faced medium problems in Thai Koi culture, 23.48 percent faced low problems and 16.52 percent faced high problems in Thai Koi culture. Fish farmers level of education, extension media contact, cosmopoliteness and training exposure on fish farming was the contributing factors for their problems faced in Thai Koi culture. According to Problem Faced Index (PFI), 'high price of feed' ranked highest and "social or political pressure" ranked as lowest position. Department of Fisheries (DoF), the sole government extension services provider to fish farmers and other NGOs (e.g., BRAC, RDRS, CARE, ASA & World Fish Bangladesh etc.) works for increasing Thai Koi culture in Bangladesh should take necessary steps to minimize farmer's problems.

Key words: Fish farmers, Thai Koi, Problems, Aquaculture, Bangladesh

CHAPTER I
INTRODUCTION

1.1 General Background of the Study

Fish, the second most valuable agricultural crop in Bangladesh, play a crucial role in the livelihoods and employment of millions of people. The culture and consumption of fish therefore, has important implications for national income and food security. Bangladeshi people are popularly referred to as "Mache Bhate Bangali" or "Fish and Rice makes a Bengali"(Ghose, 2014). Fisheries in Bangladesh have both prospects and challenges. Fisheries sector being one of the most productive and dynamic sectors is playing an increasingly significant role in the economy for the last few decades. This sector is contributing a very vital role in the socio-economic development and deserves potential for future development in the agrarian economy of Bangladesh. It contributes 3.57% to our national GDP and more than one-fourth (26.50%) to the agricultural GDP as well as 1.24% to national export earnings. This sector provides major share (60%) of all consumed animal protein (FRSS, 2022).

Bangladesh is surrounded by rivers and various types of water sources like pond, stream, and lakes. Major parts of the total population of this country are directly or indirectly involved with fish or fish related business. It is blessed with huge open water resources with a wide range of aquatic diversity.

Bangladesh ranked 3rd in inland open water capture production and 5th in world aquaculture production. Currently, Bangladesh ranks 4th in Tilapia production in the world and 3rd in Asia (DoF, 2022).

Bangladeshi has one of the biggest and most active deltas, fed by three mighty rivers: the Padma, the Meghna and the Jamuna. This contributes to a high potential for fresh and brackish water capture and culture fisheries, in addition to the vast marine resources. Despite Bangladesh's long coastline and large freshwater and marine water bodies, fisheries are underdeveloped compared to other industry sectors. Inland fisheries production has escalated over the years, but the productivity per hectare water area is not yet attained at its optimum. In recent years, the bulk of the production has been obtained from marine (14.74%) and freshwater (85.26%) wild capture fisheries.

In 2020–2021, total fishery production of Bangladesh was 46.21 lakh metric tons, of which 13.01 lakh metric tons was obtained from inland capture fisheries, 26.38 lakh metric tons from inland aquaculture and 6.81 lakh metric tons from marine water production (DoF, 2020).

Bangladesh is blessed with vast and rich fisheries resources. The enriched and diversified fisheries resources of the country are broadly divided into two groups as Inland and Marine fisheries. Inland fisheries are again divided into two sub-groups as Inland Capture and Inland Culture fisheries. Inland Capture fisheries comprise with river and estuaries, beels, floodplain, Sundarbans and Kaptai Lake and Inland Culture fisheries include pond, seasonal cultured waterbody, baor, shrimp/prawn farm, crab, pen culture and cage culture. Again, Marine fisheries include Industrial (Trawl) and Artisanal fisheries.

Thai Koi is an exotic fish species in Bangladesh which had been introduced in 2002 from Thailand after drastic reduction of popular native koi fish has recognized in the late 1980s (Ahmed *et al*., 2014). The Thai Koi opens up a new horizon in pond fish culture which was first introduced in Mymensingh region of the country (Sarker *et al*., 2014). The fish is getting popularity over time because of good taste and special nutritive qualities (Akter *et al.*, 2010; Ahmed *et al.*, 2017). The Thai Koi contains very high amount of physiologically available iron, copper, easily digestible fat, and many good essential amino acids (Saha, 1971 as quoted in Sarker *et al*., 2014). Therefore, the fish is considered as a valuable item of diet for sick and convalescent (BFRI, 2006). Now, the Thai koi became a commercially valuable fish in Bangladesh because of availability of fry and fingerling, higher growth rate and easy marketing (Kulsum, 2005). In response to growing demand of the fish, many hatcheries have been established across the country with a view of producing Thai Koi fry, especially in greater Mymensingh, Bogra and Gazipur (Mahmood *et al*., 2004).

Recently fish farmers of Mymensingh region are facing problem for culture juvenile Thai Koi, among which disease outbreak is one of the important issues. Thai Koi looks like our indigenous Koi but its body covers with gray and small black to spots. This fish can be cultivable in pond, tanks and cages successful.

Thai Koi culture is very important to fulfill nutritional requirement and to generate livelihood opportunities of poor people. Poor people are improving their social and economic condition through Thai Koi culture.

Thai Koi culture is profitable but lack of sufficient fund, high price of input, lack of marketing facilities, lack of scientific and technical knowledge, non-availability of fish seed, water shortage in dry season etc. (Sohel, 2007).

But considering the economic and nutritive potentials of Thai koi, a sharp increasing trend has observed on Thai Koi culture in some selected areas of Bangladesh, particularly, it is predominant in several upazilas of Mymensingh district (Kulsum, 2005). But now people are becoming interested in Thai Koi culture and establishing large- or small-scale Thai Koi farm commercially. On these considerations, the present researcher felt the necessity to conduct this research on "Problems faced by the fish farmers in Thai Koi culture".

1.2 Statement of the Problem

Thai Koi culture in different region of Bangladesh is increasing day by day. Thai Koi culture become very profitable for its higher consumer demand and higher market price. But there are also some factors like high price of feed, medicine and vaccines, high price of fish fry etc. which affect the catfish culture and cause fish farmer's economic losses. In view of the foregoing discussion, it is necessary to increase Thai Koi culture in Bangladesh. It is assumed that notable improvements can take place in fisheries sectors of Bangladesh. The purpose of the study was to assess the problems faced by the farmers in Thai Koi culture and also its associated factors. Analyzing the issues from farmers of Thai Koi culture, the study was designed to find out the following research questions regarding Problems faced by the farmers in Thai Koi culture:

1. What is the extent of problems faced by the farmers in Thai Koi culture?
2. What are the characteristics of the Thai Koi farmers?
3. Is there any relationship between the selected characteristics of the Thai Koi farmers with their problem faced in Thai Koi culture?

These questions point to the need for a research study with the title "Problems faced by the fish farmers in Thai Koi culture" in order to have an understanding the problems of Thai Koi farm owners in Thai Koi culture. This type of research information will be helpful to the Thai Koi farm owners, policy makers and government and non-government organizations dealing with Thai Koi production in this country.

1.3 Objectives of the Study

Considering all the aspect, the research conducted to ascertain the following objectives:

1. To determine the extent of problems faced by the fish farmers in Thai Koi culture;
2. To describe the selected characteristics of the Thai Koi farmers; and
3. To determine the contribution between the problems faced by the Thai Koi farmers and their selected characteristics;

1.4 Justification of the Study

Problems regarding fish farming are a critical issue for the Thai Koi fish farmers. Due to the problems, Thai Koi fish farming is in challenging situation all over Bangladesh. In these conditions, farmers check monetary misfortune with sadness. The present study was designed to have an understanding of the problems faced by the Thai Koi farmers regarding Thai Koi farming and to explore its relationship with their selected characteristics. Thai Koi fish farming should get adequate attention to meet the growing demand for fish for increased population of Bangladesh. Different government and non-government organizations (NGOs) are currently putting effort and allocating resources for production-oriented research and also encouraging the rural people to undertake Thai Koi fish farming.

But research shows that most of the Thai Koi fish farmers in Bangladesh are not culturing Thai Koi in a scientific manner. Considering the previously mentioned focuses, the researcher became intrigued to lead research entitled “Problems Faced by the Fish Farmers in Thai Koi Culture”.

1.5 Assumption of the Study

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

1. The respondents included in the sample were capable of furnishing proper responses to the questions included in the interview schedule.

2. The data collected by the researcher were free from any bias and they were normally distributed.

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

4. Data were normally and independently distributed with their means and standard deviation.

5. The researcher was well adjusted to himself with the social contiguous of the study area. Hence, the collected data from the respondents were free from favoritism

1.6 Limitation of the Study

The study was undertaken with a view to having an understanding of the problems faced by the fish farmers in Thai Koi culture. However, from the research point of view, it was necessary to impose certain limitations as follows:

1. The study was confined to Muktagachha upazila under Mymensingh district.
2. Farmers have many varied characteristics but only twelve were selected to complete this study as stated in the objectives.
3. For information about the study, the researcher was depended on the data furnished by the selected respondents during data collection.
4. 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.
5. There were embarrassing situations at the time of data collection. So, the researcher had to manage proper rapport with the respondents to collect maximum proper information.

1.7 Definition of Terms

The terms which have been frequently used throughout the thesis are defined and interpreted below:

Age: Age of a farmer is defined as the period of time from his birth to the time of interview of the farmers.

Education: Education referred to the desirable change in knowledge, skill and attitude of an individual, through reading, writing and other related activities. It was measured in terms of years of schooling of an individual.

Family size: Family size of a farmer refers by the total number of members in the family including him/her, children and other dependents.

Farm size: It referred to the area of farm of the farmers. It was expressed in hectare.

Experience in Thai Koi culture: Experience as a general concept comprises knowledge of or skill of some thing or some event gained through involvement in or exposure to that thing or event. Experience in Thai Koi culture is the knowledge and skill that is gained through time spent doing Thai Koi culture.

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

Extension contact: It referred to an individual's (farmer) exposure to or contact with different communication media, source and personalities being used for dissemination of new technologies.

Cosmopoliteness: The term cosmopoliteness was used to refer to the degree to which an individual's orientation was external to a particular social system. Cosmopoliteness of a respondent is measured by computing a cosmopoliteness score. The cosmopoliteness score is assigned on the basis of different places and frequency of his visit extent to and outside of his own social system.

Training exposure: It referred to the total number of days that a respondent received training in his entire life from different organizations under different training programmes.

Knowledge on Thai Koi culture: It refers to the extent of understanding of an individual about different facts information, causes and effects related to Thai Koi culture.

Attitude towards catfish culture: The term attitude towards Thai Koi culture of an individual was used to refer to his feelings, belief and action tendencies towards the various aspects of Thai Koi culture.

Innovativeness: Innovativeness refers to the degree to which an individual is relatively earlier in adopting new ideas than the other members of social system (Rogers, 1995). The respondents measured innovativeness of a respondent on the basis of adoption of nine improved practices.

Problem faced in Thai Koi culture: Problem referred to a difficult situation about which some interventions are needed to solve the in conscience. It referred to the extent of problems faced by a respondent in Thai Koi culture in terms of social, technical, economical, marketing and psychological problems.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this chapter is to review the researchers conducted in line of the major focus of similar study. This study as already indicated, was undertaken to have an understanding of the problems faced by the farmers in Thai Koi culture and its relationship with the selected characteristics. Literature having relevance to the present study has been reviewed in three sections. The first section deals with the literature on the problems faced by the farmers in Thai Koi culture and the second section deals with review of studies dealing with the relationships between selected characteristics and faced problems in Thai Koi culture. The third section deals with the conceptual framework of the study. However, the available reviews of literatures in connection with this study are briefly discussed below:

2.1 Problems Faced in Thai Koi Culture

Das (2013) reported that the major problems faced by the pond fish farmers in the study area were low quality seed, insufficient loan facilities, lack of technical knowledge, multiple ownership of pond etc. Though industrial pollution remains in low risk until now rapid growing industries in the study area could lead a serious problem in near future. Similar types of pond farming constraints were found by Mazumder (2013) which are major hinders for the progress of pond fish farming in Bangladesh.

Abdullah (2016) revealed that about 50.5 percent of the pond farmers had medium problem compared to 40.6 percent of them having low problem and only 8.9 percent having high problem. Thus, the vast majority (91.1 percent) of the pond farmers had low to medium problem.

Paudel (2016) found the fish industry in Nepal has been contaminated by heavy metal in fish ponds at some major urban centers. For example, some fish were found to have been contaminated with Manganese, Lead and Chromium at Kathmandu.

Gautam (2015) showed that lack of marketing infrastructure, lack of cold storage facilities, poor quality fingerlings and fish feed and lack of technical knowledge are other major problems the fish industry is facing.

Ghose (2014) stated that the fisheries sector is confronted with challenges posed by numerous natural and anthropogenic causes such as climate change, natural disasters, unbalanced urbanization and industrialization, overfishing and environmental pollution**.**

Gurung *et al.*, (2010) revealed that the major problem is the lack of sustainable fingerlings supply system.

Pandey (2008) showed that the problems of catfish farming in Western Kenya were dominated by some crucial factors that are: (1) lack of finance or bank loan (2) lack of water management or multiple use of pond (3) lack of modern technology knowledge or traditional culture practices.

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

Uddin (2004) in his study identified five aspects of constraints in commercial cultivation of vegetables viz. seed constraints, disease and insect infestation constraints, field management constraints, marketing of vegetable constraints and extension work constraints. Among these aspects of constraints, they revealed marketing problem severely faced by the farmers.

Pramanik (2001) conducted an extensive study on the twenty-four problems of farm youth in Mymensingh villages relating to different problems in crop cultivation and marketing. Out of twenty-four problems top five problems in rank order were; i) local NGO take high rate of interest against a loan, ii) lack of agricultural machinery and tools, iii) lack of cash iv) financial inability to procure improved seeds, fertilizers and irrigation v) marketing facilities.

Subasinghe *et al.,* (2001) observed that current trend in aquaculture development is towards increased intensification and commercialization of aquatic production. Like other farming sectors, the likelihood of major disease problems increases as aquaculture activities intensify and expand. Disease is considered as a primary constraint to the culture of many aquatic species, impeding both economic and social development in many countries.

Ali and Rahman (1986) stated that the non- availability of good quality fingerlings was the major problem in Lalmonirhat district. Unavailability of fish hatchery was the main crisis of fish seed and they had to import fish fry from far distance such as Bogra and Mymensingh resulting to increase the price of fish seeds.

2.2 Review concerning the relationship between selected characteristics of the farmers and problems faced

2.2.1 Age and problem faced

Ali (2014) revealed that age had no relationship with their problem faced in cotton cultivation.

Azad et al. (2014) also found that age of the vegetable growers has no significant relationship with problem faced in vegetable cultivation.

Pandict et al. (2013) conducted a study to identify the relationship between the personal characteristics and constraints facing in vegetable marketing of Trishal Upazila under Mymensingh district found that there was no significant relationship between the age of the farmers and their faced constraints in vegetable cultivation and marketing.

Anisuzzaman (2008) found that age had no noteworthy association with their problem faced in tuberose cultivation.

Aziz (2006) found that age of the farmers had no significant relationship with their constraints faced in potato cultivation in Jhikargacha upazilla under Jessore district.

Rashid (2003) found that age of the rural youth had significant negative relationship with problem faced in selected agricultural production activities and marketing.

Bhuiyan (2002) in his study found a positive and significant relationship between age of the farmers and their constraints in banana cultivation and `marketing. A similar finding was obtained by Rahman (1996) in his respective study.

Rahman (1995) conducted a study to identify the relationship between the personal characteristics and constraints facing in cotton cultivation of Muktagacha Thana under Mymensingh district. He found that there was no significant relationship between the age of the farmers and their faced constraints in cotton cultivation. Similar findings were obtained by Ali (1999), Rashid (1999), Pramanik (2001), Ahmed (2002), Hossain (2002), Salam (2003) and Halim (2003) in their respective studies.

2.2.2 Education and problem faced

Pandict et al. (2013) conducted a study to identify the relationship between the personal characteristics and constraints facing in vegetable marketing of Trishal Upazila under Mymensingh district found that there was no significant relationship between the education of the farmers and their faced constraints in vegetable cultivation and marketing.

Bashar (2006) found that education of the farmers had significant negative relationship with their problem confrontation in mashroom cultivation.

Aziz (2006) found that education of the farmers had very high significant negative relationship with their constraints faced in potato cultivation in Jhikargacha upazilla under Jessore district.

The study of Ismail (2001) revealed that there was no significant relationship between education and problem confrontation of farm youth. Similar findings were obtained by Halim (2003) in their respective studies. Thus, it could be concluded that an overwhelming majority of the researchers found a negative relationship between these two variables.

2.2.3 Farming experience and problem faced

Ali (2014) found in his audit a colossal association between contribution in betel leaf cultivation of the farmers and their issue faced in betel leaf cultivation of Natore district in Bangladesh.

2.2.4 Family size and problem faced

Anisuzzaman (2008) found that family size had no huge association with their problem faced in tuberose cultivation.

Aziz (2006) found that family size of the farmers had high huge negative association with their requirements confronted in potato cultivation in Jhikargacha upazilla under Jessore locale.

Basher (2006) found that family size of the farmers had no significant relationship with their problem confrontation in mushroom cultivation.

Haque (2006) found that family size of the farmers had no significant relationship with their problem faced in using integrated plant nutrient management

Rahman (1995) found that there was no significant relationship between family size of the pineapple growers and their problem confrontation. He also found negative tendency between the concerned variables.

2.2.5 Fish Farm size and problem faced

Roy (2007) in this study found no significant relationship between farm size under maize cultivation and constraints faced by farmers in maize cultivation.

Basher (2006) found that farm size of the farmers had significant negative relationship with their problem confrontation in mushroom cultivation.

Haque (2006) found that farm size of the farmers had no significant relationship with their problem faced in using integrated plant nutrient management.

Rahman (2006) found that farm size of the farmers had no significant relationship with their constraints faced in Banana cultivation of Sunargaon Upazilla under Narayangonj distrct.

Rashid (2003) found that farm size of the rural youth had no relationship with problem confrontation in selected agricultural production activities.

2.2.6 Annual family income and problem faced

Azad et al. (2014) also found that annual income of the vegetable growers has significant negative relationship with problem faced in vegetable cultivation.

Pandict et al. (2013) found a significant negative relationship between the family income and problem faced of the vegetable growers in vegetable cultivation and marketing.

Bashar (2006) found that annual family income high significant negative relationship with problem confrontation in mushroom cultivation.

Haque (2006) found that annual family income of the farmers had no significant relationship with their problem faced in using integrated plant nutrient management.

Karim (1996) found in his study that annual family income of the farmers had a significant negative effect on their problem confrontation in kakroal cultivation.

Sarker (1983) in his study found that there was no relationship between the income of the farmers and their poultry problem confrontation.

Ali (1978) in his study found that there was no significant relationship between the annual family income of the farmers from the cattle and the problem confrontation of farmers.

Rashid (2003) in his study found that there was no relationship between annual family incomes the farmers and their agricultural problem confrontation. Though the relationship was not significant, relevant data indicated a considerable negative trend between income of the farmers and agricultural problem confrontation of the farmers.

2.2.7 Extension media contact and problem faced

Haque (2006) found that extension media contact of the farmers had high noteworthy negative association with their problem faced in utilizing coordinated plant supplement administration.

Akanda (2005) reported that there was significant positive relationship between communication exposure and technological gap in cultivating transplanted modern aman rice.

Bashar (2006) found that extension media contact of the farmers had noteworthy negative association with their issue showdown in mushroom cultivation.

Rahman (2006) found that extension media contact of the farmers had no significant relationship with their constraints faced in Banana cultivation of Sunargaon Upazilla under Narayangonj district.

2.2.8 Cosmopoliteness and problem faced

Rashid (1999) found that there was a negative relationship between cosmopoliteness of the farmers and their agricultural problem confrontation.

Pramanik (2001) found that Cosmopoliteness of the farm youth had significant negative relationship with their crop cultivation problems.

Bashar (2006) found that cosmopoliteness of the farmers had significant negative relationship with their problem confrontation in mushroom cultivation.

Kashem (1977) found that there was a negative relationship between cosmopoliteness of the landless labours and their constraints faced. There was however, a negative trend between the two variables.

2.2.9 Training and problem faced

Azad et al. (2014) found that training exposure of the vegetable growers has no relationship with problem faced in vegetable cultivation.

Bashar (2006) found that training exposure of the farmers had high significant negative relationship with their problem confrontation in mushroom cultivation.

Nahid (2005) conducted a study and found that there was no significant relationship between training exposure of the sugarcane growers and their problem confrontation in sugarcane production.

Hossain (2002) found that the length of the training of the respondents had positive relationship with their knowledge of crop cultivation and marketing.

Saha (1997) found that training experience of the youth had no relationship with their problem confrontation.

2.2.10 Knowledge and problem faced

Akther (2007) found that the agricultural knowledge of the farmers had significant relationship with their adoption of improved tomato varieties.

Reddy et al. (1987) found the significant association between knowledge and use of improved package of practice in paddy production by participant and non-participant farmers.

2.2.11 Attitude and problem faced

Hasan (2003) conducted a study on adoption of some selected agricultural technologies among the farmers as perceived by the frontline GO and NGO workers. He found that there was strong positive relationship between attitude towards development and perceived adoption of selected technologies.

Podder (2000) conducted a study on the adoption of Mehersagar Banana by the farmers of Gazaria union under Sakhipur Thana of Tangail district. He found that there was no relationship between attitude towards technology of the growers and their adoption of mehersagar banana.

Islam (2002) revealed that the attitude towards technology of the farmers had a significant positive relationship with their adoption of modern agricultural technologies.

Ahmed (2006) found that the attitude toward wheat cultivation of the farmers had significant positive relationship with their adoption of selected wheat varieties.

2.2.12 Innovativeness and problem faced

Hossain (2006) found a positive relationship between innovativeness of the farmers and their adoption of fertilizer and also observed no relationship with adoption of pesticides.

Aurangozeb (2002) observed that there was significant relationship between innovativeness and adoption of integrated homestead farming technologies.

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

Ahmed (2006) found that the innovativeness of the farmers had significant positive relationship with their adoption of selected wheat varieties.

Goswami and Ziauddin (2010) reported that innovativeness of the farmers showed positive and significant relationship with their adoption of scientific fish cultivation practices.

2.3 The conceptual framework of the study

It is evident from the past studies that every occurrence or phenomenon is the outcome of a number of variables, which may or may not be interdependent or interrelated with each other. In other words, no single variable can contribute wholly to a phenomenon. Variables together are the cause and the phenomenon is effect and thus, there is cause- effect relationship everywhere in the universe.

The present study was concerned with the problems faced by the fish farmers in Thai koi culture. Thus, the problem faced was the main focus of the study and constituted the dependent variable. The characteristics of the farmers were considered as the independent variables. It is not possible to deal with the characteristics in a single study.

It was therefore, necessary to limit the characteristics, which include age, education, family size, fish farm size, annual family income, extension media contact, cosmopoliteness, knowledge on Thai Koi culture, attitude towards Thai Koi culture and innovativeness. Based on this discussion and review of literature the conceptual model of this study has been formulated and shown in the Figure 2.

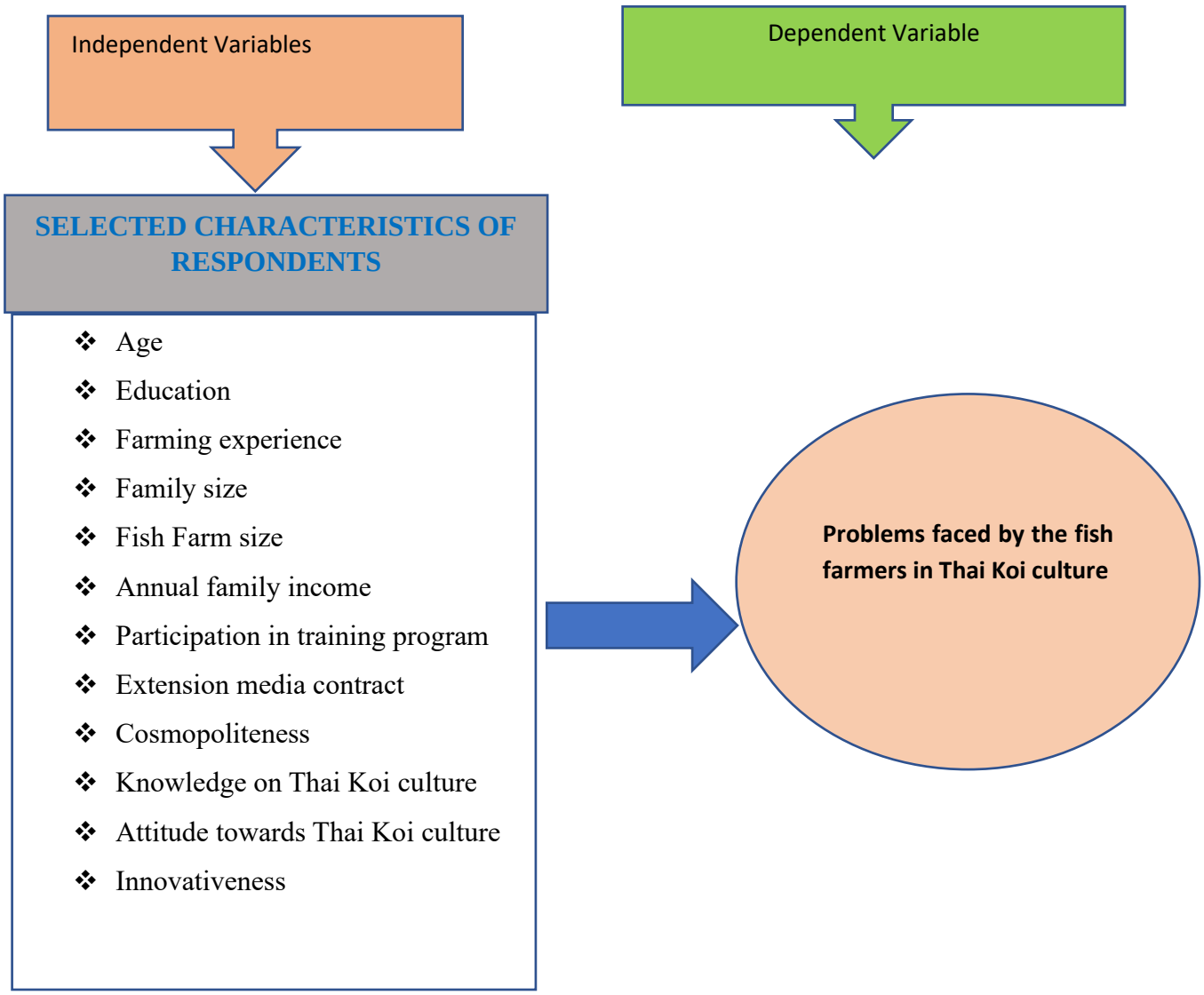

Figure 2.1: The Conceptual Framework of the Study

CHAPTER III
MATERIALS AND METHODS

Methods play an important role in scientific research. To fulfill the objectives of the study, a researcher should be very careful while formulating methods and procedures in conducting the research. According to Mingers (2001), research method is a structured set of guidelines or activities to generate valid and reliable research results. This chapter of the thesis illustrates the research methods and procedures used to collect and analyze the data for answering the research questions and attaining the purposes. The methods and operational procedures followed in conducting the study e.g., selection of study area, sampling procedures, instrumentation, categorization of variables, collection of data, measurement of the variables and statistical measurements. A chronological description of the methodology followed in conducting this research work has been presented in this chapter.

3.1 Locale of the Study

Muktagachha Upazila (Mymensingh district) area 314.71 sq km, located in between 24°36' and 24°52' north latitudes and in between 90°04' and 90°20' east longitudes. It is bounded by Mymensingh sadar and Jamalpur sadar upazilas on the north, Fulbaria upazila on the south, Mymensingh Sadar and Fulbaria upazilas on the east, Madhupur and Jamalpur Sadar upazilas on the west.

The present study was conducted at two unions of Muktagachha upazila under Mymensingh District. The researcher randomly selected these unions from the upazila namely Kheruajani and Ghoga. The selected study areas are much improved in Thai Koi culture. The map of the study area is shown in figure 3.1.

Figure 3.1: A map of Muktagachha upazila showing the study area

3.2 Population and Sampling Design

All the farmers who permanently reside in the selected unions of Kheruajani and Ghoga union of Muktagachha upazila and culture Thai Koi were constituted the active population of this study. The fish farmers who culture Thai Koi of Shaiod village, Ahmedpur villages of Kheruajani union, and Dhoro, Parolitola villages of Ghoga union of Muktagachha upazila under Mymensingh district were the population of the study. However, representative sample from the population were taken for collection of data following random sampling technique. One farmer (who mainly operated the Thai Koi culture) from each of the families was considered as the respondent.

Updated lists of all the fish farmers of the selected villages were prepared with the help of Extension Officer of DoF and local leaders. A purposive sampling procedure was followed to select one district from the whole of Bangladesh, and the same method was used to select the area of the district as well as the villages as the study group. The total number of listed fish farmers in Muktagachha upazila is 1470, most of them are engaged in freshwater white fish culture. Out of these 1470 fish farmer about 460 listed fish farmers of the selected 2 unions totally or partially related with Thai Koi culture. From these 460 fish farmers of the selected 2 unions, 115 Thai Koi fish farmers were selected as the sample of the study by using proportionate random sampling technique by taking 25% of the total population. Besides, reserve list of 12 Thai Koi farmers was also prepared by taking 10% of the sample size. Farmers of the reserve list were used only when a respondent included in the original list was not available during data collection. Distribution of the farmers constituting population, sample and reserve list are shown in Table 3.1.

Table 3.1 Distribution of the farmers constituting population, sample and reserve list

Upazila	Union	Village	Population	Sample	Reserved List
Muktagachha	Kheruajani	Shaiod village	158	40	6
		Ahmedpur	97	25	2
	Ghoga	Dhoro	117	30	3
		Parolitola	88	20	1
Total			**460**	**115**	**12**

3.3 Selection of Variables

Considering individual, financial, social and mental components of the target group, time and assets accessibility to the researcher, checking on applicable writing and talking about with pertinent specialists, the researcher chose the variables for the study problem faced by the farmers in Thai Koi Culture by the farmers of Muktagachha upazila was the dependent variable of this study. The researcher selected 12 characteristics of the respondents as their independent variables. These were: age, education, family size, farm size, annual family income, extension media contact, cosmopoliteness, knowledge on Thai koi culture, attitude towards Thai Koi culture and innovativeness.

3.4 Research Instruments

In order to collect viable and authentic data from the respondents a structured interview schedule was outlined carefully keeping the objectives of the study in mind. Simple, easy and direct questions and different scales were used to obtain information from the respondents. Both open and closed form questions were included in the interview schedule. The schedule was checked by the Supervisory Committee. An English version of the interview schedule has been enclosed in the Appendix A.

3.5 Measurement of Variables

Measurement of independent and dependent variables have been shown in these sub sections:

3.5.1 Measurement of independent variables

Measurement of independent and dependent variables have been shown in these sub-sections:

3.5.1.1 Age

The age of a respondent was measured in terms of actual years from his birth to the time of interview on the basis of his response. A score of one (1) was assigned for each year of age. For the analysis purpose, age of the respondents was broken into 3 categories viz. young age (up to 35 years), middle age (36 to 50 years) and old age (above 50 years).

3.5.1.2 Education

Education was measured as the ability of the respondent to read and write or the formal education received up to a certain standard. A score of zero (0) was given to a respondent who are illiterate and a score of one (1) was given for each year of formal schooling completed by the respondent e.g., one (1) for completing class one, two (2) for class two and so on.

3.5.1.3 Farming experience

Each year of the respondent's experience was scored one (1). Such as if a respondent cultured Thai Koi for five years, he/she was assigned a score of '5'.

3.5.1.4 Family size

Family size refers to the total number of members including the respondent himself/herself, spouse, children and other permanent dependents who lived together as family unit. Family size was operationally measured by assigning a score of one (1) for each member of the family who jointly lived and ate together. Family size of a respondent was measured in terms of actual number of members in his family (including himself) during the interview period.

3.5.1.5 Fish Farm size

Farm land is the most important capital of a farmer and the farm-size has influence on many personal characteristics of a farmer. Farm size of the farmer was measured by the land area possessed by him. Data obtained in response to questions under item No, 5 of the interview schedules formed the basis for determining the farm size of the respondent. Here, farm size was computed by using the following formula.

Fish Farm size (FFS) = A+B + (C+ D) ½ -E

Where, A= Own land under own cultivation

B = Land taken from others on lease

C = Shared out to others

D = Shared in

E= Land leased out to others

The respondent has given information for their farm size in local measurement. Finally, it was converted into hectare and was considered as the farm size score of a respondent.

3.5.1.6 Annual family income

The annual family income of a respondent's family was measured on the basis of yearly total earnings from farming such as agriculture, fisheries (Thai Koi and others), livestock, forestry, service, business and others (if any) by the members of the family. The earning from these sources were added together to obtain total annual income of a respondents.

3.5.1.7 Extension media contact

It was measured as one's extent of exposure with different information sources. It was assumed that the more contact an individual would have with different information sources, the more he becomes educated and knowledgeable. An extension contact score was computed for each respondent on his extent of contact with 13 selected media (item no. 7, Appendix-I). Each respondent was asked to mention the frequency of his contact with each of the 13 selected media. Here the score was assigned as 0 for no contact, 1 for rarely, 2 for occasionally, 3 for frequently and 4 for regularly of the contact respectively. Extension media contact score of the respondents could range from 0 to 52, where 0 indicating no extension media contact and 52 indicating very high extension media contact. Respondent's extension contact score was obtained by adding the weights for his responses to all the sources listed in the instrument.

3.5.1.8 Cosmopoliteness

Cosmopoliteness of a respondent was measured in terms of his nature of visits to the seven different places external to his own social system and as shown in item number 8 in the interview schedule (Appendix-1). The respondents indicated whether they visited those places regularly, frequently, occasionally, rarely and not at all. Weights assigned to these visits were 4. 3, 2,1 and 0 respectively. A respondent's cosmopoliteness score was obtained by adding the weights for his visits to all the places listed in the instrument. The cosmopoliteness score of the respondents could range from 0 to 28, where 0 indicating no cosmopoliteness and 28 indicating high cosmopoliteness.

3.5.1.9 Training experience

Training experience of a respondent was measured by the total number of days he/she received training on different subject matters during Thai Koi culture from various organizations. A score of one (1) was assigned for each day of training participated by the respondent.

3.5.1.10 Knowledge on Thai Koi Culture

Thai Koi culture knowledge of a respondent was measured by asking 18 questions related to different aspect of Thai Koi culture. It was measured in score. The total assigned scores for all the questions were 36 by assigning 2 for each question. Full score for each question was assigned for each correct answer, and 0 (zero) was assigned for the wrong answer; while partial score was assigned for each partially correct answer.

3.5.1.11 Attitude towards Thai Koi culture

Relevant statements were carefully constructed to develop attitude scale. The Likert scale was used to serve the purpose. There were 5 positive and 5 negative statements in the attitude statements. These statements were alternately arranged. A respondent was asked to indicate her/his degree of agreement about each of the statements along with a five-point scale as, strongly agree, agree, undecided, disagree and strongly disagree. Scores were assigned to these five alternate responses as 4, 3, 2 ,1 and 0 respectively for each positive statement. In case of negative statement, the reverse scores were assigned. However, the score of a respondent was obtained by adding her/his scores for all the 10 statements. Thus, the attitude score of a respondent could range from 0 to 50, where, 0 indicates very low attitude towards Thai Koi farming and 50 indicates very high attitude towards Thai Koi farming.

3.5.1.12 Innovativeness

Innovativeness is the degree to which an individual adopts an innovation relatively earlier than other members in a social system (Rogers, 1995). Hence, innovativeness of a respondent was measured on the basis of the period of adoption of 9 improved technologies in Thai Koi culture from the period he first listened about the innovation. Scores were assigned on the basis of time required by an individual to adopt each of the technology in the following manner:

Period of adoption	Assigned score
Within 1st year of hearing	4
Within > 1 to 2 years of hearing	3
Within > 2 to 3 years of hearing	2
Within > 3 to 4 years of hearing	1
Not adopted at all	0

3.5.2 Measurement of Dependent Variable

3.5.2.1 Measurement of problems faced by the farmers during Thai Koi culture

Problem faced by the farmers in Thai Koi culture was the focused variable of the study. Problems faced in Thai Koi culture was measured on the basis of extent of problems faced by the farmers on 17 selected problems of Thai Koi farming. Each farmer was asked to indicate his nature of problems in Thai Koi culture with four responses like High (3), Medium (2), Low (1) and not at all (0) respectively. Thus, problems faced in Thai Koi culture score of a respondent could range from 0 to 51 where 0 indicated no problem and 51 indicated highest problems faced in Thai Koi farming.

Measurement of Problem Faced Index (PFI):

To ascertain the severity of item-wise problems faced by the farmers, Problem Faced Index (PFI) was computed for each problem. Problem Faced Index (PFI) was computed by using the formula:

$PFI = PH \times 3 + PM \times 2 + PL \times 1 + PNA \times 0$

Where, PFI = Problem Faced Index

PH = High extent of problems

PM = Medium extent of problems

PL = Low extent of problems

PNA = Not at All of problems

Problem Faced Index (PFI) for each problem item could range from 0 to 345, where 0 indicating no problem and 345 indicating highest extent of problems faced by the farmers regarding Thai Koi culture.

3.6 Validity of the Research Instruments and Ethical Considerations

3.6.1 Validity of the research instruments

The validity is how much a test measures what it is accepted to quantify. The validity of a test or other measuring instruments rely on upon the steadfastness with which it is measured whatever it indicates to gauge. The researcher experienced a few comparative research instruments judged from home and abroad, Besides, the examination instruments, particularly poll for the review were by the Supervisory Committee. By directing a seminar, the analyst changed and refined the substance and sizes of the examination instruments as indicated by the recommendations of the specialists of the Department of Agricultural Extension and Information System, Sher-e-Bangla agricultural university.

3.6.2 Ethical consideration

Some basic ethical principles were maintained throughout the study and pointed out below.

- The researcher treated the respondents with incredible regard.
- The reasons for the study were clarified before beginning meetings with the respondents.
- Autonomy, protection and non-judgmental perspectives were considered significantly amid making interviews with the respondents.
- Special care was taken to stay far from subjective judgments and miss interpretations amid accumulation and documentation of subjective information.

3.7 Data Collection

The researcher himself gathered information from the respondents with the assistance of interview schedule in face-to-face setting. The researcher collected data using pre-tested interview schedule and based on pre-test experiences necessary corrections, additions, modifications and alternations were made before finalizing the interview schedule for final data collection Meeting with the respondents was made ahead of time with the assistance of UFO of Gram unnayan prokolpo. In order to build up affinity with the respondents, the researcher took every possible precaution so that they did not errors in reacting to the inquiries and explanations. At whatever point, any respondent faced any difficulty in seeing any question care was taken unmistakably to represent the same.

The researcher was also aware of side-talking in the midst of knowledge accumulation and thoughtfully tried to stay away from that problem. Data accumulation occurred from July 20 to August 20, 2022. Be that as it may, in the sense of knowledge accumulation, scientists did not face any real problems because the study area's respondents and various villagers were especially helpful and friendly.

3.8 Processing of Data

The collected raw data were analyzed thoroughly to detect errors and exclusions. Qualitative data were converted into quantitative data by means of suitable scoring whenever necessary. For this the collected data were given numerical coded values. The obtained data were then compiled on a master sheet and then tabulated and analyzed with keeping the objectives of the study in mind. A broad variety of related hypotheses and empirical studies have been compiled and reviewed. To create a specific research plan and to outline the research context, the researcher contacted numerous relevant outlets, such as books, journals, papers, theses, abstracts, and the internet.

3.8.1 Hypothesis of the Study

A hypothesis is an assumption, an idea that is proposed for the sake of argument so that it can be tested to see if it might be true. In the scientific method, the hypothesis is constructed before any applicable research has been done, apart from a basic background review. A hypothesis is usually tentative; it's an assumption or suggestion made strictly for the objective of being tested. In broad sense hypotheses are divided into two categories: (a) Research hypothesis and (b) Null hypothesis

3.8.2 Research hypothesis

Based on review of literature and development of conceptual framework, the following research hypothesis was formulated:

"Each of the twelve selected characteristics (age, education, family size, farm size, annual family income, extension media contact, Cosmopoliteness, knowledge on Thai Koi culture, attitude towards Thai Koi culture and innovativeness by the farmers during Thai Koi culture has significant relationship to their problems in Thai Koi culture. However, when a researcher tries to perform statistical tests, then it becomes necessary to formulate null hypothesis.

3.8.2 Null hypothesis

A null hypothesis states that there is no contribution between the concerned variables. The following null hypothesis used to be formulated to explore the contribution of the selected characteristics of farmers on their problem faced in Thai Koi culture. Hence, in order to conduct tests, the earlier research hypothesis was converted into null form as follows: “There is no contribution of the selected characteristics of the farmers to their problem faced in Thai Koi culture.”

3.9 Data Analysis

Data collected from the respondents were analyzed and interpreted in accordance with the objectives of the study. The analysis of data was performed using statistical treatment with SPSS (Statistical Package for Social Sciences) computer program, version 23. Statistical measures such as number, range, mean, standard deviation and percentage were used in describing the variables whenever applicable. In order to explore the contribution of the concerned variables, multiple regression analysis was used. Throughout the study, five percent (0.05) and one percent (0.01) level of significance was used as the basis for rejecting any null hypothesis.

CHAPTER IV

RESULTS AND DISCUSSION

The recorded observations in accordance with the objective of the study were presented and probable discussion of the findings was made with probable justifiable and relevant interpretation under this chapter. The findings of the study and their interpretation have been presented in this Chapter.

4.1 Characteristics of the Thai Koi farmers

This section deals with the classification of the farmers according to their various characteristics. Behavior of an individual is largely determined by his characteristics. These characteristics of an individual contribute to a great extent in the matter of shaping of his/her behavior. In this section the finding on the farmers' selected characteristics have been discussed. The selected characteristics were (i) age, (i i) education, (iii)fish farming experience, (iv) family size, (v) fish farm size, (vi) annual income, (vii) extension media contact, (viii) cosmopoliteness (ix) training on Thai Koi culture, (x) knowledge on Thai Koi culture, (xi) attitude towards Thai Koi culture and (xii) innovativeness those might influence the problem of the Thai Koi culture.

In this section the results, the salient features of the Thai Koi farmers selected characteristics have been discussed. The salient feature of the selected characteristics has been presented in Table 4.1.

Table 4.1 Salient features of the selected characteristics of the Thai Koi farmers

Categories	Measuring Unit	Range		Mean	S D
		Possible	observed		
Age	Years	-	22-65	43.72	10.40
Education	Year of schooling	-	00-18	8.72	3.69
Farming experience	No of year		5-20	12.00	4.30
Family size	Number	-	3-12	5.57	2.01
Farm size	Hectare		.03-3.58	1.64	1.09
Annual family income	Thousand Taka	-	100-600	265.22	137.04
Extension media contact	Score	0-52	8-44	22.54	8.84
Cosmopoliteness	Score	0-28	2-25	9.49	5.07
Training on fish farming	No of days	0-24	0-24	8.83	5.69
Knowledge on Thai Koi culture	Score	0-36	10-34	20.74	6.48
Attitude Towards Thai Koi culture	Score	0-50	3-28	14.43	6.24
Innovativeness	Score	0-36	4-26	11.52	5.00
Problems faced by the fish farmers in Thai Koi culture	Score	0-51	11-45	23.77	7.97

4.1.1 Age

The age of the respondents has been varied from 22 to 65 years with a mean and standard deviation of 43.72 and 10.40 respectively. Considering the recorded age, the respondents were classified into three categories namely 'young', 'middle' and 'old' aged. The distribution of the respondents in accordance of their age is presented in Table 4.2.

Table 4.2 Distribution of the farmers according to their age

Categories	**Farmers**		**Mean**	**SD**
	Number	**Percent**		
Young aged (up to 35)	36	31.3	43.72	10.40
Middle-aged (36-50)	55	47.8		
Old (>50)	24	20.9		
Total	**115**	**100**		

From Table 4.2 it is revealed that the middle-aged respondents comprised the highest proportion (47.8 percent) followed by old aged category (20.9 percent) and 31.3 percent of the respondents were in the young aged category. Data indicates that young and middle-aged respondents were more involved in Thai Koi culture than the old aged respondents. Farmers with middle age has the decision-making power than other and young farmers have the higher trend to accept new technology. Islam (2014) also reported that most of the farmers in the same study area were young to middle aged.

4.1.2 Education

The mean and standard deviation of farmer's education scores was 8.72 and 3.69 respectively ranging from 0 to 18. Based on their education scores, the farmers were classified into five categories namely can't read and write (0), can sign only (0.5), primary education (1-5), secondary education (6-10) and above secondary education (above 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 level of education

Categories	Farmers		Mean	SD
	Number	Percent		
Can't read and write (0)	13	11.30	8.72	3.69
Can sign only (0.5)	15	13.04		
Primary level (1-5)	12	10.43		
Secondary level (6-10)	40	34.78		
Above secondary level (>10)	35	30.43		
Total	**115**	**100**		

Table 4.3 shows that farmers in the secondary education category have the highest proportion (34.78 percent), followed by above secondary education (30.43 percent) and primary education category (10.43 percent). On the other hand, can sign only 13.04 percent and 11.30 percent of respondents can't read and write. Thus, the data revealed that 75.64 percent of Thai Koi farmers are literate. Similar result was observed by Hossain *et al.* (2012) where highest numbers of respondents were completed up to secondary education level.

4.1.3 Farming experience in Thai Koi culture

The experience score of the respondents ranged from 5 to 20. The mean score was with 12.00 the standard deviation 4.30. On the basis of experience, the respondents were classified into three categories namely, low experience, medium experience and high experience, as shown in Table 4.4.

Table 4.4 Distribution of the farmers according to their experience in Thai Koi culture

Categories	Farmers		Mean	SD
	Number	Percent		
Low experience (up to 8)	22	19.1	12.00	4.30
Medium experience (9-16)	78	67.8		
High experience (above 16)	15	13.0		
Total	**115**	**100**		

Data contained in the Table 4.4 revealed that the majority (67.8 percent) of the farmers had medium experience as compared to 19.1 percent and 13.0 percent having low and high experience in Thai Koi culture respectively. The majority (86.9 percent) of the respondents had low to medium experience in Thai Koi culture. Islam (2014) found that 90 percent respondents had low to medium fish farming experience that was almost similar to the present study.

4.1.4 Family size

Family size scores of the farmer ranged from 3 to 12 with a mean of 5.57 and standard deviation of 2.01. According to family size, the respondent farmers were classified into three categories as shown in Table 4.5.

Table 4.5 Distribution of the farmers according to their family size

Categories	Farmers		Mean	SD
	Number	Percent		
Small family (up to 4)	37	32.17	5.57	2.01
Medium family (5-6)	58	50.43		
Large family (above 6)	20	17.39		
Total	**115**	**100**		

Table 4.5 indicates that the medium size family constitute the highest proportion (50.43 percent) followed by the small size family (32.17percent). Only 17.39 percent farmers had large family size. Thus, about (82.6 percent) of the farmers had small to medium family. Similar result was observed by Hossain *et al.* (2012) where highest numbers of respondents were completed up to medium family size.

4.1.5 Fish Farm size

The farm size of the farmers ranged from 0.3 ha to 3.58 ha with a mean and standard deviation of 1.64 and 1.09 respectively. Based on fish farm area Thai Koi farmers were classified into three categories as small farm, medium farm and large farm. The distribution of the farmers according to their fish farm size is shown in Table 4.6.

Table 4.6 Distribution of the farmers according to their fish farm size

Categories	**Farmers**		Mean	SD
	Number	**Percent**		
Small farm (0.21-1.0 ha)	37	32.17	1.64	1.09
Medium farm (1.01-3.0 ha)	56	48.70		
Large farm (>3.01 ha)	22	19.13		
Total	**115**	**100**		

Data presented in Table 4.6 reveal that 48.70 percent of the Thai Koi farmers had medium farm while 19.13 percent of them had large farm and 32.17 percent had small farm. Thus, overwhelming majority (80.87 percent) of the farm owners had small to medium size farm. The average land area of the farmers of the study area (1.64 hectares) was higher than that of national average (0.60 hectare) of Bangladesh (BBS, 2020). Hasan (2015) found almost similar findings.

4.1.6 Annual family income

Annual family income of the Thai Koi farmers ranged from Taka 100 thousand to 600 thousand with an average and standard deviation of 265.22 and 137.04 respectively. Based on the annual income from the respondents were classified into three categories as shown in Table 4.7.

Table 4.7 Distribution of the farmers according to their annual family income

Categories	Farmers		Mean	SD
	Number	Percent		
Low income (up to 100)	27	23.48	265.22	137.04
Medium income (101-300)	59	51.30		
High income (above 300)	29	25.22		
Total	**115**	**100**		

Data presented in Table 4.7 reveal that 51.30 percent of fish farmers had medium income, 25.22 had high income and 23.48 percent had low income from their farming. Thus, overwhelming majority (76.52 percent) of the fish farmers had medium to high income from their Thai Koi culture. Islam (2014) found that most of the respondent in this area belongs to medium to high level income.

4.1.7 Extension media contact

Score of extension media contact of the farmers ranged from 8 to 44 with an average and standard deviation of 22.54 and 8.84 respectively. Based on the score, the respondents were classified into three categories as shown in Table 4.8.

Table 4.8 Distribution of the farmers according to their extension media contact

Categories (Scores)	Farmers		Mean	SD
	Number	Percent		
Low (up to 17)	28	24.35	22.54	8.84
Medium (18-35)	65	56.52		
High (above 35)	22	19.13		
Total	**115**	**100**		

Table 4.8 shows that the highest proportion (56.52 percent) of the farmers had medium extension media contact, 24.35 percent had low extension media contact and the lowest 19.13 percent farmers had high extension media contact. Thus, overwhelming majority (80.87 percent) of the fish farmers had medium to low extension media contact. The findings also indicate that all the Thai Koi farmers had medium to low extension media contact in the study area. The findings indicate that a great majority of the farmers under study had medium extension media contact. So, extension workers should concentrate their works with farmers to increase their contact with extension media.

4.1.8 Cosmopoliteness

The score of cosmopoliteness of the farmers ranged from 2 to 25, the mean being 9.49 and standard deviation of 5.07. Based on cosmopoliteness, the farmers were classified into three categories based on possible range as shown in Table 4.9.

Table 4.9 Distribution of the farmers according to their cosmopoliteness

Categories	Farmers		Mean	SD
	Number	Percent		
Low Cosmopolite (1-9)	38	33.04	9.49	5.07
Medium Cosmopolite (10-18)	51	44.35		
High Cosmopolite (Above 18)	26	22.61		
Total	**115**	**100**		

Data contained in Table 4.9 indicates that 44.35 percent of the farmers had medium cosmopoliteness; while 33.04 percent of the farmers had low cosmopoliteness and 22.61 percent had high cosmopoliteness. Thus, about 77.39 of farmers had low to medium cosmopoliteness.

4.1.9 Training exposure

The score of training exposure of the farmers ranged from 0 to 24 days, the mean being 8.83 and standard deviation of 5.69. Based on observed range, the farmers were classified into three categories as shown in Table 4.10.

Table 4.10 Distribution of the farmers according to training exposure

Categories (days)	Farmers		Mean	SD
	Number	Percent		
No training (0)	18	15.65	8.83	5.69
Low training (1-7)	10	8.70		
Medium training (8-15)	67	58.26		
High training (above 15)	20	17.39		
Total	**115**	**100**		

Data contained in Table 4.10 indicates that 58.26 percent of the farmers had medium training exposure; while 17.39 percent of the farmers had high training exposure and 15.65 percent had no training exposure and only 8.70% of the farmers had low training. Thus, about 73.91% of farmers had no to medium training exposure. Higher experience is helpful for Thai Koi culture. During the investigation it was observed that the respondents received training from different Government organization like Department of Fisheries (DoF), some NGO's and some medicine company.

4.1.10 Knowledge on Thai Koi culture

Thai Koi culture knowledge scores of the respondents ranged from 10 to 34 against possible score of 0 to 36. The average score and standard deviation were 20.74 and 6.48 respectively. Based on the Thai Koi culture knowledge scores, the respondents were classified into three categories namely low knowledge, medium knowledge and high knowledge on Thai Koi culture (Table 4.12).

Table 4.11 Distribution of the farmers according to their knowledge

Categories	Farmers		Mean	SD
	Number	Percent		
Low knowledge (up to 12)	32	27.83	20.74	6.48
Medium knowledge (13-24)	63	54.78		
High knowledge (>24)	20	17.39		
Total	**115**	**100**		

Data presented in the Table 4.11 reveals that 54.78 percent of the respondents had medium Thai Koi culture knowledge, 27.83 percent had low knowledge and 17.39 percent had high knowledge on Thai Koi culture. Thus, an overwhelming majority (82.61 percent) of the respondents had medium to low knowledge on Thai Koi culture. This led to understanding that Thai Koi culture knowledge would reflect more by the medium knowledge on respondents in the present study. Knowledge on Thai Koi culture of the respondents are definitely affected by the education of the respondents because education helps to enhance the eagerness to be acquainted with new variety or technology.

4.1.11 Attitude towards Thai Koi culture

The score of attitudes towards Thai Koi culture of the respondents ranged from 3 to 28 against the possible range of 0-50. The average and standard deviation were 14.43 and 6.24 respectively. On the basis of attitude towards Thai Koi culture, the respondents were categorized into three classes' namely low favourable attitude, medium favourable attitude and high favourable attitude.

Table 4.12 Distribution of the farmers according to their attitude towards Thai Koi culture

Categories (Scores)	**Farmers**		**Mean**	**SD**
	Number	**Percent**		
Low favourable (up to 13)	27	23.48	14.43	6.24
Medium favourable (14-26)	67	58.26		
High favourable (Above 26)	21	18.26		
Total	**115**	**100**		

The observed data (Table 4.12) showed that most of the respondent (58.26 percent) had medium attitude towards Thai Koi culture while 18.26 percent and 23.48 percent of them had high favourable and low favourable attitude respectively. The attitude of the respondents expressed their perception about Thai Koi culture. It helped the researcher to judge or measure the acceptance/rejection of Thai Koi culture in the area. From the Table-4.12, overwhelming majority (81.74 percent) of the respondents had low to medium favourable attitude towards Thai Koi culture.

4.1.12 Innovativeness

The innovativeness score of the respondents ranged from 4 to 26. The mean score was 11.52 with the standard deviation 5.00. On the basis of Innovativeness, the respondents were classified into three categories namely, low innovativeness, medium innovativeness and high innovativeness, as shown in Table 4.13.

Table 4.13 Distribution of the farmers according to their Innovativeness

Categories (Scores)	Farmers		Mean	SD
	Number	Percent		
Low innovativeness (up to 7)	35	30.43	11.52	5.00
Medium innovativeness (8-17)	62	53.91		
High innovativeness (above 17)	18	15.65		
Total	**115**	**100**		

Data contained in the Table 4.13 revealed that the majority (53.91 percent) of the farmers had medium innovativeness as compared to 30.43 percent and 15.65 percent having low and high innovativeness in Thai Koi culture respectively. The majority (84.34 percent) of the respondents had low to medium innovativeness in Thai Koi culture.

4.2 Problems faced by the farmers in Thai Koi culture

Problems faced by the farmers in Thai Koi culture scores ranged from 11 to 45 against the possible range of 0-51 with an average and standard deviation of 23.77 and 7.97 respectively. Based on the problems faced by the farmers in Thai Koi culture scores, the respondents were classified into three categories namely low, medium and high problems.

The distribution of the farmers according to their problems faced in Thai Koi culture shown in Table 4.14.

Table 4.14 Distribution of the farmers according to their problems faced in Thai Koi culture

Categories (Scores)	**Farmers**		**Mean**	**SD**
	Number	**Percent**		
Low problems (up to 17)	27	23.48	23.77	7.97
Medium problems (18-34)	69	60.00		
High problems (above 34)	19	16.52		
Total	**115**	**100**		

Table 4.14 reveals that 60 percent of the farmers faced medium problems in Thai Koi culture where 16.52 percent farmers faced high problems in Thai Koi culture and 23.48 percent farmers faced low problems in Thai koi culture. Thus, overwhelming majority (76.52 percent) of the farmers had medium to high problems in Thai Koi culture.

4.3 The Contribution of the selected characteristics of the respondents to their problems faced in Thai Koi culture

In order to estimate the contribution of the selected characteristics of the farmers on their problems faced in Thai Koi culture, the multiple regression analysis was used which is shown in the Table 4.15.

Table 4.15 Multiple regression coefficients of the contributing variables related to problems faced in Thai Koi culture

Dependent Variable	Independent Variable	B	P	R^2	Adj. R^2	F
Problems faced by the farmers in Thai Koi culture	Age	-.173	.106	0.867	0.852	55.48
	Education	-.565	.008**			
	Farming experience	-.063	.785			
	Family size	.309	.332			
	Fish Farm size	-1.309	.199			
	Annual family income	-.009	.443			
	Extension media contact	-.416	.015*			
	Cosmopoliteness	-.247	.039*			
	Training on fish farming	-.451	.043*			
	Knowledge on Thai Koi culture	.061	.824			
	Attitude Towards Thai Koi culture	.305	.227			
	Innovativeness	.215	.328			

** Significant at p<0.01;

*Significant at p<0.05

Table 4.15 shows that education, extension media contact, cosmopoliteness and training exposure of the respondents had significant negative contribution with their problems faced in Thai Koi culture. Of these, education was the most important contributing factors (significant at 1% level of significance) and extension media contact, cosmopoliteness, training exposure of the respondents were less important contributing factors (significant at 5% level of significance). Coefficients of other selected variables don't have any contribution on their problems faced in Thai Koi culture.

The value of R^2 is a measure of how of the variability in the dependent variable is accounted by the independent variables. So, the value of $R^2 = 0.852$ means that independent variables account for 85% of the variation with their Problems faced in Thai Koi culture. The F ratio is 55.48 which is highly significant ($p<0$).

However, each predictor may explain some of the variance in respondents their faced problem in Thai Koi culture simply by chance. The adjusted R^2 value penalizes the addition of extraneous predictors in the model, but value 0.852 is still shows that variance is farmers their faced in Thai Koi culture can be attributed to the predictor variables rather than by chanced (Table 4.15). In summary, the models suggest that the farmers' education, extension media contact, cosmopoliteness and training exposure of the respondents are important variables on their problems faced in Thai Koi culture and in this connection some predictive importance has been discussed below:

4.3.1 Significant contribution of education on the farmers' problems faced in Thai Koi culture

The contribution of education to farmers problems faced in Thai Koi culture was measured by the testing the following null hypothesis;

"There is no contribution of education of the farmers' on their problems faced in Thai Koi culture".

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

a. The contribution of the education was at 1% significance level (0.008).
b. So, the null hypothesis could be rejected.

c. The direction between education and problems faced by the farmers was negative.

The b-value of level of education of the farmers is -0.565. So, it can be stated that as education increased by one unit, farmers' problems faced in Thai Koi culture decreased by -0.565 units.

Based on the above finding, it can be said that farmers' education decreased the farmers' problems faced in Thai Koi culture. So, education has significantly contributed to the farmers' problems in Thai Koi culture. Education plays an important role to reduce problems faced in Thai Koi culture in many cases. Education enhances knowledge on many aspects such as training, participation, extension contact and so on.

4.3.2 Significant contribution of extension media contact on the farmers' problems faced in Thai Koi culture

From the multiple regression, it was concluded that the contribution extension media contacts on the farmers' problems faced in Thai Koi culture was measured by the testing the following null hypothesis;

"There is no contribution of extension media contact on the farmers' problems faced in Thai Koi culture".

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

a. The contribution of the extension media contact was significant at 5% level (.015).

b. So, the null hypothesis could be rejected.

c. The direction between extension media contacts and problems faced by the farmers was negative.

The b-value of media contact was -0.416. So, it can be stated that as media contact increased by one unit; farmers' problems faced in Thai Koi culture decreased by -0.416 units.

Based on the above finding, it can be said that farmers had more extension media contact decreased farmers' problems faced in Thai Koi culture. So, extension media contact has high significantly contributed to the farmers' problems decreased.

4.3.3 Significant contribution of cosmopoliteness on the farmers' problems faced in Thai Koi culture

From the multiple regression, it was concluded that the contribution of cosmopoliteness on the farmers' problems faced in Thai Koi culture was measured by the testing the following null hypothesis;

"There is no contribution of cosmopoliteness on the farmers' problems faced in Thai Koi culture".

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

a. The contribution of the cosmopoliteness was significant at 5% level (.039)

b. So, the null hypothesis could be rejected.

c. The direction between cosmopoliteness and problems faced by the farmers was negative.

The b-value of cosmopoliteness was -0.247. So, it can be stated that as cosmopoliteness increased by one unit, farmers' problems faced in Thai Koi culture decreased by -0.247 units.

Based on the above finding, it can be said that farmers had more cosmopoliteness decreased farmers' problems faced in Thai Koi culture. So, cosmopoliteness has high significantly contributed to the farmers' problem decreased. cosmopoliteness increases farmer's knowledge about various aspects which helps farmers make to reduce their problem faced in Thai Koi culture.

4.3.4 Significant contribution of training exposure on the farmers' problems faced in Thai Koi culture

From the multiple regression, it was concluded that the contribution of training exposure on the farmers' problems faced in Thai Koi culture was measured by the testing the following null hypothesis;

"There is no contribution of training exposure of the farmers' on their problems faced in Thai Koi culture".

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

a. The contribution of the training was significant at 5% level (0.043)

b. So, the null hypothesis could be rejected.

c. The direction between training exposure and problem was negative.

The b-value of training exposure was -0.451. So, it can be stated that as training

exposure increased by one unit; farmers' problems decreased by -0.451 units.

Based on the above finding, it can be said that farmers had more training decreased the problems faced in Thai Koi culture. So, training has high significantly contributed to the farmers' problems. Training helps farmers to gather more knowledge on Thai Koi culture which ultimately helps farmers to reduce their problems faced in Thai Koi culture.

4.4 Severity among the problems faced in Thai Koi culture

The observed Problem Faced Index of the problems ranged from 115 to 336 against the possible range of 0-345. Problem Faced Index (PFI) of the selected problems is shown in Table 4.16.

On the basis of PFI, it was observed that "high price of feed" ranked first followed by "high price of medicine", "high sensitivity to disease of Thai Koi", "high cost of labor" and "Social or political pressure" were the least problems faced by the farmers in Thai Koi culture.

Table: 4.16 Problem Faced Index (PFI) with Rank Order

Statement on problems	High	Medium	Low	No	Computed score	Rank order
High price of feed	108	5	2	0	336	1
High price of medicine	102	6	4	3	322	2
High sensitivity to disease of Thai koi	95	5	10	5	305	3
High cost of labor	82	16	12	5	290	4
Unavailability of quality of Thai koi seeds	73	21	13	8	274	5
Lack of knowledge about Thai koi culture	70	20	15	10	265	6
Higher production cost	63	24	13	15	250	7
Lack of Capital	55	30	16	14	241	8
Nitrogen gases present on the pond bottom	51	35	12	17	235	9

Lack of oxygen concentration	48	34	18	15	230	10
Algal blooms on the pond	42	31	30	12	218	11
Lack of water exchange facilities	40	32	27	16	211	12
Lack of marketing facilities	37	30	21	27	192	13
Lack of good roads & transportation	35	18	30	32	171	14
Seasonal floods in the pond areas	28	16	34	37	150	15
Less security of fish pond	25	15	36	39	141	16
Social or political pressure	22	10	29	54	115	17

The Table 4.16 shows that 'High price of feed' got the highest problem faced score (336) and stood the first rank problem. There is different feed of different company in the market but price is very high. Thai Koi farmers directly depend on company feed. Because farmers are not efficient to prepare the Thai Koi feed.

Second one is 'High price of medicine'. Different medicines of different company are available in the market but price is very high. Thai Koi farmers are directly dependent on company medicines.

Third problem is 'High sensitivity to disease of Thai koi'. Thai Koi is easily affected by viral disease. In addition, appropriate drugs are not available in the market which are used for viral disease.

Fourth problem is 'High cost of labor'. Farm labor are scarce in study area because high price of labor.

Fifth problem is ‘Unavailability of quality Thai Koi seeds. Most of the hatchery owner is not maintaining breeding law. So, good quality of seed is not produced in hatchery. Honest hatchery owners are needed to solve this problem.

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the Findings

5.1.1 Selected characteristics of the farmers

Age: The age of the respondents has been varied from 22 to 65 years with a mean and standard deviation of 43.72 and 10.40 respectively. The middle-aged respondents comprised the highest proportion (47.8 percent) followed by young aged category 31.3 percent and 20.9 percent of the respondents were in the old aged category.

Education: The level of educational scores of the respondents ranged from 0 to 18 with a mean and standard deviation of 8.72 and 3.69 respectively. Respondents under secondary education category constitute the highest proportion (34.78 percent) followed by above secondary education (30.43 percent) category. On the other hand, the lowest 10.43 percent in primary education category.

Experience in Thai Koi culture: The majority (67.8 percent) of the farmers had medium experience as compared to 19.10 percent and 13.00 percent having low and high experience in Thai Koi culture respectively.

Family size: The medium size family constitute the highest proportion (50.43 percent) followed by the small size family 32.17 percent and 17.39 percent respondents had large family size.

Fish Farm size: Most of the respondents (48.70 percent) had medium farm size while 32.17 and 19.13 percent of them had small and large farm size area respectively.

Annual income: Annual income score of the respondents ranged from 100 to 600 with an average of 265.22. Majority of the respondents (51.30 percent) had medium income followed by 23.48 percent and 25.22 percent low and high income respectively.

Training exposure: Training exposure score of the respondents ranged from 0 to 24 with an average of 8.83.

Majority of the (58.26 percent) of the farmers had medium training exposure; while 17.39 percent of the farmers had high training exposure and 15.65 percent had no training exposure and only 8.70% of the farmers had low training.

Extension media contact: Extension media contact score of the respondents ranged from 8-44 with an average of 22.54. Majority of the respondent's (56.52) percent of the farmers had medium extension media contact compared to having 24.35 percent low and 19.13 percent had high extension media contact.

Cosmopolitness: Cosmopoliteness score of the respondents ranged from 2 to25 with an average of 9.49. Majority of the respondent's (44.35 percent) of the farmers had medium cosmopoliteness; while 33.04 percent of the farmers had low cosmopoliteness and 22.61 percent had high cosmopoliteness.

Knowledge on Thai Koi culture: The majority (54.78 percent) of the respondents had medium knowledge on Thai Koi culture, 27.83 percent had low knowledge and 17.39 percent had high knowledge on Thai Koi culture.

Attitude towards Thai Koi culture: Most of the respondent (58.26 percent) had medium favourable attitude towards Thai Koi culture while 23.48 and 18.26 percent of them had low favourable attitude and high favorable attitude respectively. The attitude of the respondents expressed their perception about Thai Koi culture.

Innovativeness: The majority (53.91 percent) of the respondents had medium innovativeness, 30.43 percent had low innovativeness and 15.65 percent had high innovativeness.

5.1.2 Problems faced by the farmers in Thai Koi culture

Problems faced by the farmers in Thai Koi culture scores ranged from 11 to 45 against the possible range of 0-51 with an average and standard deviation of 23.77 and 7.97 respectively. The most 60.00 percent of the farmers faced medium problems in Thai Koi culture, 23.48 percent farmers faced low problems in Thai Koi culture and 16.52 percent farmers faced high problems in Thai Koi culture.

5.1.3 Contribution between selected characteristics and problem faced

Farmer's Level of education, extension media contact, cosmopoliteness, Training exposure on fish farming had significant negative relationship with the problems faced by the farmers in Thai Koi culture. Farmer's age, experience in Thai Koi culture, family size, farm size, annual family income, knowledge on Thai Koi culture, attitude towards Thai Koi culture and innovativeness had no significant relationship with the problems faced by the farmers in Thai Koi culture.

5.1.4 Severity among the problems faced by the farmers in Thai Koi culture

The observed Problem Faced Index of the respondents ranged from 115 to 336 against the possible range of 0-345. On the basis of PFI, it was observed that "high price of feed" ranked first followed by "high price of medicine", "high sensitivity to disease of Thai Koi", "high cost of labor" and "Social or political pressure" were the least problems faced by the farmers in Thai Koi culture.

5.2 Conclusions

Following conclusions were drawn on the basis of findings, logical interpretation and other relevant facts of the study:

1.The majority (76.52 percent) of the farmers faced medium to high problems in Thai Koi culture. Therefore, it is concluded that most of the farmers faced problems in Thai Koi culture which needs to minimize for increasing Thai Koi culture.

2. Farmer's level of education, extension media contact, cosmopoliteness and Training exposure on fish farming had significant negative contribution on the problems faced by the farmers in Thai Koi culture. Therefore, it can be concluded that these three characteristics are more important compare to others personal characteristics need to be focused more to improve Thai Koi culture.

3. On the basis of PFI, the farmers faced serious problems in high price of feed, high price of medicine, high sensitivity to disease of Thai Koi, high cost of labor and social or political pressure. Therefore, it may be concluded that these problems should be focused with seriousness to minimize them that will ultimately results better in Thai Koi culture.

5.3 Recommendations

The following recommendations are made from the results of the study based on the observations and conclusions:

5.3.1 Recommendation for policy implication

1. The findings indicated that an overwhelming majority of the farmers faced medium to high problems. So, it may be recommended that necessary steps should be taken by the concerned authority to remove these problems so that they can make their Thai Koi culture profitable by increasing yield with less production cost.
2. The findings shows that extension media contact had a significant negative relationship with their problems faced by the farmers in Thai Koi culture. So, it may be recommended that the extension workers of the concerned authority should increase the contact with farmers personally and motivate them to be connected with electronic and printed media that can help them to exchange related information which will reduce their problems.
3. The findings revealed that the training exposure had a significant negative relationship with the problems faced by the farmers in Thai Koi culture. So, it may be recommended that the concerned authority should increase training facilities to develop skills of the farmers technologically so that they can minimize their problems.
4. The findings of the study indicated that education had significant negative relationship with problems faced by the farmers in Thai Koi culture. Therefore, it may be recommended that the concerned authorities should take the special mass education program for the illiterate and low lettered farmers for solving their problems.
5. The findings indicated that cosmopoliteness had a negative significant relationship with the problems faced by the farmers in Thai Koi culture. Therefore, it may be recommended that the extension provider of concerned authority should increase the contact with farmers personally and motivate them to improve their cosmopoliteness that will help them to solve their problems.

5.3.1 Recommendations for further study

1.The present study was conducted in Muktagachha upazila under Mymensingh district. It is recommended that similar studies should be conducted in other parts of Bangladesh.

2. Relationships of 12 characteristics of the fish farmers with their problems faced in Thai Koi culture have been investigated in this study. Therefore, it is recommended that further study should be conducted with other characteristics of the farmers with their problems faced in Thai Koi culture.

3. It is difficult to explore all the problems faced by the farmers in Thai koi culture. Measurement of problems of the farmers is not free from questions. More reliable measurement of the concerned variable is necessary for further study.

4. In the present study farmer's age, experience in Thai Koi culture, family size, farm size, annual income, knowledge on Thai Koi culture, attitude towards Thai Koi culture and innovativeness had no significant relationship with their problem faced in Thai Koi culture. In this connection, further verification is necessary.

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Appendix-A

ENGLISH VERSION OF THE INTERVIEW SCHEDULE

Department of Agricultural Extension and Information System

Sher-e-Bangla Agricultural University Dhaka-1207

Interview schedule for the data collection for the research on

"Problem Faced by the Fish Farmers in Thai koi Culture"

Sl. no. ---------- **Date: …….**

Name of the respondent: ----------

Address:

Village: ---------- Union: ---------- Upazilla: ----

---------- District: ---------- Contract no:

.....

(Please provide following information. Your information will be kept confidential and will be used for research purpose only)

1. Age: How old are you? ..... Years
2.Education: what is your education qualification? Please mention your education qualification.

a. I don't know how to read and write.
b. I can sign only.
c. I have studied up to class……

3.Fish farming experience: How many years are you engaged with fish Culture?.....Year
4. Family size: How many members in your Family including you?.....

5. **Fish Farm size:** What is about your farm size?

Sl. No	Particulars	Local Unit (Hectare)
A	Own pond under own cultivation	
B	Pond taken from others on lease	
C	Pond taken from others on borga or share	
D	Pond given to others on borga or share	
	Total (A+B+C+D)	

6.Annual family income: Please mention your family income from the following sources.

Sl. No	Source of Income	Amount (Tk)/year
1.	Agriculture -Rice -Vegetable -wheat -others	
2.	Fisheries (Thai Koi & others fishes)	
3.	Livestock	
4.	Forestry	
5.	Business	
6.	Service	
7.	Others	
	Total	

7. Extension media contact: Please mention your extent of contact with the following extension media.

Personal media contract						
Sl. No	**Name of the media**	**Extent of contact**				
		Regularly (4)	**Often (3)**	**Occasionally (2)**	**Rarely (1)**	**Not at all (0)**
1	**Neighbors and relatives**	7-8times/ month()	5-6times/ month ( )	3-4 times/ month( )	1-2 times /month ( )	0()
2	**Experienced farmer**	7-8times/ month()	5-6times/ month ( )	3-4 times/ month ( )	1-2 times / month ( )	0()
3	**UFO**	4-5 times/ month ()	4-3times/ month ( )	3-2 times/ month ( )	1-2 times / month ( )	0()
4	**NGO**	4-5 times/3 months ()	4-3times/3 months ( )	3-2 times/ 3 months ( )	1-2 times /3 months ( )	0()
5	**Others**	7-8times/ month ()	5-6times/ month ( )	3-4 times/ month ( )	1-2 times / month ( )	0()
Group media contract						
6	**Group discussion**	7-8times/ 4 months ()	5-6times/ 4 months ()	3-4 times/ 4 months ()	1-2 times/4 months ()	0()
7	**Field day**	7-8times/ year()	5-6times/ year( )	3-4 times/ year ( )	1-2 times /year ( )	0()
8	**Result demonstration**	7-8times/ year()	5-6times/ year( )	3-4 times/ year ( )	1-2 times /year ( )	0()
9	**Participation in fisheries. Training course**	7-8times/ year()	5-6times/ year( )	3-4 times/ year ( )	1-2 times /year ( )	0()

Mass media contact						
10	**Internet**	7-8times/ week()	5-6times/ week( )	3-4 times/ week( )	1-2 week/year ( )	0()
11	**Television**	7-8times/ week()	5-6times/ week()	3-4 times/ week()	1-2 times / week()	0()
12	**Read Fisheries Related Book/Magazine**	7-8times/ year()	5-6times/ year( )	3-4 times/ year ( )	1-2 times /year ( )	0()
13	**Fish Faire**	4 times/4 year ()	3times/4 year( )	2 times/ 4 year ( )	1times /4 year ( )	0()

8. Cosmopoliteness: Please mention the frequency of your visit to the following places.

Sl. No	**Name of visit**	**Extent of contact**				
		Regularly (4)	**Often (3)**	**Occasionally (2)**	**Rarely (1)**	**Not at all (0)**
1	**Others village**	7-8times/ month ()	5-6times/ month ()	3-4 times/ month ()	1-2 times / month ()	0()
2	**Others union**	5-6times/ month ()	3-4times/ month ()	2 times/ month ()	1 times / month ()	0()
3	**Upazila sadar**	5-8times/ year()	5-6times/ year( )	3-4 times/ year ( )	1-2 times /year ( )	0()
4	**Others upazila sadar**	5-6times/ year()	4-5times/ year( )	2-3 times/ year ( )	1-2 times /year ( )	0()
5	**Own district**	7-8times/ year()	5-6times/ year( )	3-4 times/ year ( )	1-2 times /year ( )	0()

6	**Others district**	4 times/ year()	3 times/ year( )	2 times/ year ( )	1 time /year ( )	0()
7	**Regional fisheries Research institute**	4 times/ year()	3 times/ year( )	2 times/ year ( )	1 time /year ( )	0()

9.Training on fish farming: Do you have received any training on fish farming? Yes / No. If yes, please answer the following questions.

SL. No	**Title**	**Duration (Days)**	**Conducted by**

10. Knowledge on Thai Koi culture: Please answer the following questions**.**

SL#	**Questions**	**Full marks (2)**	**Marks obtained**
1.	What type of fish Thai Koi is?	2	
2.	Do you know the appropriate stocking density of Thai Koi?	2	
3.	Do you know the appropriate stocking density of Thai Koi?	2	
4.	Do you know how to prepare pond before Thai Koi culture?	2	
5.	What do mean by quality fry or fingerlings?	2	
6.	What is the best time for fry/ fingerlings release?	2	
7.	Do you know how to release fry or fingerlings in the pond?	2	
8.	What is the optimum feeding rate of Thai Koi?	2	
9.	What is the feeding period of Thai Koi?	2	
10.	What is artificial and natural feed?	2	
11.	How can you realize that enough food present in the water bodies?	2	
12.	What do you mean by fertilization in the ponds?	2	

13.	Mention at least three fertilizers name those are used in Thai Koi cultivation.	2	
14.	What is the effect of chemicals in the culture ponds?	2	
15.	Do you know about gulping of fish and why fish gulped?	2	
16.	Mention three disease names of Thai Koi.	2	
17.	Do you know about disease management?	2	
18.	Mention the fishing gears and two chemicals used during harvesting of Thai Koi.	2	

11. Attitude Towards Thai Koi Culture: Please mention the degree of your agreement with the following statements.

Sl. No	**Statements**	**Extent of agreement/disagreement**				
		Strongly agreed (4)	**Agreed (3)**	**Undecided (2)**	**Disagreed (1)**	**Strongly disagreed (0)**
1 (+)	Thai Koi Culture is profitable					
2 (+)	Thai Koi Culture is easy					
3 (-)	It requires high initial investment					
4 (-)	Modern Thai Koi Culture system is harmful for nature					

5 (-)	Thai koi easily affected by diseases					
6 (+)	High yield Thai Koi fingerlings is available					
7 (+)	Thai koi easily cultured with other fish species					
8 (+)	Thai koi pond management system is easy					
9 (-)	Thai koi production cost high compared to low profit					
10 (-)	Thai koi market price is low					

12. Innovativeness: Please mention how many years after first hearing you use the following new technologies. Put (√) in appropriate place

Sl. No	**Name of Technology**	**Level of innovativeness**				
		Used within 1 years **(4)**	Used within 1- 2 years **(3)**	Used within 2- 3 years **(2)**	Used within 3- 4 year **(1)**	Do not use **(0)**
1	Use of RAS (Recirculating aquaculture system)					
2	Use of Bio floc fish farming					
3	Use of extensive aquaculture system					

4	Use of semi-intensive aquaculture system					
5	Use of intensive aquaculture system					
6	Use of poly aquaculture system					
7	Use of mono aquaculture system					
8	Use of Integrated fish farming					
9	Use of cage & pen culture system					

13.Problems faced by the farmer during Thai Koi Culture: What were the problems did you face during Thai koi culture?

SI. NO	**problems**	**Level of problem**			
		High (3)	**Medium (2)**	**Low (1)**	**Not at all (0)**
1	Lack of Capital				
2	Unavailability of quality of Thai koi seeds				
3	High price of feed				
4	Lack of knowledge about Thai koi culture				
5	High sensitivity to disease of Thai koi				
6	High cost of labor				
7	High price of medicine				
8	Lack of water exchange facilities				
9	Nitrogen gases present on the pond bottom				
10	Algal blooms on the pond				
11	Higher production cost				
12	Lack of marketing facilities				
13	Less security of fish pond				

14	Social or political pressure				
15	Lack of oxygen concentration				
16	Lack of good roads & transportation				
17	Seasonal floods in the pond areas				

14. What suggestions do you offer for overcome those problem?

Thank you for nice co-operation

Signature of the Interviewer…….
Date…….