Development of Tilapia Marketing Systems in Bangladesh: Potential for Food Supply

By
Nesar Ahmed, Principal Investigator
Department of Fisheries Management
Bangladesh Agricultural University

and

Faisal Ahmed, Co-Investigator
School of Business Studies, Southeast University

This study was carried out with the support of the

National Food Policy Capacity Strengthening Programme

April 2009
This study was financed under the Research Grants Scheme (RGS) of the National Food Policy Capacity Strengthening Programme (NFPCSP). The purpose of the RGS was to assist in improving research and dialogue within civil society so as to inform and enrich the implementation of the National Food Policy. The NFPCSP is being implemented by the Food and Agriculture Organization of the United Nations (FAO) and the Food Planning and Monitoring Unit (FPMU), Ministry of Food and Disaster Management with the financial support of EU and USAID.

The designation and presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of FAO nor of the NFPCSP, Government of Bangladesh, EU or USAID and reflects the sole opinions and views of the authors who are fully responsible for the contents, findings and recommendations of this report.
Acknowledgements

The study was supported by the National Food Policy Capacity Strengthening Programme (NFPCSP), funded by EU and USAID and jointly implemented by the Food and Agriculture Organisation (FAO) of the United Nations and the Food Planning and Monitoring Unit of the Ministry of Food and Disaster Management, Government of Bangladesh. The author is grateful to Mr. Ad Spijkers, FAO Representative in Bangladesh, Dr. Ciro Fiorillo, Chief Technical Advisor, and Mr. Nur A. Khondaker, Research Grant Administrator, of the NFPCSP, FAO for their excellent research support. The author is also grateful to Professor Shaikh Abdus Sabur, Availability Advisor, NFPCSP and Dr. Nathalie Bouchè, Economist, NFPCSP, for their valuable comments to improve this report.

The author would like to thank Professor James F. Muir of the Institute of Aquaculture, University of Stirling, UK for his valuable suggestions regarding value chain analysis of tilapia marketing systems.

The author is grateful to Dr Shahroz Mahean Haque, Associate Professor in the Department of Fisheries Management, Bangladesh Agricultural University (BAU) who was responsible as an acting Principal Investigator during absence of author for his postdoctoral study at Charles Darwin University, Australia.

The author would like to thank Mr. Faisal Ahammed, Co-investigator, School of Business Studies, Southeast University, Dhaka and Ms. Rehana Binte Nurain, Research Assistant, Department of Fisheries Management, Bangladesh Agricultural University, Mymensingh for their enormous help and supports throughout the study period.

Finally, the author express his gratitude to all tilapia farmers, traders and associated groups those have given a lot of valuable information without which the study could not have been realised.

The opinions expressed herein is the author and do not necessarily reflect the views of the NFPCSP, FAO or BAU.

Dr Nesar Ahmed
# Contents

Executive Summary v

1. Introduction 1

2. Methodology 3
   2.1. Study Area 3
   2.2. Tilapia Farming 5
   2.3. Data Collection Methods 6
   2.4. Problems Encountered 8
   2.5. Data Analysis 9

3. Results 10
   3.1. Harvesting and Marketing of Tilapia 10
   3.2. Tilapia Marketing Systems 11
   3.3. Financing of Tilapia Marketing 13
   3.4. Tilapia Trading in Retail Markets 15
   3.5. Factors Influencing Price of Tilapia 17
   3.6. Value Chain Analysis 18
   3.7. Constraints of Tilapia Marketing 21
   3.8. Socioeconomic Features 22
   3.9. Market Development: Opportunities and Challenges 26

4. Discussion 28

5. Conclusions, Policy Implications and Recommendations 33

References 35

Appendix 39
# List of Tables

<table>
<thead>
<tr>
<th>Table No.</th>
<th>Title</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Data collection methods and sample size for target groups</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>Average farm-gate prices of tilapia</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Average marketing costs (Tk/kg) of tilapia in different retail markets</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>Average prices (Tk/kg) of tilapia in different retail markets</td>
<td>16</td>
</tr>
<tr>
<td>5</td>
<td>Summary of the regression of tilapia price influencing different factors</td>
<td>17</td>
</tr>
<tr>
<td>6</td>
<td>Marketing margin and profit (Tk/kg) of tilapia marketing, based on all market survey</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>Key constraints of tilapia marketing by traders in different markets</td>
<td>22</td>
</tr>
<tr>
<td>8</td>
<td>Correlation between income of traders and different factors by markets</td>
<td>25</td>
</tr>
<tr>
<td>9</td>
<td>SWOT analysis for the development of tilapia marketing systems</td>
<td>27</td>
</tr>
<tr>
<td>10</td>
<td>Comparison of retail market prices between tilapia and other popular fish food</td>
<td>30</td>
</tr>
</tbody>
</table>
## List of Figures

<table>
<thead>
<tr>
<th>Figure No.</th>
<th>Title</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Map of Bangladesh showing the study areas of Mymensingh and Dhaka for market survey, and tilapia producing area in Mymensingh district</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Tilapia marketing systems from producers to consumers</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>Financing of tilapia marketing from different sources</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>Interaction of tilapia supply and demand in markets</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>The concept of a value chain</td>
<td>19</td>
</tr>
<tr>
<td>6</td>
<td>Average tilapia marketing costs and profits in different markets</td>
<td>21</td>
</tr>
<tr>
<td>7</td>
<td>Factors influencing the development of tilapia marketing</td>
<td>23</td>
</tr>
<tr>
<td>8</td>
<td>Average marketing costs and profits of a trader in different retail markets</td>
<td>24</td>
</tr>
<tr>
<td>9</td>
<td>Value adding processes from farmers to consumers through different markets</td>
<td>29</td>
</tr>
<tr>
<td>10</td>
<td>A conceptual framework for sustainable development of tilapia marketing</td>
<td>32</td>
</tr>
</tbody>
</table>
Executive Summary

Although Bangladesh is considered one of the most suitable countries in the world for freshwater aquaculture, tilapia culture is not widespread. In spite of long history of tilapia introduction to Bangladesh since 1954, culture of tilapia has not yet well established due to socioeconomic, technological, institutional and marketing constraints. However, while tilapia farming has huge potential, its production, commercial viability and sustainability depends on markets. The profitability of tilapia farming is largely determined by market conditions.

A study was conducted to understand the current practices of tilapia marketing systems in Bangladesh for its sustainable development to food supply. Primary data were collected through a field survey for a period of nine months from September 2007 to June 2008, employing participatory rural appraisal, rapid market appraisal, questionnaire interviews and cross-check interviews with key informants. Data were collected in Trishal Upazila (sub-district) under Mymensingh district of north-central Bangladesh to understand tilapia harvesting and marketing systems. For the market survey, four important fish markets in Mymensingh town and the capital city of Dhaka were selected (two markets in each area). The ultimate sample size was 230, including 120 tilapia farmers, 30 wholesalers and 80 retailers.

In Bangladesh, almost all produced tilapia is marketed internally for domestic consumption. The market chain of tilapia from farmers to consumers encompasses mainly primary, secondary and retail markets, involving local agents, suppliers, wholesalers and retailers. Although the tilapia marketing system is traditional and less competitive, it plays a vital role in connecting the farmers and consumers, thus contributing significantly in the value adding process. The demand for tilapia is high in markets but supply is limited, and a strong network has developed with intermediaries and traders intervening between farmers at the one end and consumers at the other end. The prices of tilapia depend on their quality, size and weight, supply and demand, availability of other fish species in markets, location of markets, market infrastructure and seasonality. The average farm-gate prices of tilapia varied between Tk 60 and Tk 85 per kg depending on size, whereas consumer paid between Tk 89 and Tk 118 per kg. It was calculated that farmers received an average 69% of the retail price.

Despite the potential of tilapia marketing, a number of constraints were reported by traders, including poor road and transport facilities, higher transport costs, insufficient supply of ice, lack of credit facilities, poor infrastructure of markets and unhygienic conditions, poor institutional support and inadequate training facilities. Considering the above constraints, the following recommendations are offered for sustainable tilapia marketing that can provide food supply to the people of Bangladesh:

- Improvement of tilapia distribution, transport and handling facilities
- Improvement of hygienic conditions of tilapia landing centers and markets
- Establishment of ice factories for sufficient supply of ice
- Training of market operators in areas of tilapia preservation, handling, icing and curing
- Introduction of fish quality control measure
- Development of information network among market actors
- Provision of governmental, institutional and banking assistance
Abbreviations

ADB          Asian Development Bank
BFRI         Bangladesh Fisheries Research Institute
DANIDA       Danish International Development Assistance
DOF          Department of Fisheries
FAO          Food and Agriculture Organisation
FGD          Focus Group Discussion
GIFT         Genetically Improved Farmed Tilapia
ICLARM       International Center for Living Aquatic Resources Management
MAEP         Mymensingh Aquaculture Extension Project
NGO          Non-government Organisation
PRA          Participatory Rural Appraisal
RMA          Rapid Market Appraisal
SPSS         Statistical Package for Social Science
SWOT         Strengths, Weaknesses, Opportunities and Threats
## Weights and Measures

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>g</td>
<td>Gram</td>
</tr>
<tr>
<td>ha</td>
<td>Hectare</td>
</tr>
<tr>
<td>kg</td>
<td>KiloGram</td>
</tr>
<tr>
<td>km</td>
<td>Kilometer</td>
</tr>
<tr>
<td>Tk</td>
<td>Taka (Bangladesh unit of currency)</td>
</tr>
<tr>
<td>US$</td>
<td>United States Dollar</td>
</tr>
</tbody>
</table>
Glossary of Terms
(Bengali Words are Given in Italic)

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bazaar</td>
<td>Fish market is locally known as bazaar</td>
</tr>
<tr>
<td>Breeding</td>
<td>Production of fish seed through the management of broodstock</td>
</tr>
<tr>
<td>Dadon</td>
<td>A local credit system</td>
</tr>
<tr>
<td>Machua</td>
<td>Fish or fisher is locally known as machua</td>
</tr>
<tr>
<td>Monoculture</td>
<td>The farming of single fish species in a pond</td>
</tr>
<tr>
<td>Nutun</td>
<td>Anything new, i.e. Nutun Bazaar or new market</td>
</tr>
<tr>
<td>Polyculture</td>
<td>The farming of more than one species of fish in the same pond</td>
</tr>
<tr>
<td>Upazila</td>
<td>An administrative unit in Bangladesh equivalent to a sub-district</td>
</tr>
</tbody>
</table>
1. Introduction

The people of Bangladesh, one of the poorest and most densely populated countries in the world, are commonly referred to as “Macche-Bhate Bangali” (i.e. fish and rice make a Bengali). The most important food crops for the 140 million people of Bangladesh are rice and fish. Fish play an important role among the population in Bangladesh for providing protein, essential vitamins, minerals and fatty acids. Fish account for about 70% of the animal protein intake with annual fish consumption of about 14 kg per person (ADB, 2005a). The average per capita fish consumption is lower than the world average of 16.1 kg a year (Hishamunda et al., 2008). Nevertheless, the importance of aquaculture as a source of food has been well recognised in Bangladesh.

Bangladesh is considered one of the most suitable countries in the world for freshwater aquaculture, because of its favourable agro-climatic conditions. A sub-tropical climate and vast areas of shallow water provide ideal conditions for fish production. The total annual fish production was estimated to be 2.32 million tons in 2006, of which 892,049 tons (38%) were obtained from inland aquaculture, 956,686 tons (41%) from inland capture fisheries, and 479,810 tons (21%) from marine fisheries (DOF, 2007). The main production systems for freshwater aquaculture in Bangladesh are extensive and semi-intensive pond polyculture of Indian major carps and exotic carps which accounts for 80% of the total freshwater aquaculture production. The remaining 20% were mainly from catfish (Pangasianodon hypophthalmus locally known as pangas), tilapia\(^1\), small indigenous fish species and rice-fish farming (ADB, 2005a).

In order to meet the soaring demand for food, there is a huge potential of tilapia farming in Bangladesh. Tilapia farming is widespread in many Asian countries including China, Indonesia, Philippines, Thailand and Vietnam due to its rapid growth rate, high market demand and increasing consumer acceptance (ADB, 2005b). With increasing popularity among consumers, tilapia have become the world’s second most important cultured fish after carps.

There is a long history of tilapia farming in Bangladesh and it was expected that tilapia would act as a miracle fish in aquaculture. The Mozambique tilapia\(^2\) (*Oreochromis mossambicus*) was introduced to Bangladesh from Thailand in 1954 (Ahmed et al., 1996). However, this species was not widely accepted for aquaculture because of its early maturation and prolifically breeding lead to overcrowd in ponds. The Chiralada strain of Nile tilapia (*O. niloticus*), a far superior farmed tilapia (faster growing and more manageable than the Mozambique tilapia) was introduced to Bangladesh from Thailand by the UNICEF (United Nations International Children's Emergency Fund) in 1974

\(^1\) There are about 70 species of tilapia identified in the world - all are native to Africa, of which 10 have been used in aquaculture.

\(^2\) In 1939, the first tilapia introduced from Africa to Asia was the Mozambique tilapia (*O. mossambicus*) as aquarium fish in Indonesia (ADB, 2005b)
(ADB, 2005b). Nevertheless, Nile tilapia farming was slow to develop as most farmers were interested to grow-out carps. Gradually, the red tilapia (hybrid of *O. mossambicus* x *O. niloticus*) was imported to Bangladesh from Thailand. The Bangladesh Fisheries Research Institute (BFRI) reintroduced Nile tilapia and Red tilapia from Thailand in 1987 and 1988 (Gupta et al., 1992). Genetically Improved Farmed Tilapia (GIFT) was introduced to Bangladesh by ICLARM and BFRI in 1994 (Hussain et al., 2004). Performance of GIFT was found to be significantly superior to that of tilapia previously introduced. Technology was developed to produce all male tilapia or sex-reversed GIFT locally known as mono-sex tilapia, because of avoid the unwanted reproduction and male tilapia grow faster than female (ADB, 2005b).

In spite of long history of tilapia introduction to Bangladesh, culture of tilapia has not yet well established in aquaculture as tilapia culture is beset with socioeconomic, technological, institutional and marketing constraints (Bart et al., 2004; Ganesh and Majumder, 2004). Nevertheless, in recent years a considerable number of farmers are involved in tilapia culture in rural Bangladesh due to its profitability. Among various tilapia species, GIFT has now become a popular fish among farmers. This fish reaches marketable size (100 to 150 g) within four months under subsistence fish farming systems which allows for a minimum of two crops per year (Hussain et al., 2000; Hussain et al., 2004). Although tilapia farming has yet to make a significant contribution to national freshwater aquaculture production, this is likely to change, because the availability and popularity of farmed tilapia are increasing (Dey, 2000; ADB, 2005b).

However, while tilapia farming has huge potential in Bangladesh, its production, commercial viability and sustainability depends on markets. The profitability of tilapia farming is largely determined by market conditions. The market for tilapia is associated with strong demand, driven by continued increases in population. Mainly due to population growth there is a growing gap between supply and demand of tilapia in markets. Narrowing the gap not only requires increasing production of tilapia but also improvements of all aspects of marketing and distribution systems (Kleih et al., 2002; Ahmed and Sturrock, 2006; Ahmed et al., 2007). It is therefore worthwhile to develop tilapia markets for its sustainable development. Aside from a better understanding of tilapia marketing systems, it seems important to identify marketing inefficiencies that have negative impacts on poor farmers, traders and associated groups, which also affects tilapia production.

The overall goal of this study was to develop tilapia marketing systems in Bangladesh. To achieve this goal the specific objectives were: i) to understand the existing tilapia marketing systems, ii) to identify marketing constraints and iii) to

3 BFRI was established in 1984 and has played a key role in tilapia culture development in Bangladesh to transfer the technologies and seeds to farmers through training and extension services.

4 International Center for Living Aquatic Resources Management (ICLARM) is now known as the WorldFish Center, working on poverty alleviation through fish culture in rural Bangladesh.
recommend for sustainable tilapia marketing systems in Bangladesh. This paper describes the existing tilapia marketing systems with its possible constraints. The aim of this paper is to highlight key issues determine sustainable development of tilapia marketing systems to enhance food supply. It is assumed that sustainable tilapia marketing can provide food and nutrition to the people of Bangladesh.

2. Methodology

2.1. Study Area

The study was conducted in Trishal Upazila (sub-district) under Mymensingh district of north-central Bangladesh (Figure 1). Geographically Trishal has been identified as the most important and promising area for tilapia culture, because of the availability of hatchery fry, favourable resources and climatic conditions, such as the availability of pond and low-lying agricultural land, warm climate, fertile soil, and cheap and abundant labour. In addition, farmers in this area received training in tilapia farming with the help of the Mymensingh Aquaculture Extension Project (MAEP\(^5\)), funded by Danish International Development Assistance (DANIDA\(^6\)). As a result, there has been a dramatic increase in tilapia production over the last few years. Trishal sub-district was therefore selected for the study.

For the market survey, two important fish markets in Mymensingh town, namely Machua Bazaar (i.e. fish market) and Nutun Bazaar (new market) were selected based on market history, supply of tilapia, number of traders involved, and the time and duration of the trading season. Similarly, two important fish markets in the capital city of Dhaka, namely Kawran Bazaar and Mohammadpur Kitchen Market were selected to carry out comparative studies of tilapia marketing between Dhaka and Mymensingh markets. It was expected that differences might be found to experience in tilapia marketing and geographical differences.

\(^5\) MAEP Phase 1 began in 1989 with the main objective of disseminating BFRI research results in the Greater Mymensingh area as a means of increasing fish production including tilapia. MAEP Phase 2 started in 1993, and a consolidation phase was carried out from 2000 to 2003.

\(^6\) DANIDA provided support to the Department of Fisheries (DOF) in Bangladesh since 1977, commencing with the establishment of the aquaculture experiment station, which was renamed the freshwater aquaculture research station, currently known as BFRI.
Fig. 1. Map of Bangladesh showing the study areas of Mymensingh and Dhaka for market survey, and tilapia producing area in Mymensingh district
2.2. Tilapia Farming

Fish farming has rapidly increased in the Mymensingh area since 1995 along the Dhaka-Mymensingh corridor (ADB, 2005a). Many farmers have recently switched to tilapia farming due to lower market price of pangas (\textit{P. hypophthalmus}). Tilapia is produced in a wide range of culture systems, including small-scale, low-input, rural ponds, semi-intensive, intensive and commercial operations (Chowdhury et al., 2007). The average size of fish farm was reported to be 0.23 ha in the Mymensingh area (Ahmed, 2007a).

Most farmers (90%) practise small-scale tilapia farming with carps and catfish, while few better-off farmers and entrepreneurs produce tilapia as a monoculture under semi-intensive or intensive systems. The peak season for tilapia farming is from April to December, a culture period of around nine months. Farmers stock their ponds from as early as April to May and harvest tilapia after four months, usually two crops per year. Tilapia culture is fully dependent on hatchery produced fry. The average annual stocking density of tilapia fry is 24,700 per ha (Chowdhury et al., 2007). Dey (2001) obtained higher production of tilapia at a stocking density of 20,000 per ha during 6 months culture period. However, on the basis of the profit, the optimum stocking density for GIFT is 30,000 per ha (Hussain et al., 2004).

The most common supplementary feed for small-scale tilapia farming is a mixture of rice bran, wheat bran and mustard oil cake, those are readily available on-farm or in local markets. Nevertheless, intensive or semi-intensive tilapia farming is primarily dependent upon industrially manufactured pelleted feed. In general, feed is given twice a day in the morning and evening. Framers also use fertilisers mainly cow-dung, urea and triple super phosphate for grow-out of tilapia.

The average annual yield of tilapia was found to be 3,500 kg/ha, ranging from 3,000 to 5,000 kg/ha (Haque, 2008). Household of farmers consume a lower proportion (10%) of their harvested tilapia and they tend to eat smaller tilapia rather than sell them. Instead farmers sell larger tilapia in order to be able to purchase low-value fish including pangas and silver carp.

A number of constraints were reported for tilapia farming including difficult production system, lack of technical support, limited availability and poor quality of seed, high price of seed and feed, low price of tilapia in markets, poor marketing facilities and less economic return compared to carp polyculture (Dey, 2000; Hussain et al., 2004; Bart et al., 2005). Although a considerable number of poor farmers involve in tilapia farming, lack of financial support has prevented them to engage in semi-intensive or intensive culture system. Uncontrolled breeding of tilapia in pond is also a problem, while a few farmers consider this breeding to be an advantage due to providing seed. Overall, market
access by poor farmers is a problem due to inadequate knowledge which in turn limits success of tilapia culture.

2.3. Data Collection Methods

Primary data were gathered by field survey. This survey involved the inspection of the study area in terms of tilapia distribution and marketing systems. A combination of participatory, qualitative and quantitative methods was used for primary data collection (Table 1). Data were collected for a period of nine months from October 2007 to June 2008.

Table 1. Data collection methods and sample size for target groups

<table>
<thead>
<tr>
<th>Target group</th>
<th>Survey area</th>
<th>Sample size</th>
<th>Data collection method</th>
<th>Information gathered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers</td>
<td>Trishal, Mymensingh</td>
<td>120</td>
<td>Focus group discussion</td>
<td>Tilapia harvesting and marketing systems, farm-gate price and constraints of tilapia marketing</td>
</tr>
<tr>
<td>Wholesalers</td>
<td>Mymensingh markets, Dhaka markets</td>
<td>15</td>
<td>Rapid market appraisal</td>
<td>Overall tilapia distribution and marketing systems, financing of tilapia trading, marketing constraints</td>
</tr>
<tr>
<td>Retailers</td>
<td>Mymensingh markets, Dhaka markets</td>
<td>40</td>
<td>Questionnaire interviews</td>
<td>Marketing systems, pricing mechanism, marketing costs and margins, marketing constraints and socioeconomic conditions</td>
</tr>
<tr>
<td>Key informants</td>
<td>Mymensingh and Dhaka</td>
<td>21</td>
<td>Cross-check interviews</td>
<td>Validation of collected information</td>
</tr>
</tbody>
</table>

i. Participatory Rural Appraisal (PRA)

PRA is a group of methods to collect information in a participatory fashion from rural communities (Chambers, 1992). The advantage of PRA over other methods is that it allows wider participation of the community, therefore the information collected is likely to be more accurate (Chambers, 1994). The basic principle of PRA is ‘triangulation’ which basically means cross-checking information from different sources (Conroy, 2002). For this study the PRA tool Focus Group Discussion (FGD) was conducted with
tilapia farmers. A total of 15 FGD sessions were conducted in the Trishal area under Mymensingh district where each group consisted of 6 to 12 farmers (total 120 farmers) and duration of each session was approximately three hours. FGD was used to get an overview of particular issues such as existing tilapia harvesting and marketing systems, pricing mechanisms and constraints of tilapia marketing. FGD sessions were held in front of village shops, under large trees, on school premises, in farmers’ houses and at pond sites, wherever there were spontaneous gatherings and where participants could sit, feel comfortable and were easily observed.

ii. Rapid Market Appraisal (RMA)

RMA is an efficient way to obtain policy-relevant and intervention-focused information about any commodity sub-sector (Holtzman, 2003). RMA techniques mostly rely on discussions with key market actors and knowledgeable observers of a sub-sector. This study was designed to apply RMA to include: 1) identification of the tilapia marketing channel, 2) visits to physical facilities such as tilapia landing sites and markets, and 3) direct observations of tilapia trading operations. For this method, several visits were made in tilapia producing area and different markets to observe tilapia distribution and marketing systems. Moreover, a total of 30 wholesalers were interviewed in Mymensingh and Dhaka markets (15 in each area) through this process. A simple questionnaire was used for interviews, covering tilapia marketing systems with its constraints.

iii. Questionnaire Interviews

Questionnaire interviews with tilapia traders (retailers) were preceded by preparation and testing of the questionnaire, use of statistical procedures to determine the appropriate sample size and sampling method, and training of enumerators to fill in questionnaires. The pre-survey activities included reconnaissance for the pilot survey and revision of survey instrument. For the preparation of the questionnaire, primary interviews with 10 traders were conducted. Attention was paid to incorporate any new information that had not been designed to be asked and filled in on the draft schedule. The questionnaire was modified and improved based on experience gained from the pilot survey (see questionnaire in appendix). For questionnaire interviews, tilapia traders were selected through simple random sampling7. A total of 80 traders were interviewed in Mymensingh and Dhaka markets, 40 in each area. Interviews were conducted at a time convenient to the traders at the market center in their trading premises. The interviews,

7 A sample is drawn from a population in such a way that every possible sample has an equal chance of being selected (Scheaffer et al., 1990). Schofield (1993) noted that simple random sampling is the fundamental method of probability where ‘simple’ does not mean that it is easier to carry out than other methods, but that steps are taken to ensure that nothing influences selection each time a choice is made, other than chance.
lasting about an hour, focused on tilapia marketing systems, pricing mechanisms, marketing costs and margins, identification of bottlenecks and opportunities for market development, and socioeconomic conditions of traders.

iv. Cross-check Interviews with Key Informants

A key informant is someone with special knowledge on a particular topic. Key informants are expected to be able to answer questions about the knowledge and behaviour of others, and about the operations of the broader systems (Theis and Grady, 1991). For this study, cross-check interviews were conducted with District and Sub-district Fisheries Officers, researchers, policy makers, tilapia entrepreneurs, non-government organisation (NGO) workers and relevant project staff. A total of 21 key informants were interviewed in their offices and/or houses. Where information was found to be contradictory, further assessment was carried out.

2.4. Problems Encountered

Most tilapia farmers and traders had no idea about the research work, and thus, it took time for the researchers to convince them. The interviewers had to explain the purpose of the study to cooperate for obtaining reliable information. As such, a significant amount of effort had to be devoted to convincing the respondents as to the legitimacy of the survey.

Some of the fish traders, in the first instance, did not show any interest in taking part in the interview. They suspected the researchers as employee or agent of the tax office, police department or other government agency, even though they had been presented identity card before the interview. Reactions of respondents to some of the questions (costs, returns and profits) suggested that they would not like to talk freely unless they completely trust the interviewers. In the process, extra time was devoted in convincing the respondents as regards to the legitimacy of the researchers and the study itself.

Some respondents were suspicious about the identity of the researchers and reluctant to talk unless the government fisheries officers gave the respondents a “green signal.” This was happened mainly with those who have no formal education. Cooperation from the Department of Fisheries (DOF) was therefore sought, whenever possible, for interviewing these respondents. Although the reactions and responses of the tilapia farmers and traders were generally positive, this was not always happened when they were asked questions about costs, returns or incomes.

It was very difficult to obtain reliable financial data. Most farmers, traders and associated groups did not have any proper notebooks of account. Even if some farmers and traders provided financial data, this was based on their “guess-work” which might not be accurate. Extra attention was therefore paid and great care had to be taken in
compiling financial information using different data collection methods.

In tilapia producing area, village roads were unfinished and thus faced transportation difficult and time consuming. It was therefore walking long distances, caused unnecessary delays. Coupled with road access problems, this caused the researchers additional loss of time. This problem was partially overcome by using a motorbike and a guide. The assistance of Government Fisheries Officers and local people were therefore useful to communicate with tilapia farmers.

2.5. Data Analysis

Data from FGD, RMA and questionnaire interviews were coded and entered into a database system using Microsoft Excel software for analysis using SPSS (Statistical Package for Social Science) to produce descriptive statistics. Comparisons among different markets were made by ANOVA (Analysis of Variance) F-test and a 2-tailed P<0.05 indicated statistically significant differences. Multiple regression was used to relate tilapia price (P) to supply of tilapia in markets (S), weight of fish (W), distance to the markets from the producing area (D), and marketing costs (C) according to the following relationship:

\[ P = f (S, W, D, C) \]
3. Results

3.1. Harvesting and Marketing of Tilapia

Harvesting of tilapia starts as soon as fish reach marketable size. Most farmers harvest tilapia by themselves although a few large farmers depend on commercial harvesters. Normally, tilapias are harvested at very early hours in the morning. Most farmers practice partial harvesting of tilapia which allows smaller fish to grow, while a few farmers practice total harvest. Farmers harvest tilapia by using cast nets and seine nets, usually netting several times at a few week intervals. Harvested tilapias are cleaned with pond water and kept in aluminium containers or bamboo baskets until they are sold. Depending on the transaction volumes, farmers sell their harvested tilapia to the local agents or suppliers. Local agents buy tilapia from the farmers at the pond side and carrying them to the suppliers. On the other hand, farmers carry tilapia from remote villages to the suppliers. According to farmers, 65% of harvested tilapias are sold to the local agents, while the rest (35%) are sold to the suppliers. Farmers or local agents commonly use vans and rickshaws (i.e. pedal tricycle) to transport tilapia from remote villages to the assembling centers near the main roadside which takes 30 minutes to an hour, depending on distance. According to the survey, about 60% of tilapias are transported to the capital city of Dhaka, around 80 km away from the tilapia producing area. The rest (40%) of the tilapia, which are under-sized, are transported to nearby Mymensingh town markets. The farm-gate prices of tilapia depend on their quality, size and weight, supply and demand, and seasonality. The average farm-gate prices of tilapia varied between Tk\(^8\) 60 and Tk 85 per kg (Table 2). Farmers often feel exploited by the intermediaries, believing that the prices they receive for tilapia do not adequately reflect the prices paid by the consumers.

Table 2. Average farm-gate prices of tilapia

<table>
<thead>
<tr>
<th>Weight of tilapia (g)</th>
<th>Product share (%)</th>
<th>Price (Tk/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-100</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td>101-150</td>
<td>35</td>
<td>65</td>
</tr>
<tr>
<td>151-200</td>
<td>30</td>
<td>72</td>
</tr>
<tr>
<td>201-250</td>
<td>10</td>
<td>78</td>
</tr>
<tr>
<td>251-300</td>
<td>5</td>
<td>85</td>
</tr>
</tbody>
</table>

A number of constraints were reported by farmers in marketing of tilapia, including poor road and transport facilities, higher transport costs, poor supply of ice, and

---

\(^8\) US$1 was equivalent to Bangladesh unit of currency Tk 68 in June 2008.
inadequate knowledge on marketing systems and low market price. In spite of substantial improvements of the road infrastructure, remote areas still face an accessibility problem, which in turn affects the marketing of tilapia. The heavy rains often destroy village roads, and the muddy roads of the villages are virtually inaccessible for the rickshaws, vans and motorised vehicles. This leads to high transport costs and hence lower profit margins. In addition to these problems, farmers are in a particularly weak position (i.e. no bargaining power on price) in relation to intermediaries of tilapia marketing. According to the survey, 42% of respondents identified high transport costs as their single most important constraint for tilapia marketing. The proportion of respondents identifying poor road and transport facilities was 34%. Only 24% of farmers identified low market price to be the most important constraint. Since production decisions (e.g. investments and profits) are made on the current market price, any downward fluctuation in the market will affect the profitability as well as viability of tilapia farming.

3.2. Tilapia Marketing Systems

In Bangladesh, almost all produced tilapia is marketed internally for domestic consumption. In terms of volume, value and employment, the tilapia market is small. A considerable number of people, many of whom live below the poverty line, find employment in the tilapia marketing chain as farmers, suppliers, traders, intermediaries, transporters and day labourers including women and children. The tilapia marketing system is traditional and less competitive but plays a vital role in connecting the farmers and consumers, thus contributing significantly in the value adding process. Farmers are the primary producers in the tilapia marketing systems. With a few exceptions, farmers never directly communicate with consumers. The market chain of tilapia from farmers to consumers encompasses mainly primary, secondary and retail markets, involving local agents, suppliers, wholesalers and retailers (Figure 2). The demand for tilapia is high in markets but supply is limited, and a strong network has developed with intermediaries and traders intervening between farmers at the one end and consumers at the other end.

Tilapia marketing is almost entirely managed, financed and controlled by a group of powerful intermediaries. The most powerful intermediaries are the wholesalers. Communication between the suppliers and wholesalers is generally good and takes place by mobile phones. Suppliers are a form of intermediary traders who supply tilapia from primary markets to wholesale markets. In general, suppliers are tied to a limited number of wholesalers. According to the survey, a supplier carried an average 18 kg/day of tilapia, ranging from 10 to 39 kg/day. Suppliers commonly use trucks, buses, pickups and taxis to transport tilapia to the wholesale markets in Mymensingh and Dhaka, which takes 1 to 4 hours depending on distance and mode of transportation. If the transportation time is less than 6 hours from primary market to retail point, tilapia is not iced, or if iced, it is not done properly.
Fig. 2. Tilapia marketing systems from producers to consumers (based on survey)

As soon as the suppliers land tilapia in the wholesale market, the wholesalers take care of landing, handling and auctioning by size-groups. A number of day labourers work with the wholesalers. They perform post-landing tasks that include cleaning, sorting, grading and icing of tilapia. Normally, the auction sale is made by heaps. In general, wholesalers follow the incremental price system. It is the most competitive form of auctioning and ensures better prices. Auctioneers appointed by wholesalers, call out the bid loudly in the presence of the buyers. Auctioneers get commission at different rates of the sale proceeds, normally 1 to 5% of the auction price, for their services and costs involved. Most sales agreements informal that means price of tilapia, quantity and other trading conditions are set orally. Mutual trust is mainly the basis for their operation and product transaction.

The retailers are also linked to a limited number of wholesalers. The relationship between the retailers and wholesalers is generally good. Two main categories of fish retailers have been encountered: market-based retailers and itinerant retailers (fish vendors, hawkers, etc). Retail sales are made at stalls in fish markets and door-to-door to
household customers. Tilapias are traded whole, un-gutted and fresh without processing, apart from sorting and icing.

3.3. Financing of Tilapia Marketing

A quite substantial amount of money is required for tilapia marketing. According to the survey, a wholesaler typically operates with capital of around Tk 11,968 per day, ranging from Tk 8,350 to Tk 27,125 per day. It was found that wholesalers in Dhaka markets operate with more capital than in Mymensingh markets. Finance for tilapia marketing comes mainly from a broad mix of personal and informal sources, and loans. According to the survey, 70% of wholesalers used their own money for fish marketing including tilapia, while the rest (30%) received loans. Wholesalers primarily finance tilapia marketing by disposing of household assets. Some have their own capital, either savings or proceeds from sales of personal assets, especially gold jewellery, livestock, timbers and land. Nevertheless, the actual sale of land to finance fish marketing now appears to be extremely rare, leasing out of land is common.

Many wholesalers are unable to finance tilapia marketing, and therefore look to various sources of credit. Over recent years, several institutions for providing credit to fish marketing have been developed such as banks and local moneylenders (Figure 3). Access to credit is considered to be one of the important factors influencing tilapia marketing. According to the survey, 78% of wholesalers received credit from moneylenders while the rest (22%) received from banks. The number of wholesalers received credit was higher in Mymensingh markets (33%) than in Dhaka markets (27%). The average amount of credit received by a wholesaler was estimated at Tk 9,897 per year, ranging from Tk 5,850 to Tk 15,975 per year. The most common source of credit for tilapia marketing is through moneylenders. In general, local businessmen act as moneylenders. Wholesalers typically enjoy a very close working relationship with the moneylenders. The average interest rate charged by a moneylender is 10% monthly (i.e. 120% yearly). Local branches of national banks also provide credit to the wholesalers, with collateral of land at a 15% yearly interest rate. However, wholesalers who received loans from banks stated that they would not like to go to banks due to official paper work and too small amounts of loan.

Wholesalers belong largely to the lower middle class, as reflected in their access to capital, and most have been attracted by the opportunities to obtain high returns. Wholesalers possess more capital than retailers (Tk 3,500 to Tk 9,760) and have the means to control suppliers and retailers. Sometimes suppliers take small amounts of dadon\(^9\) credit (Tk 475 to Tk 1,995) from wholesalers to ensure the supply of tilapia from

\[\text{dadon}\]

\(^9\) Dadon is a system of tied credit through which the wholesalers advance money to the suppliers in exchange for the assured sale of tilapia.
farmers. Retailers also often take temporary credit from wholesalers, buying tilapia one day and paying one or two days later. The majority of retailers (56%) received either formal or informal credits for fish marketing. The number of retailers received credit was higher in Dhaka markets (60%) than in Mymensingh markets (53%). From the survey, it was found that retailers received credits from moneylenders, banks, friends, relatives and neighbours. Nevertheless, NGOs have not played much of a role in the development of the tilapia marketing in general. NGOs could play an important role, but few have been involved in tilapia farming, because of technical nature of fish production and the limited attention to social issues.

Fig. 3. Financing of tilapia marketing from different sources (based on survey)
3.4. Tilapia Trading in Retail Markets

For the market survey, four important retail fish markets were selected: Machua Bazaar and Nutun Bazaar in Mymensingh town, and Kawran Bazaar and Mohammadpur Kitchen Market in the capital city of Dhaka. In each market, around 25 to 30 individuals are associated with fish trading including tilapia, except for Kawran Bazaar which is larger. Most traders reported that tilapia trading widely started during 2000-2001. Over this time, tilapia trading has become a profitable business for its participants and has generated new employment. Most traders have been attracted to tilapia trading by the opportunities to obtain high returns. Nevertheless, the supply of tilapia is not regular and therefore traders also involve other fish trading.

Although tilapia trading is a year round business, the peak season of tilapia marketing is from September to December. Markets are open every day and traders in Kawran Bazaar spend more time due to greater supply of tilapia. According to the survey, a typical trader in Kawran Bazaar sold an average of 37 kg/day of tilapia during the peak season, while in Mohammadpur Kitchen Market, Machua Bazaar and Nutun Bazaar sold an average of 31, 29 and 25 kg/day, respectively. There was a significant difference (P<0.05) of tilapia sales by markets. The supply of Tilapia in Kawran Bazaar was higher due to the higher number of traders and consumers associated in this market. On the other hand, the supply of tilapia in Nutun Bazaar was lower due to the lower number of consumers involved.

Tilapia marketing costs include expenses such as rental of the market place, electricity, labour, ice, transport and miscellaneous. The marketing costs also depend on the volume of tilapia, number of labourers required, market distance, mode of transportation and market infrastructure. According to the survey, the total average marketing costs from producers to consumers was calculated to be Tk 11.02 per kg of tilapia which is sub-divided into: primary market – Tk 2.25 (20%), secondary market – Tk 3.75 (34%), and retail market – Tk 5.02 (46%). Among retail markets, the average marketing costs were higher in Kawran Bazaar due to higher cost for electricity, ice, transportation and labour (Table 3). On the other hand, the average marketing costs were lower in Machua Bazaar due to lower cost for all items, except miscellaneous. However, these apparent differences in marketing costs were not significantly different (P>0.05).
Tilapia is sold according to size, rather than species\textsuperscript{10}. The average price of tilapia from traders to consumers was found to be Tk 104 per kg, ranging from Tk 85 to Tk 125 per kg depending on size (Table 4). There was a significant difference (P<0.05) of tilapia prices in different markets. Overall, the prices of tilapia were considerably higher in Dhaka markets than Mymensingh due to a larger concentration of consumers and superior family incomes. Among Dhaka markets, the average prices of tilapia were lower in Kawran Bazaar due to higher supply and larger concentration of consumers. On the other hand in Mymensingh markets, the average prices of tilapia were higher in Nutun Bazaar due to lower supply and less concentration of consumers.

\textsuperscript{10} Although Nile tilapia is the most common species, there are few other tilapia species available in markets.
3.5. **Factors Influencing Price of Tilapia**

A simple multiple regression (Table 5) of tilapia price \(P\) against supply of tilapia in markets \(S\), weight of tilapia \(W\), distance to the markets from the producing area \(D\), and marketing costs \(C\) yielded the following:

\[
P = 112.36 - 0.29S + 0.78W + 0.31D + 0.67C
\]

\(r^2 = 0.79; \ SE = 37.34; \ P<0.001\)

Table 5. Summary of the regression of tilapia price influencing different factors (based on 80 retailers survey)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Regression coefficient</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y-intercept</td>
<td>112.36</td>
<td>21.34</td>
</tr>
<tr>
<td>(S)</td>
<td>-0.29***</td>
<td>0.11</td>
</tr>
<tr>
<td>(W)</td>
<td>0.78***</td>
<td>0.09</td>
</tr>
<tr>
<td>(D)</td>
<td>0.31*</td>
<td>0.13</td>
</tr>
<tr>
<td>(C)</td>
<td>0.67**</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Single (*), double (**) and triple (***) denote significant at 10%, 5% and 1% levels, respectively.

Multiple regression of price against supply of tilapia was negative (-0.29) but significant at the 1% level which indicated that increase of tilapia supply would decrease market price, or decrease of tilapia supply would increase market price. This finding corroborated with the results of some studies suggested a negative relationship between supply of fish and market price (Hasan and Middendorp 1999; Brummett, 2000; Briones et al., 2004; Burger et al., 2004). There are many factors affecting the price of tilapia through supply and demand. Tilapia supply is determined according to the biological environment, the technology used, the policy and institutional environment, and the producer’s profile. Likewise, the demand side is influenced by policy and the profile of consumers (Figure 4). Changes in any of these factors result in changes in supply, demand, trade and prices of tilapia. On the supply side, tilapia price is affected by the seasonality of production which in turn causes the quantity of the product available on the market. When supplies are scarce tilapia price increases. Demand behaviour also contributes to inter-seasonal price fluctuations. In the study area, tilapia prices are generally lower between September and December, rising during the following four to five months.

There was a positive relationship between price of tilapia and fish weight. Apparent differences in price of tilapia of the various weights were found to be statistically significant. The estimated coefficient of tilapia weight was 0.78 and
significant at the 1% level which indicated that increase weight would increase price of tilapia. Ahmed and Sturrock (2006) noted that price depends closely on the size of the fish, with larger fish fetching significantly higher prices per kilogram.

Table 5 shows that multiple regression of tilapia price against distance to markets was positive (0.31) and significant at the 10% level of confidence. This finding suggested that increase market distance would increase transport costs which in turn increase price of tilapia. Similarly, the estimated coefficient of marketing costs was 0.67 and significant at the 5% level which indicated that increase marketing costs would increase price of tilapia.

![Diagram: Interaction of tilapia supply and demand in markets (adapted from Briones et al., 2004)](image)

Fig. 4. Interaction of tilapia supply and demand in markets (adapted from Briones et al., 2004)

3.6. Value Chain Analysis

The value chain describes the full range of activities which are required to bring a product or service from conception, through the different phases of production, delivery to final consumers (Porter, 1980; Kaplinsky and Morris, 2000). In reality, value chain tends to be extended with a whole range of activities within each link and links between different value chains (Jacinto, 2004). Value chain analysis can be a useful analytical tool in understanding the policy environment in terms of efficiency in allocation of resources within the domestic economy while at the same time understanding the manner in which
marketing people are participating in the national economy (Kanji and Barrientos, 2002). Analysing value chains can bridge the gap between the focus of mainstream economics on aggregate measures of poverty such as income and the stress of livelihoods perspectives on micro-level complexity. In fish marketing systems, value chain is a structure of physical, economic and social transactions between individuals and organisations engaged in raw material transformation into end products (Figure 5). Flows of fish products and money are exchanged through value adding transactions driven by profit and allocation (Ahmed, 2007b).

![Generic Value Chain](image)

**Fig. 5.** The concept of a value chain (adapted from Trondsen et al., 2004)

For value chain analysis of tilapia marketing, variables like marketing costs and margins, number of intermediaries in the marketing channel, distance between primary and retail markets, and consumers’ behaviours on price are important factors. A considerable number of intermediaries are involved in tilapia marketing systems. Farmers’ profit margins get reduced with the increase in number of intermediaries in the marketing channel. Presence of intermediaries in different stages in the marketing channel mainly due to lack of government control over the trade. The intermediaries avail the opportunity and exploit both the farmers at the farm-gate level and consumers at the retail point. The intermediaries dictate the price for tilapia in the absence of intervention of the government in the trade and they appropriate a margin which is significant. This situation makes the farmers vulnerable in bargaining with market actors, such as local agents, suppliers, wholesalers and retailers who have better capital endowments. This situation is further aggravated by the lack of transparency in the price formation process and asymmetric information flow, lack of capital for investment, and inadequate post-harvest infrastructure especially poor road and transport facilities and inadequate market services those are vital for marketing of quality product.
In tilapia marketing systems, the farm-gate price of farmers and the price paid by consumers varied between Tk 72 and Tk 104 per kg of tilapia. The marketing margins received by intermediaries in the process of tilapia trade significantly discriminate against the farmers. It was calculated that farmers received an average 69% of the retail price. The total marketing margin is 31%, which is sub-divided into: primary market - 5%, secondary market - 15%, and retail market - 11% (Table 6). The marketing margin of farmers is relatively high due to the shorter distance of Dhaka and Mymensingh markets from tilapia producing area, which involves less transport stages, processing activities and trader categories.

Table 6. Marketing margins and profits of tilapia trading, based on all market survey

<table>
<thead>
<tr>
<th>Market</th>
<th>Marketing particular</th>
<th>Tk/kg</th>
<th>Market share* (%)</th>
<th>Marketing margin (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Market</td>
<td>Purchase Price (PP)</td>
<td>72</td>
<td>69</td>
<td>74 - 69 = 5</td>
</tr>
<tr>
<td></td>
<td>Marketing Cost (MC)</td>
<td>2.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sales Price (SP)</td>
<td>77</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marketing Margin (MM=SP-PP)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marketing Profit (MP=MM-MC)</td>
<td>2.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary Market</td>
<td>Purchase Price (PP)</td>
<td>77</td>
<td>74</td>
<td>89 - 74 = 15</td>
</tr>
<tr>
<td></td>
<td>Marketing Cost (MC)</td>
<td>3.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sales Price (SP)</td>
<td>93</td>
<td>74</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marketing Margin (MM=SP-PP)</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marketing Profit (MP=MM-MC)</td>
<td>12.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail Market</td>
<td>Purchase Price (PP)</td>
<td>93</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marketing Costs (MC)</td>
<td>5.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sales Price (SP)</td>
<td>104</td>
<td>89</td>
<td>100 - 89 = 11</td>
</tr>
<tr>
<td></td>
<td>Marketing Margin (MM=SP-PP)</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marketing Profit (MP=MM-MC)</td>
<td>5.98</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Consumers Price 104 100

* Market share = (Purchase price/ Consumer price) x 100

Amongst the intermediaries, the highest average marketing margins were received by wholesalers. As such, the highest average marketing margin and profit per kilogram of tilapia was found in secondary market, followed by retail and primary market (Figure 6). Whereas, the highest average marketing costs per kilogram of tilapia was found to be retail markets, followed by secondary and primary markets. Thus, the secondary market was identified as most responsible sector for price increase to the consumer.
3.7. Constraints of Tilapia Marketing

Despite the potential of tilapia marketing, a number of constraints were reported by traders, including poor road and transport facilities, higher transport costs, insufficient supply of ice, unhygienic conditions, lack of credit facilities and poor infrastructure of markets (i.e. inadequate drainage systems, poor supply of water, limited ceiling and flooring space). Political disturbances such as strikes and road blocks also affect tilapia marketing. As a result, the traders sell tilapia at low prices, sometimes even failing to get any profit. Frequent power cuts also affect ice production which in turn affects the marketing of good quality tilapia. There are currently no standard practices for handling, washing, sorting, grading, cleaning and icing of tilapia. Facilities at fish markets are minimal, with poor hygiene and sanitation. Most fish landing centers have a limited support infrastructure, and are perceived by some to be ill-managed and unhygienic. There are no facilities of sheds in some landing centers and auctioning places at secondary markets. The damage of fish occurs mainly in the process of transportation from the primary markets to the retail points. In general, conditions in retail markets are far from satisfactory with regards to stalls, spacing, sanitation, drainage and management. Quality control at landing, handling, distribution and marketing places is hardly ever carried out. This is largely because of a shortage of quality control inspectors and less emphasis on quality control for domestic markets.

Tilapia traders were requested to state their single most important marketing constraint. Regardless of market locations, 44% of respondents identified this as high marketing costs (Table 7). The proportion of respondents identifying poor road and
transport facilities was 24%. Only 20% and 12% of traders identified lack of money for this business and poor market infrastructure to be the most important constraints, respectively.

Table 7. Key constraints of tilapia marketing by traders in different markets

<table>
<thead>
<tr>
<th>Key constraints</th>
<th>Mymensingh market</th>
<th>Dhaka market</th>
<th>All traders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Machua Bazaar</td>
<td>Nutun Bazaar</td>
<td>Kawran Bazaar</td>
</tr>
<tr>
<td>High marketing costs</td>
<td>9 (45%)</td>
<td>8 (40%)</td>
<td>8 (40%)</td>
</tr>
<tr>
<td>Poor road and transport facilities</td>
<td>5 (25%)</td>
<td>4 (20%)</td>
<td>5 (25%)</td>
</tr>
<tr>
<td>Lack of money</td>
<td>4 (20%)</td>
<td>5 (25%)</td>
<td>4 (20%)</td>
</tr>
<tr>
<td>Poor market infrastructure</td>
<td>2 (10%)</td>
<td>3 (15%)</td>
<td>3 (15%)</td>
</tr>
</tbody>
</table>

n: sample size of traders

3.8. Socioeconomic Features

Social and economic issues influence the development of tilapia marketing and need to be taken into account in fostering and planning it. Even if biological, technological and environmental conditions are favourable for the development of tilapia marketing, it may fail if social and economic factors are unfavourable. The development of tilapia marketing calls for a holistic approach accounting for all of the factors indicated in Figure 7. Such factors are equally important for the successful development of tilapia marketing in Bangladesh. The following paragraphs describe the socioeconomic conditions of traders in different markets, analyse specific constraints, and consider the nature and dynamic of the social and economic impact of changes associated with tilapia marketing.
The socioeconomic conditions of the households of traders are very important in the planning of development activities. A household can improve its social conditions when family members have adequate access through fish marketing activities to income and resources to meet basic needs. Basic needs would include food, housing, health facilities, drinking water and sanitary facilities (Ignacy, 1994; Tellegen et al., 1996; Scoones, 1998). However, most traders live in poor housing conditions which in turn affect tilapia marketing, because traders are more likely to invest available cash resources in maintaining houses rather than fish trading. Poor health facilities also affect tilapia marketing due to inability of labour. In addition, traders are more likely to spend money in medication of household’s members rather than invest in tilapia trading. Most traders reported that members of their households often suffered from diarrhea and cholera due to poor sanitary facilities. As a result, the lack of sanitary facilities influencing not only trader’s role in tilapia marketing, but their wider opportunities in other income-generating activities.

Tilapia traders of different markets have different education level, age group, family size and income. All traders have education at some level, which implies that the reported literacy rate is 100%. The age distribution of traders has an important influence on labour, and also on the traders’ perceptions of the future (Chang, 1994; Mandima,
Most traders were quite young, with an average age estimated at 36 with a range from 23 to 57. There was insignificant difference (P>0.05) of age among markets, the highest average age was found in Kawran Bazaar (39) followed by Machua Bazaar (37), Mohammadpur Kitchen Market (35) and Nutun Bazaar (34). The family size and its composition are related to occupation and income (Islam, 1995), and are likely to have an important influence on fish marketing. However, large families and high populations result in high levels of unemployment and other socioeconomic ills (Ignacy, 1994). The average family size of tilapia traders was estimated at 5.5 in a single family. The highest average family size was found in Machua Bazaar (5.8) followed by Kawran Bazaar (5.6), Nutun Bazaar (5.5) and Mohammadpur Kitchen Market (5.2), though there was no significant difference (P>0.05) of family size among markets.

Tilapia trading is a profitable business and most traders reported that they had made significant profits. According to the survey, traders make an average gross profit of Tk 11 per kg of tilapia when buying from wholesalers and selling to consumers. Although traders can earn considerable amounts of money in their business, they spend a large portion for marketing costs (Tk 5.02 per kg), an average 46% of gross return. It was calculated that traders make an average net profit of Tk 5.98 per kg of tilapia. The average income of a trader was higher in Kawran Bazaar than in the other three markets, because tilapia supply was higher. The average net income of a trader in Kawran Bazaar was estimated at Tk 212 per day, while in Machua Bazaar, Mohammadpur Kitchen Market and Nutun Bazaar was Tk 184, Tk 180 and Tk 150 per day, respectively (Figure 8). There was a significant difference (P<0.05) in income of traders among markets.
The income of traders is further explored by examining correlations with various factors (Table 8). The analysis shows significant positive correlations between income and supply of tilapia, marketing experience, age of traders, education level and family size. The analysis finds that family size of traders is the weakest relationship to income among these factors. In turn, there was a strong positive association between supply of tilapia and income, followed by education level. Income was also positively related with marketing experience and age of traders.

Table 8. Correlation between income of traders and different factors by markets

<table>
<thead>
<tr>
<th>Factor</th>
<th>Mymensingh market</th>
<th>Dhaka market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply of tilapia</td>
<td>0.83***</td>
<td>0.78***</td>
</tr>
<tr>
<td>Marketing experience</td>
<td>0.49**</td>
<td>0.37*</td>
</tr>
<tr>
<td>Age of traders</td>
<td>0.38*</td>
<td>0.29*</td>
</tr>
<tr>
<td>Education level</td>
<td>0.53**</td>
<td>0.41**</td>
</tr>
<tr>
<td>Family size</td>
<td>0.27*</td>
<td>0.11ns</td>
</tr>
</tbody>
</table>

Single (*), double (**) and triple (****) denote significant at 10%, 5% and 1% levels, respectively; ns: not significant; sample size of each market was 20

The socioeconomic conditions of wholesalers were comparatively better than retailers because of higher income. It was also related to the higher education level, lower family size, greater experience of fish marketing and larger capital for market operation. According to the survey, the average income of a wholesaler was estimated at Tk 277 per day. The average daily income of a wholesaler was higher in Dhaka markets (Tk 334) than in Mymensingh markets (Tk 220). The socioeconomic conditions for suppliers and local agents were comparatively lower than retailers because of lower income. The average daily income of a supplier and local agent was found to be Tk 97 and Tk 89 per day, respectively. Nevertheless, the socioeconomic conditions of day labourers were extremely poor because of meager incomes, an average of Tk 75 per day. Increasing population pressures and the lack of other employment opportunities may aggravate the problem of meager incomes of day labourers.
3.9. Market Development: Opportunities and Challenges

In spite of limited evidence on tilapia demand from this study, tilapia has great potential in Bangladesh in terms of food supply. If tilapia can produce widely, the marketing of tilapia in Bangladesh would have a favourable impact on food supply to meet the growing demand for fish among consumers, including the poor. The development of sustainable tilapia market and wider adoption of tilapia farming would significant impact on household food security.

The present study ravels that consumption of tilapia at household level has been increasing. Tilapia seems to be accepted by all religious and social groups in Bangladesh. It was reported by the traders that consumers usually prefer fresh tilapia without icing. In general, the high income groups (i.e. high officials and rich businessmen) buy large tilapia, and the middle-class is able to afford medium-sized and small tilapia. The large segments of poor people also buy small tilapia (5 to 6 fish/kg) due to equity considerations, i.e. one tilapia per household member. Nevertheless, most consumers preferred larger tilapia due to taste, but normally purchased smaller tilapia because of lower market price. In general, household consumers come and purchase tilapia directly in retail markets. Restaurants, roadside hotels, highway motels, guest house, resorts, department stores (i.e. Agora, Nandan, PQS etc) and institutional consumers also buy tilapia due to increasing popularity. Institutional consumers including residents of university halls, patients of medical hospitals, and participants of workshops, seminars and training centers has become a considerable outlet for aquaculture products including tilapia. Tilapia is also consumed during festivities and guest entertainments. Most traders reported that tilapia becoming popular among all groups of people including women, children, young and older due to taste and less bones which easy to eat. In Dhaka markets, women often purchase tilapia as they take care of kitchen to maintain household nutrition. When eating out of tilapia with rice, the most frequent meal for middle income groups and the poor is lunch rather than breakfast and dinner. Nevertheless, the high income groups prefer to eat tilapia during dinner at home or restaurants.

While there is a great demand for tilapia, a number of challenges were identified for marketing of tilapia including poor road and transport facilities, higher transport costs, insufficient supply of ice, unhygienic conditions, lack of credit facilities and poor market infrastructure, inadequate drainage systems, poor supply of water, and limited ceiling and flooring space. In spite of these problems, the practice of tilapia marketing has a range of positive impacts on food supply. Table 9 shows the strengths, weaknesses, opportunities and threats (SWOT) for sustainable development of tilapia market in Bangladesh.
Table 9. SWOT analysis for the development of tilapia marketing systems

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weakness</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Almost all Bangladeshi people like tilapia</td>
<td>• Limited supply of tilapia</td>
</tr>
<tr>
<td>• Considerable number of people involved in tilapia marketing (cheap labour)</td>
<td>• Inadequate market infrastructure including poor road and transportation</td>
</tr>
<tr>
<td>• Value adding process through connecting farmers and consumers</td>
<td>• Unhygienic market conditions</td>
</tr>
<tr>
<td>• Strong network among market actors (through mobile phone)</td>
<td>• Lack of concern from the public and private sectors</td>
</tr>
<tr>
<td>• Environment friendly activities</td>
<td>• Poor socioeconomic conditions of farmers, traders and associated groups</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• High demand for tilapia</td>
<td>• Less involvement of tilapia farming</td>
</tr>
<tr>
<td>• Employment opportunities</td>
<td>• Market controlled by powerful intermediaries</td>
</tr>
<tr>
<td>• Increase in income of farmers, traders and associated groups</td>
<td>• Complex and traditional marketing systems</td>
</tr>
<tr>
<td>• Improvement of socioeconomic conditions of market actors</td>
<td>• High marketing costs and low profit margins</td>
</tr>
<tr>
<td>• Export potential of good quality large tilapia</td>
<td>• Almost total lack of credit facilities</td>
</tr>
</tbody>
</table>
4. Discussion

With rising population and demand, expansion of fish supplies to maintain food security has emerged as a priority concern for Bangladesh. In order to meet the soaring demand for food, there is a huge potential of tilapia farming in Bangladesh, because of many positive culture attributes. Nevertheless, small-scale farmers have ability to participate and benefit from aquaculture in situations where an opportunity for fish marketing is available (Gupta et al., 1998).

The profitability of tilapia farming is largely determined by market conditions. Result from this study shows that tilapia farmers can not earn a good profit because they have a limited access to market and they do not have enough knowledge on where to sell for their products. In addition, farm-gate price of tilapia is low due to exploit by intermediaries. In the tilapia marketing channel, framers profit margins get reduce with the increase in number of intermediaries. Presence of intermediaries in the marketing channel mainly due to lack of government control. The intermediaries exploit both the farmers and the consumers.

As tilapia market is fully controlled by powerful intermediaries, thus the sharing of benefits within the wider community is limited. The supply of tilapia from producers to consumers through different intermediaries is facilitated mostly by the wholesalers. Although wholesalers play an important role in tilapia marketing, they were identified as most responsible actor for price increase to the consumer. Thus, the secondary market was identified as most responsible sector for price increase (Figure 9). As such, wholesalers could help to balance market prices that could benefit both the producers and the consumers.

Adequate supply of tilapia is essential for maintaining markets. The market demand for tilapia will expand with increased supply. However, tilapia production as well as supply is not enough in order to fulfill the market demands. Despite the fact that household production of tilapia is still low due to lower adoption of tilapia farming, small size of ponds and the lower rate of production from low-input technology. Improved technology and better management practice can direct more tilapia production and on-farm household consumption (Ahmed and Lorica, 2002). The direct consumption of tilapia effects on adoption of farming can be very significant. Adoption of tilapia farming may increase market supply that may keep price down, and hence increase the intake of tilapia. According to Dey (2000), adopting GIFT will reduce tilapia prices by 5 to 16% in Bangladesh.
The marketing channel of tilapia is relatively short due to the shorter distance of Dhaka and Mymensingh markets from tilapia producing area, which involves less transport stages and trader categories. Lem et al. (2004) noted that the longer the fish marketing channels the higher the price margins. This implies that prices go up with increasing number of transactions in the fish marketing channel. Ahmed and Lorica (2002) stated that high-value fish have higher price elasticity, whereas low-value fish have lower price elasticity. According to IMPACT (International Model for Policy Analysis of Agricultural Commodities and Trade), tilapia is treated as a low-value fish (Delgado et al., 2003).

Local market demand for tilapia is significant because of the low market price, compared to Indian major carps (Table 10). Nevertheless, the price of tilapia is higher
than exotic carps. Demand for tilapia is influenced not only by its price but also income of consumers. The demand for tilapia in Dhaka markets is evidently higher. The consumers of Dhaka markets have higher purchasing power and there is an increasing trend in fish consumption. On the other hand, the demand for tilapia and consumption level in Mymensingh markets is lower due to low purchasing power and slow growth of income. This implies that fish farmers need to expand their market outlets from Mymensingh to Dhaka. However, tilapia distribution over long distance to Dhaka markets resulting in higher transport costs which in turn increase fish prices for consumers. Conversely, tilapia distribution over short distance to Mymensingh markets has several advantages, resulting fresh fish for consumers with low market prices due to lower transport costs.

Table 10. Comparison of retail market prices between tilapia and other popular fish food

<table>
<thead>
<tr>
<th>English name</th>
<th>Local name</th>
<th>Scientific name</th>
<th>Average price* (Tk/kg)</th>
<th>Range (Tk/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nile tilapia</td>
<td>Tilapia</td>
<td>Oreochromis niloticus</td>
<td>104</td>
<td>85-125</td>
</tr>
<tr>
<td>Indian major carp</td>
<td>Rui</td>
<td>Labeo rohita</td>
<td>120</td>
<td>105-145</td>
</tr>
<tr>
<td>Catla</td>
<td></td>
<td>Catla catla</td>
<td>115</td>
<td>100-135</td>
</tr>
<tr>
<td>Mrigal</td>
<td></td>
<td>Cirrhus cirrhusus</td>
<td>110</td>
<td>90-130</td>
</tr>
<tr>
<td>Exotic carp</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bighead carp</td>
<td></td>
<td>Aristichthys nobilis</td>
<td>65</td>
<td>60-85</td>
</tr>
<tr>
<td>Common carp</td>
<td></td>
<td>Cyprinus carpio</td>
<td>70</td>
<td>65-80</td>
</tr>
<tr>
<td>Grass carp</td>
<td></td>
<td>Ctenopharyngodon idellus</td>
<td>65</td>
<td>60-75</td>
</tr>
<tr>
<td>Silver carp</td>
<td></td>
<td>Hypophthalmichthys molitrix</td>
<td>65</td>
<td>55-75</td>
</tr>
<tr>
<td>Catfish</td>
<td>Pangas</td>
<td>Pangasianodon hypophthalmus</td>
<td>60</td>
<td>50-70</td>
</tr>
</tbody>
</table>

* Price estimated for 1 kg size of fish, except tilapia
Source: market survey and key informants’ interviews

It is recognised that tilapia marketing contributes a range of economic benefits at different levels. At the local level, tilapia farming and marketing activities provide employment and income for the rural poor. At the national level, tilapia marketing systems make an important contribution to food supply. Apparently, as a small fish of tilapia provides large amounts of calcium, iron, zinc and other micronutrients (Roos et al., 2003). Conversely, large fish species such as Indian major carps and exotic carps are actively promoted for aquaculture although polyculture of these species have not been provided more nutrients (Bouis, 2000).

Despite importance of food supply, not much has been done to sustain the production of tilapia as a result of difficult production technology including marketing
constraints. Better tilapia marketing facilities and transportation would help to improve the situation. In order to increase the market access and the sales systems, it is necessary to improve fish marketing infrastructure, especially market centers and facilities. Efficient distribution systems for tilapia should be set up to serve the consumers better. It is also worthwhile to establish strong coordination between farmers and market actors to ensure a smooth supply of tilapia to the consumers. Provision of capacity building for the development of stakeholder organisations, government institutions make available technical advice and support on marketing, design of market facilities and transportation, involving NGOs where appropriate and the implementation of a management plan to address existing constraints.

Policies have often failed to overcome social and institutional constraints preventing wider participation of fish farming and marketing. Overall, there is a lack of appropriate policies for sustainable development of tilapia marketing. Integration of production systems and development of backward (production inputs) and forward (post-harvest and value-added activities) linkages can help to develop tilapia marketing (Ahmed and Lorica, 2002). The public sector has important roles to develop tilapia marketing through policy implementation. DOF is also responsible for market planning, market infrastructure development and market maintenance.

A conceptual framework has developed which consists of three basic components: market awareness, market access and marketing facilities, which are assumed to be interlinked in order to develop sustainable tilapia marketing (Figure 10). Awareness implies allowing stakeholders to become informed about tilapia farming and marketing so that they can actively participate in all stages. This process increases willingness of tilapia farmers and traders to be involved in innovation. However, attempt an innovation largely depends on the scope of market access. A fundamental paradigm shift would be needed to ascertain market awareness, market access and marketing facilities of stakeholders in order to get an innovation adopted. More research, appropriate extension works, support services and public-private partnership could make significant impact on innovation of sustainable tilapia marketing.
Although tilapia has become a significant export item from many developing countries over the last two decades (Delgado et al., 2003), Bangladesh is still behind in this opportunity. Good quality large tilapia might, however, become exportable in the future. Given the importance of tilapia product and their exporting to international markets, Bangladesh will need to pay adequate attention to food safety standards (ADB, 2005a).
5. Conclusions, Policy Implications and Recommendations

Sustainable tilapia marketing can play an important role to increase food supply. However, the present study identified a number of bottlenecks affecting the efficiency of tilapia marketing, and thus, need for appropriate interventions, including:

Infrastructure:
Markets of tilapia often lack of basic infrastructure such as clean water supply, adequate drainage system, ceiling and flooring. Poor road and transport facilities are also a problem for tilapia marketing. It is therefore essential to improve fish landing, transport, handling and preservation facilities for supply of quality product.

Hygiene and Quality:
There seems to be very limited knowledge amongst farmers, traders and intermediaries with regard to sanitary standards and fish quality. It is also imperative that the fish markets are kept clean. Proper management with regard to day-to-day maintenance of the premises from a sanitary point of view has to be ensured. Improvements to hygienic conditions of fish including tilapia landing centers and markets are essential for producing good quality products. Thus, training of tilapia market operators in areas of preservation, handling, icing and curing should be provided.

Supply of Ice:
Insufficient supply of ice in markets is one of the most serious problems for fish preservation. Ice is fundamental for good quality fish storage and preservation. Having ice readily available on the premises would facilitate the enhancement of appropriate tilapia handling. It is therefore necessary to establish a sufficient number of ice factories for marketing of quality fish.

Credit Facilities:
Farmers, traders and associated groups do not have easy access to bank and NGO credits due to much official paper work and collateral arrangements. Therefore, assisting farmers and traders to obtain cheaper adequate bank credit for tilapia production, distribution and market operation costs should be considered.

Market Information Services:
Considering the lack of information services among producers, distributors and market actors as well as development institutions, the development of an information network needs to be given attention.

Training Facilities:
Training of tilapia market operators in areas of transporting, handling, icing, preservation and curing would improve quality of product in markets. In addition, introduction of
quality control measure would improve the quality of fish, including tilapia in markets.

Government Policy:
A positive policy at government level should be considered for tilapia production, promotion, distribution and pricing systems for its sustainable marketing.

It is assumed that the above findings and recommendations are certainly of high relevance to other common species of fish marketing in Bangladesh.

Further Research

The present study focused on assessing factors affecting marketing of tilapia, but more research is needed to assess overall prospects (in terms of aggregate supply and demand) for tilapia market development in Bangladesh, including analysing the technological dimensions of tilapia farming, as well as consumers’ preferences. It might also be relevant to investigate how the establishment of well-functioning assembly markets at important fish landing linked to modern wholesale markets in large urban areas, and may help develop sustainable markets for tilapia in Bangladesh.
References


Chambers, R., 1992. Rural appraisal: Rapid, relaxed and participatory. IDS Discussion
Paper No. 311, International Development Studies, Brighton, UK.


Conroy, C., 2002. PRA tools used for research into common pool resources: Socioeconomic methodologies for natural resources research - best practice guideline. Natural Resources Institute, the University of Greenwich, Chatham, UK.


Haque, M.S., 2008. Development of tilapia farming in Bangladesh: Problems and potentials. MS Thesis, Department of Fisheries Management, Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh, Bangladesh.


Schofield, W., 1993. Principles of social and educational research. The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK.


services and the limitation of domestic use of environmental resources in the Netherlands. Amsterdam’s Sociologist Tijdschrift 23, 218-241.


## Appendix

### Sample Size of Target Groups for Survey Works

<table>
<thead>
<tr>
<th>Target group</th>
<th>Study site</th>
<th>Sample size</th>
<th>Data collection method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tilapia farmers</td>
<td>Trishal <em>upazila</em> under Mymensingh district</td>
<td>120</td>
<td>FGD</td>
</tr>
<tr>
<td>Wholesalers</td>
<td>Mymensingh: Machua Bazaar</td>
<td>15</td>
<td>RMA</td>
</tr>
<tr>
<td></td>
<td>Dhaka: Kawran Bazaar</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Retailers</td>
<td>Mymensingh</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Machua Bazaar</td>
<td>20</td>
<td>Questionnaire interviews</td>
</tr>
<tr>
<td></td>
<td>2. Nutun Bazaar</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dhaka</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Kawran Bazaar</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Mohammadpur Kitchen Market</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Key informants</td>
<td>Dhaka and Mymensingh</td>
<td>21</td>
<td>Cross-check interviews</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>251</td>
<td></td>
</tr>
</tbody>
</table>
List of Questions for Tilapia Producers through FGD

1. When did you first start tilapia farming?
2. How did you get training and technical assistance?
3. What about your farm size?
4. What culture strategies do you follow?
5. What volume tilapia production per year?
6. What species of tilapia?
7. How is tilapia harvested?
8. How much tilapia is sold per year?
9. Where does tilapia sell?
10. Who are the buyers (regular/changing)?
11. How many buyers of tilapia?
12. What prices?
13. How are prices decided?
14. How are payments settled?
15. What type of agreements with buyers?
16. How is tilapia transported?
17. Are there people employed for harvesting, marketing and transporting?
18. Is demand for tilapia increasing or decreasing?
19. What are the problems of tilapia marketing?
20. How much your income from tilapia production?
List of Questions for Wholesalers through RMA

1. From where does tilapia come?

2. How is tilapia transported and who pays for it?

3. Who are the suppliers?

4. How many suppliers of tilapia?

5. How many different suppliers are used?

6. From where do the suppliers get the tilapia?

7. How are orders placed?

8. Is it difficult to find enough quantity of tilapia?

9. How many buyers are there in the wholesale market?

10. How many tilapia wholesalers are there?

11. How much tilapia is sold totally per day?

12. Is demand for tilapia increasing or decreasing?

13. How are prices decided?

14. How are payments settled?

15. How is the market structured?

16. What are the profit margins at the different levels in the distribution chain?

17. How many retailers are there and how do they operate?

18. What is the sales price? What is the sales margin?

19. How much your income from tilapia trading?

20. What are the overall problems of tilapia trading?
### Questionnaire for Traders (Retailers)

<table>
<thead>
<tr>
<th>Name of Respondent</th>
<th>Respondent Number</th>
<th>Market Name</th>
<th>Location</th>
</tr>
</thead>
</table>

1. Information on Tilapia Trader:

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age (yrs)</th>
<th># of Years of Formal Education</th>
<th>Total Family Member</th>
<th>Religion</th>
<th>Primary Occupation (in terms of time spent)</th>
<th>Secondary Occupation (in terms of time spent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1=male</td>
<td>2=female</td>
<td>0=none</td>
<td>1=class 1-5</td>
<td>1=Muslim</td>
<td>2=Hindu</td>
<td>3=Christian</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1=class 6-10</td>
<td>2=SSC(class10 pass)</td>
<td>4=Bachelor</td>
<td>4=Buddhist</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3=HSC(class12 pass)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4=Bachelor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Starting Year in Tilapia Trading: ______ years

3. Information on Tilapia Market (Peak Season):

   a. Peak marketing season: _____________ (month) to _____________ (month)
   b. Marketing time: _____________ am/pm to _____________ am/pm
   c. Marketing days per week: _____________
   d. Number of traders involve: _____________
   e. Number of consumers/day: _____________

4. Information on Tilapia Market (Lean Season):

   a. Lean marketing season: _____________ (month) to _____________ (month)
   b. Marketing time: _____________ am/pm to _____________ am/pm
   c. Marketing days per week: _____________
   d. Number of traders involve: _____________
   e. Number of consumers/day: _____________

5. Information on Fish Marketing:

<table>
<thead>
<tr>
<th>Where do tilapia come from</th>
<th>Who supply</th>
<th>Mode of transport</th>
<th>Average volume purchased (kg/day)</th>
<th>Average volume sold (kg/day)</th>
<th>No. of labourers work with a trader</th>
</tr>
</thead>
</table>

Final Report 42 April 2009
6. Price of Fish:

<table>
<thead>
<tr>
<th>Tilapia Species</th>
<th>Size (g)</th>
<th>Average purchase price (Tk/kg)</th>
<th>Average sale price (Tk/kg)</th>
<th>Average gross profit from purchase and sale of fish (Tk/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50-100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>101-150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>151-200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>201-250</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>251-300</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. What are the Important Factors for Determine price?

_____________________________________________________________________________
_____________________________________________________________________________

8. Cost of Market Operation:
   a. What are the costs of operation (transport and travel)? _____________ Tk/day
   b. How much is paid for labour? _____________ Tk/day
   c. How much is paid in rent for the stall/shop? _____________ Tk/day
   d. Are there costs caused by waste of products? _____________ Tk/day
   e. Do the traders own any fixed assets (storage, vehicles etc.)? _____________ Tk/day
   f. Are there people employed (who owns the business)? _____________ Tk/day
   g. How much is for total marketing costs? _____________ Tk/day

9. Where is the Business Based? Has There any Trade Licensing?

_____________________________________________________________________________

10. a. How Much of Your Daily Gross Profit from Tilapia Trading? _____________ Tk/day
    b. How Much of Your Daily Net Income from Tilapia Trading? _____________ Tk/day

11. What are the Problems of Tilapia Trading?

_____________________________________________________________________________
_____________________________________________________________________________

12. What are the Behaviours of Consumers regarding Tilapia?

_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

   a. If not, why? _____________________________________________________________
   b. If yes, who provided the financial assistance?
<table>
<thead>
<tr>
<th>Year</th>
<th>Amount (Tk)</th>
<th>Provided by</th>
<th>Use of the Funds</th>
<th>Terms &amp; Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Interest Rate per Month (%)</td>
<td># of Months to Repay</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. Have you Improved your Socioeconomic Conditions by Fish Trading? 1 = Yes 2 = No
   b. If no, why not
      a. If yes, what are these

<table>
<thead>
<tr>
<th>Item</th>
<th>1 = Yes</th>
<th>2 = No</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Housing condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Food consumption</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Health facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Drinking water facilities (own tube well)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Children education</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

THANK YOU