ECONOMICS OF VALUE ADDED MUSHROOM PRODUCTION AND MARKETING: A STUDY AT THE FARMERS AND CONSUMERS LEVEL OF DHAKA DISTRICT

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TO

MY BELOVED PARENTS

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ABSTRACT

The present study was designed to analysis the Economics of Value Added Mushroom Production and Marketing channel. The study area were farmers and consumers level of Dhaka district. Primary data were collected from 30 farmers; 30 market agents and 30 consumers. Secondary data were collected from books, journal and internet. Both tabular and statistical analyses were applied in this study. The major findings of the study revealed that mushroom production is highly profitable and the demand of fresh mushroom is increasing day by day in the study area. The average production cost of fresh mushroom was Tk. 145 per kg. The average gross return was Tk. 240 per kg. The gross margin of fresh mushroom was Tk 105.48 per kg. The benefit cost ratios (BCR) for fresh mushroom was 1.66.For dry and powder mushroom in case of producer the BCR were 1.28 and 1.31 respectively. Mushroom value chain actors were input suppliers, producers, traders, processors and consumers. There were four mushroom market channels in the study area. The value addition for fresh, dry and powder mushroom at production level were 65.52%, 28.15%, % and 30.64% respectively. 53% consumers were medium knowledge about mushroom. 73% consumers were showing attitude towards a favorable food of mushroom. But 53% consumers were still purchasing mushroom very poorly. With SWOT analysis there was a strong possibility and opportunity to spread the mushroom market. Based on the results it can be concluded that, demographic, cultural, socio- economic and institutional factors influence mushroom value chain. It was revealed that rich and middle income group people were the main mushroom customers. The study also identified some shortcomings faced by the farmers and market agents and suggested some recommendations to improve the present situation and made an advanced economic environment by giving the financial facility, training, good quality of spawn from the government and non-government bodies and also creates more awareness about mushroom.

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ABBREVIATIONS AND ACRONYMS

BARI	: Bangladesh Agricultural Research Institute
BBS	: Bangladesh Bureau of Statistics
BCR	: Benefit Cost Ratio
DAE	: Department of Agricultural Extension
DAM	: Department of Agricultural Marketing
FAO	: Food and Agricultural Organization
GR	: Gross Return
gm	: Gram
kg	: Kilogram
NGO	: Non-Government Organization
TC	: Total Cost
TFC	: Total Fixed Cost
Tk.	: Taka
Yr.	: Year

CHAPTER I

INTRODUCTION

1.1 Background of the study

Most of the world's poor are in, or employed mainly on, family farms. The objectives of rural development in developing countries are mainly diversification of rural income and attaining a competitive structure for agriculture in order to increase job opportunities and development. Small family farms are disadvantaged groups since they do not have enough land to produce crops and raise animal. Also rural environment can be protected by improvement of Environmental-Friendly Agricultural Practices. Especially, farmers in forest villages both do not have agricultural land and have to protect forest ecosystems. In this case, for developing and ensuring the sustainability of living and job conditions of rural community in their territory in compatible with urban areas, on the basis of utilizing local resources and potential, and protecting the environmental and cultural assets, mushroom production could be very good opportunities in developing countries.

Ensuring food security for the vast population of Bangladesh is directly associated with the agricultural development in the country. The governments of Bangladesh have therefore been giving priorities to agricultural development with a view to ensuring food and nutritional security, poverty alleviation, and increased generation of employment. Whereas a profitable, sustainable, and environment-friendly agricultural system is required to achieve these objectives, agriculture in the country faces by a number of challenges every year. These challenges include population growth, climatic hazards, loss of arable land, lack of quality seeds, food habit of people (about 90 percent is rice based), inadequate credit support to the farmers, unfair pricing, insufficient investment in agricultural research and agricultural mismanagement in terms of irrigation, use of fertilizer and pesticides. The majority are small and marginal farmers who are endowed with poor financial resources and cannot afford high cost of frontier technology.

Cultivated mushroom is fat- and cholesterol-free, low-sodium foods, rich in important nutrients (including some nutrients not usually found in great amounts in fresh produce)

and containing antioxidants. Mushrooms satisfy the needs of health-conscious consumers and are a desirable alternative food, especially for vegetarians (USITC, 2010).

Hence, if mushroom production will expand and the product will available to the market the society will be benefited socially and economically. This study concludes that in Bangladesh there are opportunities to build competitive mushroom subsector and high potential for mushroom production. But due to constrain in production and marketing sector, it is inevitable to address the constraints with value chain approach.

1.2 About Mushroom

A mushroom is the fleshy, spore-bearing fruiting body of a fungus, typically produced the climatic above ground on soil or on its food source. Mushrooms (*Agaricus bisporus*) are the members of higher fungi, belonging to the class Ascomycetes (e.g., Morchella, Tuber, etc) and basidiomycetes (e.g., Agaricus, Auricularia, Tremella, etc which are so distinct in nature. They are classified as their own kingdom – separate from plants or animals. Mushrooms are the fruiting bodies of the fungus comprising reproductive part while mycelium is the vegetative part and it is also called 'white vegetables' or 'boneless vegetarian meat' contain ample amounts of proteins, vitamins and fiber. However, "mushroom" can also refer to a wide variety of gilled fungi, with or without stems, and the term is used even more generally to describe both the fleshy fruiting bodies of some Ascomycota and the woody or leathery fruiting bodies of some Basidiomycota, depending upon the context of the word.

1.3 History of cultivation and use of mushroom

Many years before mushroom production were developed in the United States and Europe. Mushroom was first cultivated in China in A.D. 600 while cultivation of other mushrooms was first recorded in China in the year 1000, 1700, and 1800, respectively (Tewari, 2000).

France was the leader in the formal cultivation of mushrooms. Some accounts say that Louis XIV was the first mushroom grower. Around this time mushrooms were grown in special caves near Paris set aside for this unique form of agriculture.

From France, the gardeners of England found mushrooms a very easy crop to grow which required little labor, investment and space. Mushroom cultivation began gaining popularity in England with more experimentation with spawn and publicity in journals and magazines.

The development of the mushroom industry was stimulated in the 1960s. With the establishment of laboratories for research on mushroom growing not only in the United States and Europe but also in Japan, Taiwan and Korea, improved technologies on the use of mushroom growing houses and use of pure culture spawn increased production of' mushrooms worldwide. Mushrooms are now produced in some eighty countries around the world (Tewari, 2000).

1.4 History of Mushroom in Bangladesh

Mushroom is a fully 'halal'. Mushroom cultivation in Bangladesh began in 1979 with assistance from Japanese organization JOCDV. Later, Japan International Cooperation Agency (JICA) came up in 1987 with its assistance. Mushroom cultivation slowed down in 1990 following withdrawal of JICA's support. In 2003, the government introduced a Mushroom Development Project under Agriculture Extension department. Different research works are being conducted under the project in addition to providing, training on mushroom cultivation. Apart from Savar, this project has activities in Dinajpur, Jessore, Barisal, Chittagong, Sylhet, Comilla, Khulna, Mymensingh, Bandarban, Rangamati, Chapainawabganj, and Rangpur for motivating people to cultivate mushroom. (www.assignment point.com)

1.5 Characteristics of mushrooms

Without doubt, edible mushroom in fresh, cooked or processed forms are nutritionally sound, tasteful food source for most people and can be a significant dietary component for vegetarians. The nutritional value of edible mushrooms compares favorably to that of most vegetables. Within a single mushroom species, the nutrient content varies widely depending on habitat, the growing medium and handling procedures subsequent to harvest. Regular consumption of whole medicinal and edible mushrooms could introduce a functional or medicinal contribution within the individual’s diet. Medicinal mushrooms may prevent or treat "lifestyle-related diseases". The extent of the health beneficial effect will depend on the level and regularity of consumption and the

relevance of whole fresh medicinal mushrooms and concentrates to the particular disease.

The most common type of mushroom is umbrella type though its fruiting body has various shapes, size and color. Some mushrooms are in the form of pliable cups and others are round like golf balls. Some are in the shape of clubs; some resemble coral; others are yellow or orange jellylike globs; and some even resemble the human ear. In fact there is a countless variety of forms.

1.6 Magnitude of mushroom species

About 2000 varieties of mushroom are available in the world. Of the 300 edible mushroom species, about 30 have been domesticated. Only about 14 species can be commercially grown because of the difficulties in artificial growing.

Cultivation of mushroom is getting popularity in Bangladesh day by day. The chief reason of this trend is the supportive role of the Government of Bangladesh and incessant efforts of the experts of National Mushroom Development and Training Institute, Savar under the leadership of the Department of Agricultural Extension.

The modern facility of mushroom production, extension, training and research started its effective programme under the name of National Mushroom Development and Extension Centre of Department of Agricultural Extension under Ministry of Agriculture of the Government of Bangladesh. The center has now acquired lots of experience in mushroom cultivation and achieved expertise to popularize the nutritious mushroom species. Following species of mushroom are being cultivated in Bangladesh:

1. Oyster Mushroom
2. Ear Mushroom
3. Milky White Mushroom
4. Straw Mushroom
5. Reishi Mushroom
6. Shiitake Mushroom
7. Button Mushroom
8. Monkey Head Mushroom

China is the largest producer, consumer and exporter of mushrooms in the world followed by USA and Netherlands (Table 1). China grows >60 mushroom species in a small to commercial scale. The world production of mushroom in China in 2010 was 21,524,473 tonnes (Li, 2012). Of which, unlike other countries of the world, the major share goes to oyster mushroom. Oyster mushroom (Pleurotus ostreatus) is the third mushroom of the world produced by China with a production of 4,929,000 tonnes (Chinese Edible Fungi Association, 2011-Table 1). (Indian Phytopath. 67 (2): 113-125 (2014)).

Table 1.1 Mushroom and truffle production in the world (in million tons)

Country	**1999**	**2009**
China	2.18	4.68
USA	0.38	0.37
Netherlands	0.25	0.23
Poland	0.11	0.17
India	0.014	0.04
World	3.89	6.50

Source: FAO Stat (2011), Verma (2013)

1.7 Importance of mushroom

Mushrooms can produce the highest quantity of protein per unit area and time from the agro-wastes. Other major advantages are explained below:

1.7.1 Medicinal value

Mushroom is a highly heterotrophic mode of nutrition and tasty vegetable having medicinal value. It contains 25 to 35 per cent protein, 57 to 70 percent vitamin and mineral, 5 to 6 per cent fat and 4 to 6 per cent glucose. These are required for strengthening immune system of human body. Mushroom helps cure high blood pressure, diabetes, gastric, jaundice and heart ailment, experts say. Medicinal mushrooms are the golden medicinal fungi and are yet to be exploited commercially. The extractable bioactive compounds from medicinal mushrooms enhance human's immune systems and improve their quality of life. Mushrooms as medicine were used since long but the full extent of their therapeutic properties was unknown to us. Modern

scientific studies on medicinal mushrooms have now expanded exponentially during the last two decades in Japan, Korea, China and USA (Thakur and Singh, 2013). The most significant medicinal effect of mushrooms and their metabolites that have attracted the attention of the public is their antitumor property. A pleothora of antimicrobial compounds and bioactive metabolites with potential pharmacological and therapeutic properties viz, immunomodulation, anti-atherosclerotic, anti-inflammatory, analgesic, chemo-preventive, antitumor, chemo and radio protective, sleep promoting, antibacterial, antiviral (including anti- HIV), hypolipidemic, hypoglycemic, anti-fibrotic, hepatoprotective, anti-diabetic, anti-androgenic, antiangiogenic, anti-herpetic, antioxidative and radicalscavenging, anti-aging, estrogenic activity, anti-ulcer and many other exceptional nutritional and medicinal properties have been isolated from different species of medicinal mushrooms.

1.7.2 Nutritional value

Protein Content

Dry mushrooms on the average contains between 19-40% high quality proteins with all the nine essential amino acids required for good human health. Lysine is the most abundant essential amino acid in mushroom (Sawyerr, 1991). According to Bempah (2011), oyster mushrooms contain about 10-30% protein.

Fat Content

The fat content of mushroom is low (1 -8% dry weight) and consists mostly of unsaturated fatty acids, which are less hazardous to health than saturated fatty acids of animal fats (Oei, 1991).

Carbohydrate Content

Mushrooms have little sugar and no starch at all. It is therefore, an ideal food for diabetics and weight-watchers (Oei, 1991).

Mineral Salt

Mushrooms have a richer supply of minerals than many meats and double the amount found in most vegetables. They probably contain every mineral present in the material on which they grow including substantial quantities of phosphorus, potassium and

lesser amount of calcium. Other mineral salts present in mushrooms include sodium, magnesium, manganese, aluminum, zinc, iron and copper (Sawyerr, 1991).

Vitamins

Mushrooms are good source of vitamins such as thiamine (vitamin B1), riboflavin (vitamin B2) niacin (vitamin B12), biotin and ascorbic acid (vitamin C). Mushrooms also have a rich supply of folic acid on larger amounts than any other vegetable or meat with the exception of liver (Oei, 1991).

Fresh mushrooms have high water content, around 90 percent, so drying them is an effective way to both prolong their shelf-life and preserve their flavor and nutrients (FAO, 2009).

1.7.3 Economic Benefits Mushroom Cultivation

The economic advantages of mushroom cultivation are given below-

- Very few money is required.
- The invested money can be returned in a short time.
- Working time is low.

1.7.4 Social Benefits of Mushroom Cultivation

The social benefits of mushroom cultivation are given below-

- Malnutrition can be removed.
- Disease costs are decreased.
- Incensement of production ability.
- Using the manpower.
- Unemployment problem is removed.
- Mushroom cultivation is very useful for women.
- Poverty alleviation and mushroom cultivation

1.7.5 Reduction in environmental pollution

Mushrooms are capable of agro-waste degradation. They are grown on organic substrates, either raw or composted. These substrates are mostly waste materials from farms, plantations, or factories. These otherwise useless by-products can be

recycled to produce additional food in the form of mushrooms for human consumption (Imran, 2004).

1.7.6 Cultivable Benefits of Mushroom Cultivation

Following advantage are found for mushroom cultivation-

- No need of cultivation land.
- Can cultivate inside home's
- Can cultivate in rack.

In a short period (7-10 days) mushroom can be found that is impossible for any other crops.

1.8 Present status and future prospects of mushroom cultivation in Bangladesh

In the modern world, people of all religions have cordially accepted mushroom as good nutritious vegetable. In Bangladesh, the people of hilly areas use to consume mushroom from ancient time. Although mushroom cultivation in Bangladesh has tremendous prospect but due to ignorance, superstitions, religious beliefs and lack of knowledge in nutrition and a flimsy idea against this food, mushroom is yet not to be introduced widely as a popular and common food item in this country. But recently, cultivation of mushroom is gradually increasing day by day. Mushroom cultivation was first initiated in this country in 1979. The Department of Agricultural Extension (DAE) undertook the experimental culture of mushroom at Savar Upazila of Dhaka district in association with Japan International Cooperation Agency (JICA) in 1979.

Eight mushroom laboratories have been established at eight districts under Integrated Horticulture and Nutrition Development Project (Siddique, 2006). Two projects are operating on Rangamati and Savar. Rangamati mushroom center is controlled by Bangladesh Army. They provide training on mushroom cultivation to the poor tribal people. National Mushroom Culture Center (MCC) is a government controlled center which also renders extension services to farmers about mushroom cultivation. This center has been producing about sixty thousand spawn packet per year for the cultivation of three kind of mushroom viz. straw mushroom, oyster mushroom and jaw ear mushroom. Some private spawn and mushroom producing units being in

Bangladesh, but those are insufficient. That's why supply to grower is limited and uncertain.

Mushrooms have a huge export potential. There is a world market for 14 lakh tons of' mushroom per annum against which India is exporting only about 2,400 tons. The world demand was estimated at more than likely to go up to more than 20 lakh tons by 2008 (Rahman, 2002).

1.9 Justification of the Study

Bangladesh Bureau of Statistics (BBS) (2015) reported about 332,558 economically active unemployed persons available in Dhaka city. The unemployment rate in Bangladesh; still rate of female is higher than male. On one hand, since mushroom production was labor intensive business especially suitable for females and disabled persons that provides employment opportunity. On the other hand, if there are sustainable supply in terms of quantity and quality it will be one of the cash crops that fetch foreign currency for the country. As a means of sustaining and accelerating mushroom firm and thereby promoting them in Bangladesh there is a great need to study the reasons for poor development of mushroom sector and find ways to overcome these constraints mushroom production, marketing and profitability. This study will help to identify problems in different value chains stages from production to marketing, and also give suggestions for probable solutions which in turn will improve the mushroom marketing in Bangladesh. So, it is expected that the present study would be helpful to individual mushroom produce farmers, whole seller, processors, retailers, policy makers, extension workers and researchers with a view to taking further plan for mushroom sector development.

1.10 Objectives of the Study

To understand mushroom value chains which help to identify what interventions will be needed in order to make the sector more competitive in the domestic and export markets, and thereby improve the livelihood of the urban people. The objectives are given below:

1. To identify socio-economic status of farmers, value chain actors and consumers;
2. To conduct value chain analysis of mushroom product

3. To explore consumer's knowledge, attitude and practice level of mushroom product
4. To assess strength, opportunity, weakness, threats in mushroom production and marketing.

1.11 Limitation of the study

Almost all the research works have limitations. The present study is not an exception to those. Although the present study provides some valuable information for policy makers, entrepreneurs, extension workers, researchers, the relevant officials of the government and non-government agencies, the study suffers from some limitations which given below:

i. Producers and intermediaries generally do not care to keep any records of their farm business. As a result, the accuracy and reliability of data fully depend on their memories and sincerity. This situation may have caused a built in limitation of the data used in the analysis.

ii. Data collection was the most challenging task for the researcher. Most of the actors were initially reluctant to answer questions for the ungrounded fear that the investigation might bring adverse implications for them. So they were not generally ready to disclose actual figures on production, income and profit.

iii. The researcher had to work with small size of samples because of the constraint of time and funds. However, the data were analyzed quite exhaustively but a large sample might have strengthened the findings.

iv. The findings of the study were based on the data of some specific area of Savar, Dhaka, Bangladesh. So, care should be taken to draw any conclusion about the value chain as the study may not be representative of whole Bangladesh.

In spite of the above limitations some of the findings of the study may be useful in providing important information for decision makers but a lot of caution should be taken while considering the findings or result of the study in other areas of the country.

CHAPTER II

REVIEW OF LITERATURE

2.1 Introduction

The purpose of this chapter is to provide some review of previous studies, which are related with the present study. Review of related literature in any research is essential in the sense that, it provides a scope for reviewing the stock of knowledge and information relevant to the proposed research. In the business literature of Bangladesh, there is a little information regarding marketing aspects of mushroom. Because mushroom sector is a newly growing field in Bangladesh. Very small amount of research works have been completed on mushroom in Bangladesh and some research works have been committed in Bangladesh. But a research on value addition of mushroom is a new concept in our country context. Some studies on the value chain, value addition, livelihood, economics, post-harvest practices and problem aspects of mushroom production have been conducted in Bangladesh, India and other countries of the world. A few of those studies are reviewed here.

2.2. Concept of Value Chain Analysis

2.2.1. Value chain

Value chain analysis is a tool that assesses the dynamics and potential for competitiveness of an industry by examining actors, factors and the relationship aspects of the transactions involved in moving a product from beginning to end use or final consumption (USAID, 2006). Actors are the players involved in value chain transactions. Factors are the external influences affecting the nature and terms of transactions along the value chain. Relationships are to indicate the flows of power, knowledge and benefits throughout the chain. So, value chain analysis produces a roadmap to the value chain that illustrates the flow of products and value addition into key market channels, or end markets for final consumption. This value chain map provides a tool for visualizing value chain dynamics and for locating the transactions involved in the highest value or highest potential markets. These aspects of the value chain serve as a framework for identifying key constraints, opportunities, and suggested points of intervention for industry development (USAID, 2006).

Making Markets Work Better for the Poor (M4P) (2008) define the value chain in two approaches. In the first approach, value chain includes the range of activities performed with in the firm to produce output involved in the process of acquisition of inputs, production, marketing and distribution. The second approach define value chain as a complex range of activities implemented by actors such as primary producers, processors, traders and service providers to bring raw materials to the sale of the final product.

Value chain analysis is the process of breaking a chain into its constituent parts in order to better understand its structure and functioning (UNIDO, 2009). It is a useful analytical tool that helps understand overall trends of industrial reorganization and identify change agents and control points for policy and technical interventions. The analysis consists of identifying chain actors at each stage and discriminating their functions and relationships; determining the chain governance to facilitate chain formation and strengthening; and identifying value adding activities in the chain and assigning costs and added value to each of those activities (UNIDO, 2009).

Kaplinsky and Morris (2012) defined value chain as 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 customers and final disposal after use. According to UNIDO (2009) value chain is a concept which can be simply described as the entire range of activities required to bring a product from the initial input-supply stage, through various phases of production, to its final market destination. The production stages entail a combination of physical transformation and the participation of various producers and services, and the chain includes the product's disposal after use. As opposed to the traditional exclusive focus on production, the concept stresses the importance of value addition at each stage, thereby treating production as just one of several value-adding components of the chain.

2.2.2. Value addition

Value chain analysis is a useful tool to create the greatest possible value to the customer. Value added is created at different stages and by different actors throughout the value chain. According to Trienekens (2011) value added may be related among others to quality, costs, delivery times, delivery flexibility and innovativeness. The size of value

added is decided by the end-customer's willingness to pay. Opportunities for a company to add value depend on a number of factors, such as market characteristics (size and diversity of markets) and technological capabilities of the actors. Value added is produced in value chains aiming at certain markets and constituting a number of actors.

Adding value to products means to create value along the chain. According to Agriculture and Food Council (2004) value should be added to the product at each link of the chain. Value does not necessarily include dollar value rather it can be also form value, location value, time value, ownership/possession value and information value. Form value added to the product by converting raw materials into finished or semi-finished products and maintaining the product quality by cleaning, grading, sorting and cooling. Finished products, passed through processing and packaging, increases usability of the product. Location value expressed in terms of providing the product at a desired place like door-to-door delivery, mail order and convenience stores. Time value is added to the product through storage, scheduling, transportation and processing. It enables the product accessible at a desired time. Ownership or possession value can be physical possession or legal ownership of the product. It can be expressed by transferring cost and risk through insurance and credit agreements. Information value is obtained by delivering information and education. It is often done through marketing functions such as advertising, promotion, packaging, and labelling.

2.3. Mushroom and Sustainable Livelihood

Mushroom maintains sustainable livelihood through securing malnutrition problem, improving health, generate income and well-being of human. Its health importance is not only for human but also for plants through helping in breaking down and absorb nutrient by attaching themselves to the root of the plant and act like secondary root system reaching deep in to the soil otherwise the plant could not get (Halpern, 2007).

Mushroom is good source of vitamins B, C and D, including niacin, riboflavin, thiamine, folic acid, ascorbic acid and various minerals including potassium, phosphorus, calcium, magnesium, iron and copper. They provide carbohydrates, but are low in fat and fiber, and contain no starch. On a dry weight basis, mushroom is high in protein. Mushroom proteins contain essential amino acids (Halpern, 2007). Mushroom adds both flavor to bland staple foods and are a valuable food in their own right. They

are often considered to provide a fair substitute for meat, with at least a comparable nutritional value to many vegetables. The consumption of mushroom can make a valuable addition to the often unbalanced diets of people in developing countries (Birhanu and Zerihun, 2012).

Besides their nutritional values, different mushroom species have various healing ability. The fruiting body of Ganoderma mushroom has traditionally been used to improve body function, maintaining healthy and long life. It has been used clinically since ancient time in china for treatment for fatigue, coughing, asthma, indigestion, neurosis and variety of other diseases. *Ganoderma* basidiocarp has several components responsible for the inhibition of HIV multiplication. *Pleurotus Spp*. stimulate the immune system of the body help to fight abnormal cells as well as boost the system against the damaging effect of chemo and radiation therapies used to kill tumor cells. *Pleurotus* also contains compound which inhibit reductase, an enzyme used in cholesterol biosynthesis. The consumption of oyster mushrooms can lower the cholesterol level in the body and also prevent high blood pressure, hangovers and constipations (Quimio, 2004).

2.4. Mushroom Production, Processing and Marketing

People have harvested mushroom from the wild and domestically produced for thousands of years for food and medicines. Many wild edible mushrooms can be cultivated domestically. The most common types of mushroom in the world markets were oyster, shiitake and button, while mycorrizal mushrooms were the most difficult to cultivate (Jones and Buttolph, 2012).

2.4.1. Domestically cultivated mushroom

The Chinese first domestically cultivated shiitake mushroom (*Lentinula edodes*) around 1100 AD. White button mushrooms (*Agaricus* spp.), most familiar to Americans and Europeans, were first domesticated in France in 1650. Commercial production began in the United States in the 1880s. *Agaricus* spp. was the leading mushroom crop worldwide and accounted for 99 percent of the United States' mushroom production in1997. Oyster mushroom (*Pleurotus* spp.) was more recently domesticated, and now ranks second in world production. Shiitake mushroom, which was very popular in

Asian cultures, ranks third. Other edible mushrooms, such as straw and wood ear mushrooms, were gaining in popularity (Danny, 1998).

Even though, there were over 300 genera of mushroom only few of them were cultivated commercially. Commonly cultivated mushrooms throughout the world were Button mushroom, (*Agaricus bisporus),* Shiitake mushroom (*Lentinus edodes),* Oyster mushroom (*Pleurotus Ostreatus),* Velvet stem mushroom (*Flammulina velutipes),* Paddy straw mushroom (*Volvariella volvacea),* Ear fungus (*uricularia auricular),* Reishi mushroom (*Ganoderma lucidum),* Nameko mushroom (*Pholiota nameko),* White jelly fungi (*Tremella Fuciformis)* and Truffle *(Tuber aestivum)* Among these the most commonly known mushrooms in the world market were; Button mushroom *(Agaricus bisporus*), Shiitake mushroom *(Lentinus edodes)* and Oyster mushroom *(Pleurotus Ostreatus)* (Chakravarty, 2011).

2.4.2. Mushroom production system

Three systems used in mushroom growing were tray, bag and shelf. Tray growing is used mainly by medium and large growers. This is the major method used for the growing of mushrooms in Australia. Trays are made of wood, usually lm x 2m x 0.3 m in size fastened using stainless steel fittings. Bag growing is becoming increasingly popular with small to medium growers and new entrants into the mushroom industry. This system requires a smaller capital outlay than the tray system. Bag growing offers advantages in pest and disease control by allowing fast and easy removal of infected bags. However, these advantages are offset because bag growing requires a larger labor input per kilo than either of the other two systems. Shelf growing is the growing system used by only a few growers. It offers large savings in labor costs but this is offset by very large capital setup costs. Each of these growing systems is economically viable in some circumstances and all are represented in the mushroom industry in Australia. Of paramount importance is the level of expertise is required in both management and growing methods in mushroom growing. If skill in either area are lacking, production can vary greatly between crops regardless of the growing system used.

Islam and Rahman (2008) undertook a study on cultivation of Oyster mushroom on different substrates. The study was conducted at the laboratory of Food Microbiology, Institute of Food Science and Technology, BCSIR to find suitable sawdust as substrate

for growing mushroom. Seven different types of substrates viz. mango, jackfruit, coconut, jam, kadom, mahogony, shiris sawdust with wheat bran and CaCO3 were evaluated to find their growth and yield of mushroom. However, highest return was obtained with Mango sawdust (Tk. 24.86) while the lowest with Jackfruit sawdust (Tk. 11.68). Cost benefit analysis revealed that the mango sawdust and shiris sawdust were promising substrates for the growing of Oyster mushroom.

Spawn production is the process of creating "seed" for the growth of mushroom. It is sometimes referred to as spawn making. It is highly complicated process in which pure strain of selected fungus is chosen to generate a specific variety of mushroom. Spawn making requires a great deal of understanding of environments and technique and thus represents science as well as art (Tirbrichu and Buykusenge, 2009).

Growing process of mushroom involves thorough mixing of spawn into the compost using a manual spawning system. Once the spawn had been mixed throughout the compost, the compost temperature, the relative humidity and the light in the growing room were managed by the farmer to optimize mycelia growth. In this function the spawn grows out in all directions from a spawn grain. The time needed for spawn to fully colonize the compost depends on the amount of spawn added and its distribution, the compost moisture and temperature, and the nature or quality of the compost. A complete spawn run usually requires at least 10 to 21 days (Tirbrichu and Buykusenge, 2009).

Substrate is a mushroom growing medium which can be compost, agricultural by product or industrial wastes. Depend on the type of mushrooms some of the most known substrates are banana leaves, bracts of pineapple, coconut coir, coffee bran, coffee pulp, corn cob, corn stover, orange peel, rice bran, rice straw, sisal bagasse, sugarcane bagasse, and wheat straw (Amin *et al*., 2010). The substrate must be rich in essential nutrients in forms which are readily available to the mushroom, and be free of toxic substances which inhibit growth of the spawn. Moisture content, pH and good gaseous exchange between the substrate and the surrounding environment are important physical factors to consider. Before spawning (mixing the spawn with substrate) the substrate should be free from all competitive micro-organisms through sterilization. Systems involving such strict hygiene were generally too costly and impractical to

operate on a large scale. For cultivating edible mushroom substrate require different degree of pre-treatment in order to promote the growth of mycelium by inhibiting other competitive micro-organisms (APCAEM, 2010).

The word “spawn” was derived from an old French verb, espandre, meaning to spread out or expand, which was derived from the Latin, expandere, meaning to spread. Spawn is also defined as “the mycelium of fungi, especially of mushrooms grown to be eaten, used for propagation”. In the mushroom industry, spawn is a substrate into which a mushroom mycelium has impregnated and developed, and which will be used as a seed in propagation for mushroom production. In addition the verb, to spawn, is used to mean inoculation of a substrate with mushroom spawn. The simple definition of spawning is the planting of mushroom spawn in the prepared compost/substrate. Along with advances in spawn making, the methods of spawning have also been continuously developed and improved, making it possible for the mushroom mycelium to grow through the compost more quickly (APCAEM, 2010).

The cultivation of mushrooms can be both a relatively primitive farming activity, and a high technology industry. In each case, however, continuous production of successful crops requires both practical experience and scientific knowledge. Mushroom growth dynamics involve some technological elements, which are in similar with those exhibited by our common agricultural crop plants. After the vegetative (mycelia) phase had reached maturity, what the mushroom farmer needs next was the induction of fruiting. This was the time the mycelia growth tips should be retarded by regulating the environmental factors. These factors generally called “triggers” or “environmental shocks”, such as, switching on the light, providing fresh air, and lowering temperatures, can trigger fruiting (APCAEM, 2010).

2.4.3. Market potential and level of mushroom marketing

Mushrooms are delicacy with definite food value. They have acquired commercial status almost all over the world due to their nature of palatability. Mushroom dish is a common item in most big hotels (Bhupinder and Ibitwar, 2007). There are considerable variations in taste and appearance. Marketing potential of dried oyster mushrooms is limited, though the taste becomes stronger after drying. Prices fluctuate, following demand and supply (Oei, 1991).

Agyei *et al*. (1993) observed that marketing of produce including mushrooms constitutes all the processes, facilities and services involved in putting the goods and services into suitable or acceptable forms for the benefit of both the seller and consumer. These activities are strenuous and therefore require much energy and dedication.

Sukhjet and Pandey (2008) conducted a study on economic analysis of mushroom cultivation in Punjab and examined the difficulties in marketing and scope of the development of mushroom farming in six agro climatic zones in Punjab and suggested some other factors. Lack of organized marketing channel has forced the growers to search for the disposal of their produce themselves, which is quite cumbersome because of the perishable nature of the commodity. Faster means of communication, receptive farming community to innovative ideas of subsidiary occupation etc, are some other factors which suggest that mushroom farming has a much better future in the state. However, there is an enormous scope and potential of further developing mushroom farming in the state because of cheap and easy availability of cereals straw, the basic raw material required for mushroom farming.

Singh and Abhey (2008) conducted a study on economics of production and marketing of mushroom in Haryana. They examined the cost, returns and break-even point of mushroom production on different categories of farms. After that, they examined the existing marketing system along with marketing cost, margins and marketing efficiency. The returns were calculated based on the actual prices received by the growers. The different mushroom marketing channels and Marketing efficiency was calculated to study the existing system.

Khatkar and Rathee (2005) undertook a study on marketing of fresh mushroom in Haryana. They showed that Haryana state is producing about 4000 tons of mushroom. Being in close vicinity to the National Capital *i.e.* Delhi. Haryana State is having high potential for mushroom cultivation. In addition to converting the waste into valuable product, it enhances the income and provides additional gainful employment to the producers. In this article an attempt has been made to analyze the cost of cultivation and marketing margins of mushroom.

2.5. Post-harvest practices:

Mantel (2009) carried out post-harvest management of mushrooms with special reference to Himachal Pradesh. By this study he showed that Himachal Pradesh emerged as a major state of mushroom cultivation where small growers, co-operative grower's societies, big farmers and some corporate organizations are engaged in production. Increased productivity demands proper post-harvest infrastructure to increase shelf life and marketability. Since mushrooms are perishable and delicate in nature, these cannot be kept afresh for more than 24 hours. To overcome this problem, especially during peak season, suitable post-harvest management / practices are to be followed to increase the shelf life and marketability of mushrooms.

2.6. Empirical Findings

Research on economic viability of mushroom to poverty reduction in Bangladesh was also conducted by comparing net income earning of mushroom with rice and wheat production. Each rice and wheat cultivated on 4.046 km^2 (1 acre) and mushroom were grown on 50.14 m^2 (30 * 18 feet) area of land. The expected yield per four months equals 2.4ton, 1.6 ton and 1ton while the net income in USD was 183.59 (rice), 365.38 (wheat), and 439.48 (mushroom). The income generated from mushroom was 1.2 times income of wheat and 2.3 times income of rice. It was concluded that mushroom cultivation was potential job for Bangladesh and for those countries where unemployment rate was high and thus providing employment for all family member (Imtiaj and Rahman, 2008).

Research on mushroom value chain analysis in Kenya, descriptive statistics was used to describe players and activities along the value chain and logit model was applied to determine the probability of entry to mushroom cultivation. The key determinants of entry into mushroom industry were access to extension services, number of female adults in the household, household head being a fulltime farmer and male headed households (Odendo *et al*., 2009).

Research result on economics of mushroom conducted in Bangladesh shows that mushroom was found to be profitable and promising agricultural enterprise which generates high income per household (Barmon *et al*., 2012). Since mushroom

production requires small piece of land relative to other crops and vegetables, little amount of initial capital and labor is required.

Mabuza *et al.* (2013) identified that about six to ten percent of the total mushroom produced consumed at household level and the remainder sold through the following four channels.

• Channel I (Farm gate): Producers → Consumers;
• Channel II (Retail market): Producers → Supermarkets → Consumers;
• Channel III (Middlemen): Producers → Middlemen → Supermarkets → Consumers;
• Channel IV (Food services industry): Producers → Restaurants/hotels → Consumers.

CHAPTER III

METHODOLOGY

3.1 Introduction

This chapter presents a detail description of the methods adopted at different stages of the study. Methodology is an indispensable and integral part of any research. This chapter presents the methodology followed in the study, which included the selection of the study area, selection of samples, preparation of survey schedule, method of data collection, period of survey, editing and tabulation of data and analytical techniques. The tools and methods used and followed for the study with considering the specific objectives of the study are given below.

This study embarked on both quantitative and qualitative research methods and used data from both primary and secondary sources. As indicated by Silverman (2005), an effort was made to keep the balance between the qualitative and quantitative data. This is because, neither of the two methods is sufficient by themselves to capture the trends and details of the situation that they need to complement each other, to allow a complete analysis and generate reliable information.

3.2 Selection of the study area

Selection of the study area is an important step and it largely depends upon the objectives set for the study. Therefore, careful thought has to be placed on selection an area where a particular set of objectives can be fulfilled.

Mushrooms are produced in few areas only in Bangladesh. To fulfill the objectives and easy accessibility of the targeted mushroom producer concentrated area of Savar upazila of Dhaka district were selected as survey location for this study. Jamsingpur, Bydapara and Jallessor (mushroom villages) in Savar pauroshava of Dhaka district were selected for the study. The villages were selected purposively.

To know the value chain actors the respondents were selected in park at Dhanmondi, Ramna, Chandrima Uddan in Dhaka city.

3.3 Selection of sample and sampling technique

The mushroom growers of the selected villages, the traders of the neighboring local markets and the consumers were considered as the population for the survey. As there was limitation of time, money and personnel it was not possible to include all the growers, middle men or intermediaries and consumers. Here In the study areas the sample farmers cultivated mainly Oyster mushroom and for this reason this study was based on Oyster mushroom. Mushroom growers were more or less homogeneous in characteristics in the study area. There were more than 200 mushroom growers. Among them 30 were selected. 15 middle men or intermediaries, 15 retailers and 30 consumers were also selected. The total sample size for this study was fixed at 90. Purposive sampling especially critical case sampling technique were used in sampling mushroom producer, middle man retailers and consumer from the population.

3.4 Preparation of Interview Schedule

It is very important to make a survey schedule for conducting any survey. In order to collect information three types of interview schedule used for the survey, such as

1. Interview schedule for mushroom producers.
2. Interview schedule for mushroom value chain actors (Traders as spawn suppliers, retailer, supermarkets and processors as hotel and restaurant).
3. Interview schedule for mushroom consumers.

One set of schedule was used for collecting information from the growers which included questions related to various aspects of production and marketing of mushroom. The other set of schedule was used for the value chain actors and included questions related to volume of sales, place of sales, price and the marketing cost, etc. The last one was for the consumer of mushroom to know their opinion on mushroom and mushroom products.

3.5 Method of data collection

The study is analytical based on collection of data from both primary and secondary sources. Primary data were collected from semi-structured questionnaire. The researcher himself collected the relevant data from the selected samples through face to face interview. Before talking actual interviews the whole academic purpose of the study was clearly explained to the sample farmers, value chain actors and consumers. At the time of interview, the researcher asked questions systematically and explained

the question whenever it was felt necessary. Farmers were requested to provide correct information as far as possible. If there were such items, which were overlooked or contradictory, were corrected by another interview. In order to minimize the errors, data were collected in local unit, but later those were converted into international units.

In addition to primary data, secondary data were also collected from various books, journals, newspapers and different organizations and website searching.

3.6 Study period

The present study covered six months from October 2014 to March 2015. Data were collected during the period from November to March 2014 and 2015 through direct interviews with mushroom growers, value chain actors and consumers. For collecting supplementary data the researcher personally visited the area several times.

3.7 Data analysis

Information of the survey schedule rechecked and those information (data) transferred in excel programme. Finally, tabulated data analyzed through descriptive and inferential statistical procedure to fulfill the objectives of the study.

3.8 Problems faced in data collection

The researcher of the study had to face certain problems during data collections, which are noted below:

i) Most of the respondents had no previous idea about such study. They were always apprehensive about the purpose of the study. They were not always ready to disclose the actual amount of their income because they considered it as their private affair;

ii) Some respondents did not keep any written records of the farming activities. Therefore, the researcher had to depend upon their memory. But I got only 20 respondents who kept written records.

iii) Respondents from all categories were often unable to recall the exact information, say, income, sales volume, cost, total production etc. Reliability of data therefore, posed some confusion;

iv) On many occasions, farmers were not available at home or sometimes they were busy in their household activities and therefore, the author had to give extra efforts and time to collect the information; and

v) There was the limitation of time and personnel and inadequate information about mushroom aspects and for this reasons data and other necessary information had to be collected within the shortest possible time.

3.9 Analytical technique

a) Cost and Return Analysis of Mushroom Production

Following profit equation were used to assess the profitability of mushroom production. Net return is formulated by following formula:

$$\pi_i = (Pm_i.M_i + Pw_i.W_i + Pdi.Di) - (TVC_i + TFC_i)$$

Where, π_i= Net return from mushroom and other product from per spawn per day

Pm_i= Per unit price (Tk/kg) of mushroom production

M_i= Amount of mushroom production (kg/day/spawn)

Pw_i = Per unit price (Tk/kg) of waste products

W_i = Total quantity (kg) of waste products from mushroom production

Pd_i = Per unit price (Tk/kg) of mushroom

D_i = Quantity of mushroom

TVC_i = Total variable cost of mushroom production (Tk)

TFC_i= Total fixed cost of mushroom production (Tk)

i (1…..n) = number of mushroom producer farmers.

Variable costs,

i. Cost of spawn packet
ii. Cost of human labor
iii. Cost of polypack
iv. Transportation cost

Fixed costs,

i. House making cost
ii. Cost of shelves
iii. Spray Machine
iv. Balance weight
v. Packet sealing machine

vi. Freeze

vii. Cost of small equipment (Bucket, bawl, tool, scissors, tray)

viii. Water cost

ix. Electricity cost.

b) Value Chain Analysis

i) Value addition for farmer

$$\text{Value Addition} = \frac{\text{Sale price-Production Cost}}{\text{Production Cost}} \times 100$$

ii) Value addition for market agents/intermediaries

$$\text{Value Addition} = \frac{\text{Sale price-Purchase price}}{\text{Purchase price}} \times 100$$

c) Marketing margin and net margin of intermediaries

Marketing margins of the grade of mushroom per cartoon were determined as yardsticks for measuring market performance.

The marketing margin and net margin of different intermediaries were estimated by the following formula:

i) Marketing margin (Tk/quintal) =Sale price (Tk/Kg)–Purchase price (Tk/Kg)

ii) Net margin (Tk/quintal) =Gross margin (Tk/Kg) – Marketing cost (Tk/Kg)

iii)Value addition for market agents/ intermediaries =Gross margin-Marketing cost.

iv) Return on investment (%) = $\frac{\text{Net margin (Tk/Kg)}}{\text{Total investment (Tk/Kg)}} \times 100$

where, Total investment = Production cost or Purchase price + Marketing cost

d) Marketing efficiency analysis

In the present study, Acharya's methods were used for estimating Modified Marketing Efficiency (Acharya and Agarwal, 2004).

$$ME = \frac{FP}{MC + MM}$$

Where,

ME = Marketing efficiency.

FP = Net price received by farmers

MC= Total marketing cost

MM= Total net marketing margin of intermediaries.

A higher value of ME denotes higher level of efficiency and vice versa.

e) Market Performance

Marketing margin, costs and returns and price efficiency were used to examine market performance in mushroom marketing in the study area.

f) For consumer

The response of consumers was assessed by summing up the weights obtained from knowledge, attitude and practice by using the following formula as followed by Hasan (2004), Haider (2005) and Talukder (2006):

$$\mathbf{OR = R_k + R_a + R_p}$$

Where,

OR = Overall performance of the respondents

R_k = Response in terms of knowledge

R_a = Response in term of attitude

R_p = Response in term of consumption practice.

To explore the relationship between each of the selected characteristics of consumers and their level of response to mushroom cultivation technologies, a new set of data on

knowledge, attitude and practice was generated on the basis of manipulating mean and standard deviation of original data.

g) Situational analysis: SWOT Analysis

A SWOT analysis can be a useful tool in conducting a situational analysis. A SWOT analysis looks at both current and future situations, whether analyze the current strengths and weaknesses of a product while looking for future opportunities and threats of a product. The goal is to build on strengths as much as possible while reducing weaknesses. A future threat can be a potential weakness while a future opportunity can be a potential strength. SWOT analysis is a crucial tool for mushroom by which it can capture the market & the consumer.

CHAPTER IV

MUSHROOM VALUE CHAIN

4.1 Introduction

Value chain encompasses the full range of activities and services required to bring a product or service from its conception to sale in its final markets- whether local, national, regional or global. Value chain includes input suppliers, producers, processors and buyers. They are supported by a range of technical, business and financial service providers (Parker, 2007). Value chains have both structural and dynamic components. The structure of the value chain influences the dynamics of firm behaviour and these dynamics influence how well the value chain performs.

In mushroom market attempts have been made to identify the actors in the mushroom value chain to develop value chain map and to examine the value addition by mushroom producers/growers, value chain actors of mushroom and the ultimate consumer. Value addition is mainly interpreted as the difference between total expenses involved in making or buying of a commodity and the total revenue accruing from its sales.

4.2 Value addition of mushrooms

Value addition activities are mainly concerned with the changes of utilities. When product passes through distribution channels, it creates place, time and possession utilities. For this reason, this chapter deals with identifying the actors involved in value chain and their functions of mushroom marketing.

The term value added refers to the value created in a product in the course of manufacturing or processing exclusive of such costs as those of raw materials, packaging or overhead. In other words, it is the additional value of a commodity over the cost of commodities used to produce it from the previous stage of production (Rai and Arumuganathan, 2008).

In India, almost the entire domestic trade of mushroom is in the fresh form while all the exports are in the preserved formed (canned or steeped). The current era is characterized by greater awareness about quality and the demand for the readymade food products

4.3 Actors Involved in Mushroom Value Chain

The chain of actors through which the transaction of goods takes place between producer and consumer is known as a marketing channel. Marketing channels plays an important role in achieving the marketing objectives of any organization. Considering that mushroom is an important vegetable in Bangladesh, the product moved from the sellers to consumers through the same chains i.e. through some market actors like producer, contract supplier, retailer and consumer. The study revealed that there had a movement of mushroom from the point of production to the point of consumers through some actors forming a chain in the mushroom market in the study area.

4.4 Operators/Operational service providers

The value chain operators perform the basic function of the value chain. Typical operators of the mushroom value chain in Dhaka district include growers, retailers and processors. They have in common that they become owners of the product at one stage in the value chain. The operational service providers are being subcontracted by the value chain operators. (Figure 4.1).

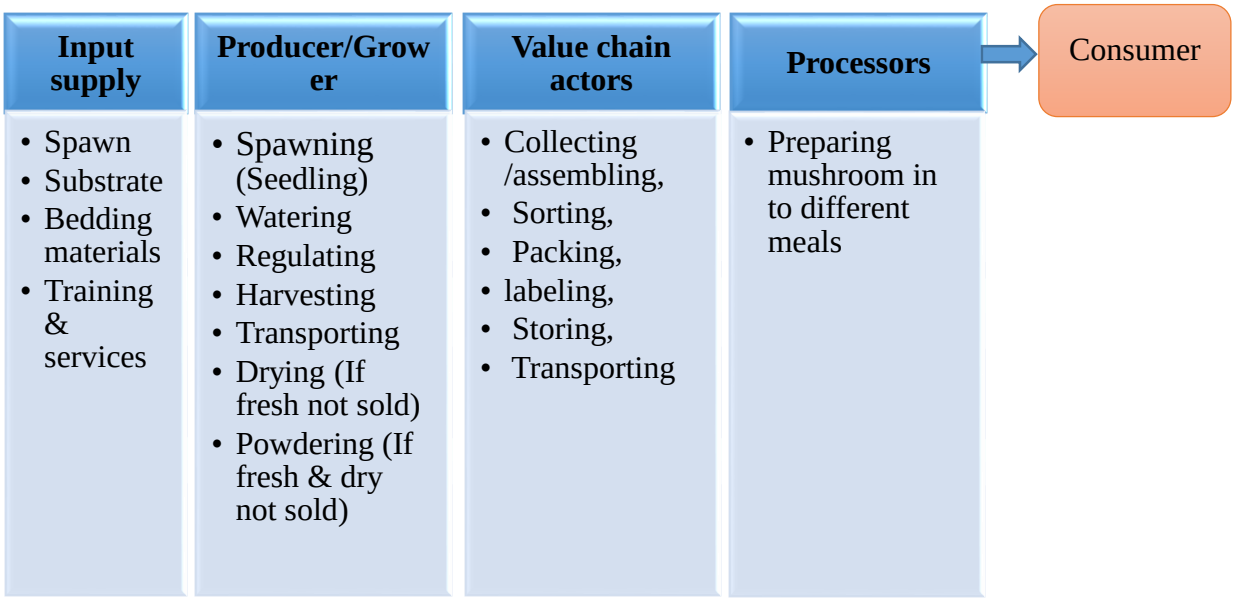

Figure: 4.1. Process & functions of mushroom value chain

Source: Author's Survey (2014)

4.5 Input suppliers

4.5.1 Spawn

During the study period there were about fifteen spawn suppliers and five own spawn producers found in Dhaka city. Fourteen of the spawn suppliers were private sectors and only one spawn supplier under the government. Producers have got the spawn suppliers (Figure 4.2).

Fig: 4.2 Spawn market flow

Source: Author's Survey, 2014

4.5.2 Substrate

Mushrooms can be classified as 3 categories by their tropic pattern; saprophytes, parasites or mycorrhizae. The most commonly grown mushrooms are saprophytes, decomposers in an ecosystem growing on organic matters like wood, leaves and straw in nature. Raw materials can be used as substrate for primary decomposers such as oyster mushroom which have lignocellulosic enzymes. Oyster mushrooms are grown from mycelium propagated on a base of steam sterilized cereal grain usually millet. This cereal grain-mycelium mixture is called spawn and is used to seed mushroom substrate. Most of the substrate is made of rice/wheat straw and agricultural by product. Mushroom is also influenced by acidity of substrate. The optimal pH value of substrate ranges from 6 to 8, varying with mushroom species.

4.6 Producer or Grower of mushroom

Mushroom growers are the main actor and play an important role in the mushroom value chain. They are the next major actors who perform most of the value chain functions start from mobilizing inputs to post harvest handling and marketing. The major value chain activities that mushroom producers perform include purchasing inputs, sterilizing substrates, spawning, managing the temperature and relative humidity, disease and pest controlling, harvesting, post-harvest handling and marketing. Mushroom growers in the study area were the person who either produced

mushroom independently or sold to the urban consumers, retailers, processors or they had contract with national mushroom culture centre. So, contract growers sold their product to the respective contractor.

4.6.1 Spawning

Spawning is a process of introducing mushroom spawn (planting material) into compost bags. During spawning, the room is cleaned thoroughly with alcohol or dettol and the cooled compost bags are arranged on a rack. The spawns are dislodged into the compost bag by shaking the bottle to loosen the grains. The inoculated compost bags are arranged on shelves leaving spaces between them to allow for good aeration. Oyster mushroom spawn grows completely through the sawdust compost within 28-41 days. After this period, the mycelium begins to thicken with the bags and starts forming fruiting bodies. The bags are then opened for the fruiting.

4.6.2 Farm labour

Both male and female labourers were involved in operational services in the field of mushroom. The mushroom production and marketing activities created new employment opportunities for both male and female labourer. It was observed in the study area that only family labourers were involved and maximum time it was the grower him/herself only. The labourers were engaged in seed rearing, watering, harvesting, various post-harvest practices and finally selling the product.

4.7 Traders

The major actors in mushroom trade categorized in to spawn suppliers, retailers and supermarkets. The activities of spawn suppliers and retailers were collecting, sorting, packing and transporting to the next destination market. As shown in Figure 4.3 spawn suppliers played the leading role in collecting and distributing fresh and dry mushroom from producers to alternative markets. Their destination markets were consumers, supermarkets, hotels and restaurants, and retailers. Supermarkets sale both imported and locally produced mushroom. Their major activities are packaging, labelling and storing until they are selling the product. The primary client of supermarkets for locally produced fresh mushroom were foreigners & upper class people followed by the local peoples.

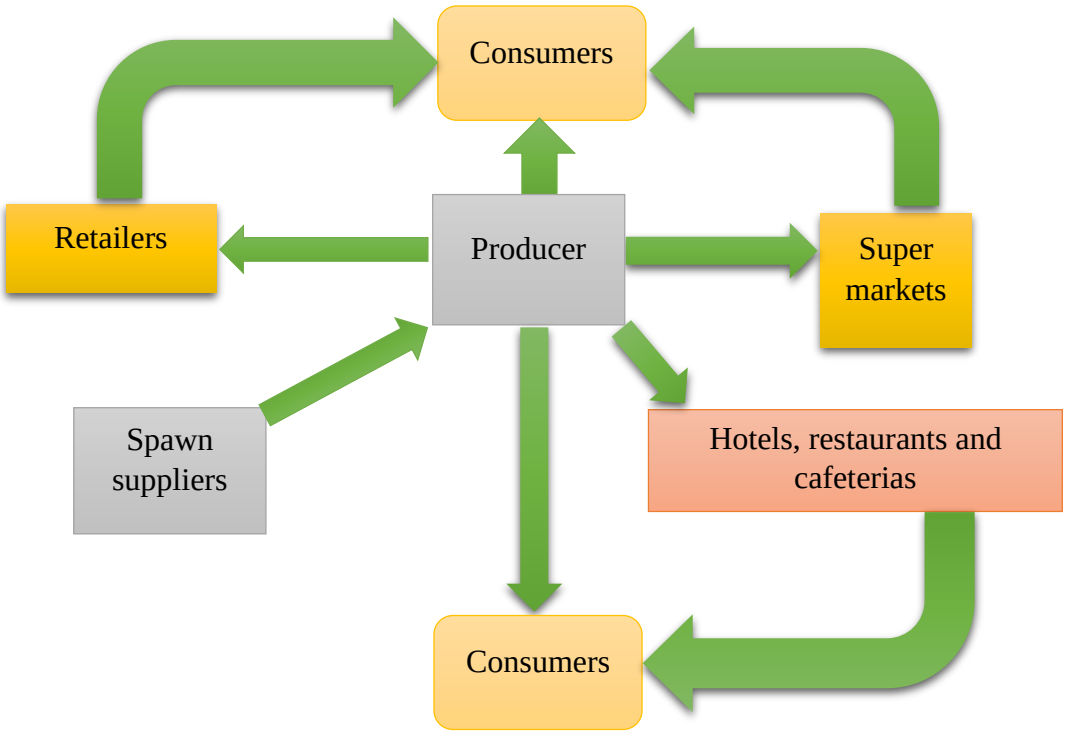

Figure 4.3 Mushroom market flows from spawn suppliers

Source: Author's Survey, 2014

4.8 Processors

Processing is one of the mushroom value chain functions. The actors are hotels, restaurants and cafeterias. Hotels, restaurants and cafeterias further process locally produced and imported mushroom in to different dishes.

4.9 Consumers

Consumers are the final users and the most important actor of mushroom value chain. There were two types of consumer in this mushroom value chain. One kind of consumer is the people of this upazila and other villages of Savar. Other kind of consumers is the people of Dhaka city.

4.10 Support service providers

Support services do not directly perform the basic functions in a value chain. They refer to general investment and preparatory activities benefiting all or at least several value chain actors simultaneously. Support services therefore provide a collective good

shared by the value chain actors. The support service providers in the mushroom value chain were transporters, national mushroom culture centre and credit organisation.

4.10.1 Transporters

Transportation system is not so developed in the mushroom value chain. Because, for transporting mushroom some specialized (refrigerated van) transport is needed. The system is not developed in Bangladesh so that actors in the mushroom value chain used bus, van and rickshaw to transport mushroom

4.10.2 National mushroom culture centre

National mushroom culture centre provides technical support to the mushroom growers by giving training on mushroom culture. After completion of training they give a fixed amount of free spawn for first cultivation. They also support the growers by supplying necessary pesticides and information on mushroom market. They also bought mushroom from the growers. As a result, farmers were free from tension in selling their product.

4.10.3 Credit organization

Credit organizations were those organizations which provide credit for mushroom farming and other related purposes. This credit organization in the study area is only bank.

4.11 Mapping Mushroom Value Chain

Mushroom value chain actors added value when the product passes from one actor to another. The actors either change the form of the product through processing or improving the grade through sorting, cleaning, packing or creating place and time utility.

4.11.1 Mapping Fresh mushroom Value Chain

The mushroom value chain in the study area and the share of mushroom supply was reviewed from the table 4.1, which shows that the value chain of fresh mushroom from producers viewed were 10% directly supplied to the consumer, 60% supplied to the traders and 30% supplied to the processors respectively. From retailers viewed supplied percentage from retailer to consumer 10 and retailer to processors 5% respectively.

Contract supplier supplied 30% to the processors. As supermarket is popular in Dhaka city. So supplied from supermarkets to consumer 5% and supermarkets to processors 5% mushroom respectively. At last the processor sold the 100% mushroom to the consumer in a processed form food.

Table 4.1 Mapping of mushroom value chain for fresh mushroom

Value chain	Share Percentage
1. Spawn supplier → Producer → Consumers	10
2. Spawn supplier→ Producer → Traders → Consumers	60
3. Spawn supplier →Producer →Processors →Consumers	30
Total distribution from producers	**100**
1. Spawn supplier → Producer → Retailer →Consumers	10
2. Spawn supplier → Producer → Retailer →Processors→Consumers	10
1.Spawn supplier→Producer→Contract supplier→Processors→Consumers	30
1. Spawn supplier → Producer → Supermarkets →Consumers	5
2. Spawn supplier → Producer → Supermarkets →Processors	5
Total distribution from Traders	**60**
1. Spawn supplier → Producer → Traders →Processors →Consumers	**100**

Source: Author's Survey, 2014

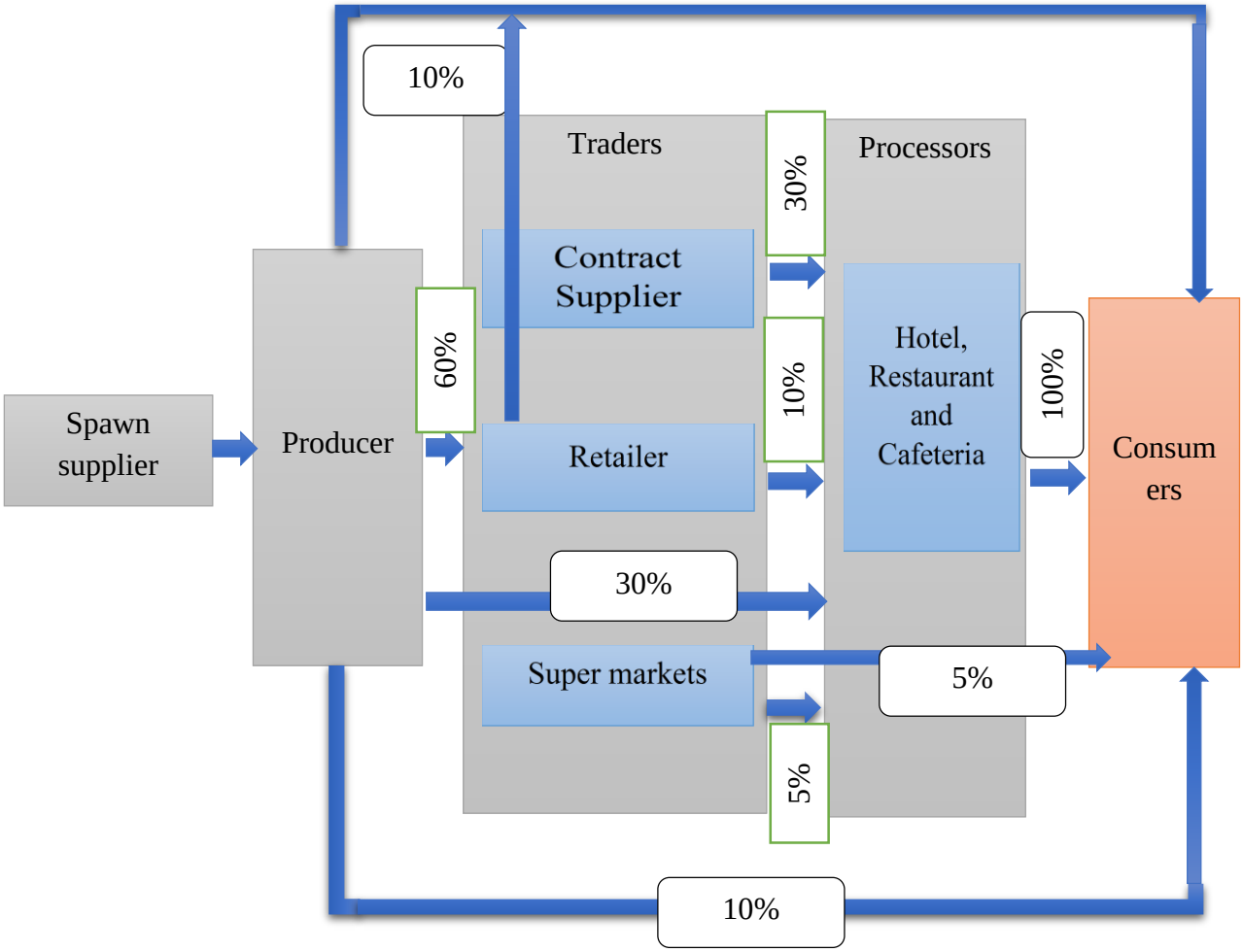

Fig 4.4 Mapping of fresh mushroom value chain
Source: Author's Survey, 2014

4.11.2 Mapping Dry mushroom Value Chain

Dry mushroom in Bangladesh is not so favourable at all. Consumer rarely purchase dry mushroom. But the dry mushroom price is high than the fresh mushroom. Because to get 1 kg dry mushroom about 8 kg fresh mushroom is needed. The value chain of dry mushroom is short in length. Table 4.2 revealed that value chain of dry mushroom from producer viewed 75% dry mushroom was supplied to contract supplier while 25% dry mushroom supplied from producer to retailer.

Table 4.2 Mapping of dry mushroom value chain

Value chain	Share Percentage
1. Spawn supplier→ Producer → Contract supplier→Processor→Consumers	75
2. Spawn supplier→ Producer → Retailer→ Processor→Consumers	25
Total	**100**

Source: Author's Survey, 2014

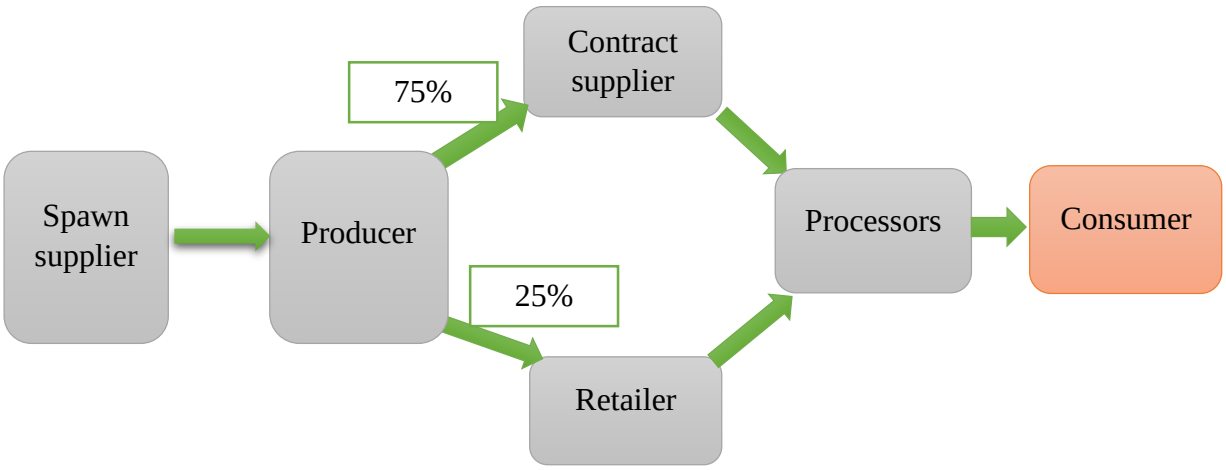

Fig 4.5 Mapping of dry mushroom value chain
Source: Author's Survey, 2014

4.11.3 Mapping Powder mushroom Value Chain

Powder mushroom is costly in Bangladesh. Most of the rich family consume it. Little of the portion is consumed by the middle class. The process of powder mushroom involves 3 steps.

1. Produce fresh mushroom
2. The fresh mushroom which was not sold in harvesting day kept it for dry mushroom.
3. Finally the dry mushroom grinding in mill and turned it into powder mushroom

Table 4.3 Mapping of powder mushroom value chain

Value chain	**Share (%)**
1. Spawn supplier → Producer → Consumers	5
2. Spawn supplier→ Producer → Traders → Consumers	60
3. Spawn supplier →Producer →Processors →Consumers	35
Total distribution from producers	**100**
1. Spawn supplier → Producer → Retailer →Consumers	5
2. Spawn supplier → Producer → Retailer →Processors→Consumers	15
1.Spawn supplier→Producer→Contract supplier→Processors→Consumers	30
1. Spawn supplier → Producer → Supermarkets →Consumers	10
Total distribution from Traders	
1. Spawn supplier → Producer → Traders →Processors →Consumers	**100**

Source: Author's Survey, 2014

Powder mushroom is also very demandable like the fresh one. The marketing channels in the study area and the share of mushroom supply was reviewed from the table 4.3, which shows that the value chain of powder mushroom from producers viewed were 5% directly supplied to the consumer, 60% supplied to the traders and 35% supplied to the processors respectively. From retailers viewed supplied percentage from retailer to consumer 5 and retailer to processors 15% respectively. Contract supplier supplied 30% to the processors. As supermarket is popular in Dhaka city. So supplied from

supermarkets to consumer 10% of powder mushroom. At last the processor sold the 100% mushroom to the consumer in a processed form food. Here producer powdered some mushroom through grinding mills and supplied it to the retailer and supermarket. Contract supplier also bought the dried mushroom and then powdered own and then sold it to the processors.

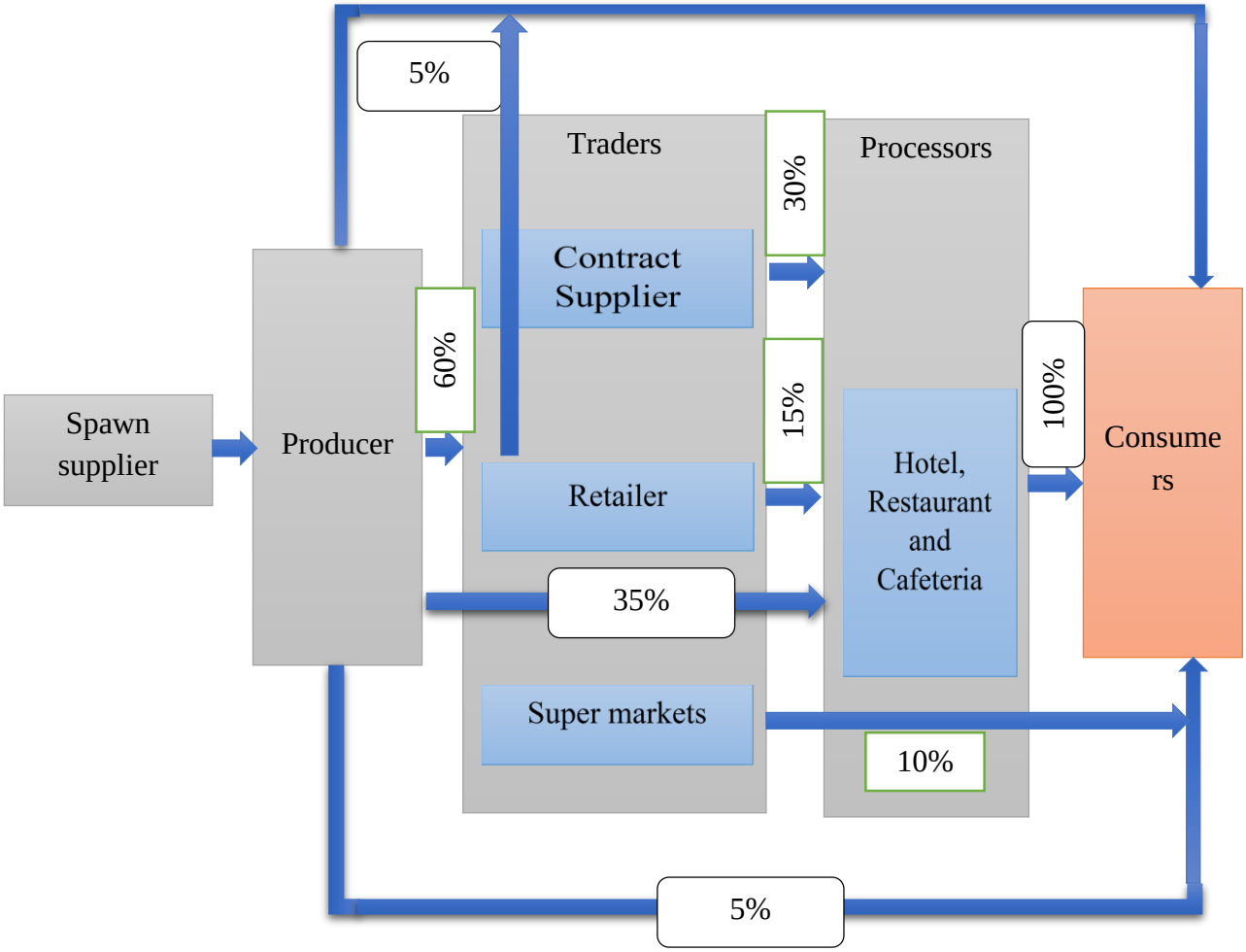

Fig 4.6 Mapping of powder mushroom value chain
Source: Author's Survey, 2014

CHAPTER V

MUSHROOM PRODUCTION AND VALUE ADDTION

Result and discussion part has three sections. The first section discusses about mushroom producers, production system, production and productivity and the marketing system. Mushroom value chain functions, actors, activities and market flow are discussed in the second section. Consumer's knowledge, attitude and practice level of mushroom product are discussed in the third section.

Mushroom Production and Marketing System

5.1 Socio-economic characteristics of mushroom producers

Mushroom growers are the main actor and play an important role in the mushroom value chain. The socio-economic characteristics of the sampled mushroom producers are presented in Table 5.1.

5.1.1 Gender distribution of the producer

The gender distribution is an important factor in mushroom production. It can show the scenario of the employment in the field of mushroom cultivation (Table 5.1). In case of mushroom cultivation, the sampled producers were 37% female and 63% male.

5.1.2 Age of the producers

Age is an important demographic factor to make a decision regarding the operation of any type of business. In case of mushroom cultivation, the sampled producers were very young (Table 5.1). About 50% of the sampled producers' age varied between 20 and 30 years. Only 3% of the total producers' age was below 20 years. Thus, it appeared that young generations are showing interest to produce mushroom in Bangladesh.

5.1.3 Occupation of the producers

In this study the family members were connected to some occupation for earning their livelihood. The primary and secondary occupations of the respondents were mostly in agriculture (mushroom). About 60% people were engaging in agriculture as primary occupation and 40% peoples were doing agriculture as a secondary occupation. Also

20% were doing services and other work (shopkeeper) respectively as primary education (Table 5.1).

Table 5.1 Demographic Characteristics

Variables	Structure	Farmers (%)
Gender	Male	63
	Female	37
Age Group	Below 20	3
	20-30	50
	30-40	30
	40-50	10
	Above 50	7
	Total	**100**
Primary Occupation	Agriculture	60
	Service	20
	Others	20
	Total	**100**
Secondary Occupation	Agriculture	40
Level of Education	Primary	20
	Secondary	34
	Higher Secondary	33
	Graduate	13
	Illiterate	0
	Post Graduate	0

Source: Author's Survey, 2014

5.1.4 Education level of the producers

Education makes a person more confident, strong and creates ability to think and decide quickly. The literacy level of the respondents is shown in Table 5.1. 34% of the producers, had secondary education and 33% had higher secondary level education. Only 13% people were graduate. So educate people were adopting the scientific method in mushroom cultivation which mitigated the loss.

5.1.5 Family income of the producers

Sources of income are the key items for running a family. If the income is satisfactory then the people will involve in any business or work happily. The income level of the respondents is shown in Table 5.2. About 30% of the respondents were generated between Tk. 35,000 to Tk. 40,000 income. Ranging from Tk. 20,000 - Tk. 24,999 was earned by 16.67% of the respondents and Tk. 30,000 - Tk. 34,999 was earned by 16.67% of the respondents. So, it can be stated that all the respondents were earning from different primary and secondary occupation.

Table 5.2 Income information of the respondent family

Family Income (Tk)	Farmers (No.)	Percentage (%)
Tk. 15,000-19,999	7	23.33
Tk. 20,000-24,999	5	16.67
Tk. 25,000-29,999	4	13.33
Tk. 30,000-34,999	5	16.67
Tk. 35,000-40,000	9	30.00
Grand Total	**30**	**100**

Source: Author's Survey, 2014

5.2 Starting year of oyster mushroom cultivation

This information was gathered to determine the impact of the depth of experience on the ability to better produce and handle the mushroom as shown in Table 5.3. Almost 47% respondents had started mushroom cultivation from the year of 2010, 23% were engaged from 2011 and 30% of the respondent were engaged in 2012. So, it states that most of the respondents were engaged in mushroom cultivation from 2010 and they earned a much than the others as they were experienced and aware of mushroom cultivation process.

Table 5.3 Cultivation starting year

Mushroom cultivation year	Farmers (No)	Percentage
2010	14	46.67
2011	7	23.33
2012	9	30.00
Total	**30**	**100**

Source: Author's Survey, 2014

5.3 Mushroom types, seasons and sources of spawn

The research indicated that 90% producers cultivated only oyster mushroom while 4% cultivated rishi mushroom. Only 6% producers cultivated button mushroom

It is revealed that, 83% producers cultivated oyster mushroom all year round, while 17% specifically preferred to cultivate mushroom during winter season since the temperature during winter season favours good harvest.

Table 5.4 Sources of spawn

Source	Farmers (No)	Percentage
Own	16	53.33
Seller	7	23.33
Training centre	7	23.33
Total	**30**	**100**

Source: Author's Survey, 2014

The growers were not much dependent to collect spawn from others. 53.33% spawn were prepared with their own capability (Table 5.4). About 23.33% spawn were purchased from seller, while 23.33% of spawn were collected from training centre.

5.4 Source of inspiration to cultivate mushroom

Majority of the mushroom growers (60%) received inspiration from training centre to cultivate mushroom, and the rest 40% producers were encouraged by looking other farmers (Table 5.5).

Table 5.5 Source of inspiration

Inspired by	Farmers (No)	Percentage
Learning from training	18	60
Looking other farmers	12	40
Total	**30**	**100**

Source: Author's Survey, 2014

Most of the farmers were getting trained from the training centre which consisted of 83.33% while other respondents about 16.67% were involved in mushroom cultivation by looking others or observing the production technique.

5.5 Source of initial investment and regular working capital

Without investment no business can establish. First investment is an important thing for running a business. Table 5.6 shows that 46.47% of the mushroom growers were managing their first investment from their own capital. 30% of the respondents were helped by the family members while 23.33% were taking agriculture loan from the bank for doing the first investment of mushroom.

Table 5.6 Source of initial investment

Source of investment	Farmers (No)	Percentage (%)
Own investment	14	46.67
Loan from family member	9	30.00
Loan from bank	7	23.33
Total	**30**	**100**

Source: Author's Survey, 2014

Working or regular capital is an inevitable item for running a business. Table.5.7 states that 83.33% of the respondents managed their regular capital by re-investing profit from selling mushroom. While a little portion of respondents (16.67%) received bank loan for running the business.

Table 5.7 Sources of regular working capital

Source of regular working capital	Farmers (No)	Percentage (%)
Re-investment from profit	25	83.33
Bank loan	5	16.67
Total	**30**	**100**

Source: Author's Survey, 2014

5.6 Reasons of cultivation, changes after cultivation and return utilization pattern

There are always some causes behind any business or cultivation. Table.5.8 shows mushroom cultivation reasons mentioned by the farmers. 46.67% respondents cultivated mushroom because of high profitability.

Table 5 8 Reason of cultivation

Reason of cultivation	Farmers (No)	Percentage (%)
Profitability is high	14	46.67
Required less capital	5	16.67
Higher demand	5	16.67
For life-style change	4	13.33
Required less labour	2	6.67
Total	**30**	**100**

Source: Author's Survey, 2014

16.67% growers were doing mushroom cultivation because of required less capital and it had high demand. 6.67% of the respondents were in this business because of less labour requirement. If any business does not bring any output, then business will not run for a long time. As mushroom cultivation is highly profitable. So it brings lot of changes.

Table 5.9 Change in family condition after mushroom cultivation

Major changes	Farmers (No)	Percentage (%)
Family income has increased than before	14	46.67
Social status increased	7	23.33
Life style changed	6	20
Daily life become comfortable than before	3	10
Total	**30**	**100**

Source: Author's Survey, 2014

Table 5.9 shows that by doing cultivation of mushroom at first 46.67% of the respondent's family income were increased than the before while 10% of the respondent's daily life were more comfortable than the before.

The income which was generated from mushroom cultivation contributed to the respondent's daily life. By cultivating mushroom, the growers were getting money which invested in many fields as 46.67% of the respondents had built a house and re-invested in their own business (Table 5.10).

Table 5.10 Utilization of return from mushroom cultivation

Fields	Farmers (No)	Percentage
Build a new house and re-invest in this business	14	46.67
Spend money for family medic and educational expense	6	20.00
Save for future	5	16.67
Contribute in family income	5	16.67
Total	**30**	**100**

Source: Author's Survey, 2014

20% of the respondents spent the money for family medic are and educational expense for the children. 16.67% of the respondents were saving money for the future and contributed their income in family respectively.

5.7 Cost and return analysis of mushroom production

Costing is an important part of running a business successfully. This section aims at identifying and quantifying different costs, which are incurred by the farmers in production process. The cost items in the mushroom farming included different types of fixed and variable costs. On the return side, gross return included revenue from mushroom and it's by product.

5.7.1 Fixed cost

Fixed assets include the items, which are permanent in nature and last longer than the duration of the crop. Fixed assets are those, which do not change and are incurred even when production is not undertaken. The fixed costs of mushroom farming considered farm house making materials as bamboos, bricks, polythene, cloths, plastic pipes, tins, spray machines, balance weight, packet sealing machine, freeze, bucket, bawl, tool, scissors, tray, rent of house, gunny bags, woods, concrete pillars and others (electricity, water supply materials etc.).

The total fixed cost was incurred during mushroom production per kg was Tk. 10.48 (Table 5.11). In fixed cost the average room cost was 1.52 Tk/kg and average shelf cost was 3.28 Tk/kg. The cost of average fixed asset was 5.57 Tk/kg. Small equipment is very essential for mushroom cultivation. This cost was included as 3.88 Tk/kg.

5.7.2 Variable costs

Variable cost share is the largest amount in the total cost of mushroom farming. These costs vary with the level of production. Variable costs encompass the cost of spawn bags (purchasing and making cost) and all labour cost (family and permanent hired labour) for mushroom production.

In mushroom cultivation spawn is essential and the most important input item. The average price of spawn was 100.90 Tk/kg. Polythene or poly propylene is an important item form packaging. Average price of poly propylene is 1.75 Tk/kg. So, total variable cost was incurred 134.52 Tk/kg (Table 5.11) during mushroom production.

5.7.2.1 Cost of human labour

Human labour was considered one of the important inputs. There are broadly to different categories of human labour: family labour and hired labour. Family labour included the operator himself/herself and other adult member of his family. The hired labour cost was calculated on the basis of the labour employed at the local market price. All types of labour costs were considered as 3 months, because commercial mushroom farmers actually produce for 3 months (6 times) in one spawn bag. Labour cost is one of the main cost items in agriculture and it is also true in mushroom farming. In case of small farm owner and family members provide their labour. However, for large farm, not only owner and family members but also hired labour works in the farm.

In variable cost the labour cost is a great factor. Total labour cost was 24.98 Tk/kg which included the family labour cost was 11.05 Tk/kg and the hired labour cost was 13.93 Tk/kg (Table 5.11).

5.7.2.2 Means of transport

Whether the alternate market is far or near, either the buyer collected the product at farm get or the producers used means of transport like on foot, public transport and own vehicle to deliver the product. Most of mushroom producers (79 %) in the study area used public transport or CNG to deliver their product to the alternate markets. About 4.2 percent and 3.4 percent of the producers used own vehicle and on foot, respectively while the remaining 13.4 percent sold at farm gate, so that the buyer was responsible to

transport product. The transportation cost of the grower was 6.89 Tk/kg (Table 5.11) which used for purchasing spawn or other materials.

Table 5.11 Average cost and return from mushroom cultivation

Cost item and Cost Calculation	**Cost (Tk/kg)**
Fixed cost (Average)	
Fixed Assets	
a. Room cost	1.52
b. Shelf cost	3.28
c. Spray Machine	0.32
d. Balance weight	0.07
e. Packet sealing machine	0.09
f. Freeze	0.29
Small Equipment	
a. Bucket	0.62
b. Bawl	0.71
c. Tool	0.53
d. Scissors	0.30
e. Tray	1.72
Water cost	0.27
Electricity cost	0.76
A. Total fixed cost (TFC)	**10.48**
Variable cost (Average)	
Spawn Price	100.90
Cost of Polythene pack	1.75
Transportation cost	6.89
a. Family Labour Cost	11.05
b. Hired Labour Cost	13.93
Total Labour Cost (a+b)	**24.98**
B. Total variable cost (TVC)	**134.52**
Production Cost (A+B)	**145**

Source: Author's Survey, 2014

5.7.3 Cost of production

Total cost of production was calculated by adding the average of total fixed cost and variable cost. From the table it can be stated that the total cost of production for mushroom cultivation was 145 Tk/kg (Table 5.11).

5.7.4 Average cost and return from fresh Mushroom Cultivation

5.7.4.1 Gross return

Returns from mushroom were found out by taking average price by which was sold in the study area. It was assumed that shows total gross return was Tk. 240 per kg. (Table 5.12)

5.7.4.2 Gross margin

Gross margin is the gross return over variable cost. Gross margin is obtained by deducting total variable cost from gross return. From the table 5.12, gross margin was calculated as 105.48 Tk/kg.

5.7.4.3 Net margin

Net margin was calculated by subtracting marketing cost from gross margin. Net margin received by producers were 75.98 Tk/kg (Table 5.14).

5.7.4.4 Net return

Net return is very useful tool to analyze or compute performance of enterprises. It is calculated by subtracting fixed cost from gross return. Net return of the producers were 95 Tk/kg (Table 5.12).

5.7.4.5 Benefit Cost Ratio

The BCR (undiscounted) is a relative measure which is used to compare benefits per unit of cost. The BCR of mushroom production was calculated as a ratio of net returns and production cost. Table 5.12 shows that benefit cost ratio of mushroom production was emerged as 1.66 implying that TK. 1.66 would be earned by spending Tk. 1.00. Thus the study reveal that in term of annual return and benefit cost ratio, mushroom cultivation is highly profitable business.

Table 5.12 Average cost and return from fresh mushroom cultivation

Estimated cost	Value (Tk/Kg)
a) Price of Fresh Mushroom (Tk/Kg)	240
b) Gross return (Tk/Kg)	240
c) Total variable cost (Tk/Kg)	134.52
d) Fixed cost (Tk/Kg)	10.48
e) Total production cost (Tk/Kg)	145
f) Gross Margin (b-c) (Tk/Kg)	105.48
g) Net return (b-e) (Tk/Kg)	95
h) BCR (b/e)	1.66

Source: Author's Survey, 2014

5.8 Value addition of mushroom

5.8.1 Value Addition for Fresh Mushroom at Producer stage

The cost of marketing represents the cost of performing the various marketing functions. It also said about operations by various agencies involved in the marketing process. In other words, the cost, which incurred to move the product from producers to consumers are generally known as marketing cost. Marketing cost of mushroom at the actors, at intermediaries' level includes the expenses incurred by different actors for movement of the product through the value chain.

Some producers sell their product after packaging. The cost involved in performing those functions were mainly packaging cost, labor, polythene, grading, electricity and transportation cost. The average cost of marketing of mushroom by producer was TK. 29.50 per liter (Table 5.13).

Table 5.13 Marketing cost for fresh mushroom

Cost components	(Tk/kg)	Cost share (Percentage)
a) Labour	13.93	47.22
b) Polythene	1.5	5.08
c) Grading	0.42	1.42
d) Electricity	0.76	2.58
e) Packaging cost	2	6.78
f)Transportation cost	6.89	23.36
h) Telephone/ Mobile	4	13.56
Total	**29.50**	**100**

Source: Author's Survey, 2014

From the table 5.14 it stated that the value addition of fresh mushroom was 65.52%. The return on investment was 43.54 Tk/kg.

Table 5.14 Value addition of fresh mushroom

Values	Value (Tk/kg)
a) Production cost	145
b) Marketing cost	29.5
c) Sales price of mushroom	240
d) Value addition {(c-a)/a}*100	65.52
e) Total investment (Production + Marketing)	174.5
f) Net margin (Gross margin-Marketing cost)	75.98
g) Return on investment (%) {(f/e)*100}	43.54

Source: Author's Survey, 2014

5.8.2 Value Addition for Dry Mushroom at Producer stage

Dry mushroom production cost involved the summation of fresh mushroom production cost and the drying cost of the rest mushroom. To get 1kg of dry mushroom 8 kg of fresh mushroom needed.

Table 5.15 stated that net return for dry mushroom was 1329.52 Tk/kg. BCR for dry mushroom was 1.28.

Table 5.15 Average cost and return for dry mushroom

Estimated cost	**Value**
a) Fresh mashroom required to get 1 kg dry (Kg)	8
b) Fresh Mushroom Production cost (Tk/kg)	145
c) Total Required Fresh Mushroom cost (Tk) (a*b)	1160
d) Gross return or Price of Dry Mushroom (Tk/kg)	1500
e) Total variable (Tk/kg)	1160
f) Fixed cost (Tk/kg)	10.48
g) Total Production cost (Tk/kg)	1170.48
h) Gross Margin (d-f)	1489.52
i) Net return (d-g)	329.52
j) BCR (d/g)	1.28

Source: Author's Survey, 2014

Marketing cost of dry mushroom was 22.19 Tk/kg (Table 5.16)

Table 5.16 Marketing cost for dry mushroom

Cost components	**(Tk/kg)**	**Cost share (Percentage)**
a) Labour	13.93	62.78
b) Polythene	1.5	6.76
c) Electricity	0.76	3.42
d) Packaging cost	2	9.01
e) Telephone/ Mobile	4	18.03
Total	**22.19**	100

Source: Author's Survey, 2014

From the table 5.17 it stated that the value addition of dry mushroom was 28.15%. The return on investment was 123.03%.

Table 5.17 Value addition of dry mushroom

Values	Price (Tk/kg)
a) Production cost	1170.48
b) Marketing cost	22.19
c) Sales price of dry mushroom	1500
d) Value addition {(c-a)/a}*100	28.15
e) Total investment (Production + Marketing)	1192.67
f) Net margin (Gross margin-Marketing cost)	1467.33
g) Return on investment (%) {(f/e)*100}	123.03

Source: Author's Survey, 2014

5.8.3 Value Addition for Powder Mushroom at Producer stage

Powder mushroom production cost was involved the summation of dry mushroom production cost and the milling cost of dry mushroom was 3.3 Tk/kg. Production cost of powder mushroom was 1290.53 Tk/kg.

To produce 1kg powder mushroom 1.1 kg dry mushroom is reqired.

Table 5.18 Powder mushroom production cost

Cost item	Value
a)Production Cost of dry mushroom	1170.48
b)Dry Mushroom Required (kg)	1.1
c)Dry Mushroom Required Cost (kg) (a*b)	1287.528
d)Dry Mushroom Grinding cost (Tk/kg Dry)	3
Total Grinding cost (Tk/kg Powder) (b*d)	3.3
Powder mushroom production cost (Tk/kg)	**1290.828**

Source: Author's Survey, 2014

Net return of powder mushroom was 398.69 Tk/kg. BCR was calculated as 1.31 for powder mushroom (Table 5.19).

Table 5.19 Average cost and return for powder mushroom

Estimated cost	Value (Tk/Kg)
a) Price	1700
b) Gross return	1700
c) Total variable cost	1290.828
d) Fixed cost	10.48
e) Total production cost	1301.308
f) Gross Margin (b-c)	409.172
g) Net return (b-e)	398.692
h) BCR (b/e)	1.31

Source: Author's Survey, 2014

Marketing cost of powder mushroom was 25.49 Tk/kg which is given in Table 5.20.

Table 5.20 Marketing cost for Powder mushroom

Cost components	(Tk/kg)	Cost share (Percentage)
a) Labour	13.93	54.65
b) Polythene	1.5	5.88
c) Electricity	0.76	2.98
d) Packaging cost	2	7.85
e) Telephone/ Mobile	4	15.69
f) Milling cost	3.3	12.95
Total	**25.49**	**100**

Source: Author's Survey, 2014

Value addition of powder mushroom was found 30.64%. Return on investment for powder mushroom was 28.92% (Table 5.21).

Table 5.21 Value addition of powder mushroom

Values	Price (Tk/kg)
a) Production cost	1301.308
b) Marketing cost	25.49
c) Sales price of powder mushroom	1700
d) Value addition {(c-a)/a}*100	30.64
e) Total investment (Production + Marketing)	1326.798
f) Net margin (Gross margin-Marketing cost)	383.682
g) Return on investment (%) {(f/e)*100}	28.92

Source: Author's Survey, 2014

CHAPTER VI

MUSHROOM MARKETING

6.1 Socio economic characteristics of market agent

6.1.1. Gender distribution of the market agent

The gender distribution is an important factor in mushroom marketing. It can show the scenario of the employment in the field of mushroom marketing (Table 6.1). In case of mushroom marketing the sampled marketers were 40% female and 60% male.

6.1.2 Age of the market agent

The marketers were mushroom retailers who handled the product from the farm gate to the final point of consumption. From Table 6.1, it was revealed that 20% of the marketers were found to be within the 41 -50 years' of age group while 20% were within 21-30 years age group and 60% agents were in the 31 -40 years age group respectively.

6.1.3 Occupation of the market agent

In this study the family marketers were connected to some occupation for earning their livelihood. The highest no of marketer (57%) were involved in business as their primary occupation and 83.33% of the respondent were engaged in agriculture (mushroom).as secondary occupation. About 60% people were engaging in agriculture as primary occupation and 40% peoples were doing agriculture as a secondary occupation. (Table 6.1).

6.1.4 Education level of market agent

The study revealed that 33.33% of the marketers had basic education, 43.33% secondary education while 23.33% of the marketers had higher secondary education. (Table 6.1)

Table 6.1 Demographic Variable

Variables	Marketers (No.)	Percentage
Gender	Male	60.00
	Female	40.00
	Total	**100**
Age group	20 and below	0
	21-30	20
	31-40	60
	41-50	20
	Total	**100**
Primary Occupation	Agriculture	16.67
	Business	56.67
	Service	26.67
	Total	**100**
Secondary Occupation	Agriculture	83.33
Level of education	Primary	33.33
	Secondary	43.33
	Higher secondary	23.33
	Total	**100**

Source: Author's Survey, 2014

6.1.5 Family income of market agent

Income is needed for generating a family. Table 6.2 stated that 40% of the market agent earned Tk. 15000 – Tk. 19000 per month while 26.67% of the respondent family earned Tk. 10000 - 14999 per month.

Table 6.2 Income information of the respondent family

Family income(Per month)	Marketers (No.)	Percentage
15000-19999	12	40.00
20000-24999	10	33.33
10000-14999	8	26.67
Total	**30**	**100**

Source: Author's Survey, 2014

6.2 Number of years involved in the marketing of oyster mushroom

The data gathered to determine the impact of level of experience on the ability to better handle and preserve the mushroom for the market.

Table 6.3 Years involved in the marketing of mushrooms

Number of years	Marketers (No.)	Percentage
Less than 1 year	0	0
1-3 years	10	33.33
4-6 years	15	50
7-9 years	5	16.67

Source: Author's Survey, 2014

The study indicated that 50% of the marketers had 4-6 years of experience in marketing mushroom while 33.33% of the marketers had 1-3 years of experience in the business. Also 16.67% marketers had been marketing mushroom for 7-9 years (Table 6.3).

6.3 Reason of involving in mushroom business

Table 6.4 stated that highest no. of marketers (33.33%) were involved in this business because of high profitability and 23.33% of marketers were involved because of high demand of mushroom. 10% of the respondent said that they involved in this business because it can easily start at any time.

Table 6.4 Reasons of involving mushroom business

Reason	Marketers (No.)	Percentage
High profitability	10	33.33
High demand of mushroom	7	23.33
Low risk in mushroom business	6	20
Have established market channel	4	13.33
Easily start at any time	3	10
Total	**30**	**100**

Source: Author's Survey, 2014

6.4 Types of market supply by the market agents

Table 6.5 stated that most of the marketers 26.67% sold their products to local market. 20% of the marketers sold at park while they were walking in the morning or afternoon. 16.67% of the marketers sold mushroom in super shop and restaurant respectively.

Table 6.5 Market types

Types	Marketers (No.)	Percentage
Local market	8	26.67
Park	6	20
Super shop	5	16.67
Restaurant	5	16.67
School	3	10
School and Park	3	10
Total	**30**	**100**

Source: Author's Survey, 2014

Some female marketer sold mushroom during school session in school premises. 10% female marketers sold mushroom in school and school and park respectively.

6.5 Types of mushroom sold by the market agents

The survey revealed that 67% of the marketers had been selling fresh oyster while 33% had been marketing fresh and powder oyster mushrooms. The mushrooms were sold due to their availability and consumers demand (Fig 6.1).

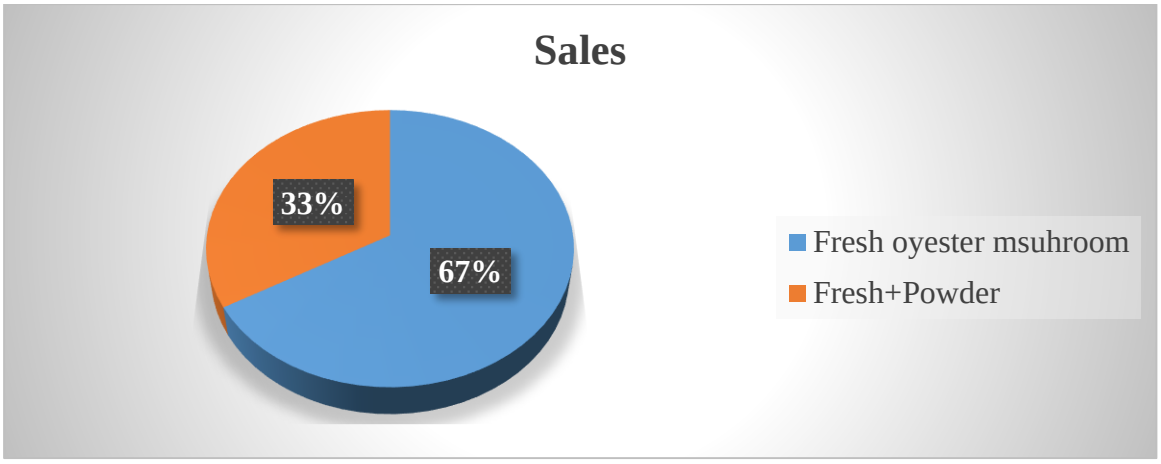

Fig 6.1 Types of mushroom sold by marketers

Source: Author's Survey, 2014

6.6 Demand level of mushroom according to the market agents

6.6.1 Demand level for fresh mushroom

Table 6.6 showed that demand level of fresh mushroom for retailer and restaurant was high. Consumer demands mainly fresh mushroom from the retailer and the restaurant for their consumption. According to retailer's and restaurant's owner answered the demand level was 80% very high and 20% high for fresh mushroom respectively. While demand level of fresh mushroom in footpath shop was 50% very high, 20% high and 30% moderate respectively.

6.6.2 Demand level for dry mushroom

Demand level of dry mushroom is relatively very low than the fresh oyster mushroom. Table 6.6 showed that demand level of dry mushroom for contract supplier was 40% high and 60% moderate respectively. According to local shop and restaurant's owner the demand level was 23% moderate and 77% low respectively. While demand level of dry mushroom in footpath shop was 27% low and 73% very low respectively.

6.6.3 Demand level for powder mushroom

Demand level of powder mushroom is relatively higher than the dry oyster mushroom. Table 6.6 showed that demand level of powder mushroom for hotel and restaurant was 46.67% very high and 53.33% high respectively. Powder mushroom is also demanded for super shop and wholesale shop. Their demand level was 43.33% very high and 56.67% high respectively. While the lowest demand for powder mushroom was in 30% low and 70% very low for footpath respectively.

Table 6.6 Satisfactory demand level

Variables	Demand Level Responded by Agents (%)				
	Very High	**High**	**Moderate**	**Low**	**Very low**
For fresh mushroom					
According to retailer shop	80	20			
According to hotel/restaurant	80	20			
According to local shop	70	20	10		
According to wholesale	70	30			
According to super shop	70	20	10		
According to footpath shop	50	30	20		
For dry mushroom					
According to wholesale		40	60		
According to retailer shop			53	47	
According to local shop			23	77	
According to hotel/ restaurant			23	77	
According to super shop				53	47
According to footpath				27	73
For powder mushroom					
According to hotel/restaurant	46.67	53.33			
According to super shop	43.33	56.67			
According to wholesale	43.33	36.67	20.00		
According to local shop		53.33	46.67		
Retailer shop		50	36.67	13.33	
According to footpath				30.00	70.00

Source: Author's Survey, 2014

6.7 Supply level of mushroom according to the marketers

There is a close relation between demand and supply. If demand is high, then the supply will high and if the demand is low then the supply will less.

6.7.1 Supply level for fresh mushroom

Table 6.7 showed that supply level of fresh mushroom for retailer and hotel/restaurant was very high relatively to local shop. According to 33.33% retailer's and restaurant's owner answered that the supply level was very high respectively. 53.33% of the retailer and 26.67% of the restaurant owner told that the supply was high for fresh mushroom. While supply level of fresh mushroom in local shop was 40% moderate and 60% low respectively.

Table 6.7 Satisfactory market supply level

Variables	**Supply Level Responded by Agents (%)**				
	Very High	**High**	**Moderate**	**Low**	**Very low**
For Fresh mushroom					
According to retailer shop	33.33	53.33	13.33		
According to hotel/restaurant	33.33	26.67	26.67	13.33	
According to super shop	30.00	20.00	20.00	16.67	13.33
According to wholesale	23.33	33.33	43.33		
According to footpath shop			43.33	33.33	23.33
According to Local shop			33.33	66.67	
For dry mushroom					
According to Wholesale		16.67	33.33	40.00	10.00
According to retailer shop			43.33	56.67	
According to super shop			40.00	60.00	
According to Hotel/ Restaurant			40.00	60.00	
According to local shop			13.33	86.67	
According to footpath				43.33	56.67
For Powder mushroom					
According to Super shop		20.00	33.33	46.67	
According to Hotel/Restaurant		10.00	16.67	73.33	
According to Wholesale			40.00	60.00	
Retailer shop			23.33	53.33	23.33
According to Local shop			13.33	20.00	66.67
According to footpath				30.00	70.00

Source: Author's Survey, 2014

6.7.2 Supply level for dry mushroom

Supply level of dry mushroom is relatively very low than the fresh oyster mushroom. Because the demand level of dry oyster is low. Table 6.7 showed that supply level of dry mushroom for contract supplier was only 16.67% high while the supply level of dry mushroom in footpath shop 43.33% low and 56.67% very low respectively.

6.7.3 Supply level for powder mushroom

Supply level of powder mushroom is relatively higher than the dry oyster mushroom. Table 6.7 showed that supply level of powder mushroom for super shop was 20% and it was high while the lowest supply for powder mushroom was in 30% low and 70% very low for footpath respectively.

6.8 Sources of mushroom for market agents

Table 6.8 stated that 26.67% marketer were buying mushroom from the training centre and own source respectively while only 13.33% of the marketers were buying mushroom from the retailer shop.

Table 6.8 Sources of buying mushroom

Sources	Marketers no.	Percentage (%)
Training centre	8	26.67
Own source	8	26.67
Farmer	5	16.67
Contract supplier	5	16.67
Retailer	4	13.33
Total	**30**	**100**

Source: Author's Survey, 2014

6.9 Types of mushroom selling by the market agents

Fresh oyster mushroom is highly demandable. So 43.33% marketers sold only fresh oyster mushroom. 20% of the marketers sold fresh + dry and fresh + powder mushroom respectively. Only 6.67% of the marketers sold dry mushroom (Table 6.9).

Table 6.9 Types of mushroom selling

Types	Marketers no.	Percentage (%)
Fresh Oyster	13	43.33
Fresh + Dry Oyster	6	20
Fresh + Powder Oyster	6	20
Powder Oyster	3	10
Dry Oyster	2	6.67
Total	**30**	**100**

Source: Author's Survey, 2014

6.10 Price variation of buying and selling at different months

100% market agent told that the price was vary in different months for some reasons. According to the 36.67% of market agent, in rainy season production was less than the winter. So price was high in rainy season as well as summer season where 33.33% of the marketers agreed with that. 3.33% of the marketers told that in November to January production is so high. Due to high production price is relatively low in this season.

Table 6.10 Reasons of price variation

Reasons	Marketers no.	Percentage
In rainy season production is less than the winter. So price is high.	11	36.67
In summer the product is unable to keep much time.	10	33.33
In April to June production is low, so price of mushroom is so high.	8	26.67
In November to January production is so high. Due to high production price is low.	1	3.33
Total	**30**	**100**

Source: Author's Survey, 2014

6.11 Marketing margin

In general, marketing margin represents the difference between price paid and received by a given market intermediary (such as contract supplier, retailers, etc.) in the

marketing of a commodity. So, marketing margin is the difference between the price of a product at any two points in the marketing chain or channels. In other words, marketing margin is equal to the value of the product when it leaves the farm plus the value that is added by the marketing system. Thus, marketing margin is the amount of value created by the marketing system (Drummond and Goodwin, 2004).

Table 6.11 Marketing margin of different actors

Particulars	Marketing margin		
	Fresh mushroom (Tk/kg)	Dry mushroom (Tk/kg)	Powder mushroom (Tk/kg)
Hotel/Restaurant	90		300
Super shop	70		300
Retailer	30	280	300
Local shop	30	180	200
Footpath	30		300
Contract supplier	10	180	200

Source: Author's Survey, 2014

6.12 Marketing efficiency analysis

Marketing efficiency fresh mushroom is 3.30 while marketing efficiency for dry and powder mushroom is 6.37 and 5.82 respectively (Table 6.12).

Table 6.12 Measurement of marketing efficiency of mushroom marketing (Tk/kg)

Particulars	Fresh mushroom (Tk/kg)	Dry mushroom (Tk/kg)	Powder mushroom (Tk/kg)
Price received by the producers (FP)	240	1500	1700
Total marketing cost (MC)	29.5	22.19	25.49
Total Net marketing margin (MM)	43.32	213.33	266.67
Marketing Efficiency (FP/MC+MM)	3.30	6.37	5.82

Source: Author's Survey, 2014

6.13 Value addition by the Market agents

6.13.1 Contract supplier

6.13.1.1 Marketing cost of fresh mushroom

Marketing cost of fresh mushroom was 28.76 Tk/kg for contract supplier (Table 5.16)

Table 6.13 Marketing cost for fresh mushroom

Cost components	**Contract supplier (Tk/kg)**	**Percentage of cost**
a) Labour	5	17.39
b) Polythene	2	6.95
c) Electricity	0.76	2.64
d)Transportation cost	10	34.77
e) Telephone/ Mobile	6	20.86
f) Entertainment	5	17.39
Total	**28.76**	100

Source: Author's Survey, 2014

6.13.1.2 Value addition for fresh mushroom

For contract supplier value addition of fresh mushroom was 6.24 Tk/kg (Table 6.14)

Table 6.14 Value addition for fresh mushroom

Cost components	**Tk/kg**
A. Average sales price	180
B. Average purchase price	145
C. Gross margin (A-B)	35
D. Marketing cost	28.76
E. Value addition (C-D)	**24.14**

Source: Author's Survey, 2014

6.13.1.3 Marketing cost of dry mushroom

Table 6.15 stated that the marketing cost of dry mushroom was 41 Tk/kg for contract supplier (Table 6.15)

Table 6.15 Marketing cost for dry mushroom

Cost components	Contract supplier (Tk/kg)	Percentage of cost
a) Labour	5	12.20
b) Polythene	2	4.88
c)Transportation cost	20	48.78
d) Telephone/ Mobile	4	9.76
e) Entertainment	10	24.39
Total	**41**	**100**

Source: Author's Survey, 2014

6.13.1.4 Value addition for dry mushroom

Value addition for dry mushroom by the contract supplier was 209 Tk/kg (Table 6.16)

Table 6.16 Value addition for dry mushroom by contract supplier

Cost components	Tk/kg
A. Average sales price	1450
B. Average purchase price	1200
C. Gross margin (A-B)	250
D. Marketing cost	41
E. Value addition (C-D)	**20.84**

Source: Author's Survey, 2014

6.13.1.5 Marketing cost of powder mushroom

Marketing cost of powder mushroom was 43.5 Tk/kg for contract supplier.

Table 6.17 Marketing cost for powder mushroom

Cost components	Contract supplier (Tk/kg)	Percentage of cost
a) Labour	5	11.49
b) Polythene	2	4.60
c)Transportation cost	20	45.98
d) Telephone/ Mobile	4	9.20
e) Entertainment	10	22.99
f) Milling cost	2.5	5.75
Total	**43.5**	100

Source: Author's Survey, 2014

6.13.1.6 Value addition for powder mushroom

Value addition for powder mushroom was 356.5 Tk/kg (Table 6.18)

Table 6.18 Value addition for powder mushroom by contract supplier

Cost components	Tk/kg
A. Average sales price	1600
B. Average purchase price	1200
C. Gross margin (A-B)	400
D. Marketing cost	43.5
E. Value addition (C-D)	**33.33**

Source: Author's Survey, 2014

6.13.2 Retailer

6.13.2.1 Marketing cost of fresh mushroom

Marketing cost of fresh mushroom for retailer was 30 Tk/kg.

Table 6.19 Marketing cost for fresh mushroom

Cost components	(Tk/kg)	Percentage of cost
a) Labour	5	8.23
b) Polythene	2	3.29
c) Electricity	0.76	1.25
d)Transportation cost	30	49.37
e) Telephone/ Mobile	7	11.52
f) Entertainment	16	26.33
Total	**30**	100

Source: Author's Survey, 2014

6.13.2.2 Value addition for fresh mushroom

Value addition for fresh mushroom was 20 Tk/kg.

Table 6.20 Value addition for fresh mushroom

Cost components	Tk/kg
A. Average sales price	200
B. Average purchase price	150
C. Gross margin (A-B)	50
D. Marketing cost	30
E. Value addition (C-D)	**33.33**

Source: Author's Survey, 2014

6.13.2.3 Marketing cost of dry mushroom

Marketing cost of dry mushroom for retailer was 46.76 Tk/kg.

Table 6.21 Marketing cost for dry mushroom

Cost components	(Tk/kg)	Percentage of cost
a) Labour	5	10.69
b) Polythene	2	4.28
c) Electricity	0.76	1.63
d)Transportation cost	30	64.16
e) Telephone/ Mobile	4	8.55
f) Entertainment	5	10.69
Total	**46.76**	100

Source: Author's Survey, 2014

6.13.2.4 Value addition for dry mushroom

Value addition for dry mushroom was 153.33 Tk/kg

Table 6.22 Value addition for dry mushroom

Cost components	Tk/kg
A. Average sales price	1400
B. Average purchase price	1200
C. Gross margin (A-B)	200
D. Marketing cost	46.67
E. Value addition (C-D)	**16.67**

Source: Author's Survey, 2014

6.13.2.5 Marketing cost of powder mushroom

Marketing cost of powder mushroom was 46.76 Tk/kg.

Table 6.23 Marketing cost for powder mushroom

Cost components	**(Tk/kg)**	**Percentage of cost**
a) Labour	4	8.55
b) Polythene	2	4.28
c) Electricity	0.76	1.63
d)Transportation cost	30	64.16
e) Telephone/ Mobile	4	8.55
f) Entertainment	6	12.83
Total	**46.76**	100

Source: Author's Survey, 2014

6.13.2.6 Value addition of powder mushroom

Value addition for powder mushroom was 353.33 Tk/kg (Table 6.24)

Table 6.24 Value addition for powder mushroom

Cost components	**Tk/kg**
A. Average sales price	1600
B. Average purchase price	1200
C. Gross margin (A-B)	400
D. Marketing cost	46.67
E. Value addition (C-D)	**33.33**

Source: Author's Survey, 2014

6.13.3 Supermarkets

6.13.3.1 Marketing cost for fresh mushroom of Supermarkets

Marketing cost in supermarkets for fresh mushroom was 51 Tk/kg.

Table 6.25 Marketing cost for fresh mushroom

Cost components	(Tk/kg)	Percentage of cost
a) Labour	7	13.73
b) Polythene	4	7.84
c) Electricity	1	1.96
d)Packaging cost	30	58.82
e) Grading cost	7	13.73
f) Labelling cost	2	3.92
Total	**51**	100

Source: Author's Survey, 2014

6.13.3.2 Value addition for fresh mushroom

Value addition for fresh mushroom in supermarkets were 29 Tk/kg.

Table 6.26 Value addition for fresh mushroom

Cost components	Tk/kg
A. Average sales price	230
B. Average purchase price	150
C. Gross margin (A-B)	80
D. Marketing cost	51
E. Value addition (C-D)	**53.33**

Source: Author's Survey, 2014

6.13.3.3 Marketing cost of powder mushroom in Supermarkets

Marketing cost in supermarkets for powder mushroom was 50 Tk/kg.

Table 6.27 Marketing cost for powder mushroom

Cost components	(Tk/kg)	Percentage of cost
a) Labour	7	14
b) Polythene	4	8
c) Electricity	1	2
d)Packaging cost	30	60
e) Telephone cost/ Mobile	6	12
f) Labelling cost	2	4
Total	**50**	100

Source: Author's Survey, 2014

6.13.3.4 Value addition for powder mushroom

Value addition for powder mushroom was 400 Tk/kg at supermarkets.

Table 6.28 Value addition for powder mushroom

Cost components	Tk/kg
A. Average sales price	1650
B. Average purchase price	1200
C. Gross margin (A-B)	450
D. Marketing cost	50
E. Value addition (C-D)	**37.50**

Source: Author's Survey, 2014

CHAPTER VII

OYSTER MUSHROOM CONSUMPTION

7.1 Introduction

This chapter presents a detail description of the consumer consumption pattern about mushroom. Consumers are end users of mushroom in the value chain. As discussed previously consumers purchased and used mushroom from producers, traders and processors. So, in value chain analysis the consumer's knowledge, attitude and practice level of mushroom product is inevitable.

7.2. Demographic characteristics of consumers

7.2.1 Age distribution of oyster mushroom consumers

From the study, it was realized that consumers who fell within 25 -30 years formed the majority of consumption (47%). While 27% of consumption was fell in the 31 -35 aged group. Also, 13% was consumed within the aged group of 36 -40 and 41-45 years respectively.

Table 7.1 Age distribution of consumers

Age limit	Consumer (No.)	Percentage
25-30	14	47
31-35	8	27
36-40	4	13
41-45	4	13
Total	**30**	**100**

Source: Author's Survey, 2014

7.2.2 Gender distribution of oyster mushroom consumers

The research revealed that out of 30 consumers interviewed, 40% of them were females while the males constituted 60% (Figure 7.1).

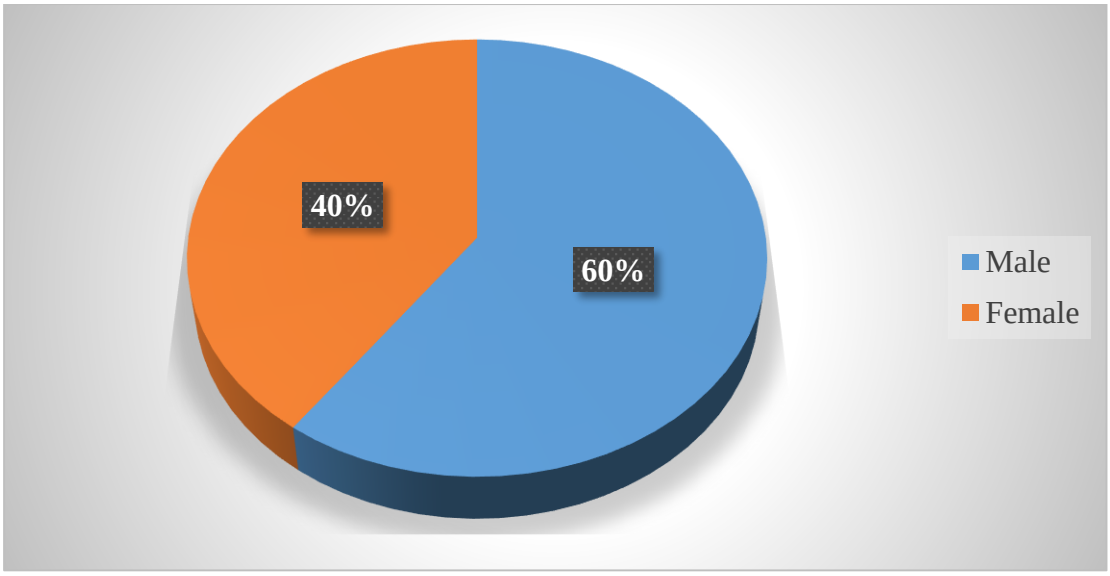

Fig 7.1 Gender distribution of oyster mushroom consumers

Source: Author's Survey, 2014

7.2.3 Occupation of oyster mushroom consumer

Table 5.29 stated that 33.33% of the mushroom consumer were government official. 23.33% teacher and 20% doctors are the ultimate consumer of mushroom. Only 10% businessman consumed mushroom.

Table 7.2 Occupation of consumers

Occupation type	Consumer (No.)	Percentage
Govt. Official	10	33.33
Teacher	7	23.33
Doctor	6	20.00
Other Service holder	4	13.33
Businessman	3	10.00
Grand Total	**30**	**100.00**

Source: Author's Survey, 2014

7.3 Consumers knowledge about mushroom

Almost 70% of the average consumer were known to mushroom. 90% of the consumer knew that mushroom is used as a component of making various palatable foods and most of them consumed it. 70% of the consumer were known that mushroom is nutritious and tasty food as well as it has antidote quality to prevent diseases (Table

7.3). 53.33 % of the respondent told that they had the knowledge about mushroom as it is used to make beauty toiletries. Only 6.67% of the respondent were unknown about it.

Table 7.3 Knowledge about mushroom

Knowledge on Mushroom	Consumer Responded (%)	
	Yes	**No**
Component of making various palatable foods	90	10
Consideration as a medicinal quality	83.33	16.67
Nutrition and taste as a food	70	30
It has antidote quality to prevent diseases	70	30
Usages as a vital drug component to control diabetes	56.67	43.33
Alternative to meat	50	50
Average Knowledge	**70.00**	**30.00**

Source: Author's Survey, 2014

7.3.1 Knowledge of mushroom availability

80% of the consumers told knew about availability or unavailability of mushroom at their locality. So mushroom was unavailable to get while only 20% of the respondent told that mushroom is unavailable in their locality.

Table 7.4 Availably of mushroom in locality

Answer type	**Customer (No.)**	**Percentage**
Available in local market	24	80
Unavailable in local market	6	20
Total	**30**	**100**

Source: Author's Survey, 2014

7.4 Attitude towards mushroom consumption

7.4.1 Purchasing attitude

40% of the consumer were strongly agreed that they consumed mushroom while 46.47% agreed to consume mushroom as food where as 13.33% of the consumer was neutral. 43.33% consumer was agreed and 36.67% of the consumer strongly agreed to consume mushroom as a delicious product (Table 7.5).

Table 7.5 Attitude on purchasing

Attitude	Scale of Attitude Responded by Consumer (%)				
	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Consumption	40.00	46.67	13.33		
Taste as a delicious product	36.67	43.33	20.00		

Source: Author's Survey, 2014

7.4.2 Pricing attitude of purchasing mushroom

90% of the consumer stated that the price of mushroom was reasonable while only 10% of the respondent told that the price was not reasonable (Table 7.6).

Table 7.6 Pricing attitude of purchasing mushroom

Answer type	Consumer (No.)	Percentage
Reasonable	27	90
Unreasonable	3	10
Total	**30**	**100**

Source: Author's Survey, 2014

7.4.3 Attitude of family members on purchasing mushroom

Figure 7.2 stated that 60% of the respondent's family liked mushroom while 40% of the respondent's family disliked mushroom.

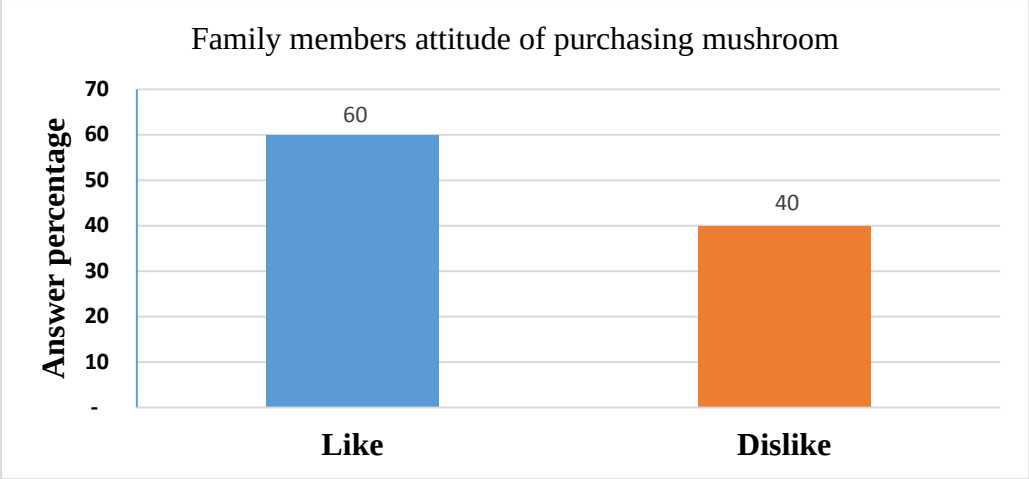

Figure 7.2 Attitudes of purchasing mushroom

Source: Author's Survey, 2014

7.4.4 Practice of purchasing mushroom

43.33% consumer was purchased mushroom few times in a year while only 23.33% consumer purchased mushroom once a week (Table 7.7)

Table 7.7 Practice of mushroom purchasing

Duration	Consumers No.	Percentage (%)
Few times a year	13	43.33
1 time in a month	10	33.33
Once a week	7	23.33
Total	**30**	**100**

Source: Author's Survey, 2014

7.5 Reasons of purchasing mushroom

Before purchasing anything a consumer is always focusing some issues. Mushroom is not our staple food and not also a popular food for all types of people. Hence to purchase mushroom consumers always focus on some issues. From figure 5.4 it can be stated that 80% of the consumer strongly agreed on consuming mushroom because of labelled as organic. 73.33% of the respondents strongly agreed to consume mushroom because of low cholesterol. Only 20% of the consumer was strongly agree to consume mushroom for ease of preparation. On the other hand, 40% of the consumer was

strongly disagree to consume mushroom for higher price and only 5% stated that ease of preparation was not a cause for purchasing mushroom.

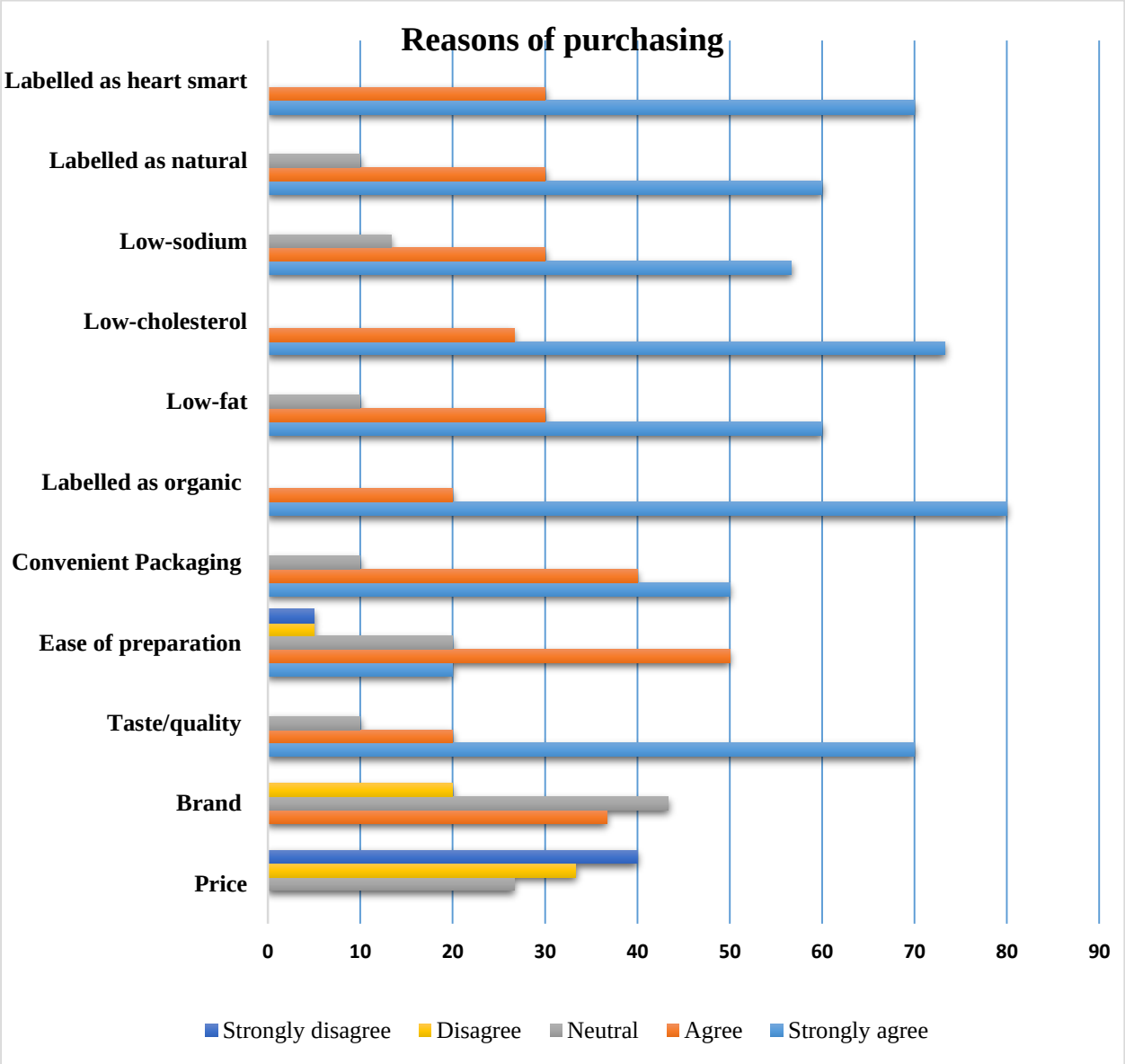

Figure 7.3 Reasons of purchasing mushroom

Source: Author's Survey, 2014

7.6 Reason of encouraging other to purchase mushroom

For what reasons the consumer should encourage for purchasing mushroom is stated above the figure 5.5. 90% of the respondents told that mushroom should be purchased because of more health benefit. Only 10% of the respondent was given logic for purchasing mushroom because of spoil not so fast and treated as super food.

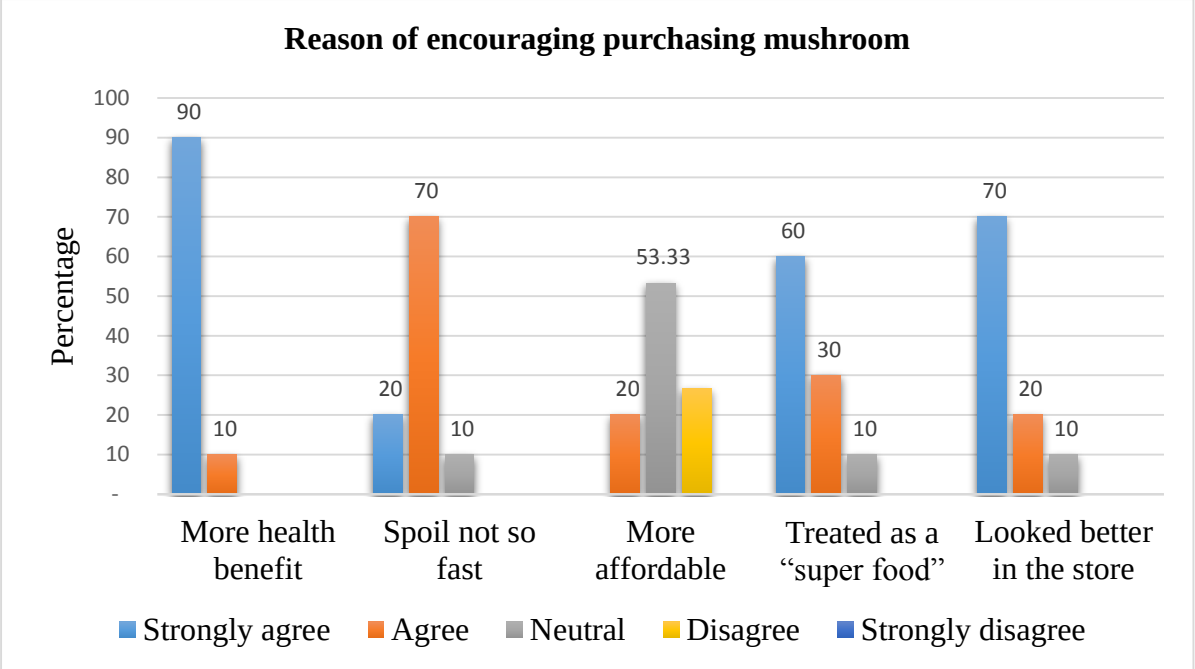

Figure 7.4 Reasons of encouraging others to purchase mushroom

Source: Author's Survey, 2014

7.7 Consumers knowledge, attitudes and practices and overall performance on mushroom

Knowledge of the consumers was assessed by asking seven questions about different aspects of mushroom. Each of the questions was assigned yes or no. For each of the yes answer the consumers was knowledgeable and each of the no answer the consumer was unaware of the mushroom. Thus, total possible score that a consumer could obtain would vary from 31 to 82, where low knowledge up to 50 score and 51-80 indicate medium knowledge and above 81 indicate high knowledge about mushroom. Attitude of the respondent towards mushroom consumption was measured by using Likert scale against various aspects of mushroom. The scale was ranging from strongly agree =5, agree= 4, undecided= 3, disagree=2 and strongly disagree=1. Hence, the attitudinal score of a respondent could range from 31 to 82, where up to 50 indicate slightly favourable attitude, ranged from 51-80 indicate favourable attitude and above 81 indicates highly favourable attitudes of the consumers towards the mushroom. Practice of mushroom consumption was also measured with the Likart scale. The scale was ranging from strongly agree =5, agree= 4, undecided= 3, disagree=2 and strongly disagree=1. Thus the practice of purchasing mushroom ranged from 51-82, where up to 50 indicate poorly practiced of purchasing mushroom, ranged from 51-80 indicates

moderately practiced and above 81 indicate the frequently practiced of having mushroom.

The knowledge assessment score of the mushroom consumers ranged from 31 to 82 with an average of 54 and standard deviation of 2.74. According to the knowledge assessment score, the respondents were classified into three categories.

Table 7.8 evince that only 30% of the respondents had low level of knowledge, while a great proportion of them (53 %) had medium level of knowledge and a small fraction (17%) had high level of knowledge about mushroom. It was found that an overwhelming majority of the respondents (53%) had medium level of knowledge on mushroom. This may be due to the fact that the advertisement of mushroom is increasing but not so alluring day by day.

Attitude assessment scores of the consumers towards mushroom ranged from 31 to 82 with an average of 56 and standard deviation of 1.26. The respondents were classified according to their attitudinal scores into three categories. About 73% of the respondents had favourable attitude towards mushroom, while 17% had slightly favourable attitude and only 10% had highly favourable towards mushroom. Majority of the respondents (73%) showed favourable attitude towards the mushroom.

The practice assessment score of the growers ranged from 31 to 82 with an average of 34 and standard deviation of 3.45. The respondents were classified into three categories according to their obtained score against the practices. Results revealed that 53% of the respondents practiced of mushroom poorly, while 37% of them practiced it moderately and only 10% practiced frequently. An overwhelming majority of the respondent (53%) practiced of mushroom consumption frequently. This may be due to the fact that mushroom is not a popular food for Bangladeshi. The food habit of mushroom in this country is not familiar. As a reason the practice of mushroom consumption or purchasing is remain poor.

Table 7.8 Consumers knowledge, attitudes and practices and overall performance on mushroom

Consumer at different level	Number of Consumer	Percent of Consumer	Mean	Standard Deviation
Knowledge				
Low knowledge (up to 50)	9	30	54	2.74
Medium knowledge (51-80)	16	53		
High knowledge (above 81)	5	17		
Total	30	100		
Attitude				
Slightly favourable (up to 50)	5	17	56	1.26
Favourable (51-80)	22	73		
Highly favourable (above 81)	3	10		
Total	30	100		
Practice				
Poorly practiced (up to 50)	16	53	34	3.45
Moderately practiced (51-80)	11	37		
Frequently practiced (above 81)	3	10		
Total	30	100		
Overall Performance			**144**	
Overall Performance (%)			**48**	

Source: Author's Survey, 2014

CHAPTER VIII
SWOT ANALYSIS

8.1 Introduction

The purpose of this chapter is to provide some review of opportunity and strength of market condition as well as to overcome the weakness and threats of mushroom cultivation and value chain analysis, which are related with the present study. A SWOT analysis can be a useful tool in conducting a situational analysis. A SWOT analysis looks at both current and future situations, whether analyze the current strengths and weaknesses of a product while looking for future opportunities and threats of a product. The goal is to build on strengths as much as possible while reducing weaknesses. A future threat can be a potential weakness while a future opportunity can be a potential strength. SWOT analysis is a crucial tool for mushroom by which it can capture the market & the consumer.

8.1.1 Strength

- Abundance potential for product diversity in rural area,
- Diversity of raw materials for mushroom production,
- Rural labor force potential,
- Low environmental pollution and existence of potential for organic agriculture,
- Richness of mushroom production and consumption culture,
- High potential in respect of mushroom consumption by youths
- Increasing supports of Ministry of Agriculture engaged in rural development,
- Small scale and fragmented agricultural holdings
- Insufficiency of capital and financial resources,
- Low soil quality, widespread erosion, and inappropriate utilization of land resources due to ignoring of soil capability,
- Problems regarding balance of conservation-utilization of natural resources (land, water, forest, pasture and grassland, fishery resources etc.),
- Prevalence of poverty in rural settlements,

8.1.2 Weakness

- Non awareness about nutritional and medicinal values of mushrooms through mass media.
- Lack of awareness to incorporate in mid-day meals, in regular diet of school children, to pregnant ladies, old age people, in Govt. canteens and hospital wards to alleviate undernourishment and malnourishment.
- Lack of good quality mushroom spawn laboratory, cold storage facility, and small scale processing units in a district place to facilitate mushroom production, processing and marketing.
- Low consumer awareness, low availability for trial, poor access to consumption centers and adverse comparison with more aggressively promoted temperate mushroom i.e. button mushroom.
- Larger scale mushroom cultivation systems can be more labour and management intensive and to some extent, are vulnerable to sporadic yields, invasions of 'weed' fungi, insect pests, and unreliable market prices for traded goods.
- Mushroom cultivation for subsistence use to commercial production and marketing can be quite challenging to local growers.
- Ability to maintain a continuous supply for chosen market outlets, and if the mushroom enterprise is one of many livelihood activities, producers need to become multi-skilled to manage several enterprises successfully.
- The initial challenges a mushroom grower has to face is to determine the most suitable mushroom to grow and identify a spawn supplier, organize available resources to develop a growing system, and assess requirements for supply of different marketing outlets.
- Lack of mushroom processing units to enhance the shelf life, prolong the availability of mushroom products and promote indirect marketing of mushrooms.
- Unavailability of cheap and easy mushroom production technology to people who are mainly dependent on forest produce including mushrooms.
- Absence of proper mushroom marketing channels to dispose of the fresh, dehydrated and processed mushrooms involving self-help groups, NGO's and private organizations.

- Lack of dissemination of generated mushroom technology/knowledge through recent means of communication like internet etc. to the entrepreneurs, tribal women, school dropouts, consumers and preferably middle class families.
- Lack of efforts to trap solar energy for drying and processing of mushrooms.
- Improper development of cultivation methodology of mushroom in an identified areas looking to the availability of local resources.
- Lack of proper designing and construction of mushroom huts/farms for small, medium and commercial scale cultivation of different mushrooms under different climates. Appropriate agencies are not involved in taking care of local ethos and culture and also considering maximum community involvement and community participation.

8.1.3 Opportunities

- Mushrooms can play an important role contributing to the livelihoods of rural and peri-urban dwellers, through food security and income generation.
- Mushrooms can make a valuable dietary addition through protein and various micronutrients and, coupled with their medicinal properties, mushroom cultivation can represent a valuable small-scale enterprise option.
- Mushrooms can be successfully grown without access to land, and can provide a regular income throughout the year.
- Growing mushrooms also helps avoid some of the challenges facing collectors of wild fungi, including species identification, obtaining access and permits for collecting, and practicing sustainable harvest. Cultivation is also independent of weather, and can recycle agricultural by-products as composted substrate which, in turn, can be used as organic mulch in growing other horticultural crops, including vegetables.
- Mushroom cultivation is highly combinable with a variety of other traditional agricultural and domestic activities, and can make a particularly important contribution to the livelihoods of the disabled, of women and the landless poor who, with appropriate training and access to inputs, can increase their independence and self-esteem through income generation.

- Successful mushroom cultivation for trade requires a good level of individual or collective organization, and although mushroom cultivation can be a viable small-scale business, any investment in a growing scheme can be risky.
- Co-operatives and community groups can collaborate in set-up and production costs, harvesting and marketing. Working in joint natures or partnerships with regional agro industries, universities or contract suppliers can help reduce vulnerability.

8.1.4 Threats

These are external factors that are outside your realm of control that may negatively affect your business. Threats are the reasons why contingency plans are usually developed. These can be situations such as, inevitable price increase from suppliers, governmental regulations, a change in consumer behavior that reduces profit, etc.

- Changing trend in agricultural support policies,
- Migration of young from rural areas, loss of productive factors and ageing population,
- Increasing pressure of rapid urbanization, and industrialization,
- Rising input prices in the world.

CHAPTER IX
PROBLEMS OF MUSHROOM CULTIVATIION AND VALUE CHAIN

9.1 Introduction

For upgrading value chain or value chain development in Dhaka District, there are some problems faced by mushroom value chain actors. These problems are mainly two types; production related problem and marketing related problem. The problems were raised when the objectives were constrained to be achieved. This chapter discusses the various constraints faced by these value chain actors and their suggested remedial measures to these constraints.

Table 9.1 evince that, producers recounted their problems as lack of financial support (100%), high cost& lack of good quality of spawn (100%), postharvest changes (93.33%), high labor cost (86.7%), climate problem (73.3%), storage problem (60%), lack of marketing facilities (60%), high cost of mushroom house construction (43.3%), Pests and diseases infestations (26.7%) etc. According to research results, all these problems were rank into their severity basis & multiple ticks of the respondents.

Table 9.1 Problems faced in mushroom production

Problems faced by producers	Farmers (No.)	Percentage
Lack of financial support	30	100
High cost & lack of good quality of spawn	30	100
Postharvest changes	28	93.3
High cost of labour	26	86.7
Climatic problem	22	73.3
Storage problem	18	60
Lack of marketing facilities	18	60
High cost of mushroom house construction	13	43.3
Pests and diseases infestations	8	26.7

Source: Field Survey 2014

9.2 Problem in Mushroom Production

9.2.1 Lack of financial support

Mushroom farming is a capital intensive enterprise. All the actors related with mushroom faced financial difficulties due to lack of capital. Credit is considered as a lubricant to capital. In the study areas very few mushroom owners had the access to the formal credit institution for loan. Most of them did not get any loan from any commercial bank or financial institutions. 100% (Table 9.1.) of mushroom growers stated that lack of capital was a problem to enlarge their farm.

9.2.2 High spawn cost & lack of good quality of spawn

Spawn is the most important input for mushroom culture. If the spawn is good in quality, it should be diseases free and give the highest yield. There were no regulatory standards for the control of quality spawn production, leading to the proliferation of unscrupulous businessmen, selling fake spawn to unsuspecting farmers. The quality of spawn was a decisive factor in getting successful crops hence growers need to use qualified seed for commercial production. Spawn production requires well trained personnel in order to maintain high quality yields. Due to unavailability of spawn in mushroom culture center, sometimes farmers collect spawn from private producers with high cost. Generally private producers who were not equipped with adequate knowledge and facility for mushroom breeding but are selling the spawn falsely claiming that they have developed new high yielding strains. Sometimes, mushroom growers get immature spawn which results in delayed spawn run. It also hampers the business of traders and badly affects the value chain of mushroom. 100% (Table 9.1.) of the respondents stated that high cost & lack of good quality of spawn is creating an obstacle in the value chain of mushroom.

9.2.3 Postharvest changes

Mushroom is a perishable item. Still it is felt that proper harvesting techniques are to be developed. Farmers have lack of post-harvest handling skills and are unable to sell all their produce due to its perishable nature. They lack storage facilities so they have to dry the produce in order to extend the keeping quality, a process that leads to dramatic weight loss. The price fetched from the dried produce does not commensurate with the price earned from fresh mushrooms. 93.3% (Table 9.1.) showed that they are affected from the post-harvest losses.

9.2.4 Labour cost

The price of labor constitutes a significant part of the total cost of a small business, and no business can survive for long by ignoring labor costs. Downsizing the workforce may result in short-term cost reduction. Unfavorable employee turnover also contributes to overall labor costs. Rational and intelligent labor cost control will boost productivity and enhance profits. In Dhaka district, labor cost is higher than other districts in Bangladesh. Though the less involvement of family labor, farmers need to employ more labor. 86.7% (Table 9.1.) percent of total farmers reported labor cost as high.

9.2.5 Climatic problem

Environmental control for mushroom cultivation is critical to the mushroom farming. Specially, temperature and humidity control appears to be a problem and need extra care for better yield. If environment is not controlled, then yield decreases. Most farmers have no knowledge on environment and as a result 73.3% (Table 9.1.) of the growers stated that production of mushroom was hampered due to unfavorable of climatic condition.

9.2.6 Marketing problems

The marketing problems faced by the sampled producers are mentioned in Table 9.1. About 60% sampled producers complained against available market facility where they sell their product efficiently. The main reason is the communication gap, advertising, and lack of awareness about mushroom. In addition, the sampled producers also faced advertising problems and lack information about mushroom production.

9.2.7 Storage problem

Lack of storage facility of fresh mushroom is also severe problem being experienced by large mushroom growers. During the peak production period, growers are unable to dispose of their fresh mushroom on the same day and they are forced to keep it for the next day. In such a situation, the quality of fresh mushroom deteriorates and it also loses weight as it is highly perishable commodity which can only be stored for about 12 hours at room temperature. In Table 9.1 60% (per cent) growers mentioned this problem as a major one. For this problem production cost raises and less value is added.

9.2.8 High cost of mushroom house construction

House construction is essential for mushroom production. Because mushroom is very sensitive in nature. If the construction cost is so high, then it will affect the pricing factor of mushroom. Table 9.1 stated that 43.3% of the respondents stated that high construction cost is one of the problems in value chain of mushroom production.

9.2.9 Pests and diseases infestations

Pests and diseases can harm mushrooms severely. They can affect the crop in several ways. Diseases and pests prevent spawn from growing into the substrate by eating grain spawn and damaging the mycelium. Pests and diseases damage the mushroom itself by causing brown spots on the cap. The most frequent biotic causes for a reduced yield are parasitic fungi, insects, mites, larger animals such as snails or rodents, nematodes pathogenic viruses and pathogenic bacteria (Oei, 1991). 26.7% (Table 9.1.) of the growers mentioned that pests and diseases infestations is consisted a severe problem in mushroom cultivation.

9.3 Solution demanded and suggested by producer

The respondents of study areas were asked to suggest solutions to the problems. They suggested different measures for solving their problems. The suggested measures of different respondents presented below:

9.3.1 Need more advertising for awareness

To increase mushroom cultivation and consumption, motivational campaign has to be intensified for making the people conscious about various aspects of mushroom including nutritional value and taste. To change our food habit in respect of mushroom 100% respondents (Table 9.2) suggested that more advertisement both in electronic and print media to create awareness, removal of ignorance are very much needed. Some actors suggest that, doctors can help in creating awareness among the people through prescription to eat mushroom.

Table 9.2 Suggestion of producers for good mushroom cultivation

Suggestions	Farmers (No.)	Percentage	Rank
Need more advertising for awareness	30	100	1
Increase market price of mushroom	26	86.67	2
Available of high quality inputs	22	73.33	3
Improvement of communication and transportation facilities	21	70	4
Reduce market price of inputs	20	66.67	5
Need more extension and training for producers	15	50	6
Provide easy loan program	14	46.67	7

Source: Field Survey 2014

The above table (Table.9.2) is created on the basis of respondent's suggestion. The growers were responded in more than one suggestion and it is set on the rank basis of their answer percentage.

9.3.2 Increase market price of mushroom

If the market price is not good for the respondent actors then then they will lose their eagerness to cultivate the mushroom. 87% (Table 9.2) of the respondents stated that the market price of mushroom should be increased.

9.3.3 Available of high quality inputs

Table.9.2 above stated that 73% of the respondents suggested on measures should be taken to confirm timely supply of quality spawns and adequate amount of other inputs for mushroom cultivation. To ensure good quality spawns, growers should contact with nearby growers who produce spawn packet at home and it is better not to purchase spawn packet from unknown persons.

9.3.4 Improvement of communication and transportation facilities

70 % (Table 9.2) of the respondents have stated that storage and transportation facilities should be developed in the areas so that the farmers can get fair prices of their product. If fresh mushroom is to be delivered to the customers (which is mostly desired) it is essential to market them within 6 to 8 hours of harvesting. So, transport facilities should

be provided to the farmers to market mushroom with proper transportation, freezing and delivery van.

9.3.5 Reduce market price of inputs

Input such as spawn, spawn packet, items which are used in cultivation should be reduced to get profit for the actors. 67% (Table 9.2) of the respondents suggested that the price of input items should be reduced.

9.3.6 Need more extension and training for producers

Table 9.2 above stated that 50% of the respondents want to get training for mushroom center of any other place to know the scientific method of mushroom cultivation. To produce large quantity of mushroom without knowing the scientific method it is not easy to produce much.

9.3.7. Provide easy loan program

Simplification of credit system and availability of credit at lower interest rates should be ensured. 47% (Table 9.2) growers suggested about this program.

9.4 Problem mentioned by the market agents

In doing business the market agents are always facing some problems. These are given below:

i. Lack of financial support
ii. Advertisement about mushroom is not wide spread. As a reason most of the consumers are also unaware of mushroom
iii. Due to political stability the marketer always possesses a great loss. Because some market agents are doing their business as day to day basis. If there is any political unrest, then their income source will hamper.
iv. Local area demand is not so high. Because many of them do not like to consume mushroom as a diet.
v. Consumer always wants good quality. Because of inferior quality of mushroom the marketers loss their potential market. Because of unavailability of storage facility & modern knowledge the quality of mushroom is deteriorate.

9.5 Required solution for solving problem by the market agent

Table 9.3 showed that 30% of the market agent was given emphasis on financial support and 26.67% answered on awareness should be created among the general people. While 13.33% of the respondent agreed to improve the quality of spawn & demand should be created in the local area.

Table 9.3 Required solutions for solving the problems

Solutions	**Marketers (No.).**	**Percentage**
Give financial support	9	30.00
Creating awareness among the general people	8	26.67
Political stability	5	16.67
Creating demand at local area by advertising	4	13.33
Needed to produce good quality mushroom	4	13.33
Total	**30**	**100**

Source: Author's Survey, 2014

CHAPTER X
SUMMARY, CONCLUSION AND RECOMMENDATIONS

10.1 Summary

In this study the present status of mushroom value chain in some selected area of Dhaka city was conducted This study conducted to understand mushroom value chains which help to identify what interventions will be needed in order to make the sector more competitive in the domestic and export markets, and thereby improve the livelihood of the urban people in In Dhaka city the major portion of the mushroom market was captured by the 4 step of value chain which consisted 90% of the total. If we develop an efficient value chain of mushroom and effective linkage between technologies, research and development then producers could clearly provide a major boost to the mushroom cultivation. It will not only be important to promote efficient production but to find a suitable distribution channel to reach the target audience is vitally important prerequisites to compete on both national and international markets. Value chain 1 indicated that 0nly 10% of the consumer got mushroom from producer.

Primary and secondary data were collected from producers, traders, spawn suppliers, supermarkets, hotels and restaurants. The data were analysed using descriptive and inferential statistics.

From this study mushroom value chain actors in Dhaka city were input suppliers, producers, traders, processors and consumers. Support institutions and service providers, facilitate the sector, includes higher educational and research institutes, urban agricultural offices, micro finances and transporters. There were eight mushroom marketing channels in which mushroom flows from producers to consumers.

Mushroom culture centre is a prerequisite to ensure the production of spawn packet at substantial level. It is a place where spawn packet can be produced all the year round. So this strategy of setting up of Mushroom Culture Centre could be a highly viable sector for generation of employment and income for the poor people. Cash earnings obtained from sold product have a deep influence on the livelihood pattern of farm households.

As a means of sustaining and accelerating mushroom and thereby promoting agricultural growth in Bangladesh there is a great need to study the reasons for poor development of mushroom sector and find ways to overcome those constraints. The study would help to assess value addition and the problems of different value chain actors and also give probable solutions which in turn will improve the mushroom value chain. The specific objective of the study were:

1. To identify socio-economic status of farmers, value chain actors and consumers;
2. To conduct value chain analysis of mushroom product
3. To explore consumer's knowledge, attitude and practice level of mushroom product
4. To assess strength, opportunity, weakness, threats in mushroom production and marketing.

10.2 Conclusion

Mushroom has already been an important crop in developed countries. Comparing with other agro-economic crops, mushroom cultivation has been found more profitable for its low production cost, and high market price. The present study found that 34% of the growers had higher secondary academic background and 60% of the growers with a little knowledge from a very short training at Mushroom centre. Investors made a good profit with their low investment. From their success rate, it can be stipulated that if the educated people get themselves involved in mushroom cultivation, they can earn substantial income from this sector. The net margin 79.24 Tk/kg with low capital indicates that Mushroom cultivation can be the main source of income if it can be nurtured professionally. Savar upazilla, here, plays as a role model for the whole Bangladesh. As soil and climatologically. Situation of this region is very suitable for mushroom cultivation, Bangladesh has a huge prospect of mushroom cultivation. Through mushroom cultivation, it is possible to generate considerable employment opportunity, alleviate poverty, and reduce malnutrition to meet the required protein of Bangladeshi people. Even it is possible to earn a huge amount of foreign currency by exporting Mushroom after meeting the domestic demand.

10.3 Recommendations

Based on the findings of the study, the following recommendations are forwarded for policy makers.

i. Govt. and non-government organization should be given emphasize on financing to the growers. Providing mushroom processing technologies to the growers as well as the market agents at fair price needs focus of relevant body.

ii. Mushroom and spawn market are concentrated in the hands of few groups which makes mushroom market imperfect. As a result, most of mushroom producers are exploited and discouraged. Therefore, government intervention required in terms of generating mushroom market information like other agricultural commodities, establish standard and quality control mechanism and link producers with potential markets. In addition, producers should communicate with each other and establish cooperatives and unions to overcome the problem.

iii. Mushroom is perishable vegetable cash crop and producers have limited market options. As a result either they consumed or dispose it during over supply. Therefore, there is a need for governmental and non-governmental bodies to play their role to contribute in this respect.

iv. Publicity on mushroom consumption should be strengthened through electronic and print media and meeting with general people at upazilla level.

v. In addition, continuous promotion may contribute to improve the awareness of the society about the nutritional and medicinal values of mushroom.

vi. Mushroom research should be given more importance. Government should provide assistance and other necessary facilities for commercial production and marketing of mushroom.

vii. Farmers need to be trained in scientific production practices and technology related to this new enterprise. The researcher should share their experience and knowledge in order to enlarge and promote mushroom cultivation.

viii. Timely and adequate smooth supply of inputs should be ensured for improving mushroom cultivation.

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