CHAPTER II
REVIEW OF LITERATURE

2.1. Fish consumption patterns

Fish is an important source of animal protein which is consumed by people almost all over the world. Dietary fish consumption patterns are influenced by complex interactions of several factors such as geographic and demographic profile, availability, income, tradition and customs, etc. The study of York and Gossard (293) reveals that fish consumption is influenced by cultural/geographical region, and economic development stimulates Asians to eat considerably more fish. But in non-Asian regions, economic development stimulates consumption of meat. The pattern of consumption of fish is different in terms of quantity, frequency and type of consumption depending on region and country, which reflect the different levels of natural availability of aquatic resources in adjacent waters as well as diverse food traditions, tastes, income levels, prices and seasons (FAO 2012: The State of World Fisheries and Aquaculture 85). According to this report, annual per capita fish consumption varies from less than 1.0 kg in a country to more than 100 kg in another. The annual per capita consumption of fish was highest in Oceania (24.6 kg), followed by North America (24.1 kg), Europe (22.0 kg), Asia (20.7 kg), Latin America and Caribbean (9.9 kg), and Africa (9.1 kg) during the year 2009. The report reveals that global per capita fish consumption increased from 9.9 kg in the 1960s to 11.5 kg in the 1970s, 12.6 kg in the 1980s, 14.4 kg in the 1990s, 17.0 kg in the 2000s, and 18.4 kg in 2009. The most substantial increases in annual per capita fish consumption have occurred in East Asia (from 10.6 kg in 1961 to 34.5 kg in 2009), Southeast Asia (from 12.8 kg in 1961 to 32.0 kg in 2009), and North Africa (from 2.8 kg in 1961 to 10.6 kg in 2009). China has been responsible for most of the increase in world per capita fish consumption due to the substantial increase in its fish production from aquaculture. China’s share in world fish production grew from 7.0% in 1961 to 34% in 2009. Per capita fish consumption in China has also increased dramatically, reaching about 31.9 kg in 2009, with an average annual growth rate of 4.3% in the period 1961–2009 and of 6.0% in the period 1990–2009. Excluding China, the annual per capita fish supply to the rest of the world was about 15.4 kg in 2009. Japan leads in annual per capita consumption of fish in the Asian region with significant level of 70 kg and it constitutes 10% of the
global demand for fish products. Global annual per capita consumption of fish is projected to increase between 19 kg and 21 kg (live weight equivalent) in 2030. But regional picture of fish consumption will be very diverse. Per capita fish consumption is projected to increase in South Asia (up by almost 60%), Latin America and the Caribbean (up by almost 50%) and China (up by more than 84%). On the other hand, per capita fish consumption may stagnate or decline in Africa (decline by 3%), the Near East in Asia (decline by 17%), Oceania (decline by 8%), and decline by 4% in the countries of the former USSR (Malhotra and Sinha 2: 620).

All the population of Japan consumes fish and it is the staple food in Japan. The total diet in Norway, Sweden, Iceland and Denmark consists of fish except a little amount of meat products which are added to their daily diets. In Britain, the majority of the people consume fish and they prefer fish more than chicken (Rao and Raju 7). The mean consumption rate of US population of the 48 conterminous states for all fish is estimated at 15.65 gm/person/day of which 4.71 gm/person/day is for freshwater/estuarine fish and 10.94 gm/person/day is for marine fish (Jacobs et al. 287). More than 84% of Taiwanese consumers prefer to eat fish and the annual per capita consumption of fish in Taiwan is 23.57 kg (Li et al. 1-7). But fish is the third preferred animal product after pork and poultry for Taiwanese consumers. Fish products convey an overall good perception to consumers in Taiwan.

Limited statistical information is available regarding fish consumption patterns in India. Only the National Sample Survey Organization (NSSO) has been conducting household consumer expenditure survey since 1973-74. Composite data on consumption of meat, egg and fish are available but exclusive data on fish consumption are not found in India and only rough estimates are generally found about per capita consumption of fish in the country. There is an urgent need to collect reliable statistics on per capita and total fish consumption in India (Malhotra and Sinha 1:283).

There are differential patterns of fish consumption in India. Consumption of fish in the country is influenced by caste among the Hindu population. In certain states, it is a religious taboo among the upper caste to consume fish. In West Bengal 99% of the population consume fish including Brahmans and Vysyas. Only Brahmin and Vysyas widows do not take fish in West Bengal. In Assam and Orissa, Brahmans consume fish.
But, only 30% of the population of Andhra Pradesh, Karnataka, Tamilnadu, Gujarat and Rajasthan consume fish and a few castes such as Brahmins, Vysyas and communities like Marwadis and Jains of those states do not eat fish. The main reason for not eating fish is religious restrictions (Rao and Raju 6-7).

Many studies have shown that fish consumption patterns differ from rural to urban areas. Per capita consumption of fish is substantially higher in rural areas than in urban areas of Asian countries and freshwater fish species constitute a major share (15% to 53%) in total per capita fish consumption (Dey et al. 2005, 89). In Bangladesh, per capita fish consumption in urban areas increased by 17.5% to 18.1 kg against a national average of 15.4 kg, while consumption in rural areas climbed 4.8% to 14.5 kg during the period 2000-2005 (The World Fish Center). The study conducted by Bhatta (2003, 17-42) on fish consumption patterns of urban and rural fish consumers in five Indian states viz. Haryana, Karnataka, Orissa, Uttar Pradesh, and West Bengal revealed that monthly average household consumption of fish was 3.17 kg and overall consumption of fish among rural producer-consumer households was almost double the consumption in urban households. The average household monthly consumption of fish was found highest in West Bengal (7.87 kg) followed by Karnataka (2.20 kg), Orissa (2.26 kg) and Uttar Pradesh (3.33 kg). The study indicated that there was an impact of increased production and accessibility of fish on consumption pattern. Bhatta (2001, 182-183) in another study conducted in Mysore and Raichur districts of Karnataka reported that fish consumption was higher in rural areas as compared to urban areas. According to his study, the rural consumers consumed on an average 24 kg per year irrespective of income classes. But for urban consumers, per capita consumption of fish per month increased if income increased. But Mugaonkar et al. (133) revealed that the annual consumption per households in India was about 7.40 kg in urban India and about 6.25 kg in rural India. About 60 million families consumed fish on a regular basis, and the estimated annual per capita consumption of fish was 2.4 kg. The study carried out by Sabat, Sharma and Salim (19) in Haryana, Punjab, and Delhi revealed that when price of fish, price of the substitutes, income of family, and family size were used as independent variables, variation in demand of fish was about 39% in urban area, 24% in semi urban area and 22% in rural area. All the respondents have purchased fish at least once in 15 days and 63%
of respondents had frequency of fish purchase once in a week and 30% had taken more than once a week.

The study of fish consumption pattern in five states of North East Region of India revealed that per capita consumption of fish in Arunachal Pradesh, Tripura, Manipur, Mizoram and Meghalaya were 28.35 kg, 18.14 kg, 17.66 kg, 10.5 kg and 14.27 kg respectively (Nandeesha et al. 37). Upadhyay and Pandey (2009, 193-96) studied the urban consumer behavior for fish in Agartala of Tripura. The result of the study revealed that per capita consumption of fish in the study area was higher than the consumption of chicken, mutton, and egg. Frequency of eating fish on an average was four times a week. The fish consumers preferred small sized, live, and locally produced fish.

Most of the studies carried out on fish consumption patterns reveal that frequency and quantity of fish consumption are dependent on income of the household. Generally, higher-income groups consume more fish, but the proportion of the food budget allocated to fish expenditure is higher among low-income groups (FAO 2001, Fisheries Circular No. 973, v). Dey et al. (2005, 89) in a study reported that fish consumption patterns were dependent on economic conditions of households and per capita fish consumption increased with increase in income. The low-priced fishes were consumed more by the low income groups than the high income groups and high income group spent a significant portion of their budget on expensive fish. P. Kumar and G. Kumar (22-23) also reported that when total income increases, people tend to spend more on fish, and relatively less on other types of meat. The frequency and quantity of fish consumption increases with income (Belton et al. 53) and people with higher incomes eat significantly more fish meals than those with lower incomes (Burger et al. 2003, 254).

The study on fish consumption in Madras (presently Chennai) conducted by the Bay of Bengal Programme (BOBP) under the Post-Harvest Fisheries Project in 1991 in coordination with the Marketing and Research Group (MARG), Madras, revealed that more than 50% respondents of lower income groups consumed less than 5 kg/capita/year only. The annual per capita consumption of fish for all groups was 7.2 kg whereas it was 2.4 kg in case of mutton or chicken. Generally, the quantity of fish purchased at a time was ranges between 250-500 gm. The incidence of consumption of fresh water fish was only 20% and it was due to the fact that consumers were unfamiliar regarding taste and
nutritive value of freshwater fish. The study further revealed that all income groups highly accepted fish as food due to its easy availability, affordable price, taste and nutritive value (BOBP 8-11). The study conducted by Sekar and Senthilnathan (27-30) on fish consumption pattern in Coimbatore city of Tamilnadu revealed that the per capita expenditure on fish increased with increase in income. Sekar, Randhir, and Meenhakshi (56-60) also reported that the average fish consumption increases with increase in income. They found that the average expenditure share of fish across different income groups increased from 0.29% to 0.33% from the lowest to the highest income class.

Gopal and Annamalai (62-65) investigated the food consumption profile of selected households in Cochin, Kerala (India) with reference to different income categories. Food expenditure has been classified into expenditure on staple food, fish, meat, milk, and egg. The result of the study showed that food consumption expenditure decreases as the income increases. The study stated that higher the income, higher the percentage of component of fish in the daily diet. The study suggested development of fish product considering the preference of high income group to get more monetary return per quantity of raw fish. Out of the four items of meat, fish, milk, and egg, fish was the most preferred food and egg constituted the least favored. The study clearly indicated that no other non-vegetarian food such as meat, milk and egg had positive association with income like fish. Bhatta (2003, 30-34) also revealed that the monthly household fish consumption increases with increase in income except for ‘rich’ income class.

The study conducted by Jamdade et al. (144) on fish consumption patterns in Kolhapur city of India revealed that among different income groups whose annual income ranged from Rs. 0.5 lakh to Rs.1.0 lakh and from Rs.1.0 lakh to 2.0 lakh per annum preferred fish as highest source of food followed by milk, meat and eggs. The study suggested creation of awareness related to the positive health aspects of fish consumption amongst the poorest socio-economic groups and drive away some of the myths and taboos. The study further suggested adoption of more centralized and organized production and distribution systems in line with Egg Produce Association of India, the Poultry Producers’ Association, and the Milk Marketing Board.

According to Delgado et al. (2003, 38-40), increasing income and urbanization shall be responsible for increasing demand for fish and meat by 2020 in the developing
countries. There is an increasing demand for high-value fish species in developed countries where urbanization is high. Thus, the demand for high-value species may increase in developing countries as urbanization increases. Hence, the study of influence of income and urbanization on fish consumption is important for calculation of future fish demand and knowledge about preferred fish species.

Contrary to the finding of the previous studies that fish consumption rises with rise in income, the study conducted by the Bay of Bengal Programme (BOBP 8) on fish consumption in Madras revealed that consumption of fish decreased with increasing income. Consumers with low and middle incomes perceived fish as one of the cheapest sources of protein that added value to their food intake. The study of Burger et al. (427) revealed that people with lower incomes ate fish significantly more often than those with higher incomes. Trondsen et al. (301) also reported that income was not significantly associated with fish consumption levels among those who like to eat more fish. They concluded that improvements in the supply of high-quality fresh and processed fish products which can satisfy children’s wishes, health-oriented family members, and convenience-oriented consumers, could significantly increase at-home consumption of fish. Fish consumption does not have relation with income alone at the macro-level, but rather to consumer’s cultural and traditional food habits (Malhotra and Sinha 2: 428). It is stated that in general “rice and fish” is popular diet to the eastern India while “bread and butter” is to the northern and western India.

Fish consumption patterns are different among different ethnic groups depending on their traditional backgrounds. Very few studies have found association between fish consumption pattern and ethnicity. Food consumption experiences of ethnic minorities are little reported in the literature despite the fact that ethnic minorities are increasingly becoming an integral part of urban life in many regions of the country (Jamal 221-27). B. Kumar, Engle and Quagrainie (1977, 12) evaluated responses on purchase of fish based on ethnicity. The highest percentage of fish buyers were among African Americans (70%), followed by Asians (67%), Caucasians (60%) and Hispanics (23%).

Columbia River Inter-Tribal Fish Commission (CRITFC) conducted a survey among Indian tribes dwelling in Columbia River Basin to determine the level and nature of fish consumption among individual tribal members (CRITFC i). The survey was
initiated to test the hypotheses that Indians in that region consume more fish than non-Indians. Information regarding consumption of fish by age group, season, species consumed, parts of the fish consumed, preparation methods, and changes in patterns of consumption over time, and during ceremonies and festivals were collected. The study revealed that respondents of age 18 years and above consumed an average of 58.7 gm per day while children aged 5 and younger consumed an average of 19.6 gm per day. The average fish consumption rate of tribal members was approximately nine times greater than the national average consumption rate (USEPA). Both adults and children consumed salmon and trout more than any other fish species. The fish fillet and skin were the two most popular parts but respondents also consumed the head, eggs, bones and organs of almost all fish species.

Burger, Fleischer, and Gochfelda (254) examined the consumption patterns of meal of people living in Singapore with respect to fish, shellfish, pork, chicken and other meats. The study revealed that the average frequency of eating fish meals was 10 per week by the whole population which indicates people ate fish every day and twice a day on some days.

Olsen et al. (84) explored cultural differences in the relationships between convenience, attitudes and fish consumption in five European countries. The results indicated that the meaning of meal convenience is not culture specific. Convenience orientation was highest in Poland, followed by Spain, and was lowest in the Netherlands. The relationships between convenience orientation and attitudes towards fish, and convenience orientation and fish consumption, were insignificant in most countries. But, convenience orientation was positively related to the perceived inconvenience of fish. Perceived inconvenience of fish was negatively related to both attitudes towards fish and fish consumption. The results of the study confirmed some earlier findings that fish is generally perceived as a relatively inconvenient type of food. This study concluded that convenience orientation could be crucial for food choice and consumption. Since people perceive fish as inconvenient, it should be a challenge for the fish marketers to develop more convenient products, educate consumers about where to buy and how to prepare fish in convenient forms.
Pieniak, Verbeke and Scholderer (2010, 480) carried out a cross-sectional consumer survey with representative household samples from five European countries - Belgium, the Netherlands, Denmark, Poland, and Spain. The study revealed that there were significant differences with respect to the belief that eating fish is healthy, have interest in healthy eating, subjective and objective knowledge about fish, and the fish consumption frequency between the five European Union countries. The study reported that despite scientific evidence on the positive effects of seafood consumption on human health, the consumption of fish remains below the recommended intake levels for the majority of Europeans.

Verbeke and Vackier (67) investigated individual determinants of fish consumption behaviour in Belgium. The study revealed that favourable attitude, high subjective norm and high perceived behavioural control have a positive impact on fish consumption decisions. The study found that the most important driver for eating fish was taste, followed closely by health. Davidson et al. (136-54) examined both consumer attitudes and willingness to pay for farm-raised and wild-caught fish in Hawaii. Consumers were willing to pay more for wild-caught fish than farm raised fish. Price, product form, and labeling had been identified as important attributes that determine utility values for seafood. Taste was found as the most important reason for consuming seafood, followed by dietary preferences and health aspects.

A socio-economic survey was carried out amongst communities living around seven selected dams in south-eastern Botswana (Sen). Results showed that approximately 20% of the households had eaten fresh fish. The reasons for unpopularity of fresh fish were non availability of fish followed by lack of skill of household to catch fish. Tilapia was the preferred species among all the communities. Households usually preferred to take fried fish followed by boiled and sun-dried fish. Other methods of cooking such as roasting and baking obtained negligible responses. Over 80% of the total sample ate tinned fish. Frozen or salted fish were eaten by a negligible number of the households, because these products were not easily available except in the larger supermarkets. Due to presence of too many bones, fresh fish was usually not fed to children. There were no cultural taboos concerning the consumption of fish.
According to Jamdade et al. (145) fish consumption patterns in Kolhapur city of India were heavily dependent on the religion and caste of the consumer in the population. The fish consumption frequency among Hindus was more than that among the Muslims. Gomna (2006, 215-17) stated that age and educational level were identified as the best predictors of fish consumption. The older and better-educated adults wanted to consume more fish.

There are several other factors that influence fish consumption patterns. According to Trondsen et al. (301-14) consumption of fish is subject to many influences such as socio-economic background of consumers, their general food consumption patterns, their personal health status, and a number of attitudinal dimensions. According to Gomna delicious taste of fresh fish was the main reason for eating fresh fish and frequency of eating particular species of fish was dependent on its availability, palatable taste, bone content, and odours. The main reasons for eating fish were health and taste (Brunso et al. 699). According to Westlund (1-13) prices of substitutes and complements, tastes as well as availability of fish also influenced consumption. Taste, texture, colour, shape and nutritional quality of fish have influenced consumer’s preferences and product-value (Malhotra and Sinha 2: 392). The study of Bay of Bengal Project (BOBP 8) revealed that all income groups highly accepted fish as food due to its easy availability, affordable price, taste and nutritive value. Among other factors influencing selection of fish for consumption, familiarity with fish variety, freshness, intramuscular bones, price of fish, and nutritional values were found as important factors. The consumption pattern does not depend on the availability of fisheries resources within the country but on nutrition habits of the people, fish imports price and supply of alternative sources of animal protein, especially poultry (Akpaniteaku, Weimin and Xinhua 28). According to Jamdade et al. (143) fish consumption patterns is influenced by price, taste, quality, availability and hygiene at point of sale. The most important reason of eating fish was the nutritional aspects of fish among the more educated group whereas less educated people consumed fish especially due to the taste of fish. Batzios et al. (27) also revealed that tradition, taste, and high nutritional value of fish were the reasons for choosing fish among the consumers with higher education.
According to Arvanitoyannis et al. (259–79) prices, season, and size of fish according to fish type were the important factors influencing fish purchase/fish consumption. Sayin et al. studied the fish consumption pattern and the factors affecting fish consumption in West Mediterranean Region in Turkey. The study revealed that the most striking factor that affected household fish consumption was the price. The factors affecting fish purchasing behaviors were tastes, and freshness. Freshness was found to be the most important factor for consumers (85.7%).

Logar et al. (1) examined the factors affecting consumer demand for certain species of fish and how fish farming can address that demand. The analysis revealed that health benefit was the major reason of consuming fish and fish products, followed by freshness, quality, and price. The demand for fish is perceived within the industry in two different points of view. The first was the consumers’ demand for a species of fish and second was the influence of the distributors on consumer preference and demand for a species of fish. Depending on this, farming of these species of fish should be encouraged. Foster carried out research on fish consumption, production and processing. The study analysed the factors influencing consumer behavior and found that consumers perceived fish as healthy food. The probable reasons for this as stated by the author were the low fat content of fish and the belief that fish is good for brain. Upadhyay and Pandey (2009, 193-96) reported that higher consumption of fish in Tripura was mainly attributable to food habit. Their analysis showed that majority of fish consumers agreed that fish is good for health, relatively cheap, tasty, and easy to cook.

Ecological conditions in a nation such as resource availability (per capita availability of land and water) and climate have impact on fish and meat consumption as ecological conditions influences the productivity of ecosystem (York and Gossard 293). Result of the study indicated that the nations with more water area consume more fish. Trondsen et al. (301-14) also reported that consumption of fish is strongly related to the availability of fresh and inexpensive fish. Their study indicated that people of the coastal Northern Norwegian region had fish for dinner every alternate day. The most common type of fish at dinner was lean fish such as cod and haddock which are available in this region. Processed fish products were the second most important product which was made from lean fish.
The reasons for eating less fish or barriers of fish consumption as found in different literatures are presence of the unpleasant physical properties such as intramuscular bones in some varieties of fish and foul smell, lack of stability of supply, quality variation, low development of fish products which can meet consumer wishes, perceived difficulty in buying, difficulty of processing and cooking fish (Verbeke and Vackier 67-82; Hulya and Aliye 87-91; Sen). According to Prell, Berg and Lena (184), the reasons for not eating or eating less fish were negative attitude towards both the smell and fear of finding bones. Less satisfaction from fish as compared to meat was another reason for eating less fish (Brunso et al. 699). Tronsena et al. (301) stated that the important reasons for not eating more fish are attributed to lack of supply of fresh fish, variations in quality, too few product variations, and high price.

Segmentization of consumers based on consumption pattern can play an important role in marketing of consumer preferred products. Market segmentation help in determining the kind of promotional devices that are effective for a particular segment which in turn helps in efficient use of marketing resources and helps in appropriate decision making relating to introduction of new products, promotion, distribution, and pricing (Papageorgiou 14). Arvanitoyannis et al. (259) in a study evaluated the Greek consumers’ attitude towards wild and farmed fish in order to segment the Greek demand in terms of consumer perceptions of fish. The study identified a number of clusters based on socio-demographic and behavioural profiles of fish consumption. The results of the study indicated that the most preferred form of fish for the vast majority of the sample was fresh, whole, marine fish. On the other hand, Pieniak et al. (2010a, 448) segmented the consumers based on their consumption of and attitudes towards fish, knowledge level, interest in potential information cues about fish and finally classical socio-demographic characteristics. The segmenting variables were selected to identify specific market opportunities and formulate strategies to promote fish consumption. The study recommended the food marketers, food policy makers and health practitioners for delivering tailored marketing and communication messages and to provide specific fish information to each of the identified consumer segments.

Dijk et al. (227–34) carried out a study to identify differences in Russian consumers according to their perceptions of health risks and benefits associated with fish
consumption. The study identified four groups of Russian consumers based on differences in perceptions of personal risks and benefits associated with fish consumption.

Birch and Lawley (12-21) segmented the Australian consumers into three categories—regular fish consumers, light fish consumers, and very light fish consumers. Regular fish consumers are those who purchase and eat fish 2–3 times per week to at least once a week. Light fish consumers purchase and eat fish about once per fortnight, while very light fish consumers purchase and eat fish once per month. The empirical findings of this study revealed that perceived risks associated with fish consumption include functional, social, physical, psychological, and financial risks. Lighter fish consumers were more likely to perceive functional risk such as not knowing much about how to prepare and serve fish, less familiar with preparing fish, not being able to easily prepare tasty dishes from fish, not being well informed about fish, not knowing how to select fish, fish not being easy to prepare and serve, not being able to recognize if fish is fresh. Based on these results, strategies for reducing perceived risks as a means of stimulating fish consumption were proposed.

Varieties of fish preferred were also found to be different depending on geographic and demographic profile. The detailed analysis of fish consumption by type of consumers and by individual species/product category is very less. Most of the studies on fish consumption in Asia are based on national level data held by FAO (Dey et al. 2005, 91). The study of consumer preferences for variety of fish has formed the coordination between the producer and the consumer. This market coordination has led to the emergence of a system of wholesaling and retailing (Lai et al. 289). The study conducted by Belton et al. (56-57) among consumers of Dhaka revealed that out of total consumption of fish, cultured fish constituted for 31%. Among cultured fish, Indian Major Carp, Pangasius and Tilapia accounted for three quarters of total consumption. Exotic carps accounted for only 8% of the total and climbing perch accounted for 12%. The study indicated that smaller farmed fish (rohu, silver carp, etc.) and small capture fish (‘puthi’, ‘moa’ etc.) were the most commonly available species in rural markets, while larger farmed and wild fish were more abundant in urban markets.

According to the FAO report (FAO 2001, Fisheries Circular, No. 973, 15-17), rohu is the most preferred species of carps by consumers in Bangladesh and India.
followed by catla and mrigal. Common carp was preferred by consumers in Indonesia and southern Viet Nam, followed by snakehead and silver carp. Consumers in northern Vietnam ranked grass carp as the preferred species, followed by mud carp and common carp. Chinese consumers preferred Crucian carp first, followed by grass carp and common carp. In Thailand, the preferred freshwater fish was tilapia, followed by snakehead and catfish. Freshwater fish species constitute a major share in total per capita fish consumption and total intake of fish protein constituted 15% to 53% in Bangladesh, China, India, Indonesia, the Philippines, Thailand, and Vietnam. Dey et al. (2005, 102-107) reported that silver carp and common carp are the most important species for the lower income groups in China. In India, lower income households spent a higher share of their total fish expenditure on mrigal and other exotic carp fish. There is no significant difference in the share of expenditure dedicated to carp (rohu and catla) across income groups in India, as these are the popular and most available fish across the country.

The study conducted by Bhatta (2001, 182-83) in Karnataka, India, revealed that rohu and catla are the most preferred species in both rural and urban areas. Mrigal is the least preferred fish among both rural and urban areas. P. Kumar, Dey and Paraguas (2005, 168) examined the fish consumption pattern with analysis of fish demand by species group. A household dietary-pattern survey was conducted in the states of Andhra Pradesh, Haryana, Karnataka, Uttar Pradesh, West Bengal and Orissa in the year 2002. The study revealed that the Indian major carps constituted almost half of the total fish consumption, followed by the pelagic low-value (17.6 %), fresh water carps (13.2 %), shrimps, both freshwater and marine (6.6 %), pelagic high-value (6.1 %), demersal (4.4 %) and molluscs (2.7%). The study revealed that the estimated price and income elasticities of demand vary across species and income classes. Different fish species considered in the study have been found to have positive income elasticity greater than one for all the income levels which indicates that with higher income, fish demand has been projected to increase substantially with change in the species mix. The study indicated that the fish production and consumption in India is characterized by a large number of species coming from marine and inland sources. Each species varies in commercial value, which is governed by catch and production pattern, and consumers’ taste and preference.
Sugunan (7) stated that there is a differential regional preference for fish species which has good market opportunities. The study reported that magur (*Clarias batrachus*), singi (*Heteropneustes fossilis*) and koi (*Anabas testudineus*) fetch lucrative price in the eastern region of India but they are not preferred in South India. Small fishes like carp, minnows *Amblypharyngodon mola*, *Puntius sophore* and *Ompok spp* have high consumer preferences and high prices in Assam and West Bengal but they are not liked by people in the South. Cat fishes fetch premium prices in the North India while they do not fetch good price in other parts of the country. The study conducted by Upadhyay and Pandey (2009, 193-96) revealed that among carps, rohu (*Labeo rohita*), catla (*Catla catla*), mrigal (*Chirrhenous mrigala*), silver carp (*Hypophthalmichthys molitrix*) are most commonly consumed fish in Tripura by all income groups.

Type of preparation of fish also varies depending on demographic and geographic profile of consumers. The CRITFC Technical Report (43) revealed that most of the respondents (98.3%) of individual tribal members of Columbia River Basin consumed baked fish and 79.5% of respondents consumed fried fish. Although only 39.3% of respondents boiled their fish, 68.2% of these persons used this method at least once per month. In addition, the methods of smoking or roasting fish were used by 66.2% and 71.3% of respondents respectively, but only 41.0% of persons roasted their fish at least once per month. According to Jamdade et al. (145), the largest part of population of Kolhapur city (55.07%) preferred fish in both fry and gravy form while 36.31% preferred fish in gravy form. The study conducted by BOBP (5-13, 55-72) among the consumers of Madras (presently Chennai), India, revealed that the curry and the fried form were the preferred preparations. Curry was more popular in the lower income group, suggesting a substitution of *dal* (lentils) and vegetables with fish. The fried form was preferred more in the upper income groups. The shark is the only fish which is usually steamed and tempered. The research revealed that consumers gave more emphasis on enhancing and ensuring taste while preparing fish dishes rather than retaining the nutritive value. Again, fish recipes were felt to be fewer compared to other non-vegetarian foods.
2.2 Prospects of Marketing of fish and value-added fish

Marketing is an important aspect of any enterprise. The American Marketing Association defined marketing as “an organizational function and a set of process for creating, communicating, and delivering value to customers and for managing customer relationship in ways that benefit the organization and its stakeholders” (Kotler and Keller 5). In simple, marketing is defined as “all processes involved from the production of a commodity until it gets to the final consumer” (Nwabueze and Nwabueze 690-93).

Coming to marketing of aquacultural products, Jolly and Clonts (259), in their book ‘Economics of Aquaculture’, defined marketing of aquacultural products as “the performance of all business activities involved in the flow of aquacultural products and services from the point of initial aquacultural production until they are in the hands of consumers”. The concept of marketing calls for understanding the needs of the consumers well so that they can be satisfied. In order to fulfill consumer needs one has to study consumers and their consumption behavior in depth (Schiffman and Kanuk 22-39).

Under the marketing concept, consumer is the fulcrum around which the entire marketing activities revolve (Santhakumar and Sanjeeviraj 51). An analysis of the consumer’s behavior in terms of consumption patterns, consumer preferences, consumer motivation, consumer buying process and shopping behavior are helpful parameters to formulate a firm’s marketing strategy (M. K. Reddy 1-9). For any business which wishes to exchange its products with customers for money or other goods, customers’ requirements have to be understood and products offered which meet these requirements (Shaw 1).

In order to sustain fish farming as profitable ventures in the long run, value addition is a necessity. Value addition implies processing of the end product or addition of ingredients which increases the acceptability of the product in terms of either convenience to the consumer, or increase in shelf life. A broad definition of value addition is to economically add value to a product by changing its current place, time, or form in conformation with preference in the marketplace (Coltrain, Barton and Boland 5). Value addition means making changes in a product either in its form or place so that it becomes more attractive and convenient to customers to procure and use the product. As a result, they are willing to pay more leading to increase in the price of the product. Value can be added to fish and fishery products ranging from live fish to ready to serve
convenience products such as fish fingers, fish burgers, fish cake, fish balls, fish steaks, fish silage, etc. according to the requirements of different markets. Value addition may mean different aspects under different national background. In a poor country, even icing of fresh fish is a high level of value addition (Sharma and Sharma 69-74). Value addition to farm products can enhance farm income and provide employment in processing businesses which may play vital role for rural growth. According to Coltrain, Barton and Boland (5-17), value added product development provides excellent opportunities to stimulate economic growth in the rural sector.

Value-added products in the fisheries sector are comparatively new to the market. There are different types of value added fish. Among different value added fish, there is a great demand for live fish and they fetch maximum price compared to all the other forms of value-added products as they maintain the highest freshness. Value addition in case of live fish can be obtained in two different aspects - transferring the fish from the point of harvesting (aquatic habitat) in live condition to the point of consumption (place utility), and selling the live fish in dressed and chopped form in front of the customer (form utility). According to the report of ‘the State of World Fisheries and Aquaculture’ (FAO 2012, 63), preference for live or fresh-fish form was the highest with a share of 46.9%, followed by frozen fish (29.3%), prepared or preserved fish (14.0 %) and cured fish (9.8 %) during the year 2010. Gopal et al. (60-65) in a study reported that carps are preferred in fresh condition in Asian countries like China, Thailand and Vietnam.

Many studies have stated that there is immense scope for adding value to ‘low-value fish’ which can give product diversification as well as remunerative price to the marketers. Based on geographical area, seasonal changes in catch, and fishing methods the term ‘low-value fish’ has different meanings. ‘Low-value fish’ is used to refer to fish that have low-commercial value, mostly fish species and fish products that cannot attract foreign markets. According to Kabahenda and Husken (29), the term ‘low-value fish’ products refer to fish that has low commercial value by virtue of their low quality, small size or low consumer preference, and by-products from fish processing. Ahmed (2010, 15-21) studied the existing marketing systems of low-valued cultured fish in Trishal and Bhaluka sub-districts of Mymensingh district of north-central Bangladesh. The study analysed the impact of efficient marketing systems of low-valued cultured fish to enhance
nutritive food supply. The study suggested to maintain better marketing facilities, transportation, fish marketing infrastructure, institutional and organizational support, government support, extension services, more researches and public-private partnership in order to ensure efficient distribution of low-valued culture fish. The study stated that there is a need to improve marketing strategies, including all important parameters of marketing mix (production, promotion, distribution and pricing strategy) in order to develop a sustainable fish marketing systems.

The study conducted by Sehgal and Sehgal (291–93) at Fisheries Research Division of Punjab Agricultural University reported that carps have a low market value due to the presence of intra-muscular bones which results in low consumer acceptability. To enhance the consumer acceptability of the carps, three value-added de-boned fish products- fish patty, fish finger and fish salad were prepared from carp flesh and compared with a reference product (‘fish pakoura’). The study on sensory evaluation of these products yielded highly encouraging results. All the three products scored higher than the reference product in terms of taste and overall acceptability. The authors opined that development of value-added products from carp flesh could play a significant role in raising the socio-economic conditions of the people associated with carp culture. Karmakar and Banerjee suggested designing and market development of ready to eat fish products like fish tikkas, kababs, sausages, salami etc. Rao and Raju (1 -14) revealed that fish sausage is very popular in Japan. In Tokyo, fishes are fried and sold to consumers in small stalls. They reported that fish biscuits and fish wafers can be manufactured and these products have already been sold in Kerela and some other states of the country.

Species diversification is also a part of product diversification. It is a fact that Indian major carps and Chinese carps form the major component of Indian aquaculture. But cultures of some other species have also shown good results. The study conducted at Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar, India on seed production and culture of other medium carp and barb species have shown promising result in terms of compatibility with major carps as well as in increasing the biomass. These medium carps have initial higher growth rate and market acceptability at smaller size of 300-400 gm for which they are ideal species for intercropping in the major carp farming system, particularly during the initial six months of farming. Air-breathing
catfishes like magur and singhi are also being cultured in ponds with Indian major carps. Two species of murrel have been identified to be potential candidates for cage aqua farming for their higher growth potential in the system (Jayasankar and Das 54-59).

Price of fish is an important aspect of marketing. Price has a major effect on the types and quantity of fish that people buy. Price of fish highly fluctuates due to its perishability, seasonality in production, species diversity, consumer’s choice and preferences, ignorance of fish producers/marketers about efficient marketing systems etc. Hence, price is a major concern of fish producers. Break-even points and profit margins are determined by consumer demand and the availability of products to satisfy this demand (Northeastern Regional Aquaculture Center 23).

Place refers to the methods of distributing finished products from the manufacturing unit to the final consumer. This involves transportation and storage of fish till they are availed by the customer. Choosing the right distribution path makes a major contribution to successful marketing. At present, restaurants and super markets are important places where customers find opportunity to purchase and taste different types of fish and fish products. Supermarkets offer one of the best places to sell larger volumes of fish products (Swann and Riepe 5). Logar et al. in a study expressed that consumers considered restaurants as the number one location where they try new fish and fish products for the first time. The study clearly indicated that supermarkets can play a critical role in educating the consumers about fish and fish products. Arvanitoyannis et al. (260-61) revealed that Greek customers purchased fish over the supermarket counter due to convenience and they prefer to buy whole, fresh fish. Their study estimated that 80% of the quantity of fish consumed domestically was distributed through wholesalers to cities’ central fish markets or local fishmongers and the remaining 20% through supermarket chains.

Meira, Engle and Quagrainie (231-47) assessed the potential for increasing sales of farm-raised tilapia through the domestic restaurant market in Nicaragua. Direct personal interviews were conducted among 118 restaurant managers selected at random from telephone directory. The study revealed that the older restaurants offer a variety of food prepared out of tilapia on the menu. This study demonstrated some ways to develop
a restaurant market for farm-raised tilapia in the country and identified those types of restaurants that would be best to target in a marketing campaign.

Fish marketing is simple in small-scale rural aquaculture where the producers sell fish directly to the consumers. This practice exists especially in developing countries like India. Fish and fish products have to be distributed in fresh condition as far as possible as consumers prefer freshness of fish and fish products. In highly dispersed and distant markets, it is not always possible for producers to distribute fish themselves. So involvement of marketing intermediaries in the process becomes necessary, even though this results in higher retail price and/or lowering the profit margin of the producers (Pillay and Kutty 274-83). The marketing channels of freshwater fish are, by and large, similar across the country. Fishers sell their fish to wholesalers directly or through commission agents and retail intermediaries. Wholesalers sell fish to retailers either through commission agents or directly. Fish marketing through cooperatives and public fish marketing corporations is very limited. Even in the case where fishers sell fish to cooperatives, private intermediaries are also involved in the marketing chain. In some cases, cooperatives become an additional intermediary in the marketing channel. In case of cultured fish, subsistence level production is consumed locally while commercial scale production is invariably sent to urban centers. There is involvement of three to four market intermediaries in commercial fish marketing. Fish farmers sell their fish to a fish trader who in turn transports the fish to urban markets, where it is disposed through auction to a wholesaler. The latter sells the fish at auctions to a retailer. In the case of export of fish products, only a few intermediaries such as an auctioneer, a fish trader-cum-preprocessor and the final processor are involved in the marketing channel. In some fish marketing and export centres, fish is directly delivered to the processor-cum-exporter at a predetermined price. Intermediaries such as auctioneers and agents are also involved in certain states such as West Bengal, where auctioneer-cum-financier-cum-preprocessor and selling agents are involved in the marketing channel between farmers and processor-cum-exporters (FAO 2008, 8-12).

In different parts of India fishes are generally marketed through the market channels having five or less intermediaries. Fishermen’s net share gets reduced with rise in number of middlemen in the market channel (Reddy and Prakash 49). Suresh et al.
(43) studied the marketing channels involved in farmed carp marketing in Thanjavur and Thiruvaur districts of Tamilnadu. Raghuram and Gurunathan (24-27) revealed that transaction of fish through Producer-wholesaler-retailer-consumer in Tamil Nadu was more expensive compared to the channel Producer-village trader-consumer and the producer’s share in consumer’s rupee is 80% and 67% respectively in channels Producer-wholesaler-retailer-consumer and Producer-village trader-consumer.

G. Kumar et al. (345-54) identified fish marketing channels prevalent at Howrah fish market as the following:

Channel I: Fishermen → Fish collector/local dealer → Auctioneer → Wholesaler → Retailer → Consumer

Channel II: Fishermen → Auctioneer → Retailer → Consumer

Channel III: Fishermen → Wholesaler → Retailer → Consumer

However, (Roy 425) identified three different fish marketing channels in Dakshin Dinajpur district of West Bengal

(i) Fishermen → Consumers,

(ii) Fishermen → Beopari (small trader) → Aratdar (big wholesaler) → Paikar (small scale wholesaler)/Retailer → Consumers

(iii) Fishermen → Aratdar (big wholesaler) → Retailer → Consumers.

The study revealed that the length of marketing channel for freshwater fish was relatively small due to non-existence of value addition/processing. This led to a higher share for the producer in the study area. The study suggested some measures for development of production and marketing of fish such as proper provision of credit to the poor and small fishers, ensuring availability of good seed, maintaining minimum size of pond through cooperative/group approach, maintenance of water quality and up-gradation of environmental aspects, higher investment for development of market infrastructure (e.g. road, transport, grading, weighing, icing, shelter, electricity, etc.), and initiatives for processing/value-addition activities as per the choice and demand of the consumer. The study concluded that to facilitate access to scientific fish production techniques and efficient marketing system for the poor fish farmers in the district, the Government, NGOs, private entrepreneurs, extension functionaries, research institutions, local governance, financial organizations, and marketing agencies should come forward.
G. Kumar et al. (2010, 105-113) studied the marketing channels for Indian Major Carps. The study revealed that carp marketing channel was most efficient at the Coimbatore market, followed by Hyderabad, Bhubaneswar, Howrah and Mumbai markets. Four marketing channels exist within the state Andhra Pradesh through which only 5 percent of fish is marketed. They are

Channel- I: Producers → Consumers (negligible quantities)
Channel- II: Producers → Wholesalers → Retailers → Consumers (2%)
Channel- III: Producers → Wholesalers → Vendors → Consumers (2%)
Channel- IV: Producers → Retailers → Consumers (< 1%)

The Marketing channels for other states where 95% of fish is marketed mainly to eastern, north-eastern and southern states are-

Channel- I: Producers → Local traders → Other states (Tamil Nadu, Kerala, Karnataka, Maharashtra)
Channel-II: Producers → Brokers → Traders (Packers) → Other states (West Bengal, Bihar, Assam, Tripura and Nepal)
Channel -III: Producers → Local traders → Traders (Packers) → Other states (West Bengal, Bihar, Assam, Tripura and Nepal)
Channel- IV: Producers → Brokers → Traders (Packers) → Local traders → Other states (Tamil Nadu, Kerala, Karnataka, Maharashtra)

After reaching respective states, fishes are again distributed in different marketing channels mainly through Dealers → Wholesalers → Retailers → Consumers.

Marketing White Paper, 2005, commissioned by the Board of Directors for the North Central Regional Aquaculture Center (NCRAC) of United States revealed that live fish were sold directly to the consumer which fetched usually the highest price but required more time and interaction with the public. The study suggested for low cost production and marketing of consumer preferred fish/fish products. The study emphasized that the producers should efficiently coordinate or integrate with processors and wholesaler/retailer so that farmed fish is produced and distributed at the right quantities, to the right locations, and at the right time (Peterson and Fronc 2-9).

Most of the marketing channels are not suitable to trade value added production (Maqsood et al.). It is argued that super market chains must be considered as a new and
an appropriate channel for marketing of these products. In case of value added fish products, marketing is dynamic, sensitive, complex, and expensive and most of the marketing channels prevalent in India are not adequate to undertake sales of value added products in a sustainably profitable manner (Pedro, Barb and Candelaria).

Promotion, from a marketing perspective, consists of four interrelated activities—advertising, sales promotion, personal selling, and publicity/public relations. Most people equate marketing with sales or advertising, two of the sub-areas of promotion when in fact, marketing strategy’s focus is on managing the relationship between product, price, place (distribution) and promotion to meet consumer needs (NRAC 29).

Fish marketing processes are inherently complex with interaction among fishermen, processors, merchants and family consumers (Bhatta 2008, 3). In such a situation, efficient marketing system can play an important role in maximizing the return from fish culture. An effective marketing system is required to ensure the supply of fish to consumers in good condition at reasonable prices, at right time and place. Marketing system not only provides remunerative price to the producers but enhances consumer’s satisfaction also. Market is one of the crucial driving forces to sustain fish production in future, along with advancement of technology and infrastructure (G. Kumar et al. 2010, 105-6).

Unlike many other research issues, fish marketing researches in India have been based largely on case studies (Bhatta 2008, 3). Katiha and Chandra (21-24) evaluated operational and pricing efficiency as measures of fish marketing efficiency in Allahabad fish market. The study revealed that the markets had all the characteristics of perfect competition. The fishermen were price taker as their catches were too little of the total market arrivals to influence the market price.

G. Kumar et al. (2008, 345-54) studied the domestic marketing of fish in India covering all the major coastal states and some selected inland states. The role of market intermediaries, major marketing channels, structure of fish markets, viz. fish landing centers, wholesale / retail fish markets and fish retail outlets, and current policies relevant to fish marketing in India have been analyzed. The marketing efficiencies for Indian major carps (IMC), sardine and seer fish have been found to vary from 34% to 74%, depending on the length of market channel. The marketing efficiency was more in the
case of marine species than freshwater species and it was due to the fact that freshwater fish had to be carried longer distances from the point of production to consumption centre and have to pass through many intermediaries as compared to marine fish.

The system of fish marketing in India has traditionally been highly unorganized and unregulated, which is the prime cause of inefficiency in the whole process (Sugunan 7; G. Kumar et al. 2010, 495-504). Auction markets are most common for fish marketing which is believed to ensure best competitive price for the producers and customers. But G. Kumar et al. (2008, 345-54) stated that fish trading starts with the auction system which is highly unorganized and unregulated in most states of India. In this marketing system, there is a financial barrier for entry of any new professional into it. In order to ensure better price by fishermen in the auctioning process there is a need of regulation by the cooperative federations, as in Kerala. The study suggested that transportation and storage of fishes need to be facilitated by creating and maintaining the needed infrastructures such as approach roads to landing centres/fishing villages/pond-river-reservoir sites from the main markets, establishing cold storages at major collection points, ice factories, etc. can facilitate better marketing of fish. Chand and Das (53-54) gave an account of basic requirements for an organized fish market. They specified the essential infrastructure facilities needed for an organized market.

Ayyapan and Krishnana (392-412) and G. Kumar et al.(2010, 105-13) studied the fish marketing system prevalent in Kolleru Lake area in Andhra Pradesh. It is a prominent carp culture area and is also known as the ‘Carp Pocket of India’. The study compared the marketing system of Kolleru Lake area with marketing system of Indian Major Carps (IMC) in other major aquaculture states like West Bengal (Howrah market), Orissa (Bhubaneswar market), Maharashtra (Mumbai market), Tamil Nadu (Coimbatore market) and Andhra Pradesh (Hyderabad market). Comparisons and analysis of the marketing channels, market intermediaries, price spread and marketing efficiencies, revealed that the price spread for IMC from Kolleru was highest at Mumbai and lowest at the Coimbatore market. Fishermen’s share in consumer price on the other hand was highest at Coimbatore (61.54%) but lowest at Mumbai (47.06%). Marketing efficiency was highest at Coimbatore (2.60) whereas lowest at Mumbai (1.89).
A research study on ‘Exploring Market Opportunities for Fisheries Sector in India’ was undertaken by National Centre for Agricultural Economics and Policy Research (411-12) during the year 2008 in different parts of the country, especially in major maritime states like Tamil Nadu, Andhra Pradesh, Kerala, Karnataka, Orissa, West Bengal, Maharashtra, Gujarat and some inland states like Assam, Tripura and Delhi. The study suggested some strategies such as promotion of Producer companies, Fishermen societies, Self Help Groups in order to have better bargaining power in the auctioning or selling process to the next intermediary in the value chain in fish marketing. It also suggested training in Responsible Fisheries/Good Harvest and Management Practices to the fishermen/aquaculturists, and grading and branding for achieving better price in the market.

The fishers in most part of India have to sell large quantities of fish catch from beels and reservoirs at low price to local fish merchants. When these catches reach the retail outlet in cities, the price multiplies many times and consumers seldom get the fish of their choice at affordable price. Inland fishers get just 30% or less of the price paid by the consumers. Many times, the local fisher groups or marchants do not have the capacity to store fish or transport it in good condition to distant markets. Strategies for improvement of domestic marketing such as good market infrastructure, research support for development and commercialization of value-added products, government support in the form of policy, institutional and legislative instrument etc. have been suggested in the study (Sugunan 7).

Sathiadhas, Narayanakumar and Aswathy (125-31) stated that rapid economic growth and expansion of domestic retail sector in India had created a significant market for fresh and processed fish and fishery products within the country. According to Mugaonkar et al. (133), there is a slow transformation of unorganized fish retail marketing into an organized marketing and it is visible through the entry of private retailing giants like Spencer’s, Reliance Retail, etc. The study further reported that more and more new companies are entering into the organized fish retailing and these include private sector companies like Foodland, Aditya Birla’s More, Tata’s Star Bazar, Spinach, etc. In the public sector, the Tamil Nadu Fish Development Corporation Ltd. (TNFDC) ‘Neidhal’, a government organization engaged in retailing of fish in Chennai is very
popular among the fish consuming public since fishes here are available at a very hygienic environment, operations are transparent, weighing is done in electronic balance, prices are lower than that prevailing in conventional fish markets, and dressing is done by trained personnel so that the consumers can get fillets and steaks. In Kerala, MATSYAFED has a chain of outlets under the name ‘Fresh Fish Point’. Reliance procures fish directly from Andhra Pradesh to a centralized location (hub) near the outskirts of Bangalore. The fish outlet in each of the 24 Reliance malls in the city reports to the hub about their next day’s requirement. By adopting this model, Reliance has gained control over its supply of fish. Each of the Reliance or Spar outlets in Bangalore sells about 50 to 150 kg of fish every day (Tara et al.). Tara et al. designed an integrated marketing strategy and an effective branding strategy to increase the sale and improve the profitability of the fisheries business in Karnataka. They designed a logo in order to communicate to the consumers that a product with great quality and hygiene is available for ready use as opposed to products sold from unhygienic local retail outlets. The brand name given by them was ‘Matsya’. Some promotional strategies for marketing of ‘Matsya’ to communicate the right information to the right people at the right time have been given in the study.

The West Bengal State Fishermen's Co-operative Federation Ltd. (BENFISH) plays an important role in marketing of fish and value added fish in West Bengal. It has mobile and stationary counters to sell various ready to eat products. BENFISH has set up a modern Fish Processing Centre at Salt Lake for processing of raw fish and preparation of various value added fish products. IFB (Agro Industries limited) prepares ready to cook products and these products are available in sub urban areas also. ‘TRIVENI’ supplies variety of fishes to hotels and restaurants on contract basis. Their products are not available in stores. They prepare itemized value added fish product for specific consumption (Food Processing Industries Survey, West Bengal).

Vrutti Livelihood Resource Centre developed a marketing strategy for livelihood promotion of poor fishermen households in two districts, Tikamgarh and Chhatarpur of Madhya Pradesh through a value chain based assessment and planning. Vrutti is a part of Catalysts Group of Institutions, working in the social development sector in India, South East and South Asian Countries. The study indicated that with direct linkage between
local producers and consumers in the project area through retailers, the current value chain can be shortened. The gains through shortening of value chain can benefit fishing communities/producers and retailers. The study recommended some approaches like facilitating marketing of fish at cooperative level such as on site sale to retailers, on site sale to traders, bulk sale to wholesale traders in local town market including Jhansi, Lucknow and Gorakhpur markets. The core strategy focuses on selling fresh carps on site to retailers and traders at competitive price based on floor price/auction. The study opined that this strategy requires proactive sharing of harvesting plan (date/time, quantity, floor price) with traders and retailers and technical training on scientific harvesting, handling of fish, icing and smoking, on management skills like planning, enterprise management, negotiation, market facilitation skill etc. for the stakeholders (Vrutti, Livelihood Resource Centre, 1-35).

Fish marketing is a lucrative trade in the economy of Assam as it is a preferred food item of 95% of the State's population. M. Goswami, Satbiadbas and U. C. Goswami (146-55) studied the prevailing fish marketing systems in Darrang, Kamrup and Nagaon Districts of Assam. The study indicated involvement of large number of intermediaries in the distribution process of fresh fish. Women are also involved in the retail trade in the markets and door to door sales in some selected parts of Kamrup District. The study suggested the need of a well organized marketing network for distribution of fish in the state at reasonable price.

The National Institute of Agricultural Marketing (NIAM) has been conducting comprehensive Market study of Agricultural Sector of Assam Rural Infrastructure and Agricultural Services (ARIASP) since August 1988. NIAM’s market study of fisheries in Assam ascertained the efficiency of the present fish marketing system in Assam and the role played by the different stakeholders. According to this report, marketing of fish has been facing many problems such as greater uncertainty with fish production, high perishability, scattered landing centers, too many species variations and as many demand patterns, frequent fluctuation in price, transportation requirement etc. The study recommended construction of auction platform in the rural markets, establishment of “Fish Farmers Marketing Support Unit” providing ‘fish carrying van’, and storage facilities in all the municipality markets (National Institute of Agricultural Marketing).
2.3 Constraints of production and marketing of fish and value-added fish

Production of consumer preferred varieties of fish and fish products have been facing several constraints. Identification of potential constraints is important for growth and development of fisheries sector. The constraints of production and marketing have been examined by a number of researchers in India and abroad.

Constraints of fish pond farming among Kenyan rural farmers were identified as lack of suitable soils, supply of quality water, high water evaporation, high cost of excavation of fish ponds, lack of supply of fingerlings, seasonal variations, uncoordinated government information and training-extension services etc (Shibanda 408-12). Brummett, Randall, and Williams (193 -203) reviewed the development and constraints of the expansion of aquaculture for economic and rural development at the continental, national and farm levels in Africa. The main constraints to the development of commercialized and productive aquaculture sector in Africa were poor infrastructure, small government budgets, sudden change of input prices and supplies, political instability, poverty of consumers and lack of local expertise. Analysis made in “Markets, Marketing and Production Issue for Aquaculture in East Africa - the case of Uganda” by Jagger and Pender (42-51) indicated that that lack of extension staff and infrastructure to deliver technical knowledge about aquaculture to rural small holders were the main constraints towards aquaculture development in Uganda. In addition to these, water hyacinth infestation created significant problem that threaten most of Uganda’s waters. The constraints of aquaculture development in Nigeria were shortage of fingerlings and feed, lack of pond management knowhow, inadequate funding, and poaching (Anetekhaia et al. 237-48). Akpabio and Inyang (45) identified fifteen constraints affecting aquaculture development in Akwa Ibom State, Nigeria of which three constraints were more serious. They are inadequate supply of fish fingerlings, high cost of fish pond establishment, and lack of awareness of available innovations. Akpaniteaku, Weimin and Xinhua (28) reported that the main constraint of aquaculture in most of the developing countries is the shortage of quality fish seed. Adeogun et al. (21-27) investigated producer perception on fish farming practices in Lagos State, Nigeria and found that the most common constraint was the lack of technical know-how. Other constraints were high cost of inputs, lack of adequate information on aquaculture
techniques and marketing, lack of capital etc. The study conducted by Kudi, Bako and Atala (17-21) in Kaduna state of Nigeria revealed that 98% of the respondents faced the problem of non-availability of capital whereas 82% of respondents faced problems in marketing, 57% in outbreak of disease, and 21% in water supply problem. Fish production was affected positively through effective delivery of fingerlings/juveniles and feeds to the fish farmers. Lack of organized fish marketing system was reported as marketing problem that constrained sell of live fishes at the farms. Ibrahim and Mohammed determined the role of women in homestead fish farming in Nasarawa state, Nigeria. It revealed that the major constraint of women involvement in homestead fish production was inadequate capital, followed by the pre-occupation in other household routine tasks. The study recommended the provision of training for women on feed formulation, raising fingerling, disease control, and linking women in the study area with micro-finance banks in order to obtain credits. According to Wetengere (2011, 146), perceived problems of fish farmers in Tanzania were high animal predation and human theft, high probability of ponds being washed away by floods, poor growth of fish, death of fish or fingerlings, rotting of fish due to poor preparation and preservation methods, low market and poor marketing channels, and purposeful poisoning of ponds.

Wetengere and Kihongo (2012, 107-17) examined the constraints in accessing credit facilities for fish farmers in rural Morogoro, Tanzania. The study revealed that the level of credit use was very low in the study area. The main constraints to credit access were lack of information, unfavorable terms, lack of support services, and illiteracy. The study suggested strategies to overcome these aspects such as providing information to rural farmers on the availability and management of credit, dealing in constraints hindering rural farmers from accessing credit facilities by the government/lending institutions/other stakeholders and identification of zones where most fish farms concentrate and high potential of success exist to reduce the risk and administrative costs of managing loans from financial institution.
Lee (65-71) identified constraints of aquaculture production in the developing countries and categorized them as natural and environmental (inequitable allocation of land resources, insufficient quantity and degraded quality of water, highly seasonal variation in temperature and natural disaster); socioeconomic (insufficiency of infrastructure for production and marketing, variation of prices of inputs, ageing and poor training of aqua-farmers); and institutional constraints (inefficiency of extension services, lack of a better organization of producers, shortage of rural finance). To overcome these constraints, the suggested strategies includes structural adjustment, better market management and effective institutional programmes intervened by the Government. Structural adjustment through establishment of cultivated areas, strengthening of early monitoring systems and acceleration of technological change were suggested to promote aquaculture development. For effective market management it proposed shortening marketing margins and transmitting market information to the producers and for institutional improvement, better organization of producers, better extension services and effective aid of rural credit.

Steinbronn et al. studied the constraints in fish production in Yen Chau district of Son La Province, Vietnam. The typical pond system in the study area was utilized for polyculture of grass carp, other carp species and tilapia. The study revealed that the main problem of pond farming were lack of training or extension services in the field of aquaculture, frequent outbreak of disease, poor quality of the seed, application of pesticides in paddy fields (which ultimately come to fish pond), shortage of water while irrigating the paddy fields, low water temperatures during the winter, and limited supply of feed resources in the cold dry season.

Liao and Chao (564-69) studied the constraints in the aquaculture industry of Asia-Pacific region. Constraints faced by aquaculture industry included competition for land and water with other industrial sectors, insufficient aquaculture engineering for land-based and off-shore aquaculture, unpopularity of automatic devices for super intensive aquaculture and post-harvest processing, high prevalence of disease outbreaks and natural disasters, and complete dependency of farmers on government aids.
Common constraints faced by freshwater fish farmers in Bangladesh and India, are plurality of ownership, lack of credit facilities, lack of technical know-how, illegal poaching, deliberate poisoning, inadequate marketing opportunities, non-recognition of aquaculture as a land-based activity, absence of long-term leasing policies, and non-assurance of seed supplies at appropriate times (FAO 2001, v). Dey et al. (2005, 11-37) reported that freshwater fish farming is generally profitable in Asia but fish culture practices in most of the Asian countries have some constraints.

Alam and Thomson (297–313) identified the problems against the fuller utilization of potential of Bangladesh fisheries sector. They reported that resource limitations, poor implementation of fisheries laws, limited spread of fish farming technology, low financial capacities and ineffective extension practices were the main factors responsible for the under-utilization of fishing areas. Mohsin and Haque (30-33) studied the constraints of carp production in Rajshahi district of Bangladesh. The study revealed that 34% farmers perceived financial crisis as the prime constraints for the carp farming followed by adequate availability of seed (25%), feed (14%), high mortality rate of fry (11%), poaching (6%), poisoning of pond (4%), scarcity of sufficient water (4%), and disease incidence (2%). Sarkar, Chowdhury and Itohara (68-73) analysed entrepreneurship barriers of pond fish culture in Mymensing district of Bangladesh. Their study revealed that lack of technical knowledge on pond management, unavailability of credit, poor extension service and lack of information were the potential barriers of pond fish culture entrepreneurship.

Ahmed et al. (2012, 51-70) carried out a study in order to develop sustainable tilapia marketing systems in Bangladesh. Constraints in marketing of tilapia, as perceived by the farmers were inadequate knowledge of marketing systems, low market prices, exploitation by intermediaries, and lack of infrastructure. Other constraints were higher transport costs, insufficient supply of ice, unhygienic conditions, lack of financial support, lack of credit facilities, and poor markets infrastructure, lack of standard practices for handling, washing, sorting, grading, cleaning and icing of tilapia. The strategies formulated in this study were- creating provision for capacity building for the development of stakeholder organization, government institutions for technical advice and support on marketing, proper market infrastructure, encouraging involvement of
appropriate NGOs, and the implementation of a management plan to address existing constraints.

The constraints for growth of small-scale fresh water fish culture in India are lack of basic inputs, poor fisheries extension mechanism, poaching, conflicting interests with regard to water use between agriculture and aquaculture, short lease period, inadequate institutional finance, lack of infrastructure facilities like cold storage, good approach roads from production sites to marketing centers, and quick transport facility etc. (Sinha and Ranadhir 526-38).

Occurrence of trash fishes and weeds, fish disease, and poaching are the major constraints of fish production in Tirunelveli district of Tamilnadu (Selvaraj 25-30). V. Kumar and Selvaraj (63-69) conducted a socio-economic study on composite fish culture in five districts of Tamil Nadu and categorized the constraints as production, management, and marketing constraints. Production constraints were related to availability and dearness of inputs like seed, fertilizer and labour. Untimely supply of fish seed was a major constraint faced by majority of the respondents. The management constraints were associated with predators, weeds, trash fish and poaching. Unremunerative price, lack of transportation, tied sale and spoilage were included in marketing constraints.

Padhy (9-10) identified constraints of fish culture in Birbhum district of West Bengal and categorized them as environmental and situational constraints, lack of technological intention, and socio-economic and infrastructural constraints. Environmental and situational constraints included occurrence of flood, drought and weeds. Inadequate availability of inputs such as feed, credit, transportation cost and returns, management, trained extension services, marketing, and storage facility were included under socio-economic and infrastructural constraints.

Chakraborty (92-95) identified technological constraints of inland fish cultivation in 24 Parganas (North) district of West Bengal. The study examined and identified the gaps between potential and actual yield and real problems so as to formulate future programmes for increased fish production in inland sector. The yield rate of beneficiaries belonging to the Fish Farmers Development Agency (FFDA) schemes was significantly
higher (1650 kg/ha) than that of non-FFDA farmers (613 kg/ha), although this was less than the potential yield (2500 kg/ha/yr) for FFDA schemes.

Perceived problems of composite fish culture in 4 districts of West Bengal studied by Bhaumik and Saha (348-59) revealed that the major perceived problem in adoption of composite fish culture was high cost of inputs followed by poaching, poisoning, high rent of water body, lack of follow-up action, marketing of harvested fish, non-availability of subsidy, non-availability of finance, multi ownership of water body, stagnancy of capital, and non-achievement of expected results. The study stressed upon development of low cost package of practices on the lines of single stocking- multiple harvests or multiple stocking-multiple harvest.

Srivastava (310-25) identified some of the constraints and problems faced in freshwater aquaculture development in India. Non-availability of quality fish seed of commercial species in adequate quantities at the right time, absence of cheap and acceptable supplementary feeds, difficulties in mobilizing institutional finance and credit for small fish farmers, low price realization by the producer due to the poor market structure and absence of uniform leasing policy in different states were reported as main constraints in the study.

The SWOT analysis carried out by Radheshyam (11) with participatory efforts of farmers revealed some important weaknesses in community based aquaculture in India. The major constraints were poor organizational capacity among rural farmers due to personal disputes, non-existence of capable community leader, lack of infrastructures, weak research-extension support, low technical awareness, and dual leasing policy with short leasing period.

Investigations of Sasmal et al. (134-42) in Dharsiwa Block of Raipur District revealed constraints perceived by the fish farmers for adoption of recommended composite fish culture technology such as high cost of pond preparation, eradication of weeds, lack of knowledge, lack of efficient marketing structure, and restriction posed by the village community regarding the use of some of aspect of recommended technology. Maximum fish farmers were adopting the traditional practices of fish farming instead of recommended technology.
Meena, Prasad and Singh (1-5) investigated the constraints perceived by rural agro-processors of Punjab to adopt post-harvest technologies and categorized the constraints as socio-economic, technological, farming, marketing, and extension aspects. Socio-economic, technological and farming constraints were more important than extension and marketing constraints. The suggested measures for removing the constraints were appropriate policy interventions for boosting-up the rural agro-processing sector.

Abraham et.al (41-48) studied the aquaculture practices of Andhra Pradesh and West Bengal and revealed that majority of the respondent farmers of the two states cultured carps. But there were differences in farm holdings, size of the pond/farm, species cultured, stocking rate and stocking density, fish seed procurement policy, nursery management, feed and feeding rates, pond fertilization, harvesting frequency, mode of fish marketing, source of information on aquaculture, fish seeds and disease treatment, and perceptions on aquaculture practices. The major constraint faced by farmers of Andhra Pradesh and West Bengal was incidence of fish diseases. Other constraints included fluctuation of market price, irregular electricity supply, poaching, declining production, poor seed quality, floods, financial problem, siltation etc. The magnitude and impacts of these problems were different among the farmers of both the states. The study concluded that in order to enhance fish production from culture systems a strong commitment from Government organizations and research institutions in the form of more training and extension services were urgently needed.

Mohanty et al. (139-45) identified the major constraints in adopting/developing participatory agri-aquaculture in three different watershed sites in Orissa through preferential ranking technique and delineated as many as nine constraints. Those were lack of awareness and technical knowledge, high feed cost, low water depth in summer, lack of interest, priority to domestic use, and non-availability of fingerlings in time. The study suggested putting efforts to improve marketing of produce through information dissemination on prices and nutritional value among vulnerable groups; improving road access to urban markets to ensure better price, formation of marketing groups, and providing information on preservation and storage.
The status of freshwater aquaculture resources in Boudh District of Orissa was investigated by Chattopadhyay et al. (20-23) which identified some constraints faced by fish farmers such as unavailability of desired quality and quantity of fish seed, poor water retention capacity (6-7 months) of the pond, high rate of evaporation, high lease value, lack of technical knowledge among fish farmers, aquatic weed infestation, and presence of predatory fishes.

Unavailability of quality seed, inadequate technology transfer, lack of private entrepreneurship, lack of infrastructure facilities, low temperature regime, complex land ownership patterns, small fragmented land holdings etc. were the main constraints of development of fish culture in North East India (Munilkumar and Nandeesh 399-412). Major constraints in fishery sector of Tripura were identified as genetic degradation in fishes due to inbreeding in hatcheries, lack of diversification of culture fisheries research facilities, soil and water quality mapping, and recurrent flood (Barman and Mandal). Singh et al. (185-95) assessed the technical efficiency level and its determinants in small-scale fish production units of West Tripura district. Primary information collected from 101 fish farmers of three blocks through a multi-stage random sampling method revealed that farmers were not getting quality fish seed. The middlemen were the source of fish fingerling supply to the farmers who made it available as a mixture of different species and different size. Farmers had no access to other assured sources of quality fish seed. All these constituted a low technical efficiency level, whereas those farmers who purchased fingerlings from the government firms enjoyed better technical efficiency. The study suggested that the State Government needs to play a role to ascertain the supply of quality fish fingerlings adequately and timely to ensure the technical efficiency of the culture systems.

Non-availability of inputs, disease outbreaks, inadequate financial and extension support, and frequent flood problems were some of the constraints limiting the productivity of fish in Assam (M. Goswami and Sathiadhas 2000, 29-32). M. Goswami et al. (2002, 103-110) conducted a study on socio-economic dimension of fish farming in two districts of Assam, viz., Darrang and Nagaon during the period 1998-2000. Only 16.67% of the respondents of Darrang and 25% of Nagaon had fishery as a major occupation. Majority of the respondents did not receive training on fish culture practices.
The percentage of trained respondents in Darrang and Nagaon were 25% and 20%, respectively.

The SWOT analysis of fishery enterprises, carried out by Agricultural Technology Management Agency (ATMA), in 2006 revealed some weakness of culture fishery in Nagaon district of Assam. They have been identified as low water retention capacity of the soil, occurrence of flood, dominance of aquatic macrophytes, unregulated retail fish markets, lack of storage and preservation facilities, non-streamlined institutional finance, exploitation by market intermediaries, subsistence nature of fish farming, imbalance use of organic and chemical fertilizers, non availability of quality fish seeds, non-availability of large size fingerlings, and poor soil and water management (Agricultural Technology Management Agency, Nagaon 146-47). In addition to these constraints, poor extension machineries, low pH value of soil and water, lack of proper marketing channels, lack of credit, lack of entrepreneurship, social taboo, natural calamities etc are some of the problems of fish farming in Assam (Kalita, Bhagabati and Dutta 9-11).

The adoption behaviour of composite fish culture practices was positively influenced by the factors like extension participation, economic motivation, cosmopolitanisms, scientific orientation and knowledge of fish farmers, and negatively influenced by their age (Talukdar and Sonatoki 12-17). The study recommends that efforts should be made by extension agencies through various programmes to highlight the economic benefits of composite fish farming to promote large-scale adoption of this technology. Study tours, exposure visits, participation in fairs and exhibitions were recommended as the ideal methods for promoting adoption of composite fish culture. This study was carried out in Sonitpur district of Assam.

There is a good market demand for endemic fish species like magur (Clarias batrachus), singi (H. fissilis), koi (Anabus testudineus), Pabda (N. notopterus) etc. in North-Eastern parts of India (Sugunan 7). But the culture practices of these species have not received much attention due to lack of standardized package of practice of culture of these varieties. Das (2002, 19-21) revealed that inadequate supply of seed and proper feed hinders the culture of magur in the area. Again, there is good demand for the snakehead, Channa striatus, commonly known as striped murrel and locally known as
‘sol’ in Assam. But the culture of murrels in Assam is still not common due to the lack of seed supply (Marimuthu et al. 21). Proper technologies for captive breeding of such other alternate potential commercial fish species are necessary to diversify the culture systems for better economic returns.

Several constraints related to distribution of fish and fish products have been identified by different studies at different times and places. Fish marketing is not an easy task as it has to face many peculiar and special problems at different stages of production and marketing management. Some of the specific problems of marketing of fish are greater uncertainties in fish production, the high perishability of fish, collection of fish from too many scattered landing centres, too many varieties of fish and therefore too many demand patterns, wide fluctuation in prices, lack of proper transportation of fish etc. (Rao 197-64). According to FAO Fisheries Circular No. 973 (FAO 2001, 25-26) major constraints of fish marketing were bad transportation system, poor bargaining power, high marketing margins, low institutional credit for production and marketing of fish etc. The study reported that credit was provided by market intermediaries to the marketers as well as to the producers and force them to sell their produce. But the credit supplier often paid less than the market price. The report concluded that sustainable development policies are needed that could address issues related to use of natural resources, research, pricing, credit, trade, investment, and exchange rates.

Nine markets in the Southern Region of Malawi, Africa were studied by Brummett (243-51). Lack of proper refrigeration facilities both in urban and rural markets and lack of proper transport or storage facilities in rural areas were the major constraints of marketing in the study area. The study indicated that due to lack of availability of preferred species and sizes at the fish landing sites or at local wholesale outlets, 41% of retailers of urban market were compelled to sell fish varieties which were not desired by them.

The study of Njai (1-28) revealed that fresh fish were not readily available in rural markets (inland markets) of Gamibia due to the shortage of ice and lack of refrigeration facilities. Therefore, most consumers in these areas get access mainly to cured fish. The study emphasized on the improvement of the quality of fish through technological
advances which would reduce post harvest losses and utilize the country's resources to their full potential.

The major constraints for both domestic and export markets in Cambodia were inadequate facilities for handling, sorting, weighing and packing fish, and lack of storage facilities and preservation equipment or materials (e.g., ice, ice-crushing machines, ice boxes, freezers, salt) at landing sites (Mohammed et al. 4). According to them due to lack of modern equipment or production methods, small and medium-scale fish processing operations were unable to adopt quality control measures and hygiene standards.

The study carried out by Chea and McKenney (19-20) on fish marketing from Great Lake to Phnom Penh revealed that most fishers are in a weak price negotiation position since they are compelled to sell their produce to the trader with whom they are in debt. The lack of transparent interest rate on loans for fishers is another constraint identified in the study area. Lenders are likely to take advantage of this lack of transparency to increase returns on their loans. The study further indicated that fish marketing is affected by a number of other constraints such as high financing costs, spoilage and weight loss, monopolistic control of distribution, high transportation and ice costs, and fees charges along the road during transport.

The marketing constraints identified by Ugwumba and Okoh (73-78) in case of catfish marketing in Anambra State, Nigeria were lack of market information, poor market structure, high cost of transportation, low income of the farmers etc. The study stated that operational efficiency and marketing income could be increased through good provision of infrastructural facilities such as provision for water supply, good roads and cheap means of transport. The problems of fresh fish marketing in Oshimili South Local Government Area of Delta State, Nigeria were seasonality, scarcity, poor means of transportation, lack of suitable containers, inability to access loans, and the presence of more middlemen in the distribution chain of fresh fish (Nwabueze and Nwabueze 690-93).

Mmopelwa and Ngwenya (3176-84) identified constraints and potentials of the market in the Okavango Delta, Botswana. Fish marketing in the Okavango Delta was mainly constrained by a small market, lack of transport, high transaction costs, lack of access to credit, insufficient storage facilities, lack of business and management skills,
lack of adequate fishing equipment, and lack of preservation facilities. The majority of fishers had no means of cooling during transportation and they used to sell fish during the cool hours of the morning to reduce the risk of spoilage.

The problems faced by the farmers in case of marketing of farmed fish in inland Tanzania were poor storage facilities and means of transport, low selling price, few buyers of fresh farmed fish, lack of knowledge to prepare and preserve fish etc. (Wetengere 2011, 145).

Different marketing constraints of fish marketing system of Swarighat, Dhaka were lack of modern hygienic fish landing centers, shortage of adequate ice-plants with sufficient capacity, cold and freezer storage, lack of handling and preservation facilities, inadequate transportation and distribution facilities, lack of insulated and refrigerated fish vans, etc. (Alam et al. 96). The study further revealed that the consumers had to pay higher price due to the participation of too many intermediaries in the marketing channel, but the actual fishers never got the actual price for their products and major portion went to the intermediaries. The study suggested establishment of more ice-plants, cold-storage and preservation facilities, introduction of insulated and refrigerated fish vans and fish carriers to maintain cold-chain during transportation, improvement of existing fish market structure, and establishment of modern wholesaling facilities.

There are no organized fish marketing policies that cover price structure and marketing outlets among others which are related to both export and domestic markets (Mohite and Mohite 35-36). The domestic fish marketing system in India is neither efficient nor modern and is mainly carried out by private traders with a large number of intermediaries between producer and consumer. This leads to reduction in the fisherman’s share in consumer’s rupee (G. Kumar et al. 2008, 345). Hence, efforts are necessary to convey the prices prevailing at the nearby fish markets for various species daily through appropriate media. Better hygienic conditions of fish markets can not only attract more consumers to the markets, but also build confidence among buyers to consume fish. The study suggested that modern retail outlets have to be promoted vigorously through public-private partnership in every major city so that fish consumption becomes an easier proposition in days to come.
A study was carried out by Upadhya, Roy and Dhanze (2011, 15-18) in one wholesale market and four retail markets in Agartala, Tripura. The study revealed that there were inadequate infrastructural facilities in terms of auction/selling platforms, market sheds, power supply, drainage facilities, water supply in both wholesale and retail markets. The study emphasized on intensive investigation on dry fish marketing covering entire Northeast region to bridge the gap on available information on demand of dry fish, seasonal variability in prices and species availability, source of supply of dry fish and employment opportunities in Northeast region. The study stated that though much progress has been made in Indian fisheries marketing system, especially in the private sector, much remain to be done with regard to improving the performance of the fish marketing system in India.

There exist some marketing constraints in fish marketing systems of Assam too. Lack of adequate transport and communication facilities in Assam has constrained the sale of fish to limited outlets and prevents the growth of specialized marketing (M. Goswami, Satbiadbas and U. C. Goswami 146-55). In addition to this constraint it was reported that insufficient credit and differential pricing policies were emerging as hindrance to the market development. The study emphasized on infrastructure development by means of providing ice plants, storage and processing facilities and improvement in transportation system for improvement of marketing system in the State. The authors also suggested motivating fish farmers/fishermen to start fish production including seed production and marketing through cooperative system.

Shil and Bhattacharjee (80-88) reported that fish markets in Barak Valley of Assam are not well organized and there is need to reform the markets by introducing proper marketing techniques. Absence of proper transportation, insufficient parking facilities, inadequate storage facilities, poor power supply, lack of proper drainage and water supply, lack of credit facilities, seasonal differentiation of price in the markets, lack of assistance from Municipal Board are some other bottleneck for development of fish marketing in the study area.

Several organizations have been set up at the national level to promote the fisheries sector and help the fishermen. These include organizations such as the National Cooperative Development Corporation (NCDC), the National Federation of Fishermen’s
Cooperatives Ltd. (FISHCOPFED) and the National Fisheries Development Board (NFDB). NCDC’s fisheries related activities include creation of infrastructural facilities for fish marketing, ice plants, cold storages, retail outlets, etc. FISHCOPFED promotes fishery cooperatives and assists fishermen to market their produce efficiently through hygienic retail fish centres in metropolitan cities thereby providing remunerative prices to fish farmers. NFDB is promoting domestic fish marketing through modernization of wholesale markets, establishment of cold chains, popularization of hygienic retail outlets and technology upgradation. Fish is not a notified commodity under the APMC Act of 1966, leading to the exploitation of fishermen by commission agents. Unlike other agricultural commodities, where commission charges are paid by the traders, in fisheries, all commission charges are paid by fishermen. This reduces the share of fishermen in consumer’s rupee and makes fishing a non-viable venture. Suitable modifications are to be introduced in the Act to overcome this situation.

Different studies suggested different measures to overcome the constraints of marketing of fish. Some of the important measures suggested for overcoming constraints and problems of marketing in India by the FAO report (FAO 2008: Fisheries Circular. No.1033, 24-25) are as follows:

- Modern fish markets should be established in major urban centers
- Development of a legal framework for the establishment and management of fish markets
- Culture of suitable species/new species of fish should be encouraged
- The development of value-added products from low value fish species should be urgently promoted
- Women self-help groups should be promoted
- Proper training in the techniques of production and marketing should be provided;
- Fish as a healthy food needs to be popularized among consumers. A special campaign, similar to the campaign currently undertaken for dairy and poultry products, to promote eating of fish is necessary
- It is necessary to formulate a nation-wide fish marketing strategy with the specific objectives of helping fishers to market their products at a remunerative price and to supply safe and quality fish and fish products to consumers. The example of the
cooperative structure of the small-scale dairy industry in India should be followed;

- In order to promote the marketing of frozen fish products, the excise duty on these products should be waived. Value-added tax (VAT) should also be reduced;
- The improvement of fishery statistics, especially with regards to inland fisheries landings and marketing of fish from various sources are necessary.

Though there are a number of organizations and policies relating to promotion of fish marketing in the country, there is a need to formulate a uniform market policy for fishes so that it becomes easier in operation and regulation, which will not only improve the level of country’s fish production but also availability to the consuming population, ensuring a remunerative price to the fishers at the same time (G. Kumar et al. 2008, 345-354). G. Kumar et al. (2010, 495-504) suggested promoting institutions like SHGs, producer/fishermen associations, cooperatives, etc. and allowing the entry of private agencies with appropriate regulatory mechanism to improve the efficiency of fish marketing in the country.

In areas where aquaculture has developed to a significant level, the general trend is to increase public awareness on the quality of farmed products and use this as a selling criterion (Pillay and Kutty 274-83). Many countries have established specialized sales federation, cooperatives or similar organizations to reduce the number of intermediaries involved, harmonize marketing within the country and compete effectively in export markets. Such organizations are able to undertake useful promotional and publicity programmes and thus improve sales.

2.4 Research Gap

The literature review reveals that very little studies have been carried out on segmental variation in fish consumption pattern in India in general and Northeast India in particular. No documented information about fish consumption pattern in Assam has been found. On the other hand, review of literature on marketing of fish showed that most of the studies are concentrated on selling concept rather than the marketing concept. The marketing concept calls for understanding consumer needs and producing products to fulfill the identified needs. It calls for building a relationship with the customers so that their satisfaction can be maximized. Moreover, it has been found that most of the studies
looked in production constraints of fish and consumption pattern of the population independently. But logically, these two aspects go hand in hand. Hence, there is a need to develop production and marketing strategies based on the consumption pattern and preference of the consumers. At the same time perception of the consumers regarding fish and fish products have to be identified so that communication to the consumers becomes meaningful.

2.5 OBJECTIVES

To fulfill the research gap, the study was undertaken with the following objectives-

1. To examine the segmental variation in consumption and preference patterns for fish among different classes of population.
2. To investigate the constraints and exploring possibilities of marketing fish as per consumption and preference patterns of the consumer.
3. To formulate effective strategies for marketing of fish in Assam.

Scope of the study

The study is restricted to the State of Assam. Though consumption and preference patterns for fish vary with variation in many demographic, geographic and psychographic variables the consumption and preference patterns for fish in Assam may be different from that of other States. Hence, marketing strategies developed for Assam may not be applicable to other States.

Limitations of the study

The study has been conducted using sample survey method. Though utmost care has been taken to reduce biasness in sample selection, hundred percent randomness could not be maintained due to lack of sampling frame in certain areas.

Secondly, most consumers do not maintain book keeping regarding expenditure of various heads. They had to rely on memory to respond to some portions of the questionnaire. Though same has been taken in the form of cross checking, some approximation may present in the data.

Thirdly, there have been difficulties in explaining constraints of fish culture to the researcher by fish farmers who are less educated. This has been tried to overcome by taking help of local people.