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Supply Chain Management in Fishing Industry: A Case Study

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Abstract— **The empirical research, based on primary and secondary data, represents the overall fish distribution system of Bangladesh with particular emphasis to the extent of value addition during the process of distribution. The data depicts the dynamics of relevant value-chains in fishing industry in Bangladesh that presents one of the developing countries in the world. This study encompasses the supply chain model of distribution of the fishing industry. The researchers demonstrate the distribution channel and the linkages between the relative benefits obtained as well as the outcome from the chain. This paper, which was based on the survey research technique, also highlights comparisons between domestic and regional value-chains with the view to understand better how developing countries can increase the value derived from their fishery resources. Consequently, the authors defined some recommendations and propose a new model which is free from the influence of the intermediate parties of any private sector and can reduce the usage of preservatives and increase the economical growth of all stakeholders' those are involved in the fishing industry.**

Keywords—*supply chain management (SCM), fishing industry, distribution channel, suppliers, customers, transportation*

1.   Introduction

A supply chain is a network of facilities and distribution entities (Suppliers, manufacturers, distributor, retailers) that performs the function of procurement of raw materials, transformation of raw materials into intermediate and finished products and distribution of finished products to customers [7]. Fig. 1 illustrates the basic supply chain.

In particular, SCM is the process of effectively managing the flow of materials and finished goods from retailers to customers using the manufacturing facilities and warehouses as potential intermediate steps[15].All stages involved, directly or indirectly, in fulfilling a customer request includes manufacturers, suppliers, transporters, warehouses, retailers, and customers for Manufacturing Industries. The main purpose of the supply chain is to maximize overall value generated. SCM engages the management of flows between and among stages in a supply chain to minimize total cost [9].
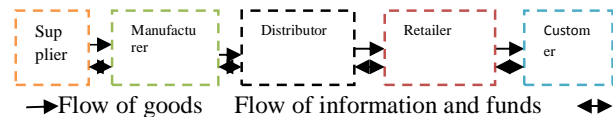

Figure 1. The Basic Supply Chain [2]

Generally a traditional food industry supply chain consists of the producer, processor, wholesaler, exporter, importer, retailer and consumer. There are mainly three sets of reasons why supply chain analysis is important and crucial now-a-days: i) division of work procedures and competitiveness has become increasingly important iii) entry into global markets which allows for sustained income growth and pulling the best out of globalization requires an understanding of dynamic factors of the whole supply chain.

2.   Literature Review

Fish is a highly perishable commodity and its quality deteriorates very rapidly. Production and consumption areas are also widely separated. Production of cultured fish can be increased by making best utilization of the existing domestic resources through modern and scientific method of fish culture and fishing techniques. Large number of different types of water bodies both inland and

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marine makes Bangladesh one of the most suitable countries of the world for freshwater aquaculture. The freshwater inland aquaculture production in Bangladesh is the fifteen highest in the world [1]. The total annual fish production is estimated at 226863 tones in [1].This sector provides full-time employment to many professional fishermen and fish farmer, and many part-timers which is a good number of total populations. The distribution system and structure is one of the main sectors of fish production system of any area. From fisherman to consumer it is a chain of various systems involved in distribution. The price of fish is generally determined by its distribution system. Four types such as primary, secondary, intermediary and consumer market of distribution systems are observed in the process of distribution of fishes in Bangladesh. Export of fish has increased during the last decades. In this case the dried coastal and marine fish, the marine finfish and organism even other than fish, could be on the top of the list of export earning items. Bangladesh exported fish and fisheries products worth Taka 32,106 million in 2009-10 of which frozen fish and shrimp shared more than 90% of the total exports of the fishery products and attained 3.7% of total export earnings of Bangladesh [1]. The total annual fish production is estimated at 2.90 million tones in 2010-11 of which 1.35 million tones (46.62%) are obtained from inland aquaculture, 1.02 million tones (35.53%) from inland capture fisheries, and 0.52 million tones (17.85%) from marine fisheries [3]. In the agro-based economy of Bangladesh, the fisheries sector contributes near about 58% of animal protein to the daily diets of the population, about 3.74% to GDP, 4.04% in export earnings. Since fish production in Bangladesh is increasing over the years, its discarding pattern is very important as growers, wholesalers, retailers and consumers- all are affected due to value addition in the distribution process. This study is conducted to examine the fish distribution system, supply chain and value addition to determine the pulling factors for enhancing production, processing and distribution of fishes in Bangladesh.

This paper analyzes how market intermediaries operate along supply chains, and demonstrates how the revenue is distributed over the entire supply chain and expected to provide some useful information about traders, fish farmers and policy makers to formulate programmes and policies

related to the concerned fish production and distribution.

The supply chain demonstrates the full range of activities which are required to bring a product or service from conception, through the different phases of production and delivery to final consumers [14]. Supply chain analysis looks at every step a business goes through, from raw materials to the end-user. The goal is to deliver maximum value for the least possible total cost [10]. Market chain analysis aims to provide information on profitability for the various agents along the supply chain [4]. The supply chain is viewed as a single process. Responsibility for the different divisions in the chain is not fragmented and transferred to functional areas such as manufacturing, purchasing, distribution, and sale [6]. Supply chain surplus is the total profit shared by all the stages and intermediaries. The greater the supply chain surplus the more successful is supply chain. Supply chain success is measured by its overall surplus not by the profit at each stage. There are six drivers in the supply chain structure:

Facilities: Places where inventory is stored, assembled, or fabricated and production sites and storage sites.

Inventory: Inventory of Raw materials, work-in-progress products, finished goods within a supply chain.

Transportation: Moving inventory from point to point in a supply chain and combinations of transportation modes and routes.

Information: Data and analysis regarding inventory, transportation, facilities throughout the supply chain**.**

Sourcing: Functions that a firm performs and functions that are outsourced.

Pricing: Price associated with goods and services provided by a firm to the supply chain.

3.   Methodology

The analysis of this research is based on primary data, i.e. survey, and secondary data, including online databases, digital libraries, books, journals, Conference papers, etc. Extensive SCM research papers of academicians and practitioners are evolved from renowned international journals namely PROQUEST, EMERALD, EBSCO, IEEE, ACM, JSTOR, Science Direct, etc.

Primary data was collected from fish market agents, fisherman, aratdar, nikari, faria, retailer by taking interviews. These surveys involve the inspection of

the study areas in terms of fish distribution and selling systems. Table 1 defines the sample size as well as sample distribution. In this study, random sampling technique was used for selecting the sample. Total sample size of the study was 124.

4.   Discussion

4.1 Distribution channel

SCM is a concept whose primary objective is to integrate and manage the sourcing, flow and control of materials using a total systems perspective across multiple functions and multiple tiers of suppliers [13].

Distribution functions may be defined as major specialized activities performed in accomplishing the distribution process of equalization. Distribution system plays the connecting link between the first stage fish farmer and the last stage consumers. By the means of the channel members (Local traders, Fishers or fish farmer, Aratdars, Mahajans, Whole seller, Distributor etc.) the harvested fisheries transfer from producers to consumers. Fish distribution channel is almost entirely managed, supported, financed and controlled with rules by traditional and skilful middlemen. Tradition and the strength held by separate channel members who affect the distribution system and the fish farmers are very sensitive to this as they never directly communicate with consumers. Fishermen and other paikers have no proper education or knowledge to make the best out of the supply chain management.

The fish farmer cannot communicate with the market directly or sell to households because the market communication is mainly made by the middlemen and the wholesaler will not permit this in most of the time and the aggressive behaviour of retailer towards the fish farmer who sells their fishes directly to households. This situation involves lots of intermediaries in the fish supply chain.

Live pangas and tilapia have longest supply chain among fishes such as six intermediaries (fish farmer, nikari, paiker, aratdar, retailer and consumer) and four intermediaries (fish farmer, aratdar, retailer and consumer) respectively. Supply chain of hilsha have six intermediaries which are fish farmer, aratdar, paiker, again aratdar, retailer and consumer for the distant

domestic market. The overseas hilsha distribution channel involves four intermediaries namely, fish farmer, aratdar, LC paiker and overseas consumers. Domestic supply chains for shrimp distribution involve four intermediaries (shrimp farmer, aratdar, retailers and consumer) for local market and five intermediaries (shrimp farmers, aratdar, paiker, retailer and consumers) for distant markets. The involved intermediaries are at most six, namely, shrimp farmer, aratdar, bepari, account holder, processing plant and overseas consumer.

Table 1. Distribution of Samples of Different Areas

	Munshiganj	Comilla (Daudkandi)	Dhaka	
Respondents	Pangas/	Pangas/	Pangas/	Total
	tilapia/ rohu/ catla/ Hilsha/ Shrimp	tilapia/ rohu/ catla/ Hilsha/ Shrimp	tilapia/ rohu/ catla/ Hilsha/ Shrimp	
Fishermen	10	5	0	15
Faria	0	0	5	5
Bepari	10	0	12	22
Aratdar	10	5	18	33
Paiker	15	4	16	35
Depot owner	0	0	0	0
Processing	0	0	0	0
Nikari	0	0	4	4
Retailer	0	0	10	10
Total	45	14	65	124

4.2 Characteristics of Intermediaries

Supply chain strategy includes "two or more firms in a supply chain entering into a long-term agreement; the development of mutual trust and commitment to the relationship; the integration of logistics events involving the sharing of demand and supply data; the potential for a change in the locus of control of the logistics process" [12]. Fish farmers and fishermen are the first stage in the fish distribution channels or supply chain of fish distribution channel. Nikari (informer) is a middleman who does not have the ownership of the product but gives information to the buyers and receive commission from fisherman and aratdars. Faria is another type of intermediary, is found in

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Hilsha distribution system who purchases a small quantity of fish from fishermen far away from the market and carry it to the terminal point and sell it to aratdar or retailer. Paikeri or bepari handles large volume of fish. They purchase fish from aratdar in the local market and sell them to the retailers. LC paiker (licensed trader/exporter) purchase hilsha fish from fishermen through aratdar and sell (export) their entire product to overseas market. Aratdars negotiate sales of fish on behalf of the producers. Aratdars arrange selling of fish through an auctioning system and receive a commission. Shrimp depot owners are the permanent shopkeepers having their own staffs in markets and act as the middlemen between farmers and commission agents. This group of traders mostly offers loans to farmers, in return for buying the shrimp at a pre-fixed price, which may be well below the market level. Account holders act as the commission agent. Retailers, the last intermediaries of fish distribution channel, do not have any permanent establishment but they have fixed places to sit in the market places or sell fishes with pot on head from door to door. It is seen that they have no idea about distribution system, modern technology or modern preservation system. However, they have no idea how they could wisely minimize their distribution costs.

4.3 Fish Market Structure & Activities Link to Buying and Selling Process

Places where buyers and sellers are brought together to buy or sell fish are generally referred as fish market. The market is performed only for a few hours in the early morning where traders are involved in fish trading from 3 am to 9/10 am. From the other markets of the city, the fish trading system in the market is unusual to a certain extent. In the open place, fish is mainly traded. There is no stall and preservation system for the traders but there is a fixed place.

Due to impact on overall costs, profit and market share, ''Supply'' is a shared objective of practically every function in the chain and is of particular strategic importance. SCM calls for a different point of view on inventories that are utilized as balancing mechanism of last, not first, resort. A latest approach is required integration rather than

interfacing [8]. In fish supply chain practices, there is a combination of series of functions that are performed by market participants like distribution agents, wholesalers, aratdars, retailer, exporter and fish farmer in order to transfer the products to the ultimate consumers both at home and abroad play vital roles.

The whole distribution of fish has been broken down into various parts such as buying and selling, auctioning, transportation, grading, packaging, storaging, financing, market information and pricing. An efficient distribution system is essential for earning fair profit for the fish's quality, fish farmers and traders.

4.4 Packaging

Bamboo, drum, boxes, plastic sack, rope and polythene are used by farmers, paikers and retailers for fish packaging. Aratdars use plastic drum to transport fish in live form. Sometimes steel, plastic sack and wooden box are used in fish distribution by paikers, beparis and LC paikers. Box made of cork sheet is widely used by account holders and processing plant owners in shrimp distribution and LC paikers in hilsha fish distribution. The packaging system has been demonstrated in Table 2.

4.5 Grading

Grading is the basic function of sales transactions and is defined as the classification of products according to some standards or measures [11]. Most fishes are graded on the basis of size and weight. Sometimes location of the fish set the price, i.e. Hilsha's location is very notable factor in the pricing. Like Hilsha from padma river is higher price than other places. Fishes are graded into three categories namely, small, medium and large depending on size and weight. Shrimp has a different grading system than other fish. Medium and large size fishes are separated by species and size and are sold in hali basis and most small size fishes are sold in maund basis. Occasionally, small fishes are sold by weighing with the eye estimation or local units of measurement and metric system are also used. The grading system has been described in Table 3.

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Table 3. Grading of Different Species of Fishes

Species	Basis	Specification
Rohu	Weight	Large: 2.5 kg above, Medium: 1.0 kg to 2.5 kg, Small: Less than 1 kg
Catla	Weight	Large: 3.0 kg above, Medium: 1.5 kg to 3 kg, Small: Less than 1.5 kg
Tilapia	Weight	Large: 250 gm above, Medium: 150 gm to 200 gm, Small: Less than 150 gm
Pangas	Weight & Size	Large: 4 kg above, Medium: 3 kg to 1.5 kg, Small: Less than 1 kg
Hilsha	Weight & Location	Large: Above 1 kg, Medium: 800gm to 1 kg, Small: Less than 800 gm Catching from Padma river, Catching from sea

Table 2. Packaging System of Fish Distribution

Packaging System	Using materials	Used by
Basket	Bamboo, Rope and Polythene	Fishermen, Paiker and Retailer
Drum	Plastic	Fishermen, Paiker Retailer, Aratdar
Steel box	Steel sheet	Paiker, Bepari
Wooden box	Wood, Polythene	Bepari, Paiker, LC paiker (hilsa)
Sack	Plastic	Paiker, Retailer, Aratdar
Box	Cork sheet	LC Paiker (hilsha), Account holder, Processing plant (shrimp)

4.6 Handling, Transport& Landing of Fish

Transportation is a basic function of making goods available at proper place. Perishable goods must be moved as early as possible from the production

centre to the consumer. The transportation system of fish determines the purity or hygienic condition of it because with the change of time fish will perish rapidly. The fish farmers and intermediaries use various kinds of transports such as van, rickshaw, truck, passenger bus, pickup, Nasimon (locally made pick-up type van for transporting passengers and goods), CNG etc to transfer product from the producing areas to the consumers. Its value decreases if it requires too much time to transfer fish from the main point to the market. For carrying fish over larger distances from the production point to the market mainly river transport is used but fishes from local area are transported by road.

There are two types of formation for fish's dead fish and live fish. Normally Shol, Pangas, Koi, Shing, Magur are transported as live form in a drum filled with water. Dead fish carried to the market in boxes and Plastic sacks covering with ice. Mainly this type of fish is transported by truck. Fish has carried into and out of the market by head-load; baskets involve unnecessary handling as there is no access of vehicles. There is no landing centre, proper auction sheds, packing shades, landing terminal and proper drainage or hygienic facilities. It is done mainly in Kawran Bazar or Showari Ghat, which located at Dhaka, in unhygienic condition. In general, fishes are arrived from Cox's Bazar, Teknaf, Chittagong, Mohangang, Chadpur, Barisal, Kuliarchar, Jessor, khulna, Mymensingh, Keranigong, Munshiganj and Gazipur etc where there are landing and distribution centers exists for the greater quantity of fish supply. Figure 2. demonstrates mode of transport used for pangas and tilapia
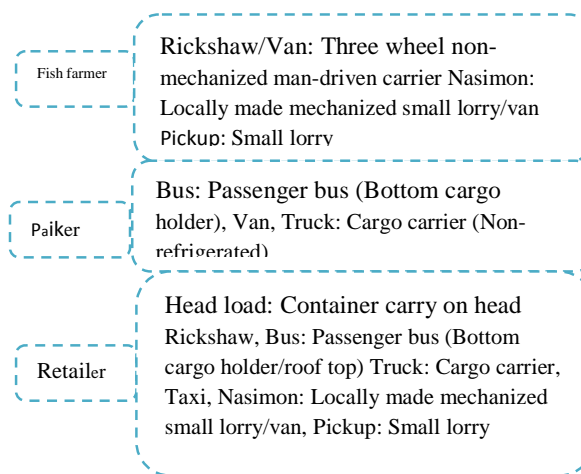
Fish farmer — Rickshaw/Van: Three wheel non-mechanized man-driven carrier Nasimon: Locally made mechanized small lorry/van Pickup: Small lorry

Paiker — Bus: Passenger bus (Bottom cargo holder), Van, Truck: Cargo carrier (Non-refrigerated)

Retailer — Head load: Container carry on head Rickshaw, Bus: Passenger bus (Bottom cargo holder/roof top) Truck: Cargo carrier, Taxi, Nasimon: Locally made mechanized small lorry/van, Pickup: Small lorry

Figure 2. Mode of Transportation for Pangas and Tilapia

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Figure 3 illustrates the mode of transportation used for Hilsha fish

Fisherman	Head load: Container carry on head Boat, Van
Mahajan	Truck: Cargo carrier (Non-refrigerated), CNG, Taxi Pickup: Small lorry
Paiker	Truck: Cargo carrier (Non-refrigerated), Van, Pickup
LC Paiker	Truck: Cargo carrier (Non-refrigerated) Pickup: Small lorry
Retailer	Head load: Container carry on head Rickshaw/Van: Three wheel non-mechanized man-driven carrier Boat: Non-
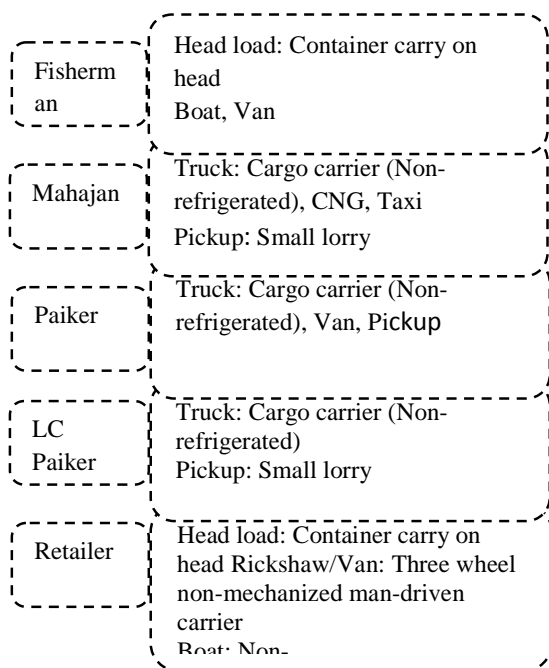
Figure 4. Mode of Transportation of Hilsha

Figure 4 illustrates mode of transport used for movement of shrimp

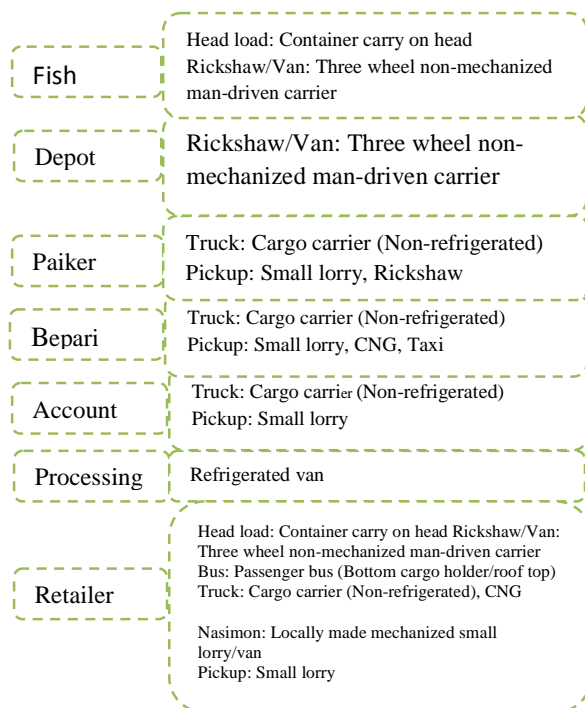| Fish | Head load: Container carry on head Rickshaw/Van: Three wheel non-mechanized man-driven carrier |
Depot	Rickshaw/Van: Three wheel non-mechanized man-driven carrier
Paiker	Truck: Cargo carrier (Non-refrigerated) Pickup: Small lorry, Rickshaw
Bepari	Truck: Cargo carrier (Non-refrigerated) Pickup: Small lorry, CNG, Taxi
Account	Truck: Cargo carrier (Non-refrigerated) Pickup: Small lorry
Processing	Refrigerated van
Retailer	Head load: Container carry on head Rickshaw/Van: Three wheel non-mechanized man-driven carrier Bus: Passenger bus (Bottom cargo holder/roof top) Truck: Cargo carrier (Non-refrigerated), CNG Nasimon: Locally made mechanized small lorry/van Pickup: Small lorry

Figure 4. Mode of Transportation of Shrimp

4.7 Ice Supply & Cold Storage

Highly perishable supplies like fish needs extremely specialized storage facilities depending on the seasonal demand. Only in processing plant of the shrimp industry use proper storage systems in order to export to the world market. Mostly, crushed ice is used at peak season, there is clearly a deficiency of ice and this is reflected in the prices charged for the same. Only river water is used for making ice which is often not chlorinated, therefore, it looks so muddy and opaque. Improper ice supply & cold storage system are the main reasons for using preservative chemical.

4.8 Supply Chain

4.8.1 Supply Chain of Rohu, Telapia, Katla, Pangas:

Three major supply chains are identified for pangas, katla, rui, tilapia:

Supply Chain 1: Fish farmer-Nikari-Paiker-Aratdar-Paiker-Retailer-Consumer.

Supply Chain 2: Fish farmer-Aratdar-Paiker-Retailer-Consumer

Supply Chain 3: Fish Farmer- Nikari- Aratdar-Paiker-Retailer-Consumer

Fig.5 illustrates the supply chain of distribution of pangas, rohu, catla, tilapia in Bangladesh.

4.8.2 Supply Chain of Hilsha:

Major Supply chains of Hilsha are as follows:

Supply Chain 1: Fish farmer-Aratdar –Paiker– Aratdar -Retailer- Consumer (Distant Market)

Supply Chain 2: Fish Farmer-Aratdar-Paiker-Retailer- Consumer (Local Market)

Supply Chain 3: Fish Farmer-Aratdar-Retailer-Consumer (Local Market)

Supply Chain 4: Fish Farmer-Aratdar-LC Paiker-Consumer (Overseas Market)

Faria (informer) is involved in different stages at the distribution network and there are different aratdars and paikers are also involved. Fig.6 illustrates the supply chain of Hilsha in Bangladesh.

4.8.3 Supply Chain of Shrimp:

Shrimp is sold in both domestic and overseas market. Major supply chains of shrimp are shown below:

Overseas Supply Chain of Shrimp:

Supply Chain 1: Fish Farmer- Aratdar- Bepari- Account Holder- Processing Plant-Consumer

Supply Chain 2: Fish Farmer- Depot Owner- Bepari- Account Holder- Processing Plant- Consumer

Supply Chain 3: Fish Farmer-Account Holder- Processing Plant-Consumer

Supply Chain 4: Fish Farmer- Aratdar-Depot Owner- Account Holder- Processing Plant- Consumer

Domestic Supply Chain of Shrimp:

Supply Chain 5: Fish Farmer- Aratdar- Retailer- Consumer (Local Market)

Supply Chain 6: Fish Farmer- Aratdar- Paikeri- Retailer-Consumer (Local Market).
Fig.7 illustrates the different supply chains of Shrimp.

4.9 Price of Fish & Value Addition

Price of fish is fixed neither by the government nor by the fisheries co-operatives but price of fish influenced by two major factors- the price at which the wholesaler buy their fish from the mahajans at auction and the amount of profit they intend to gain and it is fixed through supply and demand interaction. In addition, a new distribution chain have been seen nowadays which are the middlemen based on the extreme misuse of the fish farming communities by setting up an illogical (auction) pricing policy through intermediaries' at different levels. The price of fish varies irregularly. In this market, the main buyers are retailer.

The price of fish is usually set through open auction by the Aratdars, Mahajans and wholesalers. According to rules of auction system, the price for an allotment is settled through competitive bidding. Generally the payment is made in full and cash. Aratdars sometimes retains a small quantity of fish as commission. The price is also fixed by direct bargaining between seller and expected buyers. The

potential buyer begins with a price which is lower than that of their minimum buying capability. Through several rounds of bargaining, the price is reached at a satisfactory destination to both parties. Production area of the fish tends to influence the price of the fish. There is a variation of price between fishes produced in Bangladesh as Bangladeshi fishes are liked better and sold at a higher price than fishes from other countries.

Value is added when products pass through different stages and move from one intermediary to another. The different costs are added during fish transportation, packaging, icing, wages (for people who help to do packaging, icing etc.), aratdar's commission, informer's charge, storage cost, telephone bills, personal expenses, tips- donation, wastage, government tax. Top three expenses are transportation, aratdar's commission, and storage. Depending upon the estimated cost of transportation, preservation, icing and money paid to moneylenders of the market, fishermen share of the prices become different which is much lower than the selling price to the consumer.
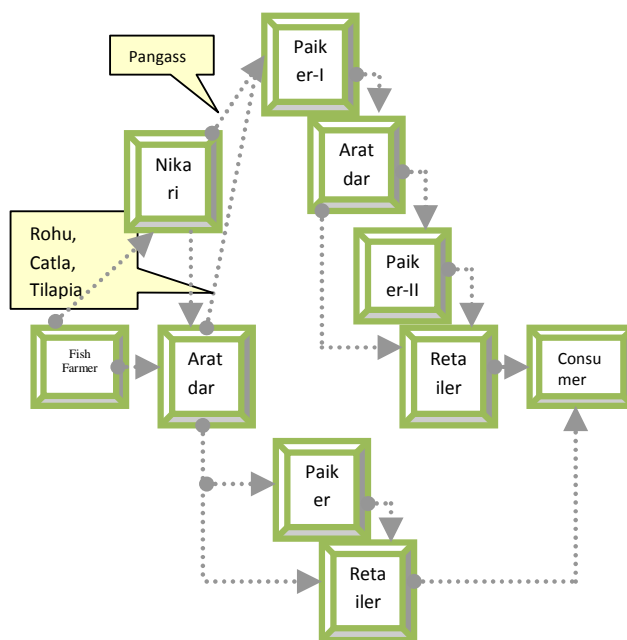

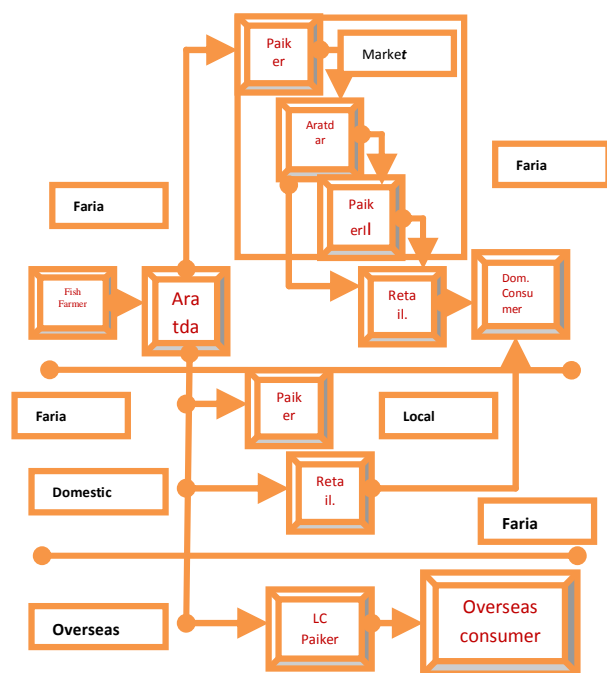**Figure 5.** Supply Chains of Pangas, Rohu, Catla, Tilapia in Bangladesh

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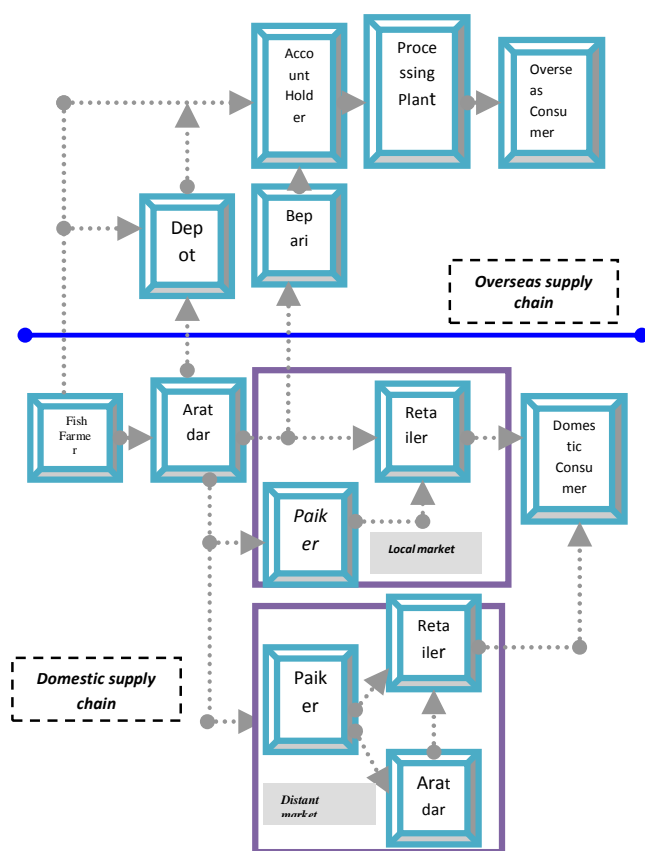**Figure 6.** Supply Chain of Hilsha in Bangladesh

Figure 7. Supply Chain of Shrimp in Bangladesh

4.10 Storage

The storage function is primarily concerned with making goods available at the desired time. It enables traders to obtain better prices for their products at a better quality.

In fish distribution system there is no particular storage centre. As it adds cost however no refrigerated van is used in Bangladesh to transport fish. Live fish is transported from one place to another place using water in the plastic drums. If the distance is long, water is then changed twice or thrice depending on the distance. Dead fish is transported using plastic sack covered with ice cubes; their use of ice in fish is not hygienic for which quality of fish gets affected. While retail selling, some use ice and some do not. The storage facilities can help buyers and sellers to control the wide fluctuation of prices between peak and lean seasons.

4.11 Constraints of Fish Distribution

In fish distribution system from the infrastructural constrains lack of hygienic fish landing centres, illiteracy, ignorance towards fishermen, lack of awareness and poor economic condition of the fishermen, cold storage, transportation and preservation facilities etc are the most severe. Problems are particularly serious in certain areas where inadequate transportation and distribution facilities, lack of insulated and refrigerated fish vans, electricity, wastage of ice and where open trucks are the main fish carriers. Lack of proper knowledge of modern techniques in controlling fish farms, ignorance or careless in managing personal hygiene of the worker, isolation of fishermen from their wholesale market etc are also regard as the constraints of fish distribution.

Dominance of mahajans, aratdar in capture fishing is so firmly established that it is difficult to introduce any new arrangement. The consumers have to pay higher price due to the participation of too many intermediaries in the distribution channel, but the actual fishermen do not get the perfect price for their products and the major shares go to the intermediary's pocket. The wholesale market is not in a good condition also. Lack of adequate drainage, lack of facilities for washing down, dirty floor, lack of toilets, lack of auction place at peak period, lack of mechanical weighing equipments etc. are regarded as the main constrains for efficient

fish distribution system in this market at one hand. People are not eager to buy fishes from market because of unhygienic environment.

5. Findings

Fish distribution system in Bangladesh has been organized by the private sector. Involvement of some intermediaries seems to be unnecessary whose presence just adds a cost to the consumer and a loss to the fishermen. Moreover, the extra involvement of intermediaries keeps fishermen and markets separated not allowing them to be market responsive.

Absence of road networks, transports and landing points has created opportunities for some intermediaries who bridge the gap and make some money, which are a loss to the fishermen and an additional cost to the consumers. Product quality is also affected due to the absence of landing centers and planned transport network. There is neither any effort for organized cooperative distribution facilities nor there is any mechanism for the small-scale fishermen to quickly sell their production to an organized outlet.

Many of the fishermen work on a daily payment basis. The fisherman without capital (boat, nets, money for fishing trip etc.) do not have any ownership to sell the fish caught by him. Decision to sell is taken by the organizers or the suppliers of capital. As a result, fishermen get lower share of the consumer's price as mahajans (give loans) get a higher portion of the consumer's Taka. This scenario is probably not going to change in the very near future if the distribution network is not restructured.

Fig.8 demonstrates a new model for fish distribution. In this system there will be area wise common landing centre with transportation facilities of cold storage. Fish farmer or fishermen sell their products to this point at proper grading system. Paiker, retailer will collect fish from that common center with proper transportation facilities. There will be licensed system market for paiker where proper grading system will be followed. Retailer can buy from licensed paiker market or from landing center whereas no private sector can control the fish market, however, it can lessen the usage of chemical. An emerging new phenomenon in fish distribution in Bangladesh is

the availability of fish in super markets. New super markets are not only confined in the capital city, its network is being expanded in many other districts of Bangladesh. The fish in the super markets are usually of better quality in terms of freshness as fishes are kept chemical-free. Proper icing and refrigerated boxes are maintained for fish being sold. Live fish are also sold at these super stores, i.e. Shopno, there is an own aquarium system. They have made contract growers and suppliers at the production points, which directly carry fish from the arats to the super stores. This arrangement can made the distribution channel more shorter if they can make a deal with a landing center and thus reduced the number of intermediaries and cost.
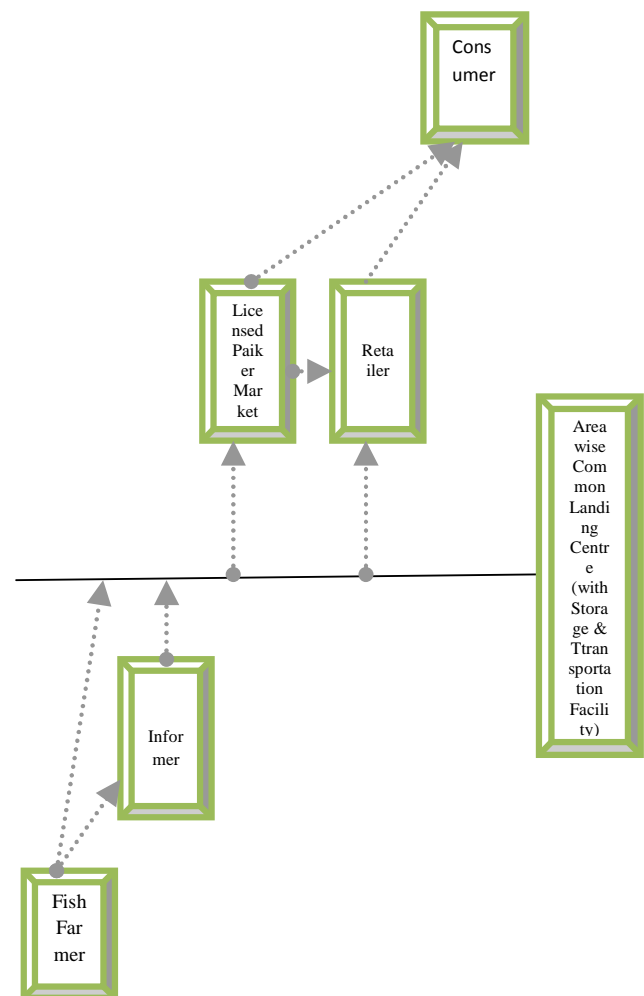

Figure 8. Proposed Model for Fish Distribution

Specific suggestions which are needed to establish to improve the distribution system are as follows:

- Establishment of proper cold-storage and preservation facilities.

- Using insulated and refrigerated fish vans and fish carriers to maintain cold during transportation.
- Improvement of existing fish market structure.
- Improvement of fish transport, handling facilities.
- Establishment of modern wholesaling facilities.
- Establish hygienic condition, drainage, washing facilities in the market
- Using of mechanical weighing equipment.
- Increasing fish supply through improved culture practice.
- Socio-economic development in loan system.
- Financial assistance.
- Inspection system in the fish market
- Checking price system in the Aratdar by Government.

6.   Conclusion

Though fish distribution in Bangladesh is overwhelmed with a number of unresolved issues, there have been a number of positive changes that are expected to improve fish distribution environment in the country.

- The shift from subsistence to commercial fish farming,
- Emergence of super-markets.

For better fish distribution, with the private sector government should also play active role in providing physical facilities like refrigerated storage, refrigerated vans, good market places with related facilities like water, ice, cleanliness, electricity, drainage facilities and sitting arrangements etc. To ensure fish quality government needs to start inspection system at the fish market. Similarly, it is also the responsibility of the government to see that consignment can reach the destination without requiring paying unnecessary tolls and maintaining quality. If there are proper landing centres with cold storage facilities the perish ability of fish could be checked and this could reduce post harvest loss and provide better price for the fishermen.

This paper highlights the structured model of fishing supply chain management to reduce the cost and usage of chemical, therefore, this research provides a novel approach to developing and assessing supply chain management in fishing distribution. The proposed model would unlock further frontiers for the Government, Policy makers, Investors to review their performance and apply this proposed model for the well-being of the fishing industry

References

[1] Bangladesh Bank, 2011. Annual Report of Central Bank of Bangladesh 2009-2010, http://www.bangladesh-bank.org/

[2] Chopra, S. and Meindl, P., Supply Chain Management, Prentice Hall, NJ,2001

[3] DOF 2011. Fishery statistical yearbook of Bangladesh 2010-2011. Fisheries Resources Survey System, Department of Fisheries, Dhaka, Bangladesh.

[4] Ferris R.S.B., Collinson C., Wanda K., Jagwe J. and Wright P., Evaluating the marketing opportunities for shea nut and shea nut processed products in Uganda,2001

[5] FAO 2011, Review of the status of the world fishery resources.

[6] Habib, Dr. Md. Mamun, *"Supply Chain Management: Theory and its Future Perspectives",* International Journal of Business, Management and Social Sciences (IJBMSS), 2010,Vol. 1, No. 1, ISSN 2249-7463

[7] Habib, Md. Mamun, *"Supply Chain Management (SCM): Theory and Evolution"* Dr. Md. Mamun Habib (Editor), "Supply Chain Management – Applications and Simulations"*,* InTech Open Access, Croatia, 2011,ISBN 978-953-307-250-0

[8]   Houligan, John B, ''International Supply Chains: A new Approach,'' Management decisions,1980,Vol.26, No.3, pp 13-16

[9] Habib, Dr. Md. Mamun, "*Supply Chain Management for Academia - An Integrated Tertiary Educational Supply Chain Management (ITESCM)",* LAP Lambert Academic Publishing, Germany, 2010, ISBN 978-3-8433-8026-3

[10] Investopedia2011. http://www.investopedia.com/terms/v/valuech ain.asp [Access: October, 2012]

[11] Kohls, R.L and Uhl, J.N, ''*Marketing of agricultural products''*,2005,9th edition, p-315

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[12] La Londe, B. J. and Masters J.M., Emerging logistics strategies: blueprints for the next century, International Journal of Physical Distribution and Logistics Management, 1994,Vol. 24, No. 7, pp. 35-47

[13] Monczka Robert, Robert Trent, Robert Handfield.,Purchasing and Supply Chain Management, Cincinnati, OH: South- Western College Publishing,1994

[14] Porter, M.E., Value Chain Analysis. Oxford Press Ltd. London, 1980.

[15] Sengupta, S. and Turnbull, J.,Seamless optimization of the entire supply chain, IIE Solutions,1996, Vol. 28, No. 10, pp