

Chapter 25

Supply chain management in fisheries

P Jeyanthi

Extension, Information and Statistics Division,
ICAR-Central Institute of Fisheries Technology, Cochin
Email:tvjeyanthi@gmail.com

The issue of the supply chain has been given much attention in recent decades, both in the academic as well as in the business world. Supply chain is defined as the sequence of processes involved in the production and distribution of a commodity. It is a network of producers, wholesalers, retailers, distributors, transporters, storage facilities and suppliers that participate in the production, delivery and sale of a product to the consumer.

Supply chain is a system which encompasses organizations, people, activities, information and resources involved in moving a product or service from supplier to consumer. It is a complex and dynamic supply and demand network of particular commodity/ product. Supply chain is a combination of three functions i.e. procurement of raw materials, production process and distribution. It is the process of evaluating the various stages of a business till it reached the consumers. It included evaluation of every step, starting from purchase of raw material and the processes and actors in between until deliver to the hands of consumer. It comprises of refining the activities with the aim to enriching consumer satisfaction level. The basic aim is to make the system more flexible that ultimately respond to better consumer preference.

Supply chain is comprised of various mid-chain actors viz., producers, processors, wholesalers, retailers, transporters, head load labourers and consumers. Supply chain mapping is the process of representing the selected supply chain either geographical or an abstract network design. This consists of various analysis i.e., stakeholders analysis, problem analysis, objectives analysis and strategy analysis. These analyses were aimed at identifying different individuals associated with the supply chain, cause and effect and means and end and also strategies for improving the existing supply chain.

Fish supply chain

Fish supply chain is the set of inter-dependent fishers, agents, processors, distributors, wholesalers and retailers including consumers in the line of transporting fish from landing centre (production point) to the consumer markets (market site). The landing centers serve as primary markets and the wholesale markets situated at a distance away from actual fish landing centers act as secondary markets. Retail markets are normally closer to the consumer. In some cases, wholesale markets have a separate retail section. New supply chain model is an advanced type of traditional supply chain which incorporated the feedback and information flow mechanism into chain. This is based on push strategy that includes consumer demand and feedback.

Supply chain as an integrated system

Supply chain is the integrated system of processes such as, acquiring raw material, transforming raw material into finished products, add value to the products, distribution and promotion of products and facilitate information exchange among functionaries. The supply chain contains two processes such as, material management (inbound logistics) and physical distribution (outbound logistics). Material management comprises of acquisition and storage of raw materials, parts and supplies. It supports material flow from raw material supply to distribution of finished products. Physical distribution encompasses activities related to better consumer services.

A supply chain comprises of multiple stakeholders (many suppliers, processors, third party distributors, retailers and consumers). They added that the success of supply chain depends heavily on availability of timely information that should be shared between members of the supply chain. The supply chain perspective involves the analysis of product and the actors (producers, wholesalers, retailers and consumers). This is faced with lot of issues and challenges i.e., trade, traceability, transparency, product quality & safety and consumer information. A supply chain has three key parts i.e., supply, manufacturing and distribution. These are explained below.

- **Supply** focuses on the raw materials supplied to manufacturing units.
- **Manufacturing** focuses on converting these raw materials into semi-finished / finished products.
- **Distribution** focuses on ensuring these products reach the consumers.

The main objective of the supply chain analysis is to produce higher quality and efficiency by co-operation rather than integration. The fish supply chain is a set of interdependent agents (fishers, processors, distributors and retailers) work together to convey the fish to the consumers. This has acquired complexity due to growth of international fish trade. The peculiarity of fish supply chain is that it does not concern of supply of products only, but it is a series of interconnected flow of goods, services, incentives and information between the market functionaries in the market chain. The co-operation and co-ordination of supply chain is essential for an effective supply chain. Now-a-days, the fisheries sector problems are becoming more complex due to multiplicity of challenges. This can be solved with the effective co-ordination of action and activities by the market functionaries. They added that both, the cooperation and coordination sides of supply chain management to be simultaneously handled.

The three parts of supply chain are the details about supply, manufacturing and distribution. The supply includes the details about raw materials that includes how, when and from where the raw materials will be supplied. Manufacturing part includes the details about conversion of raw materials into semi-finished products. At the last, the distribution part includes the network of market function till reach the consumers. In other view, it is the quantitative analysis of inputs and outputs between firms or markets along the chain which traces the complete sequence of operations from producer to consumer.

FAO (2005) highlighted two major tasks of any supply chain analysis. These are,
i. Mapping of the chain using flow chart: It includes overview of the chain, product flows and position of actors and their interactions.

ii. Developing of economic accounts corresponding to the actors: This is activity of quantifying the activities in terms of physical and monetary terms.

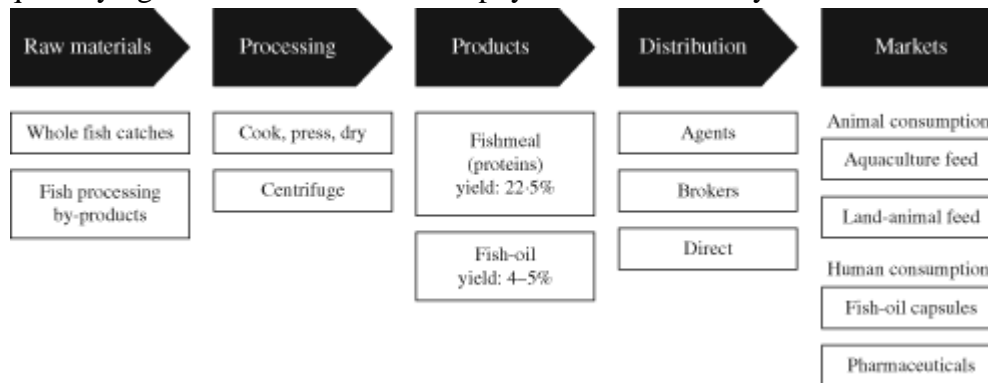


Fig.1 Steps in supply chain analysis

It is a key tool in improving operational efficiency. In general, the marketing channel of fish is very short due to the nature of perishability and non-availability of transparent price negotiation system. Generally, there are two types of measurements used to evaluate the overall performance of supply chain that includes financial and non-financial. The financial measures consider the economic and financial attributes and the non-financial measures considered operational attributes. Supply chain management is explained by various attributes, methods and techniques which is applicable to fishery products too.

Attributes used in SC performance analysis

There are certain attributes used towards explaining the supply chain and its performance. An attribute is defined as, “a set of metrics that are used to explain a competitive strategy to assess the supply chain performance. It is an ability of the SC ability for deliver products and services with good quality, on time, in precise amounts and minimizing costs”. There are certain attributes used in supply chain performance analysis viz., performance, delivery, information, processes, operations, service and cost.

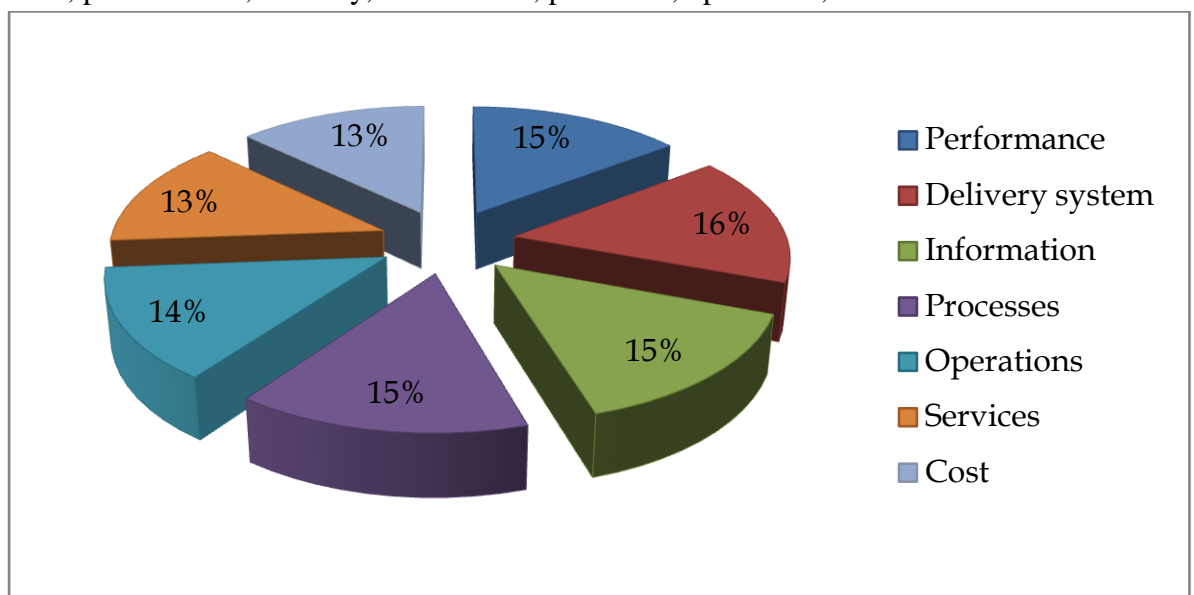


Fig.2. Attributes for supply chain performance analysis

Among the attributes, delivery system is the major attribute explained the supply chain performance followed by performance, information and processes involved in the supply chain.

Techniques used to evaluate the supply chain performance

Apart from attributes, there are certain techniques which are usually used to evaluate the supply chain. The popular techniques used in the analysis are furnished in the table below.

Table. 1. Techniques used to evaluate the supply chain

| Techniques | Utility (%) |
|---------------------------------------|-------------|
| Structural Equation Models (SEM) | 22 |
| Empirical analysis | 20 |
| Descriptive analysis | 18 |
| Simulation models | 10 |
| Analytical Hierarchical Process (AHP) | 5 |
| Regression Analysis | 2 |
| Discriminate Analysis | 1 |

The popular techniques used in supply chain analysis are structural equation models, empirical analysis, descriptive analysis and simulation models. SEM is a possible technique used to find causal relations among latent variables, where the performance is a dependent latent variable that is measure by using other variables. The second group of techniques is the empirical analysis, related to cases of studies in different sectors and this technique is very important because usually are referred to do comparisons among firms. Another big group of techniques is the descriptive analysis that includes measures related to central tendency and dispersion.

Methodology used

The multivariate analysis is the most widely used group of methodologies and the second place was occupied by cases of study. The third place is occupied by reviews. There are others techniques applied for supply chain performance but at lower scale are like quantitative analysis, multi-criteria analysis and six sigma.

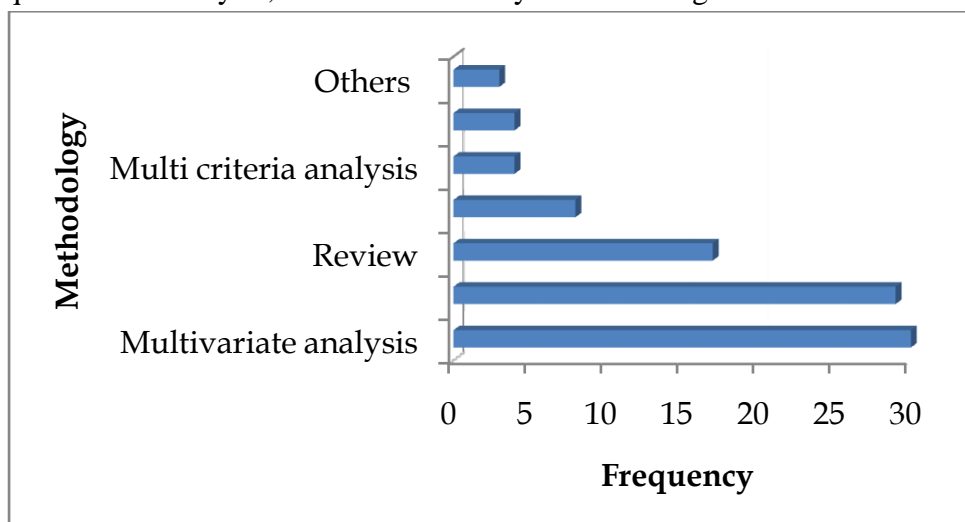


Fig.3. Methodologies used to assess the supply chain performance

Supply chain mapping

A supply chain map is a representation of process in such a way to facilitate through monitoring of supply chain integration progress. A map will depict the initial status and the proposed structure to be developed and disseminated. This helps to evaluate the progress at various points along the way to the supply chain redesign goal. There are various methodologies used to map the supply chain. Finally, a well-documented supply chain mapping approach can lead to an improved supply chain management procedure. There are certain methods used in supply chain mapping.

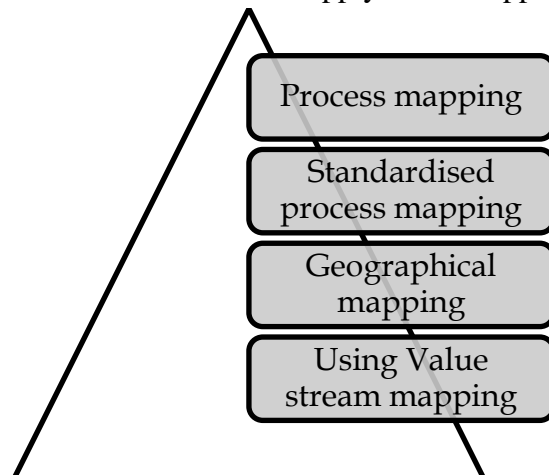


Fig.4. Methods used in supply chain mapping

- 1. Process mapping:** It aims to cover all the processes involved in deriving the output. It includes input, control, output and mechanism involved in the process. It comprises of the detailed functions or processes involved in the system as a whole. It illustrates that how the existing processed work rather than how the process to be analysed. But, this method requires lot of time and resources.
- 2. Standardised process mapping:** It is a method used to identify the standardized processes which can be better applied towards specific processes. This showed the standardized processes only rather than detailed or whole processes.
- 3. Geographical supply chain mapping:** Instead of process, this explains how the supply chain network works at different regions or locations. The linkages and co-ordination the network enhance the supply chain performance.
- 4. Supply chain mapping using value stream mapping:** The value stream mapping (VSM) involves a system approach rather than a process or network. Value stream mapping is the process of identifying bottlenecks, waste, and value-added steps within a flow of material and information. The value stream map is the appropriately named tool used to present and analyze the information uncovered by looking deeper into an organization's processes. This is a modern and practical approach used for supply chain mapping. There are different steps involved in VSM that are explained below.

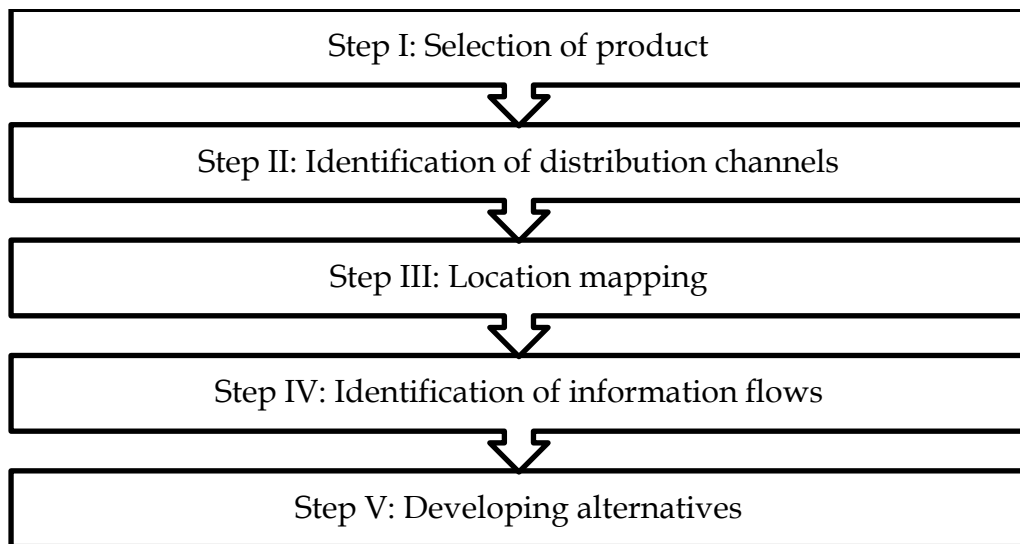


Fig. 5. Steps in value stream mapping approach

Supply chain map attributes

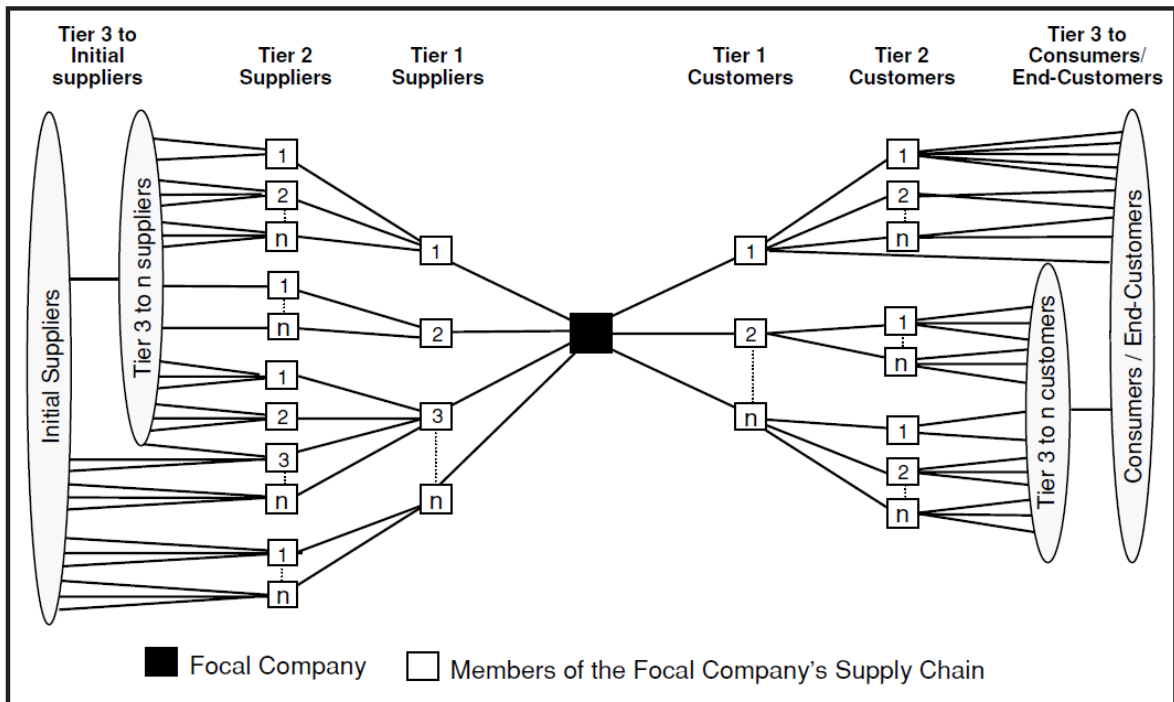
Supply chain mapping is explained by certain attributes viz., geometry, perspectives and implementation issues.

Table. 2. Attributes used in supply chain mapping

| Attributes | Meaning |
|-----------------------------------|---------------------------------------------------|
| I. Geometry | |
| a. Tiers | Number of units performed |
| Direction | Either up or down |
| Length | Number of levels in each direction |
| b. Aggregation | Degree of specificity with in a tier |
| c. Spatial | Geographical representation |
| II. Perspective | |
| a. Focal point | Firm-centric or industry-centric |
| b. Scope | Scope perspective |
| Product breadth | Product coverage |
| Supply chain perspective | Key processes in the supply chain |
| Process view depth | Includes complete set of detailed processes |
| Cycle view | Includes distribution channels and feedback loops |
| III. Implementation issues | |
| a. Information density | Amount of information integrated |
| b. Live link to database | Linked to preexisting database |
| c. Delivery mode | Mechanism made available to consumers |

The supply chain network structure derived using the attributes of the supply chain mapping is presented below.

SUPPLY CHAIN NETWORK STRUCTURE



Source: Lambert, cooper and Pagh (1998)

Traditional and Supply chain approach in management

There are differences between the traditional and supply chain management process. The differences are given in table. 3.

Table 3. Differences between traditional and supply chain approach in management process

| Process | Traditional | Supply Chain |
|----------------------|---------------------------------|----------------------------------------|
| Inventory Management | Only company based approach | Integrated and holistic approach |
| Cost Management | Focused on price (Price focus) | Focused on total cost |
| Coordination | Limited | Extensive planning and planning |
| Planning | None | Integrated with information technology |
| Supplier Management | Not so close with key suppliers | Close relationships with key suppliers |

Fish is highly perishable and inherently unpredictable, which makes the fish supply chain a complicated one. The nature of fishing operations also makes the

predictability even more complicated. This is the major challenge faced by the supply chain management of fisheries.

References

- Douglas M. Lambert, Martha C. Cooper, Janus D. Pagh, (1998) Supply Chain Management: Implementation Issues and Research Opportunities, *The International Journal of Logistics Management*, 9(2), pp.1-20.
- Felix, M. 2012. Supply chain analysis for fresh seafood in Haiti, United Nations University Fisheries Training Programme, Iceland, p22.
- Lazzarini, S., Chaddad, F. and Cook, M. 2001. Integrating supply chain and network analysis: The study of net chains. *Journal on Chain and Network Science* 1(1): 7-22.
- Neves, M.F. 2003. Marketing and Network Contracts (Agreements). *Journal on Chain and Network Science* 3(1): 7-19.
- Nuss,P., Graedel, T.E., Alonso, E. and Carroll, A., (2016) Mapping supply chain risk by network analysis of product platforms, *Sustainable Materials and Technologies*, 10: 14–22.
- Avelar-Sosa, García-Alcaraz., and Maldonado (2014) Techniques and Attributes Used in the Supply Chain Performance Measurement: Tendencies. In: Avelar-Sosa L., García-Alcaraz J.L., Maldonado-Macías A.A. (eds.), [Lean Manufacturing in the Developing World](#), pp 517-541.