Analyzing Distribution Networks of Supply Chain in Perspective of Bangladesh

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Abstract:

Supply chain is the sequence of processes involved in the production and distribution of a commodity. And designing distribution network is one of the crux factors of supply chain management. Shortly, a distribution network is the system that a company uses to get products from the manufacturer to the retailer. A fast and reliable distribution network is essential to a successful business because customers must be able to get products and services when they want them. With a view to designing a supply chain, we need to consider how all supply chain drivers should be used together to support the competitive strategy of a company and maximize supply chain profits. This paper aims to discuss various mode of distribution networks of supply chain in perspective of Bangladesh and their recent transformation into another mode due to introduction of new business types.

Keywords: Distribution Network, Drop Shipping, Manufacturer, Distributor, Retailer.

1. Introduction

There are two key factors needed to be considered to design the supply chain network. And performance of a distribution network is evaluated through these two dimensions. These two dimensions are:

1.**Customer needs that are met (Customer Service):

- Response time (Time it takes for a customer to receive an order)
- Product variety (Number of different products that are offered)
- Product availability (Probability of having a product in stock)
- Customer experience (Ease of placing and receiving orders)
- Order visibility (Ability of customers to track their orders)
- Returnability (Ease of returning unsatisfactory merchandise)

2.**Cost of meeting customer needs (supply chain cost):

- Inventory (All raw materials, WIP, and finished goods)
- Transportation (Moving inventory from point to point)
- Facility & handling (Locations where product is stored, assembled, or fabricated)

 Information (Data and analysis of all drivers in a supply chain)

Distribution network design options must therefore be compared according to their impact on customer service and the cost to provide this level of service.

Changing the distribution network design directly affects the following supply chain cost.



Fig 1. Factors that affect distribution network

2. Literature Review

In 1982, the term "supply chain management" was first coined by Keith Oliver. However, the concept of a supply chain in management was of

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great importance long before, in the early 20th century, especially with the creation of the assembly line. The characteristics of this era of supply chain management include the need for large-scale changes, re-engineering, downsizing driven by cost reduction programs, and widespread attention to Japanese management practices. Then starts integration era. In this era of supply chain management studies was highlighted with the development of electronic data interchange (EDI) systems in the 1960s, and developed through the 1990s by the introduction of enterprise resource planning (ERP) systems. This era has continued to develop into the 21st century with the expansion of Internet-based collaborative systems. This era of supply chain evolution is characterized by both increasing value added and cost reductions through integration. Then in 1990s specialization era, phase1 began. In this era, companies began to focus on "core competencies" and specialization. They abandoned vertical integration, sold off noncore operations, and outsourced those functions to other companies. This changed management requirements, by extending the supply chain beyond the company walls and distributing management across specialized supply chain partnerships. After that, specialization era, phase2 began which is known as supply chain management as service. Specialization within the supply chain began in the 1980s with the inception warehouse of transportation brokerages, management, and non-asset-based carriers, and has matured beyond transportation and logistics into aspects of supply planning, collaboration, execution, and performance management.

3. Design Options For a Distribution Network:

There are two key decisions associated with designing a distribution network

- Will the product be delivered to the customer location or picked up from a preordained site?
- Will product flow through an intermediary?

Most importantly there are eleven steps are considered to align a distribution network for Competitive Advantage. 26-27 December, 2014, Khulna, BANGLADESH

Step 1: Identify scope and current network constraints Step 2: Determine your goals Step 3: Gather data on the current network situation Step 4: Cleanse and verify the data Step 5: Select design tools Step 6: Build baseline models Step 8: Model potential strategic network scenarios Step 9: Model potential strategic network scenarios Step 10: Determine capital investment requirements Step 11: Recommend and develop your implementation plan

4. Types Of Distribution Network:

Answers that are ratified based on those two previous key questions, there are six distinctive distribution networks are used to move products from manufacturer to consumer or end user.

Those six types of distribution networks are presented in below figure:



Fig 2. Types of supply chain distribution network.

4.1 Manufacturer Storage with Direct Shipping (Drop Shipping)



Fig 3. Manufacturer Storage with Direct Shipping

Product Flow: -----

Example:

-Western Marine (Large Ship/ Vessel) -Ananda Shipyard (Large Ship/ Vessel)

Characteristics of this distribution networks are stated below:

- Products are shipped <u>directly</u> to the consumer from the manufacturer
- Retailer is an information collector:
 - Passes orders to the manufacturers
 - It does not hold product inventory
- Inventory is centralized at manufacturer
- Drop shipping offers the manufacturer the opportunity to postpone customization
- Effective for high value, large variety, low demand products
- High <u>transportation cost</u>

4.2 .Manufacturer Storage with Direct Shipping and In-Transit Merge



Fig 4. Manufacturer Storage with Direct Shipping and In-Transit Merge

Product Flow: -----

Example:

-Energypac Power Genretaion Limited. (EPGL) assemblies generator by sourcing engine and alternator from different manufacturers.

-Aftab Automobiles merge engine and various automobiles parts produced by different manufacturers to assembly Toyota & Hino Vehicles.

Characteristics of this distribution networks are stated below:

- Shipments from multiple manufactures are <u>merged</u> before making a single delivery to the consumer
- Shipments to Mergers are larger so <u>economies</u> of scale is achieved
- Mergers increase <u>facility costs</u>
- Response time may go up

4.3 . Manufacturer or Distributor Storage With Customer Pickup



Fig 5. Manufacturer Storage with Direct Shipping

Product Flow: _____ Information flow:-----

Example:

-Bangla CAT (Sole distributor of Caterpillar Products in Bangladesh) -Clarke Energy (Sole distributor of Jenbecher) -Walton Product

Characteristics of this distribution networks :

- Customers come to pick up sites (warehouse, retailer) to get the products
 - If consumers are willing to pick up the products, let them do so.
 Otherwise, they would be charged for the delivery costs
- Order tracking is crucial. Consumers must be alerted when their order is ready for pick up. Once a consumer arrives at the pick up site, the products must be quickly located.
- Significant amount of <u>information</u> is required
- Increased <u>handling cost</u>

4.4 Distributor Storage with Last Mile Delivery (Home delivery)



Fig 6. Distributor Storage with Last Mile Delivery

Product Flow: _____ Information flow:-----

Example: -Milk delivery -Chaldal.com -Niloy grocery home service.

Characteristics of this distribution networks :

- Warehouse delivers to customers instead of carrier
 - Warehouses are located closer to consumers
 - <u>Transportation costs</u> go up because warehouses are not as effective as package carriers in aggregating loads to have economies of scale
- Warehouse may need to own a trucking fleet so the physical infrastructure costs are higher.
 - Products must be flowing <u>fast</u> to justify the infrastructure
 - Processing cost are high

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4.5 Distributor Storage with Carrier Delivery



Fig 7. Manufacturer Storage with Direct Shipping

Product Flow: _____

Example:

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-Sundorban Querier Service -Continental Querier Service -SA Poribahan, Querier Service

Characteristics of this distribution networks are stated below:

- Inventory is held at a <u>warehouse</u> which ships to customer by carriers
 - With respect to direct shipping
 - Inventory aggregation is less
 - Higher <u>inventory costs</u>
 - <u>Facility costs</u> are higher
 - Less information to track
- Warehouses are physically closer to consumers which leads to
 - Faster response time
 - Lower <u>transportation cost</u>
- Not effective for slow moving items

4.6 Retail Storage with Customer Pickup



Fig 8. Manufacturer Storage with Direct Shipping

Product Flow: _____ Information flow:-----

Example: -Agora Retail Store (Rahimafrooz), -Shopno Retail Store (ACI), -Meena Bazar

Characteristics of this distribution networks are stated below:

- Customers pick up product from retailers
 - Low transportation cost
 - High <u>facility cost</u>
 - Relative easy <u>returnability</u>
 - Increased <u>inventory cost</u>
- No order tracking necessary
 - If the product is available at the retailer, the consumer buys.
 Otherwise goes to another retailer
- Effective for fast moving items

5.0 Comparing among distribution network in prospective of Bangladesh

Table 1.Comparison among distribution network

	-		-	-					-	
Retail storage with customer pickup	1	4	4	1-5	1	1	4	1	9	1
Manufacturer/Distributor storage with customer pick up	4	1	1	5	6	2	1	1	5	5
Distributor storage with last mile delivery	2	3	3	1	2	3	3	5	7	2
Distributor storage with carrier delivery	3	2	2	2	3	4	2	2	3	3
Manufacturer storage with direct shipping & In transit Merge	4	1	1	3	4	5	1	3	2	4
Manufacturer storage with direct shipping	4	1	1	4	5	5	1	4	1	4
Criteria	Response time	Product variety	Product availability	Customer experience	Order visibility	Return ability	Inventory	Transportation	Facility & Handling	Information





Fig 9. Contribution of various distribution network in Bangladeshi market (% wise) .

According to recent survey of supply chain network among various district of Bangladesh below calculative percentage can be obtained.

1=Strongest Performance,6=Weakest Performance

Table 2. Product characteristics & customer preference

Retail Storage with Customer Pickup	+2	+1	-1	-2	+1	-1	+2	-1	-2
Distributor Storage with Carrier Delivery	0	+1	+1	0	+2	+1	-1	+1	+2
Distributor Storage with Last Mile Delivery	+1	0	-	-2	+1	0	+1	0	+2
Manufacturer or Distributor Storage With Customer Pickup	-1	0	+1	+1	0	+2	-2	+2	-
Manufacturer Storage with Direct Shipping and In-Transit Merge	-1	0	0	+1	-1	+1	-2	0	+2
Manufacturer Storage with Direct Shipping	-2	-1	+1	+2	-1	+2	-2	+2	+1
Criteria	High Demand Product	Medium Demand Product	Low Demand Product	Very Low Demand	Many Product Sources	High Product Value	Quick Desired Response	High Product Variety	Low Customer Effort

- +2: Very suitable;
- +1: Somewhat suitable;
- 0: Neutral;
- -1: Somewhat unsuitable;
- -2: Very unsuitable

7.0 Conclusion

The purpose of this study is to identify the factors that influence supply chain distribution network and analyzing and comparing various distribution method in comparing to Bangladeshi perspective. Since many of those factors are under the control of the seller, identifying them may help sellers improve the outcome of their sales. However, in recent days in Bangladeshi business market, one supply chain network is converting into another supply chain network due to ease of end user. For an example, due to invent of more online shops recently the network of distributor customer pickup is now converting into distributor storage with last mile delivery. Therefore, it may assume from the study that customer will certainly involve themselves that network is much more convenient for them.

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