

CHAPTER 1 INTRODUCTION

1.1 Introduction To Logistics

In the early 1980s, logistics started to be considered a key means of differentiation for the firm. Logistics is viewed as a critical component in the strategy of the firm. The concepts emerging are integrated supply chain management, logistics channel management, inter organizational efficiency, environmental logistics, reverse logistics and a heightened awareness of globalization. Information technology and strategy concepts have had a significant influence.

The Indian industry spends 14 per cent of its gross domestic products on logistics (Sahay and Mohan, 2006). The Indian logistics environment comprises road transport companies, railways, airfreight companies, inter-modal transport providers, ports and shipping companies, as well as 3PL companies.

A logistics management system comprises a variety of components: corporate headquarters; retail stores; distribution centers (DCs); suppliers; manufacturers; distributors; carriers; networks; information service providers; insurers; and bankers. Out of total logistics cost, 45% is spent on transportation, 25% on inventories, 6% on losses, 30% on packing, material handling and warehousing operations and 6% on customers' shopping.

The field of logistics is early as old as man himself. Its activities were carried out when man first began forming more goods than could be consumed at the point of manufacturing to the point of consumption. Companies all over the world are experiencing stiff competition from their competitors. To gain a competitive edge, they need to be flexible and innovative in their modes of operations.

In modern business environments, manufacturers and retailers face an increasing pressure of customers' requirements in product customization, quality improvement, and demand responsiveness. In order to sustain the business

under these pressures, most enterprises are striving to develop long-term strategic partnerships with a few competent suppliers and collaborate with them in product development, inventory control and non-core process outsourcing

Lead time as simply the time between order placement and receipt of shipment, it involves the time taken to prepare an order, send it to the supplier, allow the suppliers to make or assemble materials and prepare them for shipment, ship the goods back to the customer, allow the customer to receive and check the materials and put them in stock. Depending on circumstances, this can vary between a few minutes and months or even years.

Long lead times reduce flexibility and encourage high stocks to cover uncertainty before another order can arrive. Just-In-Time technique looks for ways of avoiding this by moving to small, frequent deliveries with short lead times. Flexibility reduces lead time and ensures that specific customer requirements are met .

Customer service might involve after-sale activities such as delivery, setup, warranty work and technical support. Besides, it might involve extra attention while work is in progress such as courtesy, keeping the customer informed and attention to details. Service quality can be a key differentiator and helps to retain customers. Moreover, businesses rated highly by their customers for service quality tend to be more profitable and grow faster than businesses that are not rated highly. Quick response to customers' needs can be a competitive advantage to many firms. It involves quickly bringing a new product or service to the market, quick delivery of existing products or service to a customer after they have ordered and quickly handling customer complaints. Also ability to provide an excellent service is a pre-requisite to both attracting and retaining customers.

The recent trend in the logistics research is a deeper understanding of behavioral issues, specifically, customer perceptions of a firm's logistics systems and their related behaviors. Other area to focus on includes interfunctional

cooperation and coordination and theory building to develop specific solutions for specific problems.

Functional Areas of Logistics:-

Logistics covers the following functional areas, called Logistics Mix

- i. Information flow
 - a) Order registration
 - b) Order checking and editing
 - c) Order processing
 - d) Coordination
- ii. Warehousing
 - a) Material storage
 - b) Load unitizing and material handling
 - c) Site selection and network planning
 - d) Order picking and filling
 - e) Dispatch documentation
- iii. Inventory control
 - a) Material requirement planning
 - b) Inventory level decisions for customer service objectives
- iv. Packaging
 - a) For handling and damage prevention
 - b) For communication
 - c) For inter-modal transportation
- v. Transportation
 - a) Route planning

- b) Mode selection
- c) Vehicle scheduling

Logistics delivers value to the customer through three logistical phases:-

- i. Inbound logistics: It precedes the manufacturing operations. This includes movement of raw materials and components for processing from suppliers.
- ii. Process logistics: It is directly related to the processing of the manufacturing the final product. This includes storage and movement of raw materials and components within the manufacturing premises as per manufacturing schedules and the inventory management of stored materials and in-process goods.
- iii. Outbound logistics: It follows the actual manufacturing process. It includes the warehousing, transportation and inventory management of finished products.

Logistics activities include the following functions:

- i. Procurement
- ii. Plant and warehouse selection
- iii. Demand forecasting
- iv. Customer service
- v. Order processing
- vi. Traffic and transportation
- vii. Inventory control
- viii. Warehousing and storage
- ix. Parts and service support

- x. Packaging
- xi. Salvage and scrap disposal
- xii. Material handling
- xiii. Distribution communication
- xiv. Handling of returned goods

Today, the logistics concept suggests that instead of marketing, production, distribution, finance and purchasing, all working away of the others involvement in the flows of materials and information and all attempting to optimize their own particular set of logistics activities, all should work together and all of the individual functional areas to operate sub-optimally in order for the whole logistics system to be more effective. The integrated systems-based approach which characterizes the logistics concept implies a recognition that an inter-relationship exists between the parts of the whole such that action affecting one part may affect all the others. Any action, therefore, must be considered in the light of its effect on all parts of the business and on the objectives of the company. Thus, the company can be viewed as a number of inter-linked subsystems which must somehow be united if effectiveness is to be maximized. The firm must be concerned with the flow of materials and information through the whole business process, from raw materials through to the finished goods arriving at the customer's premises; from conception to consumption.

Logistics management is concerned with the analysis, planning and control of that level of product availability appropriate to the needs of the marketplace and the resources of the company.

Customers not only want products to be physically available in the marketplace, they also want them in the right unit, sizes, in good condition and at the appropriate time. To meet these requirements the manager has to consider individually and then to co-ordinate the seven key decision areas which together constitute what has been termed the "Logistics Mix".

There is some time lag between production and consumption of food products, so it is necessary to preserve the food from its production until its consumption. The quality of the final product depends on how the transportation and storage of the products are done. There are number of issues that need to be addressed in order to keep the food products' quality.

a. The product must be transported as fast as possible from its harvest/production to its storage place or plant to prevent losses due to climatic conditions. Highly perishable products such as milk must arrive quickly at the consumer or plant, vegetables and fruit must also arrive early at the distribution centers.

b. The quantity and quality of storage places are very poor and leads to losses. There are several proposals to avoid this loss; however it would be much more efficient to increase the food availability and its quality through better storage and transportation systems than increasing production.

The logistics of perishable products is more complicated due to products deteriorating over the time. Perishable products are affected by temperature variation, humidity, other environmental conditions and transportation time. Therefore, it is extremely important that transportation time, handling, storage and other requirements are well planned in order to maintain the product characteristics till they reach to the customers. Transportation costs are always a significant component of logistics cost, especially for companies where the movement of raw material or product is required. These costs are even more important when transportation of perishable product is involved and special handling is required.

Transportation costs are always a significant component of logistics cost, especially for companies where the movement of raw material or product is required. These costs are even more important when transportation of perishable product is involved and special handling is required. In the past, most perishable products had to be consumed around the area where they were

manufactured or collected due to the lack of transportation and storage equipment. It was almost impossible to reach long distance and keep perishable product with acceptable quality. However, the improvements of logistics facilities have made it possible to reach other areas, regions and markets around the globe.

The market for fresh and perishable products is increasingly guided by demands regarding freshness, inherent quality and minimum food safety requirements. Therefore there are some regulations for production, handling, processing and transportation that need to be followed in order to guarantee and ensure safety and quality of products and meet the customers' standards. The logistics of food products require special treatment for their storage and transportation. Transportation temperatures play a considerable role in keeping the quality of the final products by avoiding the growth of bacteria, mould and yeast which consequently extends the shelf life that is not very long in this type of product. Therefore, it is important that refrigerated vehicles, containers and shipping spaces have been pre-cooled before any product is loaded, especially when dealing with fresh products. In addition, the unloading process into the shipping spaces or cold stores must be done as quickly as possible to avoid any increase in the product temperature which can affect the quality of final product.

1.2 Logistics in Fluid Milk and Milk Products –

Milk booths are a relatively small, low-cost, low-margin, high-volume, operation designed to serve total needs for milk and milk products. Milk booths earn an operating profit of only one percent of sales and ten percent on net worth.

In a low margin and high volume business, it requires a very close attention on the planning and operational part of the entire value chain activities because these minutes details can change the fortune of any organization.

While branding differentiates the image of the product, the distribution system will determine the faith of the organization up to a very large extent. The

diversity of India and existence of vast untapped markets of rural areas provide the bundle of opportunities to companies.

The best price or quality product offerings combined with heavy promotional and advertising budgets will not help the product succeed if one of the major ingredients of the marketing mix as distribution is not properly focused.

With an estimated 86.8 million tons of annual milk production from animals managed by nearly 70 million farmers, India is the top-most milk producing country in the world. The average annual growth is about 5.6%. The per capita milk availability is about 214 grams per day as against the recommended requirement of 250 grams. Milk is one of the most important item of common vegetarian diet of Indian people. With rapid industrialization, economic growth and 250 million potential economically strong domestic consumers of milk and milk products, there is a very strong potential for future growth of the industry.

Milk is a highly perishable product. It must be processed within few hours after product, unless kept at low temperatures at which it can be stored for 2 or 3 days before processing. The key process of milk logistics is during its collection and cool storage. The capacity of dairy co-operatives to keep themselves competitive in a market is based on their ability to manage the production cost at an acceptable level.

Significant logistics problems arise both in collection of the milk from farms and the distribution of varieties of fluid milk and milk products to retailers and customers. The requirements of quality and productivity in the process of milk production have stimulated improvements in the logistics of the milk collection into dairy co-operatives, which make possible the reduction of collection routes and the increase in the amount of milk carried by truck, resulting in significant economy in the logistics cost and increase in profits.

Dairy co-operatives must avoid the increase in logistics cost as it will affect the price paid for the milk collected from their farmers. The cost of milk has two

components: the cost of logistics and the cost of paying the farmers for the milk. The dairy co-operatives are always trying to find ways of reducing the milk collection cost by applying an efficient logistics system which allows a higher milk price paid to the farmers.

In the older days, dairy co-operatives were small and milk production was not high, the milk was supplied to nearby farms and collected daily therefore did not spend too much time on its way to the plant. It was also easier to keep the bacteria growth in the milk under control using minimum of refrigeration conditions. Nowadays, the situation is significantly different. Milk production is now much higher, the concern about the quality has increased and the distance travelled is also greater. Basically, the logistics of milk encompasses three parts under co-operative structure:

1st part: From the farms to the milk collection stations called primary co-operative society

2nd part: From primary co-operative societies to the dairy co-operative plants

3rd part: From dairy co-operatives to the retailers and customers

The logistics flexibility plays crucial role in supply chain of fluid milk and milk products. It is more crucial and critical due to the high number of product variants, strict traceability requirements, shorter shelf life of products and larger volume of the goods to be handled. Out of all product categories of fast moving consumer goods sector; the fluid milk and milk products segment has the lowest shelf life, higher inventory carrying cost and logistics cost and disposal of outdated products are vital issues.

Lead time is the amount of time between the placement of an order and the receipts of the goods ordered. It depends on the nature of the product e.g. whether it is made to order or if it is a from the shelf product. Lead time also depends on planning and supply chain management, logistics services and of

course distance to customers and suppliers. Long lead time does not need to be a problem if delivery is predictable and demand is stable.

However, if there is uncertainty about future demand, long lead time is costly even when the customer knows exactly when the merchandise will arrive. If future demand has been underestimated, running out of stock has costs in terms of foregone sales and the possibility of losing customers. If future demand has been overestimated, excess supply must be sold at a discount.

Furthermore, the longer the lead time and the more varieties of the product in question are on the market, the larger stocks are needed. It is also important to notice that competitiveness on lead time is not a static concept. When some firms are able to shorten lead time, others must follow in order to avoid punishment in terms of discounted prices or at worst exclusion from the bidding process. The latter can happen when a critical mass of suppliers are able to deliver just-in-time and the customer finds it safe to reduce inbound inventories to a couple of days or in some cases even a couple of hours supply.

Just-in-time refers to a way of organizing production where inbound as well as outbound inventories are kept to a bare minimum and inputs arrive at the factory at the point where they enter the production process. Finally, time variability is measured by the (statistical) variation in delivery time. The more variable the delivery time, the larger buffer stocks are needed. Thus, even if the average lead time is low, a high rate of variability can render a supplier uncompetitive and can be more damaging than having long, but predictable lead times.

The logistics services included in the manufacturing section are often undertaken in-house in developing countries where the market for such services is shallow. This limits the quality of the services since most firms cannot afford to employ specialists in each of the services mentioned. It is usually the case that purchasing services from outside has a much lower fixed cost but somewhat higher variable costs than in-house production. Therefore, small firms in particular would benefit from a broad and rich logistics services market

which would allow them to purchase only the amount of expert services they need, saving the fixed costs of in-house logistics provision. In fact a well developed logistics services market reduces the entry barriers for small and medium sized firms both in local and international markets.

Logistics is the management of the flow of resources between the point of origin and the point of destination in order to meet some requirements, for example of customers or corporations. The resources managed in logistics can include physical items such as food, materials, equipment, liquids, and staff as well as abstract items such as information, particles, and energy.

The logistics of physical items usually involves the integration of information flow, materialhandling, production, packaging, inventory, transportation, wareho using, and often security. The complexity of logistics can be modeled, analyzed, visualized, and optimized by dedicated simulation software. Minimizing use of resources and time are common goals.

Table 1.1 Benefits of using Logistics Information System

Evaluation Criteria	Definition
Timeliness	Available information is current relative to the situation
Accuracy	Available information is error free
Availability	Information can be accessed when and where desirable
Exception basis Formatted	Information is organized in a form that focuses decision makers' attention on situations requiring action
Formatted to facilitate usage	Information layout is designed to bring together data items which are used concurrently

Information sharing	Willingness to share common information across functions within the firm
Flexibility	Ability to exchange information effectively across managerial areas within the firm
Internal Validity	Ability to exchange information effectively across managerial areas within the firm
External Connectivity	Ability to exchange information effectively with next destination customers and/or suppliers

1.3 Problem Statement-

Here I would like to outline the issues such as how to keep and maintain the quality and freshness of milk throughout the whole process and other issues such as lack of clarity between roles of different departments , lack of proper cold chain infrastructure, large areas to be covered for distribution with limited cost and various other issue pertaining to the topic which can be useful to increase the efficiency of the whole system.

1.4 Significance of study-

Companies all over the world are experiencing stiff competition, be it making profits or satisfying customers. Supply chain management plays an very important role in streamlining companies with their goals.

The logistics flexibility plays crucial role in supply chain of fluid milk and milk products. It is more crucial and critical due to the high number of product variants, strict traceability requirements, shorter shelf life of products and larger volume of the goods to be handled. Out of all product categories of fast moving consumer goods sector; the fluid milk and milk products segment has the lowest

shelf life, higher inventory carrying cost and logistics cost and disposal of outdated products are vital issues. The significant growth of economy and the flourishing development of co-operative network of fluid milk and milk products demand perfect synchronization of supply of various fluid milk and milk products with market opportunities.

1.5 Objective of the study

The study is undertaken with the following objectives:

- I. To perform an in-depth investigation on logistics practices for fluid milk and milk products.
- II. Whether companies outbound transportation deliver variety of shipment on time and to see the inbound supply chain system are effective for all shipments
- III. Is the company taking care of reverse logistics efficiently.
- IV. Whether the company has kept accurate records of inventory quantities and locations.
- V. What is the perception of the customer towards the quality of products.
- VI. Are the satisfied enough to keep purchasing the products of same brand

CHAPTER 2 LITERATURE REVIEW

As per the Council of Logistics Management it can be inferred that Physical Distribution is a part of Logistics Management, while Logistics Management is a part of Supply Chain Management.

The Indian industry spends 14 per cent of its gross domestic products on logistics. The Indian logistics environment comprises road transport companies, railways, airfreight companies, inter-modal transport providers, ports and shipping companies, as well as 3PL companies.

In market conditions, increasingly levels of product variety and customization, the ability to respond to customer orders in a timely fashion can provide a critical competitive advantage. Companies are indicating that responsiveness and flexibility are the keys to responding to markets, which are rapidly changing and where customers are requiring a range of products and services. To succeed in an increasingly uncertain environment, firms must respond to changing customer needs in terms of special treatment in design, production, and delivery, which require firms to view flexibility from a supply chain perspective rather than an equipment or process perspective

The decision process of outsourcing is based on an evaluation of the costs and benefits of outsourcing. The principle behind 3PL (third party logistics) is to concentrate on core activities and rely on experts (third party logistics service providers) for other critical activities. In doing so, companies can direct scarce resources for developing core competence and outsource critical activities like logistics on expert third party providers for whom logistics is the core activity. The relationship with third party logistics service providers increases efficiency and effectiveness in performance without investing in assets and new capabilities. Three kinds of benefits can occur using third party logistics: strategy, finance and operations related.

Various forms of sub-contracting are also considered in today's environment. In particular, the design of fourth party logistics solutions entails that the logistics service provider acts as a single point of contact within the client's supply chain. The concept of a fourth party logistics service provider was introduced a few years ago by Andersen Consulting. The definition given by Andersen Consulting is: An integrator that assembles the resources, capabilities and technology of its own organization and other organizations to design, build and run comprehensive supply chain solutions.

CHAPTER 3 METHODOLOGY

Research is the journey from known to unknown or from problem to solution. Research methodology refers to the design of the study method and processes by which data is gathered for a research project. It includes the blueprint for the collection, measurement, and analysis of data to achieve the objectives of a research project.

3.1 significance of the study

The study is done by analyzing the impact of logistics on dairy products. The logistics flexibility plays a very important role in supply chain of milk and milk products. Logistics is important due to high no, of product variants and shorter shelf life and large volume of goods to be handled. In all FMCG products Milk and milk products have shortest shelf life.

3.3 Research Design

The study was carried out through a descriptive survey design on assessing the impact of logistics on lead time and customer service for milk and milk products. The executives of various dairies in Delhi were considered as sample universe for sampling procedure. It includes surveys & fact findings enquires of different kinds. The major purpose of descriptive research is description of state of affairs, as it exists at present. The main characteristic of this method that the researcher has no control over the variable. He can only report what has happened or what is happening. Descriptive research will be applicable to the existing problem. Here the study is conducted for a fact i.e. "An in-depth investigation on Logistics practices for fluid Milk and Milk products". So the process was conducted through a questionnaire.

3.4 Questionnaire Design

Set of Questions were formulated in order to identify how much delay actually occurs in different items. Questionnaire contained factors like physical supply

flexibility, purchasing flexibility, demand management flexibility and customer satisfaction. The questionnaire has three sections, section one dealt with general information of the participant. Section two; sought information on the logistics flexibility. Section three; sought information on customer satisfaction.

All the questions were close- ended in nature.

3.5 Data Collection Procedure

Primary data was collected via a composition of open ended as well as dichotomous questions. Open-ended questions intend to elicit qualitative responses about respondents views. The personal contact method was used for final discussion and filling up of questionnaire. Major source of secondary data will be research articles, books, journals, and internet. Basically secondary data is required in order to identify the various elements of supply chain. The population of this study was drawn from all Booth owners and the sample of this study consisted of twenty (20) owners.

CHAPTER 4 DATA ANALYSIS

4.1 Introduction

For the purpose of data collection and analysis the Questionnaire was divided into three sections:

Section1: To know the time duration in delay of grocery items.

Section2: To identify replenishment time of items.

4.2 DATA ANALYSIS

SECTION 1

These set of questions were formulated in order to identify how much delay actually occurs in different items. Responses were collected from twenty booths stores in Delhi.

Responses collected are shown in 3-D Columns below..

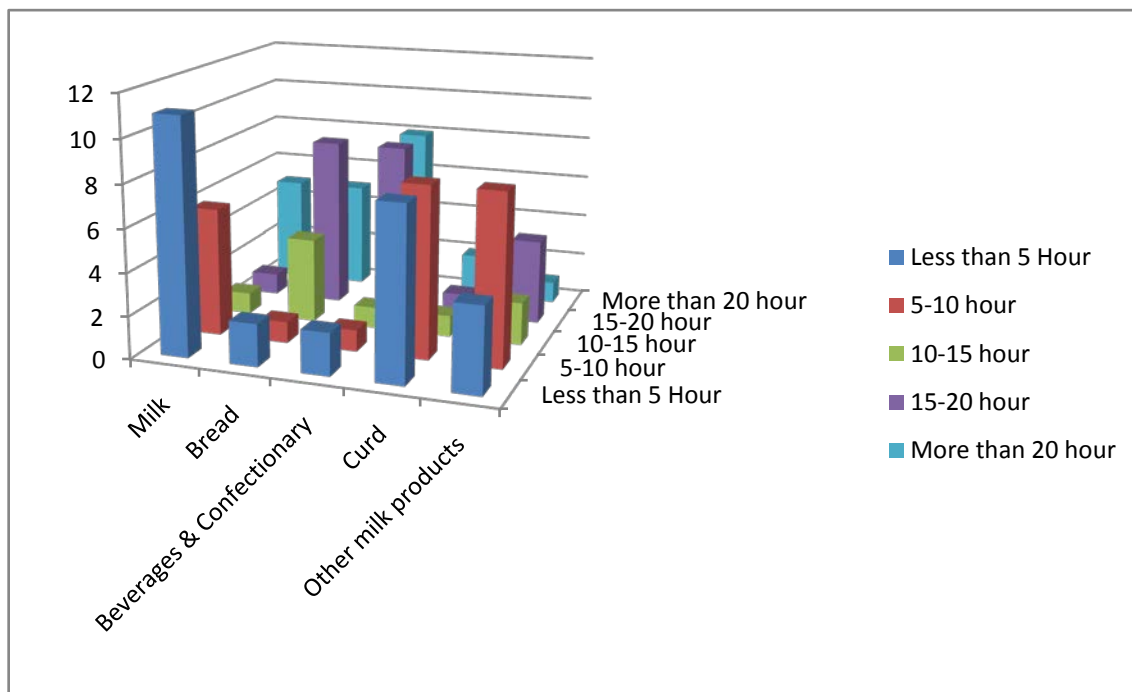


Fig. 4.1

Observations

- There is not much delay in grocery items like milk & curd, bread and other milk products
- Most of the delay is observed in items like breads & beverages and confectionary.

SECTION 2

These set of questions were formulated in order to know the replenishment period of various booths for different items. Responses were collected from twenty booth stores in Delhi.

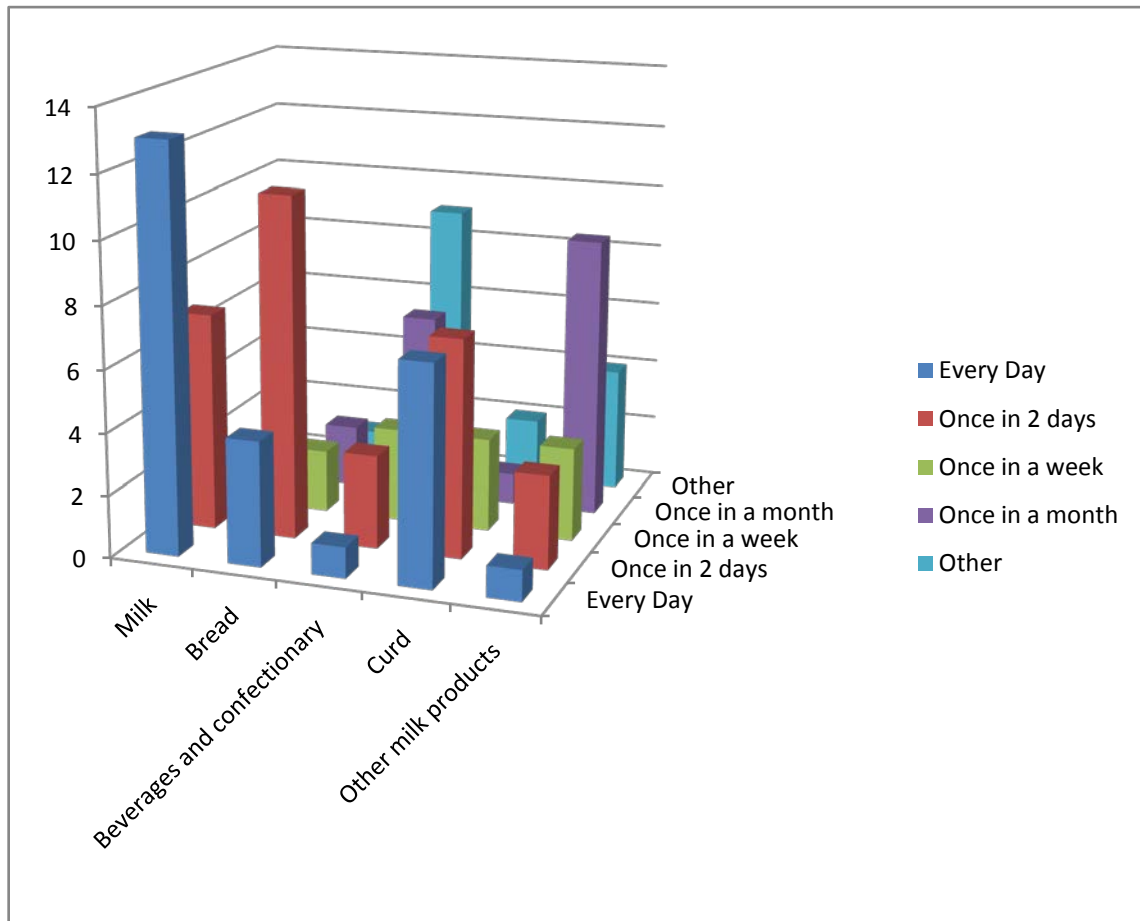


Fig 4.2

Following observations are made

- Perishable items like milk, curd and bread are replenished frequently i.e within 2 days
- Items like beverages & confectionery and other milk products are not replenished frequently i.e once in a month.

4.3 Multiple Regression Analysis

The descriptive statistics like maximum ratings, minimum ratings, mean and standard deviation have been used to describe the data. The regression analysis method has been used for analysis of data for two of the questionnaires. The analysis is done using 95% confidence level. In first part, Regression analysis is used to find out the degree of impact of various dimensions of logistics flexibility model for fluid milk and milk products in co-operative dairies in Delhi. In second part, regression analysis is used to find out the important benefits of using third party logistics service providers in logistics activities, which have the significant impact on logistics flexibility for fluid milk and milk products in co-operative dairies in Delhi.

Multiple regression analysis is a multivariate statistical technique used to examine the relationship between a single dependent variable and several independent variables. The objective of multiple regression analysis is to use the independent variables whose values are known to predict the single dependent value selected by the researcher. Each independent variable is weighted by the regression analysis procedure to ensure maximal prediction from the set of independent variables. The weights denote the relative contribution of the independent variables to the overall prediction and facilitate interpretation as to the influence of each variable in making the prediction. The set of weighted independent variables forms the regression variate, a linear combination of the independent variables that best predicts the dependent variable.

4.3.1 Usefulness of Multiple Regression Analysis

1. Multiple regression provides a means of objectively assessing the degree and character of the relationship between dependent and independent variables by forming the variate of independent variables. Here, the contribution of independent variable in overall contribution of all variables can also be known.

2. Regression analysis provides a means of objectively assessing the magnitude and direction (positive or negative) of each independent variable's relationship with dependent variable.

3. Regression analysis provides diagnostic analyses to determine relationship among independent factors that will be useful to find out the real power of each independent variable on dependent variable.

4.3.2 Measurements used in Multiple Regression Analysis

1. Regression Co-efficient: It is standardized regression co-efficient that allows for a direct comparison between coefficients as to their relative explanatory power of the dependent variable.

2. Coefficient of Determination (R^2): It is a measure of the proportion of the variance of the dependent variable about its mean that is explained by the independent or predictor variables. The strength of association is measured by the coefficient of determination. Its value varies from 0 to 1. The researcher can infer that the higher the value of R^2 , the greater the explanatory power of the regression equation and therefore the better the prediction of the dependent variable.

Adjusted R^2 : It is the modified measure of the coefficient of determination that takes into account the number of independent variables included in the regression equation and the sample size. It explains whether or not the inclusion of additional independent variables in regression equation may increase or reduce the overall coefficient of determination.

4.4 Major Hypothesis

4.4.1 Regression of Physical Distribution Flexibility (PDF), Purchasing Flexibility (PF) and Demand Management Flexibility (DMF) on Customer Satisfaction (CS)

Hypothesis:

$H_{0(pdf)}$: There is no significant impact of Physical Distribution Flexibility (PDF) on Customer Satisfaction (CS) for fluid milk and milk products in Co-Operative Dairies.

$H_{1(pdf)}$: There is a significant impact of Physical Distribution Flexibility (PDF) on Customer Satisfaction (CS) for fluid milk and milk products in Co-Operative Dairies

$H_{0(pf)}$: There is no significant impact of Purchasing Flexibility (PF) on Customer Satisfaction (CS) for fluid milk and milk products in Co-Operative Dairies

$H_{1(pf)}$: There is a significant impact of Purchasing Flexibility (PF) on Customer Satisfaction (CS) for fluid milk and milk products in Co-Operative Dairies

$H_{0(dmf)}$: There is no significant impact of Demand Management Flexibility (DMF) on Customer Satisfaction (CS) for fluid milk and milk products in Co-Operative Dairies

$H_{1(dmf)}$: There is a significant impact of Demand Management Flexibility (DMF) on Customer Satisfaction (CS) for fluid milk and milk products in Co-Operative Dairies

The regression co-efficient of the independent variables with their respective direction, values and significance level are given in the table 4.2.1.1 below:

Table 4.3

Regression coefficients of Physical Distribution Flexibility, Purchasing Flexibility
and Demand Management Flexibility

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.142	2.290		.066	.947
	PSF	.639	.209	.598	14.070	.001
	PF	.318	.394	.235	.807	.007
	DM	.405	.211	.323	8.922	.008

a. Dependent Variable: cs

Dependent Variable: CS

R²= 0.902

Independent Variables: PDF,PF, DMF

N = 20 numbers

(a). The table 4.3 shows that Physical Distribution Flexibility (PDF) has positive relationship with Customer Satisfaction (CS); as the regression co-efficient is + 0.639. The significance level of 0.000 indicates that this regression co-efficient is statistically very significant. So, null hypothesis H(PDF)₀ is rejected and alternate hypothesis H(PDF)₁ is accepted that there is a significant impact of Physical Distribution Flexibility on Customer Satisfaction for fluid milk and milk products in Co-Operative Dairies. This means Physical Distribution Flexibility (PDF) exerts significant influence over Customer Satisfaction (CS). An increase in Physical Supply Flexibility (PSF) will bring about an increase in Customer Satisfaction (CS) by number of times the value of regression co-efficient.

(b). Purchasing Flexibility (DMF) has positive relationship with Customer Satisfaction (CS); as the regression co-efficient is + 0.318. The significance level of 0.000 indicates that this regression co-efficient is statistically very significant. So, null hypothesis H(DMF)₀ is rejected and alternate hypothesis H(DMF)₁ is accepted that there is a significant impact of Purchasing Flexibility on Customer

Satisfaction for fluid milk and milk products in Co-Operative Dairies. This means Purchasing Flexibility (DMF) exerts significant influence over Customer Satisfaction (CS). An increase in Purchasing Flexibility (DMF) will bring about an increase in Customer Satisfaction (CS) by number of times the value of regression co-efficient.

(c). Demand Management Flexibility (DMF) has positive relationship with Customer Satisfaction (CS); as the regression co-efficient is + 0.405. The significance level of 0.000 indicates that this regression co-efficient is statistically very significant. So, null hypothesis $H(DMF)0$ is rejected and alternate hypothesis $H(DMF)1$ is accepted that there is a significant impact of Demand Management Flexibility on Customer Satisfaction for fluid milk and milk products in Co-Operative Dairies. This means Demand Management Flexibility (DMF) exerts significant influence over Customer Satisfaction (CS). An increase in Demand Management Flexibility (DMF) will bring about an increase in Customer Satisfaction (CS) by number of times the value of regression co-efficient.

According to regression analysis

$$CS = + 0.066 + 14.070 (PDF) + 0.807(PF) + 8.922 (DMF)$$

4.5 Summary

The relationships among various components of logistics flexibility have been examined using regression analysis. The results have shown the significant relationships among various components of logistics flexibility. The results have also brought out the importance of logistics flexibility at all procurement, processing and distribution levels for fluid milk and milk products in co-operative dairies in Delhi.

Regression analysis is done to find important variables in Logistics Operating System, affecting logistics flexibility in co-operative dairies in Delhi. The result shows that the Logistics Operating System exerts significant impact on

maintaining logistics flexibility due to perishability and variety aspects to be maintained on day to day basis.

4.6 FINDINGS

- i. Physical Supply Flexibility exerts significant positive impact on manufacturing flexibility for fluid milk and milk products in co-operative dairies. The ability of dairies to deliver multiple kinds of required materials on time and accurately in response to operations requirements brings manufacturing flexibility in terms of ability to respond to changes in delivery request and producing varieties of products cost effectively and quickly for fluid milk and milk products.
- ii. Physical Supply Flexibility exerts significant positive impact on Physical Distribution Flexibility for fluid milk and milk products in co-operative dairies. The ability to deliver multiple kinds of materials quickly and accurately creates positive impact on Physical Distribution Flexibility in terms of distributing varieties of fluid milk and milk products quickly and cost effectively.
- iii. Purchasing Flexibility exerts significant positive impact on Physical Distribution Flexibility for fluid milk and milk products in co-operative dairies . The ability of dairies to obtain multiple kinds of materials that meet specifications quickly and maintain close communication with suppliers in terms of specification of required materials leads to more accurate physical distribution of varieties of fluid milk and milk products as per specifications quickly and accurately.
- iv. Physical Supply Flexibility exerts significant positive impact on Demand Management Flexibility for fluid milk and milk products in co-operative dairies. The ability of dairies to deliver multiple kinds of materials as per

specifications quickly and cost effectively, creates ability to respond to multiple retailers' and customers' requirements quickly and accurately.

- v. Purchasing Flexibility exerts significant positive impact on Demand Management Flexibility for fluid milk and milk products in co-operative dairies. The ability of dairies to maintain co-ordination with suppliers brings ability in terms of specifications of multiple materials requirements quickly crates ability to respond to feedback and specification from customers for fluid milk and milk products.
- vi. Physical Distribution Flexibility exerts significant positive impact on Customer Satisfaction. The ability to quickly assemble multiple customer orders in different pack size brings flexibility in terms of delivering varieties of products as per customized requirements. The accuracy of transport system to deliver varieties of products, maintaining quality standards brings uniformity on distribution of fluid milk and milk products.
- vii. Demand Management Flexibility exerts significant positive impact on Customer Satisfaction for fluid milk and milk products in co-operative dairies . The proper management of distribution schedule and delivery time requirements leads to greater availability of various fluid milk and milk products to customers as per requirements. The ability respond to retailers' and customers' feedback and suggestions leads to greater customer satisfaction and improved reputation of the firm in market.

4.7 LIMITATIONS OF THE STUDY

- i. The survey was limited to Delhi only.
- ii. The respondents were less interested in answering the questionnaire,as they felt that it was an interruption to their regular work.
- iii. The number of respondents limited to 20 only.
- iv. Some of the respondents were not open in giving their opinions.

4.8 Recommendations

1. Installation of more and more bulk milk coolers for efficient collection of milk is critical for preserving and improving the quality of milk, which in turn provides the following benefits:

- a. Longer collecting intervals, which reduces cost of transportation and gain the benefit of Full Truck Load (FTL),
- b. Flexibility in terms of milk delivery and pick up time,
- c. Increased potential for collection from producers in remote locations and
- d. Maintenance of good hygienic condition.

2. There are regional demand-supply imbalances in different areas. It is critical to develop capacity in line with the increase in supply of milk supported by procurement infrastructure. The dairy co-operative having low to medium milk collection from primary co-operative societies are either producing low varieties of milk products or not producing anything and supply the chilled milk to other dairy co-operatives, which increase their logistics cost. At the same time to fulfill local demand for various milk and milk products, they have to rely on other co-operatives to distribute various milk and dairy products in local market, which again increases the logistics cost. If the proper production facilities can be developed at district unions to produce various milk and milk products, the flexibility in terms of fulfilling local as well as other market demand with specified time period can be enhanced and logistics cost can be reduced at great extent.

3. The co-operative dairies need to place considerable importance on relationships and networking, which requires linkages with other firms both up and down the supply chain and also with firms outside the supply chain to improve performance in the areas of product handling, product tracking,

information flow technology, and other product and process advancements. These, in turn, enhance customer satisfaction and firm performance.

4. There should be strong information network among various co-operative dairies also to manage regular demand-supply discrepancies. The strong information linkages among co-operative dairies and federation will give real time information regarding availability of various products at co-operative dairies, which is helpful to manage collection as well as distribution of various fluid milk and milk products in the market.

5. Co-operative dairies can provide assistance and guidance to third party logistics service providers in performance assessment or benchmarking within the supply-chain network. Similarly, appropriate performance measurement systems can be developed and shared by co-operative dairies within the supply chain.

6. There is a need to improve the quality of transport vehicles carrying the milk from villages to dairy co-operatives. The proper maintenance of temperature in vehicles during transportation and proper scheduling of transport route must be improved so that the milk can be brought to dairy co-operatives at reasonable cost and quality of milk can also be maintained.

7. The dairy co-operatives should take care of the customization in quality of service provided by contract transporters like quality and size of vehicles, maintenance of temperature, cleanliness and accuracy in distribution of varieties of products at various locations. It brings flexibility in delivering varieties of fluid milk and milk products effectively at various locations in local and other markets.

8. The third party logistics service providers should be educated in terms of handling retailers' and customers' complaints, providing their suggestions and feedback to dairy unions. It will be helpful to dairy unions in getting real picture

of the market, which brings efficiency in maintaining flexibility to provide customization. It will also lead to more satisfaction to consumers.

CHAPTER 5 CONCLUSION AND IMPLICATIONS

5.1 Conclusion

There is a huge potential for growth of fluid milk and milk products. The co-operative structure developed by co-operative dairies has been proved successful. There is a strong need to educate milk producers regarding improving productivity of milch animals, which leads to improve production as well as quality of milk in the state. The government, NGOs and dairy co-operative can play important part in educating milk producers and providing proper facilities for enhancing quality and quantity of milk.

It is empirically verified that flexible logistics competence supports the flexible logistics capability, which ultimately enhances customer satisfaction for fluid milk and milk products in co-operative dairies. Firms can achieve customer satisfaction by developing logistics flexibility, which enable quick replenishment of incoming materials and rapid delivery of finished product to customers. Customers value the visible capabilities, physical distribution flexibility and demand management flexibility, rather than the supply-side competences because customers see how capabilities are deployed to meet their needs. However, physical distribution flexibility and demand management flexibility cannot be achieved also without flexible logistics competences in terms of manufacturing flexibility.

The co-operative dairies outsource logistics function to third party logistics service provider for operational and cost based reasons. The role of third party logistics service providers is limited to basic logistics function of transportation only. The co-operative dairies have an internal strategic orientation and motive for outsourcing and tend to outsource for the primary purpose of reducing logistics costs. So, the outsourcing of logistics functions by co-operative dairies to third party logistics service provider firms brings out purely transaction cost economics view.

5.2 Implications of the research

This research helps managers to understand that flexible competence may not be sufficient to build competitive advantage. Customer value expression of these competences, which is the capability of the dairy co-operatives to provide the right product, at the right time and in the correct quantity, is more important.. The investment in advance information technology is a key to enhance logistics flexibility. The co-ordination of different types of information flow such as demand, capacity, inventory and scheduling along a supply chain is a key to faster response to customer demands, lower inventories and lower cost associated with operations.

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ADHERENCE SHEET

Particulars	Last Date	Signature of Mentors	
Title of the Project/Area of Topic Finalization	21-Jan-16		
Literature Review/Objectives of the study	2-Feb-16		
Methodology	18-Feb-16		
Questionnaire/Data Collection tools	3-Mar-16		
Data Collection	17-Mar-16		
Analysis	24-Mar-16		
Conclusion and Recommendations	1-Apr-16		
First Draft	15-Apr-16		
Final Report/Binding and Submission	3-May-16		

Annexure

Questionnaire

Dear Respondents,

Myself, Maninder Kumar, is a student in Delhi School of Management (DTU), Delhi. I am doing research for the topic on “**AN IN-DEPTH INVESTIGATION ON LOGISTICS PRACTICES FOR FLUID MILK AND MILK PRODUCTS**”. This questionnaire seeks information regarding logistics practices at respective co-operative dairies. I request you to fill up this questionnaire, which would be very helpful for me in my research. I assure that your response will be kept confidential and its use will be limited to academic purpose only.

Details

NAME:- _____

AGE:- Under 20 Year 20-30 Year 30-40 Year
 40-50 Year Above 50 Year

Gender:- Male Female

Family Size:- Upto 3 members 4-5 members Above 5 members

Q1. How much does order gets delayed in following categories?

	Less than 5 hour	5-10	10-15	15-20	More than 20 hours
Milk					
Bread					
Beverages & Confectionary					
Curd					
Other milk products					

Q2 How often you purchase goods from suppliers.

	Every Day	Once in 2 days	Once in a week	Once in a month	Other
Milk					
Bread					
Beverages & confectionary					
Curd					
Other **milk products					

Logistics Flexibility

This section contains the questions regarding logistics flexibility from supply chain point of view. The basic objective of this section is to find out linkages among various phases of logistics and maintaining flexibility at each stage. The flexibility can be judged on the basis of three attributes, i.e. range (ability to design, make and distribute different products), mobility (speed at which a firm can change from one product to another) and uniformity (ability to maintain performance standards).

Please tick mark (√) your responses at appropriate place.

(1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree)

	Particulars	1	2	3	4	5
	Physical supply flexibility					
Q1.	Company delivers multiple kinds of materials in response to operation requirements.					
Q2.	Company's outbound transportation deliver the variety of shipments on time.					
Q3.	Company's inbound supply systems are effective for all shipments.					
Q4.	Company has accurate records of inventory quantities and locations.					
Q5.	Less Shelf life products if remained unsold are taken back by the company					
Q6.	Reverse Logistics of the company is efficient					

	Purchasing flexibility					
Q1.	You can obtain multiple kinds of materials that meet specifications.					
Q2.	You can obtain multiple batch sizes of materials from suppliers.					
	Particulars	1	2	3	4	5
	Demand management flexibility					
Q1.	You can efficiently respond to multiple distributor and customers' delivery time requirements					
Q2.	You can effectively respond to multiple distributor and customers' requirements in terms specifications of products.					
	Customer satisfaction (To be filled by customer) Brand-					
Q1.	Do you keep buying products of same brand.					
Q2.	Are you satisfied with ratio of price and quality of product.					
Q3.	Do you think you receive your money's worth when you purchase products of this brand					
Q4.	Are you satisfied with the quality of products.					
Q5.	How would you rank the firm in terms of quality on a scale of 1 to 5					