
Relevance of Logistics in Supply Chain Management for Overall Customer Satisfaction: An Empirical Study

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Abstract

Supply chain management (SCM) is basically an information based process that integrates the various activities from raw material supply to manufacturing and finally the supply of finished products and services to the end customer. Logistics is a process of movement of goods across the supply chain of the company. This process consists of various functions, which have to be properly managed to bring effectiveness and efficiency in the supply chain of the organisation. The major logistical functions are order processing, inventory management, warehousing, transportation, material handling and storage system and, logistical packaging. Customer service is an important element in marketing, irrespective of the product being tangible and intangible. In logistics management, customer service is the key element. Proper communication and information processing between customers and marketers is central to the supply chain philosophy. Highly satisfied customers are more loyal than less satisfied customers. In this research study a survey of customers on the air conditioning product of Voltas is used to examine the customer satisfaction due to the logistics management. Quality of packaging, improving the product delivery and maintaining a good relationship between the warehouse boys and the vehicle control managers are found to be related to customer satisfaction in logistics and supply chain management. Further to this, we have done a detailed literature review on logistics and supply chain management in customer service to supplement the authenticity of the research paper. In additions to this, we have also developed a customer service driven logistics system which can be implemented in the companies for improving their business operations.

Introduction

Due to emerging competition in the volatile markets of globalised economies across the world, business organisations have realised that the business process of satisfying the demand of the customer is of critical importance. They now understand that a functional approach to the business process would not help any more in developing competitiveness. Due to this reason there has been a paradigm shift in their outlook. They

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are aware that today the focus of competition has shifted from products to supply chains to deliver superior customer value. Hence, effective and efficient management of the supply chain has become critically important for any business.

Ellram and Cooper (1990) define SCM as an integrative philosophy to manage the total flow of distribution channel from supplier to the ultimate user. It is an approach to controlling the physical flow of products and services from suppliers to end users by coordinating the activities of suppliers, manufacturers, channel partners, service providers, and customers to develop a sustainable competitive advantage. It takes a cross functional integration into consideration and looks beyond the functional excellence of the organisation. It contributes to the world class performance of a business enterprise and adds value to its product and service offerings, thereby helping it to outperform its rivals.

The pursuit of growth and the need to access new markets have been propelling companies all over the world to search for sustainable competitive advantage. The global environment has forced business organisations to recognise the critical role of back end operations of the logistics operations. As business firms are focussing on production, marketing, and finance, greater attention should be focussed towards achieving customer satisfaction through effective and efficient logistics. For effective marketing, it requires to deliver the products at right time, right place, right condition, right cost and right handling. The study is based on analysing the market-logistics system of Voltas Limited Kolkata region. Voltas Limited, a subsidiary of Tata Sons Limited, is one of the leading air conditioning and engineering concerns of India. Voltas offers engineering solutions for a wide spectrum of industries in areas such as heating, ventilation and air conditioning, refrigeration, climate control, electro-mechanical projects, textile machinery, machine tools, mining and construction, material handling, water management, building management systems, pollution and chemicals. The company's operations have been organised into four independent business-specific clusters, namely the air conditioning and refrigeration business group, unitary products business group (UPBG), engineering products business group and, international operations business group. This study is mainly focused to analyse the logistics system

of Voltas Limited in the Kolkata region, because the company is a leading player in air-conditioning industry, where this study would be helpful to the corporate to implement into their supply chain and logistics activities for better management and distribution of products.

Conceptual foundation and role of logistics in supply chain

Logistics connects the source of supply with the sources of demand. It is basically an integrative process that optimises the flow of materials and supplies through the organisation and its operations to the customer. Christopher (1994) defines logistics as essentially a marketing planning process and an information based activity for delivering the goods to the ultimate customer.

According to Gattorna and Walters (1996), logistics is a component of strategic marketing management. It is responsible for managing the acquisition, movement and storage of materials, parts and finished goods inventory through an organisation and its marketing channels to meet customer expectations- thereby meeting the company's profit objectives.

The concept of logistics is understood as an integrated management of forecasting, inventory control, transportation, warehousing, order entry and customer service and product planning functions. Logistics and SCM is an art of management of flow of materials and products from the source of production to the end user. This system includes the total flow of materials and products from the stage of acquisition of raw materials to the delivery of finished products to the customers. The ultimate objective of logistics function is to support corporate goals by delivering products to the customer at a time and place of his choice. Logistical activities supplement supply chain operations. The efficiency and effectiveness of inventory movement across the supply chain is greatly dependent on the capability of logistics management. Cost reduction and customer service enhancement is not possible in a supply chain without the efficient logistics operations like warehousing, material handling, inventory control, packaging, and transportation. The components of integrated logistics management are exhibited in Table 1.

Table1: Logistics management: The Integrated Approach

<i>Supply</i>	<i>Operations</i>	<i>Distribution</i>
<ul style="list-style-type: none"> ● Production/Source ● Purchasing ● Inward transportation ● Raw material and ad-hoc inventory 	<ul style="list-style-type: none"> ● Production Planning ● Scheduling ● Ad-hoc inventory for production 	<ul style="list-style-type: none"> ● Forecasting ● Customer service ● Finished good inventory ● Warehousing ● Outward transport

Objectives of the study

The marketing researcher has certain objectives towards improving the logistics and physical distribution, which has to take utmost care for growth, profitability and secure a safe position in the competitive market.

- (i) To find out the gap in the existing knowledge relating to the SCM and logistics strategies through literature survey.
- (ii) To find out the quality of Voltas products
- (iii) To find out the packaging quality of Voltas products.
- (iv) To analyse and test of independence of attributes like the promptness of order delivery and quality of transportation services of Voltas Limited with regards to logistics service.

Hypotheses of the study

The following null hypotheses (H_0) were formulated for the purpose of the study:

1. a) H_0 : The product quality of Voltas has the same level of significance for all options.
b) H_1 : The product qualities of Voltas do not have same level of significance for all options.
2. a) H_0 : The customised delivery of products of Voltas has the same level of significance for all options.
b) H_1 : The customised delivery of products of Voltas does not have the same level of significance for all options.
3. a) H_0 : The packaging quality of Voltas products has the same level of significance for all options.
b) H_1 : The packaging quality of Voltas products does not have the same level of significance for all options.

4 a) H_{01} : The transportation facilities and the delivery of products of Voltas are independent to each other.

b) H_{02} : The transportation facilities and delivery of products of Voltas dependent.

Research methodology of the study

The term market research refers to the function that links the customer and the marketer through information –information used to identify and define marketing opportunities and problems; generate and refine, and evaluate marketing actions; monitor marketing performance; and improve understanding of marketing as a process (American Marketing Association, 1997). The present study is an empirical one which was conducted on Voltas Ltd. It is based mainly on primary data collected from the market by interviewing the dealers, distributors, retailers of Voltas limited. In addition, some secondary data have been collected from various books, journals, publications of companies to supplement the primary data. The data so collected have been properly tabulated and analysed with the help of statistical tool like Chi-Square

In this research study, the methods are as follows:

(a) Research design

The research design is **descriptive**. The data that have collected basically relate to perception, attitudes, usages and behavioural intentions of the respondents.

(b) Regions / Areas: The data have been collected by interviewing a number of people in Kolkata, 24 Parganas (North and South), and other parts of West Bengal and the relevant data are collected from Distributors, dealers and retailers of Voltas.

(C) Sampling units and sample size: Each and every distributors, dealers and stockists who sales or deals with VOLTAS air conditioning products are considered . The total sample size is 80.

$$\chi^2 = \sum \frac{(f_0 - f_e)^2}{f_e}$$

(d) data collection Methodology

On the basis of hypothesis, a structured questionnaire has been prepared. All the questions in the questionnaire are both close ended and open ended.

For the purpose of analysing the data, the following statistical tool like chi-square has been used as a part of the research methodology. A brief explanation of the statistical formula in the study is provided as a frame of reference for the convenience of the readers and users of the study.

Chi-Square (χ^2) Distribution

This test, devised by Karl Pearson, is used to decide whether the observations are in good agreement with a hypothetical distribution, i.e. whether the sample may be supposed to have arisen from a specified population. The observed frequencies (f0) of different classes are compared with the expected frequencies (fe) by the test statistic.

Developing customer-service driven logistics systems

The role of logistics can be seen as the development of modern marketing systems to ensure that customer service goals are met. The term customer service has been used to describe both marketing and logistics activities which are aimed at enhancing the product offering or facilitating the exchange process between a supplier and the customer. From a modern marketing perspective, customer service is concerned with the elements of product design and maintenance , providing training to salesperson , and building positive attitude amongst salesperson , to facilitate better service to the ultimate customers. Logistics service, as a subset of overall customer service, includes elements associated with the delivery of products to meet customer requests or needs. Delivery reliability, product availability, timeliness or responsiveness, accuracy, and freedom from damage are important dimensions of logistics service (Rinehart et al., 1989). Rinehart et al. (1989) have noted that customer service is the unifying factor for integrating marketing and logistics activities, which creates the customer service output of the firm.

Findings and Interpretation

Table 2 : Frequency distribution of product quality of Voltas

Opinions about the product quality of Voltas

Frequency	Very Poor	Poor	Neutral	Good	Very Good	Total
No. Of Respondents	5	15	10	20	30	80
(%)	6.25	18.75	12.5	25	37.5	100

Source: Primary data

Ho (Null Hypothesis): The product qualities of Voltas have the same level of significance for all options.

H1 (Alternative Hypothesis): The product qualities of Voltas do not have same level of significance for all options.

Frequency	Very Poor	Poor	Neutral	Good	Very Good	Total
Observed Frequency	5	15	10	20	30	80
Expected Frequency	16	16	16	16	16	100

$$\chi^2_{05} = E (f_0 - f_e)^2 / f_e$$

$$= (5-16)^2/16 + (15-16)^2/16 + (10-16)^2/16 + (20-16)^2/16 + (30-16)^2/16$$

$$= 23.125$$

χ^2_{tab} at degree of freedom 4 = 9.49

So, $\chi^2_{cal} > \chi^2_{tab}$

So we reject the null hypothesis H0 and accept the alternative hypothesis H1 which interprets that the product quality of the Voltas is good. In the next stage, data analysis will be done for analysing the customised delivery of products that suit special requirements of customers.

Table 3 Frequency distribution of the company that customizes the delivery of products to suit special requirements of customers

Responses regarding customized delivery

	Yes	No	Can't say	Total
No. Of Respondents	22	48	10	80
(%)	27.5	60	12.5	100

Source: Primary data

H0 (Null Hypothesis): The customised delivery of products of Voltas has the same level of significance for all options.

H1 (Alternative Hypothesis): The customised delivery of products of Voltas does not have the same level of significance for all options.

Observed / Expected frequency	Yes	No	Cannot say	Total
No. Of Respondents	22	48	10	80
Expected Frequency	26.667	26.667	26.667	100

$$\chi^2_{.05} = \sum (f_0 - f_e)^2 / f_e$$

$$= (22 - 26.667)^2 / 26.667 + (48 - 26.667)^2 / 26.667 + (10 - 16)^2 / 26.667 = 28.299$$

χ^2_{tab} at degree of freedom 2 = 5.99, So, $\chi^2_{cal} > \chi^2_{tab}$

So we reject the null hypothesis H0 and accept the alternative hypothesis H1 which infers that the customised delivery of products of large quantity on demand is not adequate. Now we will go for the next analysis to test the packaging perspective in logistics of Voltas products.

**Table 4 : Frequency distribution of quality of packaging of Voltas for logistics
Responses regarding packaging quality**

	Very Poor	Poor	Average	Good	Very Good	Total
No. Of Respondents	2	4	26	41	7	80
(%)	2.5	5	32.5	51.25	8.75	100

Source: Primary Data

H0 (Null Hypothesis): The packaging quality of Voltas has the same level of significance for all options.

H1 (Alternative Hypothesis): The packaging quality does not have same level of significance for all options.

Observed /Expected frequency	Very Poor	Poor	Neutral	Good	Very Good	Total
Observed Frequency	2	4	26	41	7	80
Expected Frequency	16	16	16	16	16	100

$$\chi^2_{.05} = \sum (f_0 - f_e)^2 / f_e$$

$$= (2 - 16)^2 / 16 + (4 - 16)^2 / 16 + (26 - 16)^2 / 16 + (41 - 16)^2 / 16 + (7 - 16)^2 / 16 = 71.625$$

χ^2_{tab} at degree of freedom 4 = 9.49

So, $\chi^2_{cal} > \chi^2_{tab}$

So we reject the null hypothesis H0 and accept the alternative hypothesis H1 which tells that packaging quality of Voltas is highly satisfactory.

Test for independence of attributes like transportation and warehousing facilities and ability to delivery the order

Table 5.1 Frequency distribution of respondents regarding the opinions of transportation and warehousing of the Voltas products.

Responses regarding the facility of transportation and warehousing

	Poor	Average	Good	Total
No. Of Respondents	8	24	48	80
(%)	27.5	60	12.5	100

Source : Primary Data

Table 5.2 : Frequency distribution of respondents regarding the ability of order delivery of Voltas products

Responses regarding the ability of order delivery

	Poor	Average	Good	Total
No. Of Respondents	18	32	30	80
(%)	22.5	40	37.5	100

Source : Primary Data

H_0 (Null hypothesis): The transportation and warehousing facilities and the delivery of products of Voltas are independent to each other.

H_1 (Alternative hypothesis): The transportation and warehousing facility and the delivery of products are not independent.

Observed Frequency	Poor	Average	Good	Total
No. of respondents on transportation	12	24	44	80
No. of respondents on ability to delivery the order	18	32	30	80
	30	56	74	160

Expected Frequency	Poor	Average	Good	Total
No. of respondents on transportation	15	28	37	80
No. of respondents on delivery standards	15	28	37	80
	30	56	74	160

$$\chi^2_{.05} = \sum (f_0 - f_e)^2 / f_e$$

$$= (12-15)^2/15 + (24-28)^2/28 + (44-37)^2/37 + (18-15)^2/15 + (32-28)^2/28 + (30-37)^2/37$$

$$= 4.991$$

χ^2_{tab} at degree of freedom 4 = 9.49

So, $\chi^2_{cal} < \chi^2_{tab}$

So we accept the null hypothesis H_0 and conclude that transportation, storing and ability to delivery the orders are independent

Limitations of the study

The limitations are as follows:

- i. It was not possible to gain assess to the confidential decisions and policies of the Voltas's marketing and management operations, the interpretations of the data and observations about our findings are based on the primary data and whatever information we could gather from conversations with the officials of the company.

ii. The total sample size is 80, which is not enough. As we know, the more data we could gather and analyse, the more reliable and authentic will be the result of the research study. The time and also the related costs are the limitations of the research work

Suggestions and conclusion

A number of well-thought suggestions have been made with the aim to improve its logistics operations and efficiencies of Voltas Limited. They are as follows: (a) to provide more logistics services to the customer, (b) the quality of packaging should be improved as compared to other competitors in the market, (c) to improve the product delivery as it has been observed that the company was not able to meet customer requirements, (d) the company should improve and maintain a good relationship between the warehouse boys and the vehicle control managers who are related to the final delivery of the product.

Supply chain management is an overall organisational activity whose primary objective is to proactively manage the movement and coordination of goods, services, and information from raw material suppliers to end customers. The coordination of material and information movement across the supply chain is possible with integrated logistics. Logistics activities such as transportation, warehousing, material handling, inventory management, and order processing have a significant impact on customer cost and operations. Inefficient logistics operation may force the customer to carry more inventories which finally results a burden on his profit margins. Integrated logistics enhances customer service level and it ensures the availability of the right product, at the right place and at a reduced price.

Due to liberalization and globalisation of the Indian economy, trade and commercial activities have increased manifold. The future for logistics in India is very bright, provided issues like abolition of octroi levy, rationalisation of customs formalities, and privatization of ports, improvement in road and rail infrastructure, and creation of cold storages are taken care of through Government initiatives with proper policy formulations. The FMCG, consumer durables, retail chains, food processing pharmaceuticals, electronics goods, and automobile industries are the major drivers of logistical activities in India.

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