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A STUDY ON IMPACT OF REVERSE LOGISTICS ON SUPPLY CHAIN AT METRO CASH & CARRY

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ABSTRACT

The modern world values quality and time, not only during the purchase and sale of a product, but also during after-sale service. It is only right for the organizations to have accurate and timely knowledge on the inflow and outflow of their goods/products to remain competitive in the market. A large element of this includes reverse logistics. Reverse logistics is the opposite of traditional logistics dealing with the reverse movement of goods usually from the end users to the manufactures/ wholesalers. The purpose of the paper is to analyze the impact of reverse logistics on the supply chain. It focuses on the relationship of reverse logistics between different variables such as inventory control, customer satisfaction & forward logistics. The foundation of the study is done through prevalent review of literatures. The study also aims at finding the challenges faced by the organization in implementing reverse logistics. The sampling method used is non-probability sampling (Selective sampling). Data was collected through questionnaire and face to face interviews. Various statistical tools in SPSS software and Microsoft Excel are used to analyze the data. The research paper also discusses its limitations, implications & scope for future studies.

Keywords: *Logistics, Reverse Logistics, Supply Chain, Inventory Control, Forward Logistics.*

Introduction

Logistics is the art and skill of managing, movement of goods from the manufacturer to the end consumer. It acts as a bridge which connects the missing dots in the delivery process of a product throughout its business cycle. In the present world where time is money, logistics plays a vital role in getting the goods delivered within the expected time range by the customer. It aims at getting the right goods to the right place at the right time with the right order to the right customer in desired condition while making the highest contribution to the firm, The Chartered Institute of Logistics & Transport UK, 2019[1] Supply chain management is clearly an extension of logistics management. Supply chain deals with the network of business from manufacturers to customers whereas logistics deals with the activities involved in this process. There are three main types of logistics: Inbound logistics, outbound logistics and Reverse logistics.

Reverse logistics is,'The process of reclaiming the value of returned goods and reintroducing them into the market as soon as possible.', Shifted Team, 2021[2].It is generally referred to as the reverse flow of goods from the end user back to the manufacturer. It is usually done in case of damaged, outdated products and returns which is transferred back to the original owner for re-manufacturing, repairs, recycling or in some scenario to dispose the product. Reverse logistics along with forward logistics creates closed loop supply chain. Guide Jr. and Van Wassenhove, 2009[3]defined closed-loop supply chains as the, "design, control, and operation of a system to maximize value creation over the

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1 The Chartered Institute of Logistics & Transport UK, 2019
2 Shifted Team,2021
3 OR FORUM—The evolution of closed-loop supply chain research

entire life cycle of a product with dynamic recovery of value from different types and volumes of returns over time." The entire process becomes very efficient with a proper supply chain network. Reverse logistics not only serve as a means of controlling the flow of goods within an organization, but also acts as a driving force in maintaining sound supplier relationships.

This paper provides insights on the significance of adopting reverse logistics in an organization. Further the paper aims at providing better understanding of reverse logistics influence on supply chain and reveals the challenges faced by the organization in the implementation of reverse logistics.

Literature Review

In the paper ***Cezary Suszynski et.al, 2022***[1] the dynamic nature of the market highlights the needs of adapting to the market needs accordingly. It is highly important for the business to cut cost and utilize the resources to its maximum ability to gain consistent profitability. This paper focus on building relationship between parties and supply chain for cost optimization in operations of reverse logistics. According to the study conducted by ***NNC Pushpamali, et.al, 2020***[2] the paper states the role of Reverse Logistics on Supply Chain performance at construction industry in South East Queensland, Australia. The paper examines reverse logistics practices and achieves that it reduces the sourcing cost of materials as compared to new materials. The paper is limited to qualitative analysis. The paper concludes that used materials if meet the industry specifications can have similar performance without affecting construction time or quality of the project with substantially lower cost. ***Kateryna Lysenko-Ryba, 2017***[3] in his study has explained the importance of full value product returns, and the complaints in the context of their importance for customer satisfaction. He believes that each perceived customer who will be able to smoothly return the product will be satisfied and will make the purchase once again and can help in building positive relationships and contribute to the growth of customer loyalty. According to the authors ***Salvatore Cannella, et.al, 2016***[4] the flow of inventory in close loop supply chain is an intricate task for the products dropping in for recycle or replenishment (reverse logistics) purpose. The study of reverse logistics factors that influences the performance is analyzed under various market conditions. The outcome presents higher stability in closed loop supply chain as compared to the traditional chain of supply and suggests investing in returns management for dynamic performance. ***Ekahri Mandota, 2015***[5] in her research focuses on the impact reverse logistics of glass bottles on supply chain performance and the challenges faced at Carlsberg Malawi. According to the paper reverse logistics has a positive impact on the profits and business growth. It also reduces the cost of procuring new glass bottles. The study also suggests government to offer economic benefits such as tax redemptions to organizations exercising reverse logistics practices. It also focuses on engaging the supply chain partners in the reverse logistics process such as educating customers on importance of returning glass bottles. The purpose of the paper by ***Ilias Vlachos, 2014***[6] is to explore the firm's performance in relation with the influence of the elements in reverse logistics. The application of 3 models was done which includes 'joint Reverse Logistics, 'close-loop logistics' & 'outsourcing Reverse Logistics'. The author also observes the relationship between customer loyalty and reverse logistics .This research concluded on having a positive result of Reverse Logistics on the firm's performance. The study by ***Mario Turrisi et.al, 2013***[7] aims at impact of reverse logistics on the supply chain performance and the tools and strategies to be implemented by the managers for the smooth management of reverse logistics thereby having optimal and efficient utilization and maintenance of inventory and increase the logistics performance in the organization. This study also suggests future researchers to implement forecasting techniques for reverse logistics.

Statement of Problem

A well-planned reverse logistics system reduces storage & distribution costs and creates sustainable supply chain. Metro adopted reverse logistics to utilize the economic advantage as well as to have sufficient management of inventory ensuring the products are used at its fullest.

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1 Cost optimization for R-logistics operations at foreign supermarkets in Vietnam

2 Strategic decision making in construction supply chains: A comparison of reverse logistics strategies.

3 Impact of reverse logistics on customer satisfaction

4 Closed-loop supply chains: What reverse logistics factors influence performance?

5 The Impact Of Reverse Logistics On Supply Chain Performance In Malawi Manufacturing Sector: A Case Study Of Carlsberg Malawi (Kanengo Plant)

6 A conceptual framework of reverse logistics impact on firm performance.

7 Impact of reverse logistics on supply chain performance. *International Journal of Physical Distribution & Logistics Management*.

Although reverse logistics increases the total cost of ownership, the benefit of it overcomes the cost factor. Having good relation with the suppliers is an essential part of continuing a business in an efficient manner. Suppliers usually build good relations with buyers who purchase often and make timely payments. When a product is returned, it costs the consumer and the seller time, money, and effort. Frequent returns of goods/products are a bad sign for both parties. This can deter suppliers from providing products and disrupt the supply chain. Customers are the key end point of the supply chain and, as such, should be regarded an important component of reverse logistics.

Objectives of the Study

- To assess the effect of reverse logistics on inventory control.
- To study the relation of reverse logistics on customer satisfaction.
- To determine the impact of reverse logistics on supply chain performance.

Research Methodology

- **Data Source**

The primary and secondary data for the study was explored through face to face interviews and structured questionnaire from respondent employers of Metro and also from published reports, journals and surveys.

- **Sample Unit and Size**

Sample respondents' population comprised of employees working in reverse logistics and quality inspection team at Metro. A total of hundred (100) respondents are considered to gather the data. This study uses Non-probability sampling technique to execute the questionnaire.

Hypotheses

There are three hypotheses framed to meet the objectives of this study.

Objective 1: To assess the effect of reverse logistics on inventory control.

H_0: Reverse logistics has no impact on the supply chain performance.
H_1: Reverse logistics has an impact on the supply chain performance.

Objective 2: To study the relation of reverse logistics on customer satisfaction.

H_0: Reverse logistics has no effect on Inventory control.
H_1: Reverse logistics has an effect on Inventory control.

Objective 3: To study the relation of reverse logistics on customer satisfaction.

H_0: There is no significant relationship between customer satisfaction and reverse logistics.
H_1: There is a significant relationship between customer satisfaction and reverse logistics.

The data collected was analyzed using Microsoft excel and SPSS software. Analysis of frequency is done for the demographic data. The mean and standard deviation of the data set was taken for better interpretation.

Limitations of the Study

The study covers only the impact of reverse logistics on supply chain, inventory control and the relation between reverse logistics and customer satisfaction. It does not investigate and calculate mathematical implications/models on reverse logistics and is limited to a Bengaluru branch of Metro.

Analysis and Results

The study comprises of both descriptive and analytical research. Sample size of 100 was used for the analysis and interpretation of data consisting of different levels of employees at Metro. Three hypotheses are tested with the help of Frequency analysis, regression and co-relation techniques.

H_1: Reverse logistics has an impact on the supply chain performance.

This hypothesis is tested and analyzed with the help of Linear Regression Test.

Table 1: ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	513.088	1	513.088	360.029	<.001
Residual	139.662	98	1.425		
Total	652.750	99			

(Primary source)

Table 1(a): Coefficients

Model	Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	T	Sig.
(Constant)	.647	.368		1.759	.082
Hypothesis_1_1	.941	0.50	.887	18.974	<.001
(Primary source)					

Table 1(b): Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.887	.786	.784	1.19379
(Primary source)				

The data collected for H1 constitutes of reverse logistics cost factors and network structure impacting supply chain performance. The independent variable for is the reverse logistics network structure followed by the dependent variable, reverse logistics cost factors impacting supply chain performance. It can be inferred from Table 1 the significance value of regression is <.001 which is less than the acceptance level of 0.05 hence showing an impact of reverse logistics network structure on reverse logistics cost. Table 1 (a) shows the significance value= 0.887 which is positive. It also shows the value of t=18.974 which is >1.96 representing an impact. Further from the Table 1(b) r^2 interprets 78.6% effect of reverse logistics on supply chain performance. The significance of co-efficient (P) is 0.082 which is > 0.05. Hence alternative hypothesis is accepted. Therefore, the result proves that there is an impact of reverse logistics on the supply chain performance. The dependency of reverse logistics cost in an organization is highly influenced by their network structure (supply chain). Further the hidden cost of reverse logistics is a major challenge as the organization fails to ascertain this cost.

H_2: Reverse logistics has an effect on Inventory control.

This hypothesis is tested and analyzed with the help of Linear Regression Test.

Table 2: ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	3.243	1	3.243	2.812	.097
Residual	112.997	98	1.153		
Total	116.240	99			
(Primary source)					

Table 2(a): Coefficients

Model	Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	T	Sig.
(Constant)	22.829	1.156		19.744	<.001
H31	.107	.064	.167	1.677	.097
(Primary source)					

Table 2(b): Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.167	.028	.018	1.07379
(Primary source)				

For the testing of H2 data was collected with variables such as effect of reverse logistics on stock control and management of inventory. The independent variable is the management of inventory and the dependent variable is the benefit of reverse logistics on stock control. It can be inferred from Table 2 the significance value of regression is .097 which is greater than the acceptance level of 0.05% showing an impact between the variables. Table 2(a) depicts the significant value of impact= 0.97 which is >0.05. Therefore alternative hypothesis is accepted. Further Table 2(a) exhibits the value of t=19.744 which is >1.96. Hence results prove there is an effect of reverse logistics on inventory control. Table 2(b) shows the value of r=0.167 which is positive in nature exhibiting a positive impact/effect of reverse logistics on inventory control. The value of r^2 in Table 2(b) depicts a positive impact of 28% on both the variables. Because of the reverse logistics process, the organization has accurate knowledge of goods. It also aids in improved inventory planning for the future and prevents inventory availability delays, resulting in an optimized inventory system.

H_3: There is a significant relationship between customer satisfaction and reverse logistics.

This hypothesis is tested and analyzed with the help of Karl Pearson's co-relation of co-efficient Test.

Table 3: Correlations

		H41	H42
H41	Pearson Correlation	1	-.560
	Sig. (2-tailed)		<.001
	N	100	100
H42	Pearson Correlation	<.560	1
	Sig. (2-tailed)	<.001	
	N	100	100
(Primary source)			

The data collected for H3 analyzes the relationship between reverse logistics and customer satisfaction. The independent variable is the interaction level with customers on reverse logistics and the dependent variable is the feedback taken from customers by the organization. It can be inferred from Table 3 the value of r=-0.560, which proves there is a negative relationship between reverse logistics and customer satisfaction. Two tailed significance value is <0.01. Therefore, alternative hypothesis is accepted. Hence there is a significant relationship between reverse logistics and customer satisfaction. Result indicates the increase of reverse logistics has a strong negative correlation with customer satisfaction. The primary reason for implementing reverse logistics was to satisfy their customers, but the more returns they make, the more dissatisfied they are. As a result, organizations should keep track of product returns on a regular basis, as well as the reason for the return and the supplier who provides them, in order to make better decisions.

Conclusion

The study investigated whether reverse logistics has an impact on supply chain and other variables such as inventory control and customer satisfaction. Organizations face a lot of challenge in implementation of reverse logistics but the adaptation of this is extremely important to survive in the market. Findings from this study reveals the major challenges faced in implementation of reverse logistics at Metro such as high return handling cost, storage cost and time cost factor invested by the employee. The finding also suggests the organizations to take separate feedbacks pertaining to reverse logistics from their customers for mutual understanding of their customer's behavior and satisfaction. The study also emphases on the positive impact of reverse logistics on the inventory control. It is not only important for the demand awareness of a product but also prevents under-stock/over-stock of goods. The integration of reverse logistics in supply chains is used as a strategy to increase profits or to promote sustainability and customer satisfaction *(Du and Evans, 2008)*[1]

The lead time of products in an organization is highly influenced by the reverse logistics practices followed by them. We also learn the importance of supplier's perception on reverse logistics as it is a crucial factor which may affect the functioning of entire reverse logistics process. Frequent returns demotivate the suppliers to provide goods, as a result the supplier-buyer relationship affects negatively.

In the recent years reverse logistics is considered as a competitive advantage especially in the online business. Literature *(Gabriela Cecilia Stănciulescu ,2011)*[2] shows the impact of reverse logistics on the firm's strategic decision making. Just as timely product delivery has a positive impact on customer purchasing, reverse logistics influences customer purchasing and helps in generating greater satisfaction when the process becomes easier and faster. To achieve this, the suply chain is critical, as it is only through strong and positive supplier relationships that any organization can deliver an efficient logistics process. Reverse logistics not only aids in the establishment and maintenance of a supplier-buyer relationship, but it also indirectly aids in organizational growth and performance. The findings of this study confirm that there is a strong impact of reverse logistics on the supply chain.

Research Implications, Limitations and Scope for Further Research

This paper provides major implications for the practice of reverse logistics and supply chain. The most significant contribution to the existing literature is the effect of reverse logistics on inventory control. This is a major challenge for all supply chain members, as the management of inventory is

[1] A bi-objective reverse logistics network analysis for post-sale service. Computers & Operations Research

[2] Importance of Reverse Logistics for Retail Acts. In *Supply Chain Management-New Perspectives*.

crucial task for efficient functioning of business activities in any organization. This paper shows a positive impact of reverse logistics on inventory control which could act as a motivator for organizations in adopting reverse logistics. Further as the storage capacity is highly affected from the reverse flow of goods, it is of great need to determine factors to overcome this.

The research limitation found in the paper is the effect of reverse logistics on forward logistics. Future researchers can conduct a study to understand the relation between these two variables and its impact on each other. Furthermore a model can be developed for inventory control through reverse logistics. Future study should also consider Green reverse logistics effect on wholesalers and retailers.

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