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Integrating Quality Management Into Reverse Logistics Systems

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ABSTRACT

Reverse Logistics is the process of moving products from their typical final destination to Original Equipment Manufacturer and/or companies concerned in recuperation activities, in an attempt to recapture a number of used merchandise value, e.g. through resale, or for proper disposal of the item if not resalable or reusable. Reverse logistics management concerned with a variety of processes that have a direct or indirect impact on cost of quality. The development and implementation of a diagnostic tool to fully identify and measure this impact can point out the way of improving reverse logistics management and thereby leading to lower overall costs by lowering quality costs. Quality management has become an important and crucial factor among manufacturing companies. Reverse logistics and quality management are two interrelated but not frequently used aspects in the economy. The present study identifies the prospects of quality management in reverse logistics. The study gives the result that the factors influencing reverse logistics among companies are mostly social in nature. Factors influencing reverse logistics especially reduced storage and distribution cost is influenced by the level of business area. The study revealed that nature of operation, level of business area & type of products offered by the company influences the quality management in reverse logistics among the respondent companies.

Keyword: Reverse Logistics, Quality Management, Manufacturing companies, Cost of quality

1. INTRODUCTION

After the introduction of Goods and Services Tax in India the Logistics sector has become very important in terms of ensuring the consumer expectations in timely reception of products. Reverse logistics also enhanced during this era where online purchases are at its peak. It has become more relevant and noticeable due to real-time feedback and returns generated by end customers. Quality entails more than just a product that functions well. Performance, appearance, availability, timely and proper delivery, reliability, maintainability, cost effectiveness, and low price may all be included. It is not by coincidence that products of the required quality are produced by the manufacturing companies. There has to be a production process which is properly managed, ensuring satisfactory and consistent quality. All efforts guaranteeing that products and services fulfill their purpose and meet preset requirements are included in Quality Management (QM).. As such, it constitutes an old scientific and research area, which has been developed and implemented in various stages of forward, mainly, production processes. The positive effects of Quality Management on companies are numerous. The influence of reverse logistics over quality management of a manufacturing concern is of utmost significance in the covid stricken economy.

Statement of the problem

India is a developing economy which has vast potential for global market. It is the largest economy by nominal GDP and third largest by purchasing power parity. Even though Indian economy has this much potential, reverse logistics is still at its embryonic stage in our economy. Proper adoption and implementation of reverse logistics are still a question mark in certain companies.

Quality management has become an important and crucial factor among manufacturing companies. Many organizations have started realizing the importance of quality management and new quality system improvement standards. Reverse logistics and quality management are two interrelated but not frequently used aspects in the economy. Reverse logistics is often considered as a reuse platform only and quality among them are not thoroughly examined due to the nature of the returned products. But an effective quality management in reverse logistics can improve and enhance the cost and other quality aspects

of the product. So it is crucial to examine the quality determinants and quality management in reverse logistics among companies

Objectives of the study

The following are the important objectives of the study,

1) To examine the factors influencing Reverse Logistics of a product.

2) To analyze the components of quality of returned products.

3) To study the barriers of Quality Enhancement.

Scope of the study

It is investigated that reverse logistics and quality management are gaining importance in the current economy at a tremendous growth phase. It is also analyzed that manufacturing companies pay somewhat less attention to the reverse logistics process among themselves and concluded that the companies need to consider reverse logistics quality for their own betterment. The study indicates the quality management in reverse logistics among Southern Kerala. So, further research in the proposed area helps the manufacturing companies in Southern Kerala to improve their operational efficiency in the field of reverse logistics quality management. And to identify the quality determinants and barriers involved in reverse logistics process.

Research Methodology

The researcher used descriptive research methods throughout the study. Sampling frame include companies involved in manufacturing, retailing and manufacturing cum retailing companies in southern Kerala. Sampling unit involves companies operating in different levels of business areas and producing different type of products. The study covered about 130 manufacturing companies in Kerala. Samples were selected using purposive sampling and collected using Structured Interview Schedule with suitable scaling. Primary data were collected using survey method. And secondary data were included from research journals, books, magazines, newspapers and websites. Likert scale, close ended and multiple choice questions were used. Several statistical tools such as simple percentage, Mean score, Kruskal-Wallis H-test and One-way ANOVA test were used by the researcher in the study using SPSS.

Data Analysis & Findings

Factors influencing Reverse Logistics

Sl. No	Factors	Mean Score
A	**Economic Factors**	
1	Profitable business opportunity	3.52
2	Reduced manufacturing costs	3.76
3	Wealth maximization	3.30
4	Reduced storage & Distribution costs	3.72
B	**Organizational Factors**	
1	Technological Advantage	3.52
2	Organizational Policies & Procedures	3.73
3	Employee Acceptance	3.72
4	Proper Management Information System	2.18
5	Support of Top Management	2.92
C	**Social Factors**	
1	Corporate Social Responsibility	3.95
2	Green Image of Organization	3.41

Table 4.11.2 – H test for the influence of business area over reverse logistic factors

Reverse Logistic Factors	Profitable Business Opportunity	Reduced manufacturing costs	Wealth maximization	Reduced Storage & Distribution costs	Technological Advantage	Organizational policies & procedures	Employee Acceptance	Proper Management Information System	Support of Top Management	Corporate Social Responsibility	Green image of organization	Commitment towards stakeholders	Legal Regulations	Supplier relations	Customer loyalty
Chi-Square	1.744	4.478	4.785	12.519	3.200	1.588	.164	6.391	4.876	1.941	.754	2.400	1.494	1.880	4.945
df	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Asymp. Sig.	.627	.214	.188	.006	.362	.662	.983	.094	.181	.585	.860	.494	.684	.598	.176

a. Kruskal Wallis Test

b. Grouping Variable: Level of business Area

3	Commitment towards Stakeholders	3.46
4	Legal Regulations	3.89
5	Supplier Relations	4.16
6	Customer Loyalty	3.22

The companies agree on corporate social responsibility, legal regulations, reduced manufacturing costs, reduced storage & distribution costs and employee acceptance being the factors influencing reverse logistics with a mean score of between 3.5 and 4.0. The companies strongly agree on supplier relations being the factor influencing reverse logistics with the mean score of 4.16. From the table supplier relations, corporate social responsibility and legal regulations are the important factors that influence reverse logistics in the companies.

Influence of business area over reverse logistics factors

The influence of level of business area in reverse logistics factors is analyzed by the researcher using Kruskal Wallis H-test.

H_0: There is no significant difference between factors influencing reverse logistics across different levels of business area

H_1: There is significant difference between factors influencing reverse logistics across different levels of business area.

The above table clearly shows that insignificant differences (Asymp. Sig. > 0.05) in the factors influencing reverse logistics in companies for different levels of business area (State level=77, National level=35, International level=13 and All levels=5) except reduced storage and distribution costs (Asymp. Sig. = .006). The null hypothesis (H_0) is accepted and alternate hypothesis (H_1) is rejected.

In the case of reduced storage and distribution costs null hypothesis (H_0) is rejected and alternate hypothesis (H_1) is accepted. That is, there is significant difference between reduced storage & distribution costs between different levels of business area.

Quality of reverse logistics process

Sl. No.	Process involved	Mean Score
1	Quality objectives laid down by Organization	3.64
2	Arrangement of transportation facilities to collect product returns	3.62
3	Timeliness of products arrival at collection facility	3.63
4	Availability and accuracy of Information management of returned products	2.65
5	Data sharing within the organization	2.87
6	Expertize of employees in the department	3.03
7	Training programs for employees	3.14
8	Goods Handling of returned products	3.55
9	Proper Resource Allocation & Utilization for improving quality	3.60
10	Organizational efforts to improve product quality	3.61
11	Quality materials & Services provided by Suppliers	3.62
12	Employee participation in giving suggestions	3.39
13	Use of Innovative Technology	2.65

The quality objectives laid down by organization is the highly satisfied quality process involved in reverse logistics process. The timeliness of products arrival at collection facility, arrangement of transportation facilities to collect product returns are considered the next important satisfied quality process involved in reverse logistics process.

Table shows that quality objectives laid by the organization has the most satisfied quality process involved in a company. While the use of innovative technology and the availability and accuracy of information management of returned products are the most dissatisfied quality process in reverse logistics.

Influence of business area over quality process involved

The influence of level of business area over quality processes involved in reverse logistics is analyzed by the researcher using One-way ANOVA test.

H_0: There is no significant difference between mean of quality process involved in reverse logistics across different levels of business area.

H_1: There is significant difference between mean of quality process involved in reverse logistics across different levels of business area.

Quality Process involved	F	Sig.
Quality objectives laid by organization	.126	.945
Arrangement of transportation facilities to collect product returns	.950	.419
Timeliness of products arrival at collection facility	.542	.655
Availability and accuracy of information management of returned products	1.348	.262

Data sharing within the organization	.875	.456
Inefficiency of employees	.382	.766
Training programs for employees	.632	.596
Goods handling of returned products	1.290	.281
Proper resource allocation and utilization for improving quality	1.188	.317
Organizational efforts to improve product quality	.628	.598
Quality materials & services provided by suppliers	.631	.596
Employee participation in giving suggestions	1.575	.199
Use of innovative technology	1.348	.262

The table shows that quality process involved in reverse logistics among the respondent companies show p value or significant level of more than 0.05 in the One-way ANOVA test.

There is no statistical significance between the level of business area and quality processes in reverse logistics. Hence the null hypothesis is accepted (H_0) and the alternate hypothesis is rejected (H_2). So, there is no significant difference between mean of quality process involved in reverse logistics across different levels of business area.

Influence of type of products offered over quality process involved

The influence of type of products offered over quality processes involved in reverse logistics is analyzed by the researcher using One-way ANOVA test.

H_0: There is no significant difference between mean of quality process involved in reverse logistics across different types of products offered.

H_1: There is significant difference between mean of quality process involved in reverse logistics across different type of products offered.

Quality Process involved	F	Sig.
Quality objectives laid by organization	3.931	.005
Arrangement of transportation facilities to collect product returns	.554	.697
Timeliness of products arrival at collection facility	.557	.694
Availability and accuracy of information management of returned products	.482	.749
Data sharing within the organization	1.389	.242
Inefficiency of employees	.987	.417
Training programs for employees	.196	.940
Goods handling of returned products	1.282	.281
Proper resource allocation and utilization for improving quality	.352	.842
Organizational efforts to improve product quality	.677	.609
Quality materials & services provided by suppliers	1.044	.387
Employee participation in giving suggestions	1.502	.206
Use of Innovative Technology	.482	.749

Table shows that there is no statistical significance between the type of products offered and quality processes in reverse logistics except in the case of quality objectives laid down by the organization. In the case of quality objectives laid down by organization, the null hypothesis (H_0) is rejected and the alternate hypothesis (H_1) is accepted. So there is significant difference between mean of quality objectives laid down by the organization across different type of products offered.

Barriers in quality enhancement of returned products

The researcher analyzed the barriers of quality management encountered in the reverse logistics process using statistical tools.

Sl. No	Barriers	Mean Score
1	Lack of Employees	3.11
2	Inefficiency of Employees	2.94
3	Lack of Technology	3.67
4	Higher cost	3.85
5	Legal issues	2.48
6	Bio-hazardous components of product	1.85
7	Resistance to adopt Innovations	2.11
8	Lack of Strategic Planning	3.52
9	Lesser predictability of quality	3.52
10	Improper use of procedures	2.23
11	Others	.38

The table shows that higher cost involved in quality management is the most agreed quality barriers involved in a company. It is followed by the lack of technology. While bio- hazardous components of product are the most disagreed quality barrier involved among the respondent companies followed by resistance to adopt innovations.

Influence of business area over quality barriers

The researcher analyzed the barriers of quality in reverse logistics process with respect to the level of business area using One-way ANOVA test.

H_0: There is no significant difference between mean of quality barriers involved in reverse logistics across different levels of business area.

H_1: There is significant difference between mean of quality barriers involved in reverse logistics across different levels of business area.

Quality barriers	F	Sig.
Lack of Employees	2.898	.038
Inefficiency of employees	.222	.881
Lackof technology	.548	.651
Higher cost	.150	.930
Legal issues	.536	.659
Bio hazardous components of product	1.328	.268
Resistance to adopt innovations	.707	.549

Lack of strategic planning	3.535	.017
Lesser predictability of quality	1.309	.274
Improper use of procedures	.393	.758
Others	3.887	.011

The barriers, lack of employees, lack of strategic planning and other barriers have less than 0.05 significant value. Hence among these barriers the level of business area has significant influence on these barriers. There is significant difference between mean of lack of technology, lack of strategic planning and other barriers involved in reverse logistics across different levels of business area. There is no significant difference between mean of quality barriers involved in reverse logistics across different levels of business area.

Influence of business area over quality barriers

The researcher analyzed the barriers of quality in reverse logistics process with respect to the level of business area using One-way ANOVA test.

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Improper use of procedures	.393	.758
Others	3.887	.011

It is found that, the level of business area has significant influence on lack of employees, lack of strategic planning and other barriers.

Findings, Suggestions and Conclusion

Reverse Logistics has gained an important position in global supply chain. The dynamic nature of reverse logistics helps the manufacturers to make necessary changes to cater their growth and survival in the economy. Customers have preference over quality of the product rather than quantity. The present study identifies the prospects of quality management in reverse logistics. The study gives the result that the factors influencing reverse logistics among companies are mostly social in nature. Factors influencing reverse logistics especially reduced storage and distribution cost is influenced by the level of business area. The study revealed that nature of operation, level of business area& type of products offered by the company influences the quality management in reverse logistics among the respondent companies. The quality management in reverse logistics is still at its introduction stage in southern Kerala. Companies consider reverse logistics as a legal prerequisite rather than its economic benefits. According to the increase in their business area, reverse logistics process involved and factors influencing

them also increases. Corporate Social Responsibility is found to be the driving factor to adopt reverse logistics among all companies. The legal prerequisite to accept product return in certain companies to ensure consumer right is the reason of CSR being an important factor. All the companies establish quality standards regarding their reverse logistics management but it seems that only some of them are strictly followed. The economic constraint in managing the quality of returned products are highlighted throughout the study. Proper credit channels are to be provided to the companies according to the business level and volume of reverse logistics. The government should also initiate support to the companies through effective monetary policies and should introduce schemes to provide credit at low interest rates. It can be assured that there is a bright future for reverse logistics management in Indian economy as a whole.

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