Study on reverse logistics and its significant importance – review
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Keywords: supply chain, reverse logistics, operation management, refurbishment, resale.
Abstract: Reverse logistics (RL) has become increasingly significant in the field of supply chain and operation systems in recent years. One of the key components of operation and supply chain systems for carrying out business activities in a more methodical and effective manner to boost value addition for end users is reverse logistics. Returning final used goods from the customer's end to the manufacturer via a store is known as reverse logistics. The main purpose of reverse logistics is to make the final product flow from customer back to seller or manufacturer in order to reuse the product by recycling this reduces the cost of remanufacturing the product also it adds value to the customers through recycling the product. In this article attempt has been made to conduct extensive survey on logistics and its significant role in supply chain operations. In addition to that literature analysis is done by referring from various top-rated journals around the globe. The survey questions were prepared to collect the inputs from various customers to further reframe the design of Reverse logistics.

1   Introduction

The process of returning goods from buyers back to sellers or manufacturers It's called reverse logistics. After a customer receives an item, reverse logistics is required for activities like recycling or product returns. The process of reverse logistics involves starting with the final consumer and working backwards through the supply chain to the distributor or the distributor to the producer. Recycling, refurbishing, and resale are examples of processes where the product's disposal is left to the end user can also be included in reverse logistics. When items are sent backward through the supply chain to the seller and maybe back to the suppliers, organizations employ reverse logistics. Getting rid of the thing or recovering its worth is the aim. Returns have grown in frequency with the expansion of e-commerce and are valued at about a trillion dollars annually globally (opens in a new tab). Recovering value and ensuring repeat business are the goals of reverse logistics. In contrast to at least 30% of things ordered online, less than 10% of purchases made in-store are returned (opens in a new tab). Savvy businesses employ reverse logistics to reduce return loss and foster client loyalty and repeat business.

In today's corporate climate, reverse logistics is becoming more and more crucial. Businesses are realizing that in order to support corporate objectives and maintain attempts to become more sustainable, they must manage returns, recalls, and other defective products.

1.1   Were reverse logistics can be applied

Businesses of all kinds can benefit from the practice of reverse logistics. This strategy can help businesses that produce and market goods like electronics, apparel, and furniture. This procedure can also be used by distributors, wholesalers, and retailers to handle refunds and exchanges. Additionally, it can be used by Third-Party Logistics (3PL) providers to offer their business-to-business (B2B) clients services.

Companies in the service sector, such as those that provide equipment, cars, and maintenance services, can also employ this kind of logistics strategy. To handle the return of damaged components from the items that customers rent, they might make use of reverse logistics.

1.2   Discrimination between traditional logistics and reverse logistics

The process of moving products from suppliers to factories, production facilities, distributors, retailers, and final consumers is called traditional logistics, sometimes referred to as forward logistics.

The process by which items arrive from customers and go in the opposite direction to any point or stakeholder in the supply chain is known as reverse logistics.

Physical illustration of reverse logistics are shown in Figure 1.

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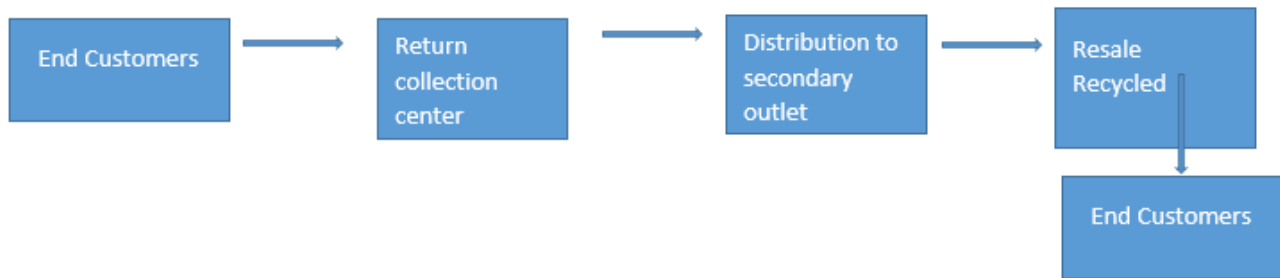Panneerselvam Sivasankaran

Figure 1 Physical representation of reverse logistics

Over the past ten years, the markets and business models for reverse logistics (RL) and closed loop supply chains (CLSC) have received more attention. This is caused in part by the impact of green regulations, especially in Europe, and the realization of the growing value of the goods and technologies developed in this area at the end of broad direct supply chains. Because of urbanization and the growing population density of metropolitan regions, the question of how to properly dispose of waste, trash, and junk has always existed. Due to the emergence of hazardous products and waste, the effects on the environment, and the increasing need to manage and dispose of human and animal waste in order to preserve public health and safety, the issues grew more urgent during the industrial revolution.

Since reverse logistics is a relatively new idea, scholars and logistics firms have only recently attempted to concentrate on how it affects managerial choices. Additionally, the emphasis on enhancing customer happiness has grown significantly in recent years since it is now seen as a critical component of any business's growth. Reverse logistics can significantly increase customer satisfaction, according to recent studies.

2 Literature review

Senthil S. and Sridharan R. (2014) The purpose of this study is to motivate and provide academics with ideas for future reverse logistics research topics. Because supply chains are designed for onward flow, it might be difficult to include product recovery into the network architecture. The analysis of reverse logistics' difficulties is one of the most significant duties of senior management and could be essential to the future survival of the sector. Reverse logistics practices are reviewed in this research using published literature [1].

Anon S. Y. et al (2024) Reverse logistics (RL) is essential for fulfilling sustainability goals, cutting waste, and improving supply chain management in today's more interconnected world. With the aid of mathematical algorithms, deterministic decision-making models evaluate variables and predetermined criteria, including capacity, cost, and reliability, across different geographic locations. The unpredictable nature of real-world situations, on the other hand, is incorporated into uncertain decision-making models by taking into account the uncertainties and ramifications of decisions and choices based on insufficient knowledge, ambiguity, unreliability, and the possibility of several likely outcomes [2].

Namweseza Z. et al. (2024) Reverse logistics is becoming an essential skill for pharmaceutical companies in the highly competitive market. These companies look to gain a competitive edge by managing returns and recalls effectively, whether it is because of errors, expired stock, quality or environmental issues, non-compliance, or other customer-related concerns. Even however, the significance of RL is not well recognized in many developing nations where the pharmaceutical industry plays a significant role in the economy. Four essential reverse logistics capabilities—logistics information systems, process formalization, flexibility, and top management support—are the focus of this study, which investigates the conflicting effects of these capabilities on pharmaceutical supply chains in developing nations [3].

Banihashemi T. A. et al (2019) As a strategic option, reverse logistics (RL) is receiving a lot of attention from organizations because to its positive effects on sustainable development. In order to evaluate the efficacy of the reinforcement learning process in connection to the social, economic, and environmental aspects of sustainability, this manuscript aims to perform a comprehensive literature review. The findings of this investigation show that most studies have focused on assessing RL's performance while accounting for economic and environmental performance. Due to the positive social results it produces, RL's social side has been underused and requires more study. Furthermore, the impact of each disposal option on the triple-bottom-line sustainability performance has not been assessed in any study [4].

Rubio S. and Jiménez-Parra B. (2014) Reverse logistics (RL) is a research area focused on the management of the recovery of products once they are no longer desired (end-of-use products, EoU) or can no longer be used (end-of-life products) by the consumers, in order to obtain an economic value from the recovered products. This paper aims to introduce the concept of RL and its implications for supply

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chain management (SCM). Because of this, RL has grown to be a strategic concern and is now taken into account by businesses when making decisions on the structure and evolution of their supply networks. Finally, a summary of the implications of reinforcement learning (RL) for supply chain management (SCM) will be covered, along with an examination of some of the potential benefits and drawbacks implied by RL [5].

Pokharel S. and Mutha A. (2009) Through a content analysis of the available literature, this paper examines the current state of research and practice in reverse logistics (RL). We have located and reviewed the literature using a variety of web-based search engines, books, and conference proceedings. As per the review, research and practice in reverse logistics (RL) are concentrated on every facet of RL, starting from the gathering of old items, processing them, and ultimately arriving at the processing outputs, which include recycled materials, spare parts, remanufactured products, and disposal of waste materials [6].

Kazemi N. et al. (2019) Green supply chains may benefit from the use of reverse logistics and closed loop supply chain management (RL&CLSCM), two widely acknowledged eco-friendly techniques. A significant amount of literature has evolved as a result of the popularity of these research areas. To date, the area has benefited from the contributions of numerous journals; among the most well-known of these is the International Journal of Production of Research (IJPR). In-depth bibliometric and content analyses of 94 papers published in IJPR between 2000 and July 2017 are presented in this report. Initially, a thorough bibliometric and mapping analysis was conducted on the papers, which assisted in identifying their characteristics. The contents of the sample papers were then carefully assessed. The papers were categorized into two primary groups and their subcategories based on the results of the content analysis, and their attributes were then carefully determined [7].

Dabees A. et al. (2023) Reverse logistics is becoming a necessary competitive requirement for sustainability. The costs and customer service of many supply chains have been negatively impacted by a lack of resources to implement reverse logistics solutions, making it hard to meet return processing standards. Under such circumstances, the primary forces behind successful sustainability operations are client requests for greater service quality. The purpose of this study is to provide the theoretical framework for sustainable reverse logistics service quality, or SRLSQ, that reverse logistics service providers (RLSPs) supply. 56 papers from 2011 to 2022 were found utilizing a systematic approach protocol that examines reputable academic journals using PRISMA criteria based on the research scope. The primary focus of

the study is on the SSQ and RLSQ aspects in order to establish a research framework [8].

Turrisi M. et al. (2012) This research aims to analyze how reverse logistics affects inventory variance and order amplification in a single-echelon supply chain (SC) and suggests a new order policy to reduce this amplification. The research is based on a general examination of the literature on reverse logistics's effect on SC performance and on sustainable operations. Modeling and analyzing a closed SC, the authors employ a difference equation math technique. The resulting numerical results are validated by an appropriate experiment design and data gathered from the statistics of the European Union [9].

Agrawal S. et al. (2015) Because of rising environmental concerns, laws, corporate social responsibility, and sustainable competitiveness, reverse logistics (RL) has become a crucial area of focus for all firms in recent years. When we talk about reuse, repair, remanufacturing, recycling, or disposal, we're talking about the series of steps needed to gather used products from customers. An analysis of the literature reveals that the subject of reinforcement learning is still developing and that there is a lack of comprehensive reviews on topics including adoption and implementation, product return predictions, outsourcing, RL networks from the standpoint of secondary markets, and disposition decisions [10].

De Brito M. P. (2005) The procedures involved in moving goods, parts, and materials from owners or users to other users are known as reverse logistics. In this work, over sixty case studies on reverse logistics are reviewed and their contents analyzed. The case studies address topics including inventory management, planning and control, information technology, network structure, and the interactions between the various stakeholders on the networks [11].

Shi C. et al. (2009) The importance of reverse logistics implementation was first discussed in the paper, which also examined its challenges from the perspective of supply chain management. Finally, countermeasures for the implementation of reverse logistics management were suggested [12].

Govindan K. et al. (2015) Reverse logistics and closed-loop supply chain challenges have brought attention from academics and practitioners due to environmental, legal, social, and economic factors. A large number of these works have been published in scientific journals in recent years, demonstrating this focus. For this reason, a thorough literature evaluation of current and cutting-edge works is essential to provide context for the past and to suggest future lines of inquiry. In order to better understand reverse logistics and closed-loop supply chains, this study will evaluate recent publications in scientific journals. The

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selected and evaluated papers are a total of 382 published between January 2007 and March 2013 [13].

Alkahtani M. et al. (2021) Today, organizations and scholars all around the world are concentrating on sustainable development. Various ideas have been presented to promote sustainability in supply chains, including closed-loop supply chains and reverse logistics (RLs). Reusable goods (RLs) are the actions required by customers to gather used goods for recycling, remanufacturing, reuse, or disposal. Collection systems is one of the many procedures that go into reinforcement learning. The term "collection" describes how a business comes into possession of particular goods. We examine the research on collection mechanisms for RLs. To gain more knowledge about the topic and identify any patterns, a bibliometric studywascarriedout. First, based on review papers that are currently available, we share the classification schemes that are applied in the field. Furthermore, we assess scholarly works pertaining to many domains that are associated with the technical aspects or the problem formulation. Presentations and classifications of various viewpoints are made. Manuscripts relevant to the reader's interests can be found more easily with this strategy. Emerging themes in assessing the effectiveness of collection systems are recognized throughout the assessment of the literature, along with suggested avenues for further investigation [14].

Straka M. (2019) All company processes connected with logistics are repeated, the so-called logistic propeller. Supply, storage, production, planning and transportation activities are divided into separate parts, which requires systematic planning to ensure effective coordination of material flow, production and distribution of products. Inventory holding costs include costs associated with inventory management, packaging of goods, and costs associated with reverse logistics activities [15].

Mohamed A. G. et al. (2015) Because of the advantages used-product recovery offers on the social, economic, and environmental fronts, its implementation is growing in the industrial and service sectors alike. For any product recovery to be successful, there must be a consistent supply of old goods because reverse supply is obviously necessary. In the distribution channel, reverse logistics refers to the transfer of used goods from the customer to the manufacturer. A number of factors, including legal requirements, rising trash levels, and consumer awareness of eco-friendly products, were identified in the literature analysis as drivers of reverse logistics that compel organizations to apply. The advantages of using reverse logistics, including cost savings, improved customer satisfaction, and the availability of less expensive products, have been explained by numerous writers. The majority of earlier research focuses on showing how reverse logistics can be used in various industries. Few research,

meanwhile, have looked at how reverse logistics affects customer satisfaction [16].

Guo S. et al. (2017) Reverse logistics is an extremely relevant and important field as environmental sustainability is becoming more and more widely known. The performance of logistics systems has historically been demonstrated to be improved by the application of supply chain contracts. Supply chain contracts in reverse logistics, however, are the subject of a patchy body of current scholarship. The objective of this work is to examine the latest research on supply chain contracts, specifically focusing on reverse logistics systems, and reviewing the state-of-the-art literature from 2006 to 2016.

We examine how common various supply chain contract types are and list the most successful scholars in the field. We categorize and review the literature in terms of the channel leaderships (i.e., the person who leads) and the supply chain structure (i.e., the chain links that are engaged). Lastly, we address the corresponding research problems, identify the research gaps, and propose five main areas for future research initiatives [17].

Jayant, A. et al. (2012) Sustainability in supply networks is believed to be founded on the rise of environmental and economic concerns, which have a substantial influence on reverse supply chain management. A review of the literature reveals that the field of reverse supply chain management lacks a well-developed framework. While research on this topic is still in its early stages, it has recently been apparent that the reverse logistics components of sustainable supply chain practices contribute to better integrated supply chains, which in turn can enhance economic performance. It is imperative that companies take into account the perspectives of the economy and the environment. The features of RSCM that are presented here can aid future study and practice advancement for researchers and practitioners [18].

Umeda S. (2013) Businesses aim to minimize their negative environmental impact by reusing, remanufacturing, and recycling used products as a form of ecological and environmental responsibility. One of the key components needed to build a supply chain system this sustainable is reverse logistics. The modeling and analysis techniques for supply chain systems with reverse logistics flows are proposed in this work. The two forms of reverse supply chains covered in this research are PULL- and PUSH-type reverse logistics. Analysis examples of particular features will be shown together with the introduction of generic models [19].

Le S.-T. (2023) The importance of reverse logistics systems for improving an organization's overall financial and environmental performance is now widely recognized, especially for poorer countries where these issues are more

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pressing. In industrialized nations, the majority of study looked at implementation drivers and impediments. With a focus on developing nations like Vietnam, this study seeks to identify the key variables that favorably affect reverse logistics practices. 287 managers from 5 different industries were included in the study's sample. The results indicated that the following four major factors—economic, competitive, outsourcing, and environmental—had an impact on the deployment of reverse logistics in developing nations.

Contrary to expectations, reverse logistics performance is not much impacted by regulation drivers or reputation drivers. The results aid researchers in comprehending the variables affecting reverse logistics activities in developing countries. The results also show that developing and developed nations have different drivers for the execution of reverse logistics [20].

Rehman S. A. and Khan S. S. (2017) In recent years, the idea of reverse logistics has become increasingly popular. Reverse logistics is undoubtedly growing more significant in the automotive industry's supply chain management. The primary aim of this study is to discuss the significance of reverse logistics within the context of supply chain management, with a particular emphasis on the automotive sector. The purpose of this article is also to highlight the significant obstacles facing reverse logistics in the automotive sector. When products are managed after they are no longer useful to customers, it is known as reverse logistics [21].

Tyagi V. (2021) Scholarly articles on the subject attest to the frequency with which scholars have focused on supply chain and reverse logistics issues impacted by a variety of changeable environmental elements. Upon conducting a comprehensive analysis of the published literature in this field, this review paper was conceived. With this paper, we hope to lay forth a framework that will be useful for conducting more research in this area. Review and analysis were done on 150 publications that were published between 1995 and 2020. The research gaps that can be filled by conducting studies in the near future are thus those that were found after this review. In this publication, it is mentioned that some recent research has been conducted on reverse logistics following the COVID-19 epidemic. These studies provide e-retailers guidance so they can prepare for future encounters with incidents of this nature [22].

Larsen S. B. et al. (2024) Reverse supply chain (RSC) operations have historically been seen by manufacturers as an expensive hassle, but more recent studies have shown that RSC can actually improve a company's financial performance. This study explores the exogenous contingency elements that determine the magnitude of the contribution and highlights the ways in which the RSC might improve the financial performance of the company. The exogenous elements impact the RSC's financial contribution regardless of management policies and design choices since they are uncontrollable by the company's operations and supply chain management. Fifteen different ways for RSC to improve the firm's financial performance have been found by the study. Fifty-six contingency factors have been found in this investigation. Market segmentation, consumer behavior, product design, and the company's distributor network are all connected to these. In addition to the RSC's input, the study provides an interrelationship network between components [23].

Wang M. et al. (2020) A major problem that impedes the advancement of contemporary logistics and supply chain management is the uncertainty inherent in the supply chain, which has grown in complexity. The purpose of the research is to provide a triadic model of reverse logistics uncertainty by conceptualizing it based on supply chain uncertainty literature. Based on a triadic model of supply chain uncertainty and logistics uncertainty, the idea of reverse logistics uncertainty was established. A taxonomy of reverse logistics uncertainty is created through desk research. We address the many forms of reverse logistics uncertainty in the triadic model using case studies in order to more accurately illustrate the uncertainty [24].

Ljubičić K. and Bajor I. (2021) If not continually optimized and frequently left unclear, reverse logistics procedures result in large expenditures associated with logistics. While reverse logistics constraints include things like process length, educated people, and dissatisfied customers, logistics businesses stress the importance of optimization and process uniformization to the greatest extent possible. The logistics market research for the Republic of Croatia has chosen to analyze the reverse logistics process at a supplier's site. The case study focuses on difficulties related to reverse logistics, on-site investigation, and opportunities for process optimization that save time. Analysis and recommendations for optimization have been given for each reverse logistics process over a period of time measurement [25].

Mohamed M. A. et al. (2024) This paper provides a thorough bibliometric analysis of research on reverse logistics (RL) from 2013 to 2023 with the goal of identifying major themes, significant writers, institutional contributions, and international involvement in the subject. Based on information extracted from 1,650 papers in the Scopus database, the Analysis shows how RL is becoming more and more important in supply chain management and sustainability studies. Authorship analysis, temporal analysis, institutional contribution analysis, worldwide participation analysis, journal impact analysis, keyword dynamics analysis, and citation network analysis are only a few of the bibliometric approaches used in the study [26].

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Djikanovic, J. and Vujosevic M. (2015) The increase in the quantity of product recovery and recycling activities is mostly driven by regulatory requirements, although user needs also play a role. Consequently, a substantial amount of materials and products have been pulled off the market for a particular cause. This calls for entirely new methods of decision-making that the managers are unfamiliar with. A novel integrated forward and reverse logistics model (IFRL) is presented in this research. Location capacities are assumed to be finite. A problem of mixed-integer linear programming (MILP) aiming at minimizing the overall cost is introduced [27].

Melan, M. B. (2021) The study looks into Chinese university students' practices of returning used paper boxes when they shop online. Additionally, it can look at studies comparing online buying in different nations and implementing the idea of reverse logistics. Nowadays, the most common form of payment is online purchasing, particularly for convenience purposes among working people and students. Online shopping offers the advantages of shorter wait times, lower personal expenses, and a wider selection of less expensive goods. When it comes to packing, the majority of online retailers use specially made paper boxes to package their goods before shipping them to their clients [28].

Mishra O. and Singh S. (2023) In order to recover the value of End of Life (EOL) assets, reverse logistics helps move commodities from the customer to a facility. Product recovery management is able to accomplish this. One way to increase cost competitiveness is by reusing the recovered material as a raw material in manufacture. In addition, reverse logistics (RL) facilitates easy return policies for online shoppers and reduces pollution and costs associated with raw materials and waste. In order to make RRL a viable endeavor and more environmentally conscious, this study emphasizes how important it is. A road map for top management to fulfill their social obligation of caring for End-of-Life products generated by their companies is also provided by the study, since humans are becoming less wasteful and indifferent to their environment. The best application of RL may be to reduce the issues associated with disposing of waste from electronics and plastics, polluting the air, land, and seas, and eliminating rare metals that are valuable to humanity [29].

Antonyová A. et al. (2018) The sustainability of natural resources and our ability to access them directly affect the state and quality of the environment today. Our planet's future is directly impacted by manufacturing activity and related events. The recycling process, which in large businesses frequently develops into a crucial and essential component of the production schedule, is typically difficult in small and medium-sized businesses. A few elements stand out as having a direct bearing on the creation and

successful implementation of an efficient reverse logistics system [30].

Xin C. et al. (2022) The crucial influence that safe transportation and efficient handling of hazardous waste have on environmental sustainability and public health has led scholars and practitioners to focus closely on reverse logistics of municipal hazardous waste (RLMHW). A thorough and comprehensive summary of the research activities previously carried out in this specific field is noticeably lacking from the large number of studies that make up the body of existing literature on RLMHW, despite the fact that the study themes covered are numerous and varied. By conducting an extensive and methodical literature assessment of RLMHW over the previous three decades, this paper aims to close the gap and create a foundation for future RLMHW research [31].

Malkus T. and Kozina A. (2023) The concept of the description of negotiations within reverse logistics cooperation is a preliminary approach to the issues under consideration, since they are relatively new, not fully recognized in theory and research, as well as in economic practice. Therefore, it is necessary strive to enrich and broaden his concept, mainly by searching for more precise characteristics of the considered features of the negotiations under consideration. It is also necessary planned to conduct comparative empirical research in order to verify the usefulness of the reverse logistics concept [32].

3   Methodology

In this section an attempt has been made to design survey form for collecting information on reverse logistics in supply chain management. The following are the questionnaire framed in the survey form as listed below:

Q1. How would you be able to rank the performance of Reverse logistics in SCM out of 5.0 scale?

Q2. What is the level of customer satisfaction index towards reverse logistics? Rate it using 5.0 scale?

Q3. How would you be able to rate the strategic value of reverse logistics in SCM?

Q4. Measure the benefit of Reverse logistics in 5.0 scale rating.

Q5. In Reverse logistics maximizing the values of recovered items significantly improves profit margins. Rate it using scale values from 0 to 5.

These are the above set of questionnaires framed and sent to various respondents like students, faculties, industrialists etc.

The total number of responses collected was 11 during the survey analysis.

4   Case study

In this section detailed case study on reverse logistics performance in Supply chain management is presented to

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illustrate the survey inputs given by various respondents across the nation. Let us discuss the Responses given by various experts as follows:

Q1. How would you be able to rank the performance of Reverse logistics in Supply Chain Management out of 5.0 scale?

Responses:
a.   81.8 % of the responses given the rating as 4.5 out of 5 scale for Supply chain Management performance in reverse logistics.
b.   The remaining 9.1% of the responses were found to be 2.5 and 5.0 out of 5 scale.

Q2. what is the level of customer satisfaction index towards reverse logistics. Rate it using 5.0 scale?

Responses:
a.   60 % of the responses given the rating as 4.5 out of 5.0 scale.
b.   The remaining 30 % of the responses were found to be as 2.5 and 10 % of the responses measured to be 5.0 out of 5 scale rating.

Q3. How would you able to rate the strategic value of reverse logistics in SCM?

Responses:
a.   45.5% of the responses fixed their rating as 4.5 for strategic value of reverse logistics in SCM.
b.   45.5% of the responses framed their rating as 5.0 for strategic value of reverse logistics in SCM.
c.   9.1% of the responses fixed their rating as 2.5 for strategic value of reverse logistics in SCM.

Q4. Measure the benefit of Reverse logistics in 5.0 scale rating.

Responses:
a.   50 % of the responses given their rating as 5.0 out of 5 scale for benefits of reverse logistics.
b.   40 % of the responses given their rating as 4.5 out of 5 scales.
c.   10% of the responses given their rating as 2.5

5   Conclusion

In this research work attempt has been made to perform literary work on reverse logistics in SCM performance. Nowadays reverse logistics plays important role in every manufacturing organization to achieve the various objectives. Reverse logistics tries to cut down the wastage costs of final products. Instead, the same products are used again by refilling it without the aid of new one. Case study with various questionnaires prepared by collecting responses from various peoples from education industry, Manufacturing Industry etc. Based on the responses given the results and discussion were analyzed in the case study. The main key input is to maximize the logistics efficiency by minimizing the transpiration cost in holding the items.

References

[1] SENTHIL, S., SRIDHARAN, R.: Reverse Logistics: A Review of Literature, *International Journal of Research in Engineering and Technology*, Vol. 3, No. 11, pp. 140-144, 2014.
http://dx.doi.org/10.15623/ijret.2014.0323031

[2] ANON, S.Y., AMIN, S.H., BAKI, F.: Third-Party Reverse Logistics Selection: A Literature Review, *Logistics*, Vol. 8, No. 2, 35, pp. 1-14, 2024.
https://doi.org/10.3390/logistics8020035

[3] NAMWESEZA, Z., NDANDIKO, C., OBANDA, P.W., MUGURUSI, G.: Reverse logistics capabilities and supply chain performance in a developing country context, *Supply Chain Forum: An International Journal*, pp. 1-13, 2024,
https://doi.org/10.1080/16258312.2024.2384828

[4] BANIHASHEMI, T.A., FEI, J., CHEN, P.S.-L.: Exploring the relationship between reverse logistics and sustainability performance A literature review, *Modern Supply Chain Research and Applications*, Vol. 1, No. 1, pp. 2-27, 2019.
https://doi.org/10.1108/MSCRA-03-2019-0009

[5] RUBIO, S., JIMÉNEZ-PARRA, B.: Reverse Logistics: Overview and Challenges for Supply Chain Management, *International Journal of Engineering Business Management*, Vol. 6, No. January, pp. 1-7, 2014. https://doi.org/10.5772/58826

[6] POKHAREL, S., MUTHA, A.: Perspectives in reverse logistics: A review, *Resources, Conservation and Recycling*, Vol. 53, No. 4, pp. 175-182, 2009.
https://doi.org/10.1016/j.resconrec.2008.11.006

[7] KAZEMI, N., MODAK, N.M., GOVINDAN, K.: A review of reverse logistics and closed loop supply chain management studies published in IJPR: a bibliometric and content analysis, *International Journal of Production Research*, Vol. 57, No. 15-16, 2019. https://doi.org/10.1080/00207543.2018.1471244

[8] DABEES, A., BARAKAT, M., ELBARKY, S.S., LISEC, A.: A Framework for Adopting a Sustainable Reverse Logistics Service Quality for Reverse Logistics Service Providers: A Systematic Literature Review, *Sustainability*, Vol. 15, No. 3, 1755, pp. 1-16, 2023. https://doi.org/10.3390/su15031755

[9] TURRISI, M., BRUCCOLERI, M., CANNELLA, S.: Impact of reverse logistics on supply chain performance, *International Journal of Physical Distribution & Logistics Management*, Vol. 43, No. 7, pp. 564-585, 2013.
https://doi.org/10.1108/IJPDLM-04-2012-0132

[10] AGRAWAL, S., SINGH, R.K., MURTAZA, Q.: A literature review and perspectives in reverse logistics, *Resources, Conservation and Recycling*, Vol. 97, No. April, pp. 76-92, 2015.
https://doi.org/10.1016/j.resconrec.2015.02.009

[11] DE BRITO, M.P., DEKKER, R., FLAPPER, S.D.P.: Reverse Logistics: Review of Case studies, In: Fleischmann, B., Klose, A. (eds) Distribution

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Logistics. Lecture Notes in Economics and Mathematical Systems, Vol. 544, Springer, Berlin, Heidelberg, pp. 243-281, 2005. https://doi.org/10.1007/978-3-642-17020-1_13

[12] SHI, C., HOU, Z., RUAN, J.: *Study on Reverse logistics based on supply chain management*, 2009 Asia-Pacific Conference on Information Processing, Shenzhen, China, pp. 495-498, 2009. https://doi.org/10.1109/APCIP.2009.127

[13] GOVINDAN, K., SOLEIMANI, H., KANNAN, D.: Reverse logistics and closed-loop supply chain: A comprehensive review to explore the future, *European Journal of Operational Research*, Vol. 240, No. 3, pp. 603-626, 2015. https://doi.org/10.1016/j.ejor.2014.07.012

[14] ALKAHTANI, M., ZIOUT, A., SALAH, B., ALATEFI, M., ABD ELGAWAD, A.E.E., BADWELAN, A., SYARIF, U.: An Insight into Reverse Logistics with a Focus on Collection Systems, *Sustainability*, Vol. 13, No. 2, 548, pp. 1-22, 2021. https://doi.org/10.3390/su13020548

[15] STRAKA, M.: *Distribution and Supply Logistics*, Cambridge Scholars Publishing, Newcastle upon Tyne, United Kingdom, 2019.

[16] MOHAMED, A.G., FATHI, A.A., MAROUF, M.A., HASSAN, M.S., EL BARKY, S.S.: *Impact of Reverse Logistics Applications on Customer Satisfaction*, Proceedings of the 2015 International Conference on Operations Excellence and Service Engineering Orlando, Florida, USA, September 10-11, 2015, IEOM Society, pp. 393-405, 2015.

[17] GUO, S., SHEN, B., CHOI, T.-M., JUNG, S.: A review on supply chain contracts in reverse logistics: Supply chain structures and channel leaderships, *Journal of Cleaner Production*, Vol. 144, pp. 387-402, 2017. https://doi.org/10.1016/j.jclepro.2016.12.112

[18] JAYANT, A., GUPTA, P., GARG, S.K.: Perspectives in Reverse Supply Chain Management(R-SCM): A State of the Art Literature Review, *Jordan Journal of Mechanical and Industrial Engineering*, Vol. 6, No. 1, pp. 87-102, 2012.

[19] UMEDA, S.: *Simulation analysis of supply chain systems with reverse logistics*, Proceedings of the 2013 Winter Simulation Conference: Simulation: Making Decisions in a Complex World (WSC '13), IEEE Press, pp. 3375-3384, 2013.

[20] LE, S.-T.: Investigating the Drivers of the Reverse Logistics Implementation in Reducing Waste in Vietnam, *Environmental Health Insights*, Vol. 17, pp. 1-18, 2023. https://doi.org/10.1177/11786302231211058

[21] REHMAN, S.A., KHAN, S.S.: Reverse Logistics and Challenges: Supply Chain Management of Automobile Industry, *Advances in Applied Sciences*, Vol. 2, No. 5, pp. 80-86, 2017. https://doi.org/10.11648/j.aas.20170205.15

[22] TYAGI, V.: Reverse Logistics In 21 St Centuries In Special Reference To Supply Chain Disruptions During Covid-19, *JK International Journal of Management and Social Science,* Vol. 4, No. 1-2, pp. 1-9, 2021.

[23] LARSEN, S.B., MASI, D., FEIBERT, D.C., JACOBSEN, P.: How the reverse supply chain impacts the firm's financial performance: A manufacturer's perspective, *International Journal of Physical Distribution & Logistics Management*, Vol. 48, No. 3, pp. 284-307, 2018. https://doi.org/10.1108/IJPDLM-01-2017-0031

[24] WANG, M., WANG, B., CHAN, R.: Reverse logistics uncertainty in a courier industry: a triadic model, *Modern Supply Chain Research and Applications*, Vol. 3, No. 1, pp. 56-73, 2021. https://doi.org/10.1108/MSCRA-10-2020-0026

[25] LJUBIČIĆ, K., BAJOR, I.: Supplier's Reverse Logistics Process Management, *International Scientific Journal "Science. Business. Society"*, Vol. 6, No. 2, pp. 58-61, 2021.

[26] MOHAMED, M.A., FARAH, M.A., JAMA, L.A., MOHAMUD, I.H., MOHAMUD, I.H., SIYAD, M.A., MALIN, I.M.: A Decade of Reverse Logistics Research (2013-2023): A Comprehensive Bibliometric Analysis of Trends, Influences, and Global Engagement, *Journal of Logistics, Informatics and Service Science*, Vol. 11, No. 7, pp. 37-53, 2024. https://doi.org/10.33168/JLISS.2024.0703

[27] DJIKANOVIC, J., VUJOSEVIC, M.: A new integrated forward and reverse logistics model: A case study, *International Journal of Computational Intelligence Systems*, Vol. 9, No. 1, pp. 25-35, 2016. https://doi.org/10.1080/18756891.2016.1144151

[28] MELAN, M.B.: Reverse Logistics from Recycling of Used Paper Boxes from Online Shopping in China: A Literature Review, *Turkish Journal of Computer and Mathematics Education,* Vol. 12, No. 3, pp. 1543-1549, 2021. https://doi.org/10.17762/turcomat.v12i3.960

[29] MISHRA, O., SINGH, S.: Investigating Responsiveness of Reverse Logistics for Manufacturing Industries, *Green and Low-Carbon Economy*, Vol. 00, No. 00, pp. 1-9, 2023. https://doi.org/10.47852/bonviewGLCE32021481

[30] ANTONYOVÁ, A., ANTONY, A., SOEWITO, B.: Logistics Management: New trends in the Reverse Logistics, *Journal of Physics: Conference Series,* Vol. 710, pp. 1-10, 2016. https://doi.org/10.1088/1742-6596/710/1/012018

[31] XIN, C., WANG, J., WANG, Z., WU, C.-H., NAWAZ, M., TSAI, S.-B.: Reverse logistics research of municipal hazardous waste: a literature review, *Environment, Development and Sustainability,* Vol. 24, pp. 1495-1531, 2022. https://doi.org/10.1007/s10668-021-01526-6

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[32] MALKUS, T., KOZINA, A.: The features of negotiations within reverse logistics cooperation, *Acta logistica,* Vol. 10, No. 1, pp. 111-119, 2023. https://doi.org/10.22306/al.v10i1.364

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