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Reverse logistics practices and operational performance of firms in the manufacturing sector: a systematic review

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Abstract:

The purpose of this study is to present the literature on the impact of reverse logistics (RL) practices on operational performance (OP). The Kitchenham and Charters' guidelines served as the direction for this review process. The study used articles that were posted on Google Scholar, Scopus, Web of Science, Emerald, and ProQuest between 2017 and 2022. The study findings revealed that a sizeable number of countries were conducted in countries like Malawi, Ethiopia, Ghana, Kenya, and Pakistan. Although prior research conducted in numerous countries generally agree that reverse logistics generally improves a business's operational performance, they did not specifically narrow down to focus on isolated reverse logistics practices such as re-use, recycling and remanufacturing and their direct impact of operational performance. Additionally, some studies failed to pay much attention to the beverage manufacturing industry in favour of focusing on the fast-moving goods. Moreover, most studies only examined practices for reusing and recycling materials while ignoring other reverse logistics strategies in the industry of beverage manufacturing. Therefore, future studies should focus on the beverage manufacturing firms and assess how beverage manufacturing firms manage their reverse logistics operations as well as its impact on operational performance. In addition to reuse and recycling practices, future studies should concentrate on other reverse logistics practices such as return, remanufacturing, and repackaging, as well as factors that affect both reverse logistics and operational performance as these factors were not fully addressed by previous studies to understand how much operational performance is affected by the adoption of reverse logistics.

Key words:

reverse logistics, operational performance, sustainable supply

Introduction

Climate change and sustainability issues are currently receiving more and more attention. Consumers' concerns about the environment are growing, and government

regulations are putting more pressure on businesses to manage all operations sustainably. Additionally, to provide environmentally friendly goods and services, industries are quickly changing their sustainability strategies and policies. Every industry faces a critical issue with reverse logistics implementation, which has grown to be a challenging task for businesses worldwide (Kot et al., 2019). Governments, legal defence organizations, consumers, and suppliers are seeking solutions to have an impact on their production cycle's activities. The efficiency of a company's use of resources and overall effectiveness are heavily influenced by its logistics, which connects various operations and participants in a supply chain (Qaiser et al., 2017).

With regards to warehousing, inventory handling, information services, and transportation, managing a logistics system entails several related activities, and any decisions made may have an impact on a sizable number of stakeholders, either positively or negatively. Reverse and forward logistics and Industry 4.0's technological innovation and recent technological advancements have given businesses new opportunities to create value and offer by quickly and affordably meeting the unique needs of customers (Wang et al., 2017). As a result, there has been a change in the manufacturing paradigm as well as a dramatic change in how reverse logistics operations are conducted, moving them toward a high level of digitalization, connectivity, intelligence, integration, and responsiveness (Winkelhaus and Grosse, 2020).

Even though reverse logistics gives businesses new opportunities to improve their sustainable logistics practices, implementing these has never been a painless process and may also run into structural resistance at both the intra- and inter-enterprise levels (Sony and Naik, 2019). Prior research conducted in numerous countries did not specifically narrow down to focus on isolated reverse logistics practices such as re-use, recycling and remanufacturing and their direct impact of operational performance. Therefore, it is crucial to conduct a thorough literature review to draw conclusions that can be applied to the benefits and difficulties of reverse logistics and aid in the successful transformation of the beverage sector for the upcoming digital era. Several earlier studies reviewed various reverse logistics procedures and operational results. There have been no studies on reverse logistics methods and operational effectiveness in the context of this nation's beverage manufacturing industry. To comprehend the current implications, obstacles, crucial success factors, and opportunities of reverse logistics in various industries, this paper reviews earlier studies of reverse logistics practices and operational performance. Throughout the research process, the writers of this paper prioritized sustainability, environmental friendliness, and low ecological impact, utilizing a green approach. In other words, this involved focus on use of eco-friendly materials, cutting down on waste production, consuming less energy, and taking the research activities' long-term environmental effects into account. This review article examined reverse logistics in Zimbabwe using the PRISMA model (Olah et al, 2020). Despite being conducted in Zimbabwe, this study has wider relevance because it is highly pertinent and applicable in other contexts.

1. Literature review

1.1 Reverse logistics

Many academics published thorough reviews of reverse logistics in the latter part of the 1990s, where topics like manufacturing, green planning, and recycling in the supply chain were presented in-depth (Pakurár et al., 2020). Reverse logistics refers to the planning, implementation, and management of an efficient, cost-effective flow of raw materials, in-process inventory, finished goods, and associated information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal (Rogers et al.,

2001). Reverse logistics adoption as a fundamental requirement for businesses to operate in a competitive market is shown in literature reviews on logistics beginning in the 2000s.

According to Klausner and Hendrickson (2000), manufacturing companies are compelled to include disposal costs in product prices since doing so encourages them to design their products to be more affordable at the end of their useful lives, frequently through reuse or recycling. Muttimos (2014) conducted research on the relationship between reverse logistics practices and organisational performance of manufacturing firms in Kenya. It is noted that on-compliance with the established environmental regulations may have costly and time-consuming repercussions. One of the concepts in the broader notion of green supply chain management that is seen as a potential remedy for this is reverse logistics, sometimes known as "product take-back." It improves customer service and loyalty, speeds up asset value recovery, and accomplishes sustainability objectives. Mandota (2015), studied the impact of reverse logistics on supply chain performance in Malawi manufacturing sector, a case study of Carlsberg Malawi. Environmental activities are incorporated into SCM practices to ensure eco-friendly goods or services and to lower costs throughout its value chain.

The term "reverse logistics" refers to a variety of practices that are implemented through the various Rs (re-use, reduce, rework, recycle, refurbish, reclaim, remanufacture, reverse logistics,) to achieve a reverse logistic waste minimization activity. It also includes the implementation and monitoring of environmental management programs. Reverse logistics is a planned supply chain that takes environmental concerns into account. Additionally, it brings in internal business aspects. Reverse logistics, according to Kant (2015), is a comprehensive strategy that integrates environmental awareness into a supply chain and helps businesses increase their sustainability.

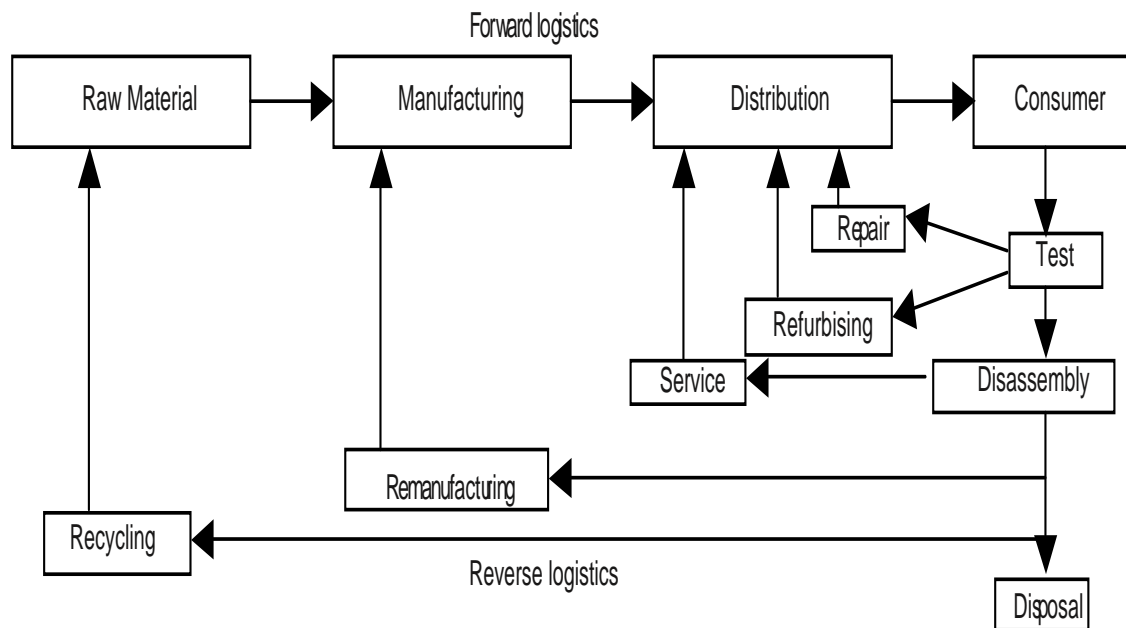


Fig.1. Forward and Reverse logistics

Source: (Srivastava, 2008) [An adapted version according to the used reference]

1.2 Operational performance

Since operational performance concept holistically evaluates all of a company's functions, the argument over its relationship with reverse logistics has become important to

most firms. Operational performance quantifies the effectiveness and efficiency with which a company carries out its internal procedures in order to meet its targets (Rompho, 2018). Numerous previous researches have agreed in defining operational performance as a measure of unit manufacturing cost, quality, inventory turn, speed of new product introduction, flexibility, and delivery dependability (Kaydos, 2020). Operational performance entails keeping an eye on and improving key performance indicators (KPIs) like cost effectiveness, quality, productivity, and customer contentment (Rompho, 2018). Many studies studied concur that reverse logistics activities will also give businesses additional chances to lower the overall cost of their supply chain and enhance the quality of their products (Yu et al., 2018).

In this study, manufacturing operational performance, defined as measures of cost, time, quality, and delivery reliability related to the operations within manufacturing companies is evaluated and referred to as manufacturing process performance. Mihi et al. (2014) studied on improving organisational performance through reverse logistics. Their results demonstrated that various reverse logistics activities have distinct effects on return costs; hence, in the operational plan, an organization is bound. Thus, wise choices about reverse logistics operations are essential to cost reduction during the spike in product returns.

Yu et al. (2018) also studied the impact of reverse logistics on operational performance. Their findings demonstrated that there is a positive and significant correlation between all endogenous variables (operational, environmental, and financial performance) and reverse logistics activities, however there is no meaningful association between competitive advantages and reverse logistics operations. Flexibility was left out of the current study because it is a manufacturing process capability rather than an operational outcome (Chou et al., 2008). The rate at which new products are introduced was not examined either, as this depends more on research and development than on the operations department.

In order to further restrict this article, only research that offered empirical proof of a reverse logistics and operational performance link in a production system, supply chain, or manufacturing company was accepted for evaluation. This was done in order to separate the impact of reverse logistics practices from management actions.

2. Methodology

A systematic literature review aims to locate, assess, interpret, and classify all pertinent articles addressing one or more research questions and topics (Ranieri et al., 2018). A systematic literature review can provide a thorough overview of the research landscapes in contrast to a narrative literature study, whose results primarily concentrate on the descriptive findings of a particular field of knowledge and may be biased (Evangelista and Durst, 2015). According to Kazemi et al. (2019), a systematic literature review includes the following actions.

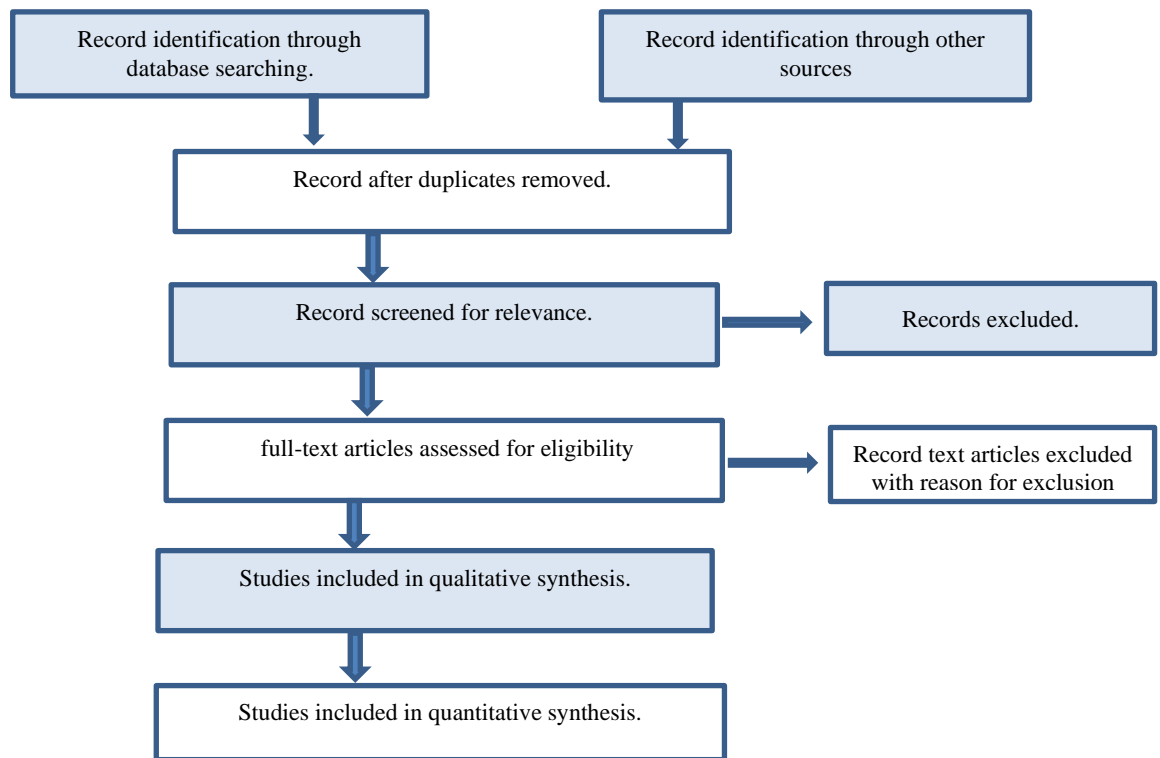


Fig. 2 Guidelines for performing systematic literature reviews
 Source: (Kitchenham and Charters, 2007).

Using electronic databases such as Google Scholar, Scopus, Web of Science, Emerald, and ProQuest, the researchers conducted a keyword search. Two main sets of keywords related to reverse logistics and performance were used in the literature search. Reverse logistics, green logistics, and sustainable logistics are included in the first set of keywords that are related to sustainable and intelligent logistics. Additionally, "reverse logistics practices" was added to this group because many logistics-related issues were discussed in the context of supply chains, though the entirely collection of studies did not confine only to the beverage industry. The second step is to set up various filters to choose the most pertinent articles. Papers were excluded if they fall outside the scope of the study or are not helpful in addressing the research questions. First, the search horizon was set to 2017 to present because the idea of reverse logistics was first introduced during World War II (Rojko, 2017).

The search results were also limited to journal articles that had made it past the peer-review stage, considering the caliber and rigor of the chosen papers. English was the only acceptable publishing language. As a result, this study did not include papers published in other languages, book chapters, pre-prints, or conference proceedings. The second round of paper selection involved a full-text reading by the researcher. Special attention was given during this stage to papers that did not directly address the research questions that were put forth. Although these papers contain the keywords "reverse logistics" and "reverse logistics practices," the impact of applying these practices on operational performance in the beverage industry is not sufficiently covered in these papers, so they are deemed unrelated to the research questions. Following that, a content analysis was conducted to discuss how reverse logistics techniques can improve various performance and to present the opportunities, challenges, and potential directions for future research.

3. Results

The researchers examined 108 articles published between 2017 and 2022 by reading each one in its entirety and summarizing the information according to the primary goals of the authors' research. Initially, a descriptive analysis of the results was carried out; the keywords, nations, and goods covered in the research papers were examined, along with year-wise publications. The articles covered a wide range of topics from a content standpoint. A few papers dealt with several topics. The DeBrito framework for reverse logistics (why, what, how) was used to classify the issues into general categories (Govindan and Bouzon, 2018; Melo et al., 2021). The most often discussed themes were the reverse logistics practice, the Rs: re-use, reduce, rework, recycle, refurbish, reclaim, remanufacture, reverse logistics. These articles examined in this study were grouped first according to the nations where they were conducted, then also measured according to other attributes such as methodology used, background context, study focus and findings (See Table 1). As this section illustrates, the search results can be categorized into 5 sections based on the type of publishing. 83% of the chosen materials, according to research categories, are journal articles, while 12% are conference proceedings. Books make up an additional 5% of the chosen resources; the other sources are reviews from conferences, book chapters, editorials, and errata. The numbers back up the claim that the search term is current in terms of scientific study.

Tab. 1 Literature review on Reverse logistics and operational performance (Author, 2023).

Author(s) and Year	Methodology	Geographical Context	Focus	Findings
Job et al. (2021)	Correlation cross-sectional survey	Kenya	Reverse logistics and operational performance: the moderating effect of progress innovation among manufacturing firms in Kenya	Results revealed the relationship linking reverse logistics and gaining internal operational competency was significantly moderated by process innovation
Jeruto and Namusonge (2022)	Descriptive survey	Kenya	Effect of green supply chain practices on performance of the food and beverage firms in Nairobi Kenya	According to the study's findings, reverse logistics significantly and favourably impacts the performance of food and beverage businesses in Nairobi City County. The study also concludes that eco-labelling positively and significantly affects the performance of food and beverage businesses in Nairobi City

				County. The study also concludes that green purchasing significantly and favourably affects the performance of food and beverage businesses in Nairobi City County.
Panya and Marend (2021)	Descriptive cross-sectional survey	Kenya	The effects of reverse logistics practices on the performance of FMCG firms in Kenya	The study discovered that the organizational performance of FMCG Companies is directly and significantly impacted by reverse logistics practices.
Mutuku and Morong (2020)	descriptive research design	Kenya	the influence of reverse logistics on performance of food and beverage manufacturing firms in Kenya	The results of regression analysis revealed that there was a significant positive relationship between reverse logistics and performance.
Ebenezer and Zhuo (2019)	Correlation cross-sectional survey	Ghana	Reverse Logistics and Performance of Bottled and Sachet Water Manufacturing Firms in Ghana: The Intervening Role of Competitive Advantage	Reverse logistics favourably and significantly influences competitive advantage and company performance, according to the study's findings. The results also showed that competitive advantage has a positive and significant impact on business performance. Furthermore, the results demonstrated that competitive advantage significantly mediates (intervenes) between reverse logistics and firm performance.
Zhang Yu et al. (2018)	Linear regression	Pakistan	The impact of reverse logistics on operational performance	They concluded that operational, environmental and financial performance except competitive advantage is positively and

				significantly correlated with reverse logistics operations, while competitive advantages and reverse logistics operations have insignificant relationship
Mbovu and Mburu (2018)	Descriptive survey	Kenya	The influence of reverse logistics practices on enhancing competitiveness in manufacturing firms in Kenya: A case of East African Breweries	The results showed that independent variables and dependent variables had a link with a correlation coefficient of that is a positive relationship between reverse logistics practices and the competitiveness of the firm.
Betelhem Guta (2016)	Descriptive cross-sectional survey	East Africa, Ethiopia	Relationship between reverse logistics practices and organisational performance	findings showed that reuse and recycle reverse logistics practice were found strongly correlated with organizational performance and both reuse and recycle have strong positive correlation with financial and market performance
Sirak Wondimu (2016)	Mixed method strategy	Ethiopia	Measuring performance of reverse logistics system in PET bottle recovery in EABSCO	The finding from this research revealed that, since EABSCO's failure to consider as on the strategic importance areas most likely implied on existing level of performance in terms of recovering PET bottles through its logistics systems
Ekahri Mandota (2015)	Mixed method strategy	Malawi	The impact of reverse logistics on supply chain performance in Malawi manufacturing sector, a case	the study also found that reverse logistics has impact on organization financial performance, inventory management, competitiveness and green outcome

Muttimos (2014)	descriptive cross- sectional survey study	Kenya	study	of
			Carlsberg Malawi Relationship between reverse logistics practices and organisational performance of manufacturing firms in Kenya.	The results demonstrated that reverse logistic methods have been embraced to a significant degree by Kenyan manufacturing companies. More specifically, it was discovered that improved organizational performance of manufacturing enterprises depended on more acceptance of remanufacture and recycling reverse logistics methods, with less adoption of reuse reverse logistics practice.

3.1 Thematic Analysis

Thematic analysis derived "A pattern in the information that at least describes and organizes the possible discoveries and at maximum interprets aspects of the phenomenon" (Boyatzis, 1998). Dubey et al. (2017) state that it offers a thorough examination of the content of every chosen publication. As a result, numerous themes are produced. The study's themes were on aspects such as re-use, recycle, refurbish, reclaim, and remanufacture.

4. Discussion

The distribution of publications produced throughout time is displayed in Fig 5.1 below:

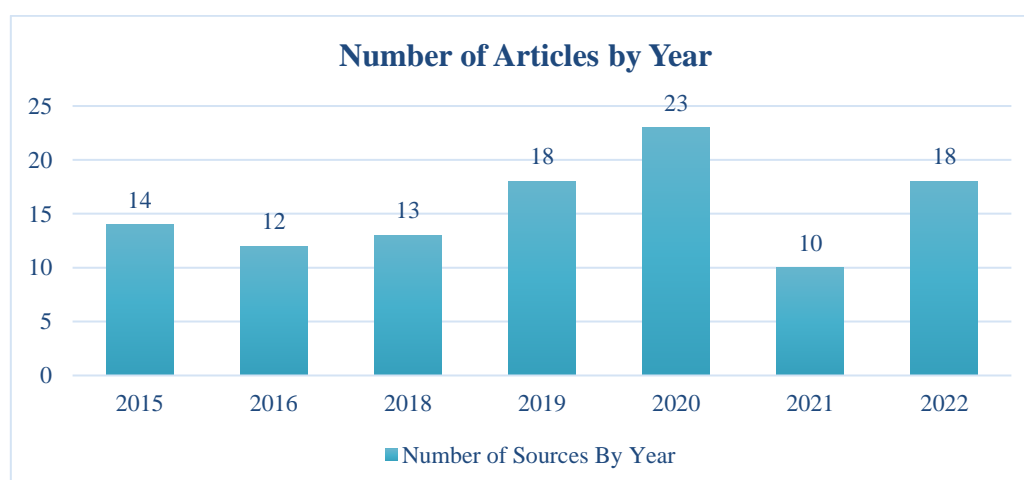


Fig. 3 Distribution of publications by Year (Author, 2023)

According to the articles accessed by the authors, there was an increase in the number of publications from 2016 to 2020, a slight decline in 2021, then a rise again in 2022. The findings reviewed that all the studies examined were conducted in countries like Malawi by Mandota (2015), Zimbabwe by Saruchera and Asante-Darko (2021), Ethiopia by Wondimu (2016), Ghana by Ebenezer and Zhuo (2019) Kenya by Muttimos (2014), and Pakistan by Yu et al. (2018). Other studies, for example by Panya and Marendi (2021). focused on the impact of reverse logistics on the performance of fast-moving products only without much attention given to the beverage sector. To add on, most of the studies by these authors focused on reusing and recycling practices in other disciplines only, ignoring other reverse logistics practices highly relevant in the beverage sector.

4.1 Product reuse practices and operational performance

The relationship between reuse practices and operational performance is evident as demonstrated in this study, based on articles examined. There is a positive relationship between reuse practices and operational performance (Saruchera and Asante-Darko, (2021); Musau, (2019); Eshikumo, 2017). This occurs through lowering production costs since reusing or cleaning products makes them more cost-effective than purchasing new or recycled ones. Beverage manufacturing were examples where reverse logistics successfully reduced production costs (Beiler et al., 2020); Mutuku and Moronge (2020); Oey and Bangun, 2020). A thorough examination of the results from various investigations suggests that a manufacturing company might be able to recycle or reuse excess materials instead of needing to purchase new ones-this could eventually lead to significant cost savings. Nevertheless, a number of studies point out the lack of practical approaches for selecting appropriate strategies for reuse or recycle of resources (Abdessalem et al., 2012)

4.2 Product recycle practices and operational performance

Substantive empirical evidence has been found of a connection between product recycling and operational performance in a body of literature. It has been agreed by many articles that *manufacturing companies' performance is impacted by product recycling, and firms needed to improve strategic performance and apply product recycling techniques* (Saruchera and Asante-Darko, 2021); Panya and Marend, 2021). *Most studies settled that* organizations that use recycling systems through reverse logistics lower the amount of garbage that needs to be disposed of in other ways, enhancing operational performance. Many of the studies that were looked at came to the general conclusion that recycling also increases operational performance through increased efficiency because it uses fewer natural resources by reusing materials, which lowers energy consumption (Prenovitz et al., 2023). Businesses can use resources more effectively and lessen their impact on the environment by recycling and engaging in resource-related activities.

4.3 Remanufacturing practices and operational performance

The empirical findings of a bunch of articles studied demonstrated that remanufacturing can have a positive relationship with operational performance because its processes can reduce costs, waste, and material consumption, give each product a second chance at life, and relieve staff members of extra work that would otherwise be necessary to create a product from scratch (Bag and Gupta, 2020); Beiler, de Arruda et al., 2020; Mutuku and Moronge, 2020; Oey and Bangun, 2020). That is, it has also unveiled that lessening

negative environmental effects through reverse logistics did not only reduce solid waste but also increased operational efficiency (Singoei and Yusuf, 2019; Bag and Gupta, 2020). Nevertheless, other research studies cited principal difficulties with a focus on core and spare part acquisition and management, that the most common remanufacturing process difficulties are connected to the unpredictable and occasionally insufficient incoming core: quantity, quality, unpredictability, and timing (Kurilova-Palisaitiene et al., 2018; Matsumoto, et al., 2016).

4.4 Return practices and operational performance

In the articles studied, the most common definition of a product return refers to the process of returning previously acquired goods to the retailer and getting a refund in the original mode of payment or exchange (Li et al., 2019). Reduced product quality, lax return policies, shifting consumer preferences, an increase in online product purchases, and shorter product life cycles are some of the factors contributing to higher volumes of reverse product flow (Lysenko-Ryba and Zimon, 2021); Agrawal and Singh, 2020). This means that after making a purchase, a customer's interaction with a business may continue if the product is returned for whatever reason for example, if it is flawed or does not meet expectations (Felipe, 2020).

This research has demonstrated that despite the fact that customers frequently perceive product returns as an unpleasant process, an inevitable inconvenience, and a necessary evil, in reality, a number of recent studies have started to shed light on the possible advantages of enabling consumers to return goods without consequence (Guo et al., 2020; Aslani and Alp, 2022). According to this research, customers are more likely to make additional purchases from a business that offers a lax product return policy that permits them to return practically any product at any time. 13 of articles studied revealed that product returns techniques that work can lead to higher profits, cheaper expenses, and better customer service (Ambilkar et al., 2022)

Effective after-sales service management is a customer service strategy that significantly impacts an organization's performance (Julianelli, et al., 2020. and customer satisfaction is influenced by after-sale service (Stephanie, 2020. as demonstrated in almost three quarters of all the articles reviewed. However, none of the articles studied have spelt directly whether product returns have a direct effect on operational performance, but they dwelt much on general performance through aspects such as customer satisfaction and retention. Businesses want to increase operational efficiency while proactively managing the returns process for products. Improving a company's competitive position might result from carefully managing product returns to increase operational efficiency. In 7 other articles studied between 2010 -2016, the notion has been consistent that the firm may not be able to handle reverse logistics efficiently due to the growing volume of returns, which is significantly more than what the business units can handle (Genchev et al., 2011; Petersen and Kumar, 2010). This suggests that while product returns are unavoidable in business and may incur costs, having a strong system in place for managing returns of goods would help businesses stay afloat and cut expenses.

4.5 Government as a moderator variable

It is noteworthy that more than 80% of the articles reviewed have shown that government (and its regulations) is a factor that affects reverse logistics. Government restrictions are one of the four main elements affecting reverse logistics that were mentioned in 30% of the examined publications (Muthemba, 2016; Hung-Lau and Wang., 2009; Changli

and Lili., 2008; Xin, 2010). This suggests that the government is involved as a factor in determining the degree of success for the company's reverse logistic framework in all the processes that manufacturers may implement for the efficacy of their reverse logistics. This has been explained in some articles studied. An inadequate government policy framework has hindered the development of asset recovery programs and processes (Dekker et al., 2013).

Reverse logistics operations can be integrated for businesses in an industry through partnerships headed by governments or industry associations (Hung-Lau and Wang, 2009). The government and corporations are under pressure to invest in green politics in order to reduce pollution, as a result of societal demands and fierce corporate competitiveness. As a result, businesses can accomplish sustainable development, cut costs, increase customer satisfaction, and create competitive advantages by implementing reverse logistics and, subsequently, studying it (Changli and Lili, 2008; Xin, 2010; Abdulrahman et al., 2014). Concerns about the environment, corporate social responsibility, and government laws and regulations put pressure on businesses processing end-of-life goods returns. Regulations such as extended producer responsibility compel manufacturers to assume accountability for the recycling of end-of-life goods. Reverse logistics operations can be integrated for businesses in an industry through partnerships headed by governments or industry associations (Hung-Lau and Wang, 2009).

5. Future research directions

Therefore, in conclusion, future studies should focus on the beverage manufacturing firms located in Harare and assess how beverage manufacturing firms manage their reverse logistics operations as well as its impact on operational performance. In addition to reuse and recycling practices, future studies should concentrate on other reverse logistics practices such as return, remanufacturing, and repackaging, as well as factors that affect both reverse logistics and operational performance but were not addressed by previous studies. This will help researchers better understand how much operational performance is affected by the adoption of reverse logistics.

6. Limitation

The study was constrained by the fact that it only included articles that the researcher was able to access. As a result, conclusions drawn from the study were based on the articles that the researcher was able to access, raising the possibility that not accessed articles may have had an influence on the study's conclusions.

7. Conclusion

From this study, the researchers came to these four main conclusions: First, the bulk of earlier research has concentrated on beverage manufacturing in both developed and developing nations, business and operational performance, and reverse logistics as a whole. Kenya was the site of numerous investigations on the factors under investigation. Second, after a thorough study, we found a few studies that focus on the impact of operational performance in reverse logistics. Thirdly, most studies that looked at reverse logistics practices concur that reverse logistics has a positive effect on operational performance. Lastly, there aren't many research that take government intervention into account as a moderator variable that can influence the connection between reverse logistics and how it affects operational performance. Thus, the focus of this paper is on investigating the function of

government intervention as a moderating factor in relation to the impact of reverse logistics on operational performance.

8. Research implications

8.1. Theoretical Implications

The study's theoretical ramifications stem from its examination of the relationship between sustainable reverse logistics and operational effectiveness using the triple bottom line approach. Additionally, in order to prevent any delays or inefficiencies in installation and government intervention, this study suggests using operation risk as a significant mediator variable.

8.2 Practical Implications

This study emphasizes the relevance of reverse logistics and its sustainability for decision-makers and stakeholders due to its impact on operational performance, as the Zimbabwean market suffers from limited implementation of reverse logistics services and its sustainability. This work also functions as a research to take into account the government intervention that may have an impact on this importance with regard to the relationship between reverse logistics practices and operational performance of manufacturing organizations.

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