The Effect of Reverse Logistics on Competitive Advantage through Operational Performance in Manufacturing Industry of Iraq

Abstract

Today, manufacturing companies worldwide are prioritizing sustainability to acquire economic benefits. Implementing reverse logistics programs was seen as a viable option to reduce the adverse impacts of production and obtain a competitive advantage. Investigation has shown that enhancing operational performance leads to the attainment of edge over competitors. Nevertheless, the issue remains as to whether the implementation of reverse logistics generates a comparative advantage which ultimately results in acquiring a competitive edge for industrial firms. The research aimed to investigate the impact of reverse logistics on competitive advantage through operational performance of a business. The findings of the study shown that the mediating effect of operational performance between the association of reverse logistics and competitive advantages. The limitation and future suggestions discussed in the end.

Keywords: competitive advantages, reverse logistics, operational performance

Introduction

Now a day ecological issues have been prompted through manufacturing firms to configure their operations to achieve ecologically sustainable production (Prakash, Barua, & Pandya, 2015). Consequently, consumers as well as manufacturers have an obligation to disassemble recycled items into their individual components for the purpose of reusing, recycling, or disposing of them safely (Feng, Xia, Wang, & Zhang, 2022). Reverse logistics means the process of transporting items at the end of their functional lifespan from customers back to the producers. This is done in order to recover value from the goods or to guarantee that they are disposed of in an ecologically appropriate manner (Stock, 1992). Firms strive to achieve performance specially in its operation while effectively overseeing the product recovery process (Santoso, Siagian, Tarigan, & Jie, 2022). Effectively overseeing product returns may enhance a firm's competitive position by increasing operational performance.

Stock (1992) defines reverse logistics as the set of logistical operations that include the recycling of garbage, as well as the handling of potentially hazardous substances. Reverse logistics is an organized technique that involves the successful transportation of raw materials, partially assembled and complete goods, and the linkedinformation from their process location back to their origin. This process aims to reclaim value or dispose of them appropriately in the most economical way (Rogers & Tibben-Lembke, 1999). Why reverse logistics is necessary, the growing awareness of environmental issues, the impact of temperature change, the limited availability of industrial resources, and developments in technology have led to an increasing emphasis on it (Dias & Braga Jr., 2016). The factors that contribute to an increase in the number of products being returned include a decrease in product quality, lenient return policies, changes in consumer preferences, a rise in online product purchases, and shorter product lifecycles (Ravi & Shankar, 2015). The strategy suggested for establishing reverse logistics systems contain outsourcing, partnerships, adopting environmentally friendly strategies, and executing from a product-life cycle perspective by using a recycling supply strategy. Outsourcing allows a company to focus on its main strengths, attain more adaptability, and shift responsibility to a third party (Hsu, Tan & Mohamad-Zailani, 2016). Public or governments may lead collaborations to include reverse logistics services for enterprises in a particular sector (Dabees, Lisec, Elbarky, & Barakat, 2024). Implementing environmentally-friendly practices such as reusing, recycling, and remanufacturing contributes to making the supply chain more sustainable (Rao & Holt, 2005). Incorporating reverse logistics utilizing the product-life cycle strategy enables the production of value via the supply chain viarecycling (Sangwan, 2017).

Reverse logistics boost competitive advantages. Competitive advantage is the distinct capability possessed by a company that allows it to achieve more profit compared to its rivals (Kim &Hoskisson, 2015). In order to get a competitive edge, companies must provide distinctive value propositions by using tailored value chains that provide different trade-offs compared to their rivals (Porter, 2008). Developing the procedure for returning products in order to develop new market prospects enhances competitiveness by attracting new customers and maintaining the loyalty of current ones (Mugoni, Nyagadza, & Hove, 2023). Effective reverse logistics strategy always enhances the edge over competitors by influencing consumer buying behavior via the management of product returns (Stock et al., 2006). Further, Barney (1991) discussed the benefits for achieving competitive advantage, which include the value, rarity, imperfect imitability, imperfect mobility, and non-substitutability of resources. Markley and Davis (2007) also stated the benefits of competitive advantages including loyalty to consumers, waste reduction, revenue growth, market share, and brand awareness. (Mugoni, Nyagadza, & Hove, 2023) have proposed that for evaluation of competitive advantages these factors are play pivotal role customer interactions, brand image.

Operational performance (OP) refers to the extent to which preset objectives and targets are achieved via a process-oriented method that assesses both the efficiency of human capital and the level of quality of the goods and services (Shaw, 2003). Further, operational performance refers to the evaluation and quantification of characteristics that connect the results of a company's operations to its overall performance, including metrics such as defect rates, manufacturing cycle time, and turnover in inventory. Operational assessment of performance is a continuous process that involves defining, monitoring, and taking proactive corrective action to efficiently and effectively achieve organizational objectives (Cazuza de Sousa Júnior, Dias, & Nunes de Azevedo Filho, 2023). There are several indices available for assessing operational success. Operational performance may be assessed by measuring the proportion of defects per item, the number of consumer complaints, the amount of waste, the mean-time breakdown rate, the time it takes to respond to client queries, the time it takes to process requisitions, the rate of output, and the level of performance (Slack, Chambers & Johnston, 2010). Research has shown that the primary factors affecting operational performance are cost, time, operations adaptability, reliability, as well as quality (Chavez, et al, 2013).

While industrial companies worldwide are becoming more aware of the significance of environmental conservation, the adoption of solutions like reverse logistics to minimize environmental impact has been sluggish (Hung-Lau & Wang, 2009). The reason for this is that industrial companies have systems of information specifically designed to maximize the flow of products in the forward direction. However, when it comes to executing reverse logistics, these systems have remained at the planning stage. Furthermore, the advancement of asset value recovery systems is still in its early stages (Dekker, et al, 2013). Reverse logistics necessitates the acquisition of supplementary infrastructure, including warehouse space, extra materials management and transportation vehicles. This is an aspect that many enterprises are hesitant to engage in (Rogers, et al, 2002). Reverse logistics creates challenges for predicting demand than predicting for forward logistics due to the intricacies of monitoring faulty items. Presently, the majority of firms typically manage product return operations at the level of each particular business unit, rather than as a part of the whole supply chain. Ultimately, the growing number of returns much surpasses the ability of business units to efficiently handle reverse logistics (Genchev, et al, 2011).

Iraqi manufacturing enterprises have not effectively used reverse logistic projects to obtain a competitive edge. The primary factor is that the development and execution of such a program have been deemed laborious due to the intricacies involved in creating demand projections for reverse logistics and the need for extra infrastructure expenditures (Rogers et al., 2001). Moreover, the absence of information technology and resource recovery systems that aid in making well-informed decisions during the development of reverse logistics operations adds significant complexity to their execution (Dekker et al., 2013). Research on manufacturing performance in the Iraqi setting has just emerged lately (Hussein, & Abdullah, Ibrahim, Hami, &Abdulameer, 2020). In order to address variations in different situations and considering the significance of emerging economies in the global economic landscape, additional investigation is required regarding reverse logistics in Iraq.

The current study provides many substantial contributions to the present literature by examining this model. First, the present literature on reverse logistics and competitive advantage remnants in its infancy, with occasional study examining this significant association – mainly through depending on secondary data. Further, this study will support in enhancing RBV, particularly the model is tested in a developed country, while in Iraq the importance of RL still needs to be emphasized (Chen et al., 2022). Finally, highlighting the effect of reverse logistics in Iraq, concerning boosting reverse logistics in the Iraqi market (Al-obaidy, Mawlood, & Al-Dulaimi, 2021).

Literature Review

This study has the resource advantage theory of rivalry, which suggests that businesses get a competitive edge by effectively using their own internal strength (Hunt & Morgan, 2005). The competitive approach of an organization should be influenced by the collection of resources inside the company itself, rather than relying on external factors (Amit & Shoemaker, 1993). The resource selection process, as explained by the theory, is responsible for determining how rivalry for comparative advantage occurs. The procedure establishes the organization as a component of selection that may be transmitted or passed on to others (Conner, 1991). Every firm has distinct resources, so these resources serve as an edge over competitors, resulting in favorable prospects in the market. These resources provide a sustained edge over competitors throughout time (Barney, 1991). The idea acknowledges that innovation is generated from inside the organizational processes of a firm's competitive atmosphere (Hunt & Madhavaram, 2012). Nevertheless, the theory explains the effect of reverse logistics on competitive advantages through operational performance by elucidating the interconnections of resources inside businesses as they strive to attain a comparative edge. The idea provides a framework for examining how the skills and results related to reverse logistics affect a company (Hunt & Morgan, 2005). Further, Stock et al. (2006) found that the success of reverse logistics programs is determined by the level of resource commitment from management. Companies get a competitive advantage when they have control over resources that enable them to develop and execute plans that lead to highly effective and productive operations (Barney, 1991).

One important concept is that reverse logistics techniques help ensure the well-being of the next generation by making current generations responsible for the environment and all stakeholders, including the most important stakeholder, the universe (Sangwan, 2017). These techniques are believed to optimize the use of a company's resources, while also addressing the environmental impact on a global scale and improving operational performance at a company level (Ravi & Shankar 2015). Huang and Yang (2014) have posited that there is a connection between reverse logistics and the creation of a competitive advantage. However, they have not considered the impact of external factors on this relationship. In addition, although researchers have debated the connection between operational excellence as well as competitive advantage, Carter et al. (2000) did not consider this from the standpoint of reverse logistics. Reverse logistics strategies have the ability to decrease the risk for customers when they buy items and provide additional value to the consumer (Russo & Cardinali, 2012). Furthermore, Rogers and Tibben-Lembke (2001) suggested that implementing reverse logistics procedures may help a company reduce return of goods by identifying problematic regions and patterns of defects within its value chain. De Brito, Flapper, and Dekker (2005) said that adopting a value system may lead to both financial and non-financial advantages, thereby enhancing the firm's competitiveness. The link between reverse logistics as well as a firm's rival position is dependent on the achievement of internal operational excellence. However, the strength of this relationship has not been previously examined.

Conceptual Framework and Hypothesis Development

According to Barakat et al. (2023), performance of organizations may be categorized into two distinct groups: financial and nonfinancial. Optimal financial performance is characterized by a significant market share and consistent rise in income along with a return on investment (Ou and Zhang, 2023). Nonfinancial performance refers to the ability of business to achieve operational efficiency, high productivity, and effective market penetration and consumer outreach via the development of new goods, all of which are dependent on a competent staff (Seo et al., 2023). In contrast, Strategic Competitive Advantage (SCA) emphasizes the efforts of firms to establish a distinctive market position by improving their capabilities and effectively using resources to sustain their high levels of performance (Haseeb et al., 2019). Reinforcement learning (RL) is a strategic tool which companies might employ to improve their competitive advantage. It strengthens the value that organizations provide to customers and cultivates their loyalty. Consequently, customers are more inclined to buy again and to suggest the products to others. Nevertheless, the application of Reinforcement Learning (RL) mechanisms requires funding and deployment of resources (Bajar et al., 2024). This may be accomplished by maintaining a portion of the resources, both financial and nonfinancial, to support RL processes (Fernando et al., 2023). According to Liu et al. (2020), the pledges made by managers and suppliers to improve RL procedures may ultimately result in improved overall organization performance. Furthermore, Bajar et al. (2024) validate that businesses may get superior performance by allocating sufficient resources to reinforcement learning. This is consistent with the Resource-Based View (RBV) since it emphasizes the effective use of resources to attain a competitive edge (Teoh et al., 2023).

Drawing from the previous analysis and integrating the fundamental principles of Resource-Based View (RBV), it can be said that Reinforcement Learning (RL) activities have the potential to augment the company's strengths along with resources acquired by its exceptional performance, both in terms of financial and nonfinancial aspects, in order to maintain its competitive edge. Increased performance enables firms to get more ownership of resources (Liu et al., 2018), hence augmenting their competitive advantage (Bag et al., 2019). Nevertheless, companies need reinforced learning (RL) to maintain their competitive edge, as it facilitates the restructuring of resources and their efficient and effective use by adapting to the constantly shifting workplace (Plaza-Ubeda et al., 2021). This concept is substantiated by the Resource-Based View (RBV), which posits that achieving outstanding performance inside an organization may result in a CA maintained by ongoing achievement (Fernando et al., 2023). Nevertheless, in a constantly changing business landscape, organizations must enhance their ability to adjust, that might be accomplished by effectively managing assets (Maitiet al., 2020). This justifies the intermediary function of RL practices in the relationship between efficiency and SCA, particularly considering that RL is believed to have a positive impact on strategic corporate adaptability (Haseeb et al., 2019).

Research Methodology

The current study is a quantitative and cross-sectional design. We used a five-point Likert scale, 1 = strongly disagree to 5= strongly. The scale was adapted from the current literatures of RL, OP and CA. In total, to evaluate employees' perception, there were 20 items scale consists ofreverse logistics, operational performance, and competitive advantages. Reverse logistics is measure by six items. The items of reverse logistics were 1) Managing the return of the customer's product. 2) Managing the refunds or replacement. 3) managing warranty or guarantee claim. 4) Disposing the customer products that cannot be sold or repaired. 5) Managing value from retuned products through recycling or resale. 6) Examining return data to increase the efficiency in supply chain. The items of competitive advantages were 1) Products has unique feature and higher quality. 2) Products has lower price and better technology and higher quality. 3) Products has unique technology. 4) Products has innovative feature and engage customer. 5) Products has strong brand recognition. 6) Products has continuous process improvement. The items of operational performance were 1) Operational performance is efficient. 2) Products has better average throughput time. 3) Products has better lead time. 4) Products has rarely production downtime. 5) Products has better inventory turnover ratio. 6) Products has better supply chain visibility. 7) Products has better average defect rate. 8) Product has better percentage of fulfilling the order. The reliability of all these items was more than 0.80.

Date Collection

Data collected from the managers of the manufacturing industry to analyze the hypotheses of the study. Online data was collected. The sample size was 290. Also, non-probability and purposive sampling technique was usedfor data collection (Sekaran, 2002). Because, the list of all the managers was not available.

Data Analysis

Investigating the measurement model comprises reliability or internal consistency, convergent as well as discriminant validity (DV). Reliability or internal consistency measures the degree to which the items evaluate a precise latent construct (Ramayah, Cheah, Chuah, Ting, & Memon, 2018). Composite reliability (CR) should havethe value above 0.7 as a standard for each construct is measured as acceptable. For all the constructs, the results designated that CR values were above 0.70 such as reverse logistics (0.905), operational performance (0.918) and competitive advantages (0.921)- thereby postulating the high reliability or internal consistency of internal constructs.

Convergent validitymeasures the degree to which an amountassociates positively with alternatemeasuring of the same constructs (Hair Jr, Matthews, Matthews, & Sarstedt, 2017). The measurement of CV needsexaminingfactor loading values of the items as well as the average variance extracted (AVE). Hair Jr, Matthews, Matthews, & Sarstedt, (2017) suggested that outer loadings can be retained if the value is greater than0.50.

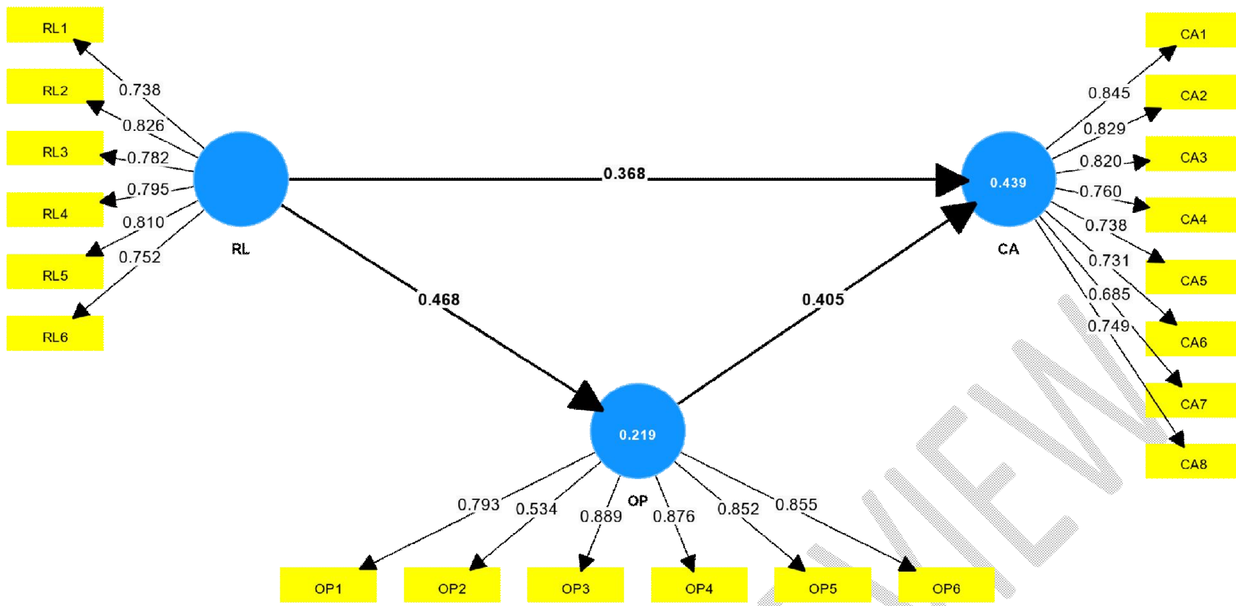

Figure 1:
Internal Consistency

Table 1:
Internal consistency and Validity of the Constructs

Constructs	CA	A	CR	AVE
CA1	0.845			
CA2	0.829			
CA3	0.820			
CA4	0.760	0.902	0.921	0.595
CA5	0.738			
CA6	0.731			
CA7	0.685			
CA8	0.749			
OP1	0.793			
OP2	0.534			
OP3	0.889	0.890	0.918	0.655
OP4	0.876			
OP5	0.852			
OP6	0.855			
RL1	0.738			
RL2	0.826			
RL3	0.782	0.875	0.905	0.615
RL4	0.795			
RL5	0.810			
RL6	0.752			

Discriminant validity (DV) means the dgree to which the constructs applied in the model are separate from one another constructs (Hair et al., 2017). HTMT ratio was applied at 0.85,since it is the most conservative standard value for HTMT (Henseler, Ringle, & Sarstedt, 2015). For HTMT, the value greater than 0.90 proposes lack of DV. The results show the HTMTin table 2 was less than 0.85. It is obvioust hat value confirms to all the expectations of DV. Thus, the complete results of the measurement model show that satisfactory internal consistency or reliability, convergent validity as well as discriminant validity.

Table 2:
Discriminant Validity

Constructs	CA	OP	RL
CA			
OP	0.636		
RL	0.620	0.521	

Structural Model

Structural model measures the causal association between the constructs. So, Hair et al., (2017) recommendedapplying the bootstrapping method with 5000 resampling for assessing the significance of hypothesized model. So, Table 3shows that the effect of reverse logistics (H1: β1=0.368, t=5.791>1.96, P=0.000<0.05) had significant direct effect on competitive advantages.Additionally, the effect of reverse logistics (H2: β2=0.468, t= 8.167> 1.96, P=0.000<0.05) had significant direct effect on operational performance. Further, the effect of operational performance (H3: β3=0.405, t=6.728>1.96, P=0.000<0.05) had significant direct effect on competitive advantages.

The hypothesis (H4) as mediation was measuredapplying the mediating procedures. The results shown in table 3. It is evident that OPpartially mediated the relationship between RL and CA (H4: β4=0.190, t=4.937>1.96, P=0.000<0.05).

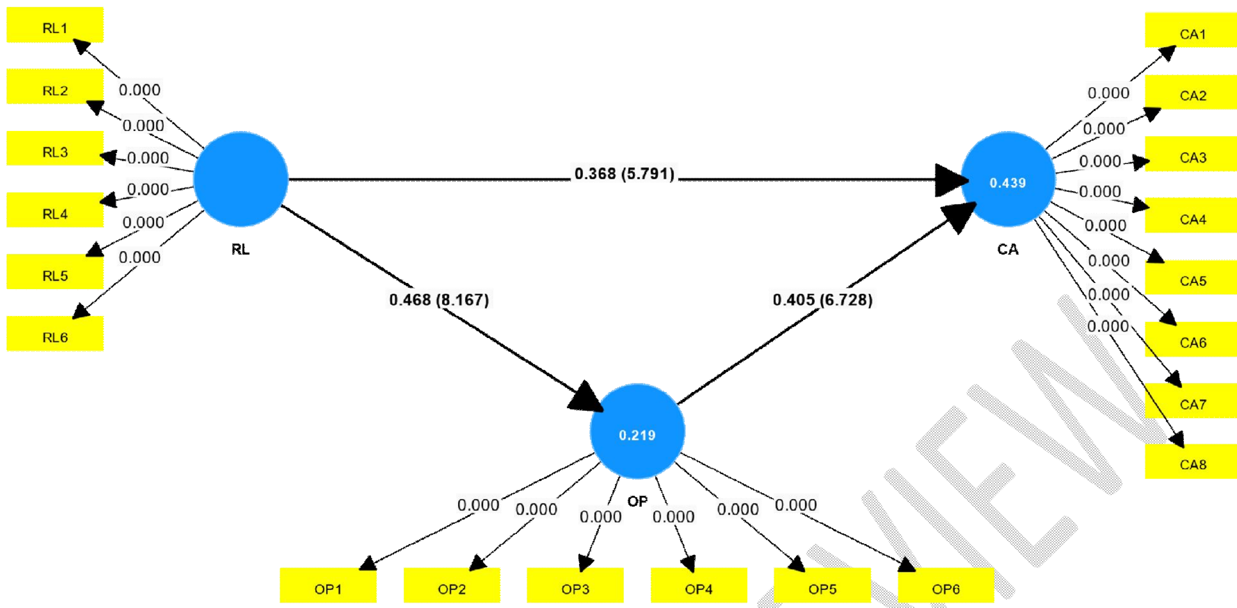

Figure 2:
Path Coefficient

Table 3. Path Coefficient

	β	t values	P values
RL -> CA	0.368	5.791	0
RL -> OP	0.468	8.167	0
OP -> CA	0.405	6.728	0
RL -> OP -> CA	0.190	4.937	0

Discussion

Theoretical foundations derived from the resource advantage theory of competitiveness and a comprehensive literature assessment resulted in the conclusion that the mediating effect of operational performance in the relationship between the deployment of reverse logistics and the attainment of competitive advantage by enterprises. The findings of this research suggest that operational effectiveness mediates the relationship between RL and CA. This finding is consistent with the findings of previous investigations (Dias & Braga Jr., 2016). So, these studies often argued that deploying resources in a distinct manner contributed to the establishment of comparative advantage, which increase the level of edge over competitors. However, there is less empirical evidence to support this claim. This work has made a valuable contribution to understanding the connection between the success of reverse logistics programs, the acquisition of operational skills, and the attainment of a competitive advantage. the mediating effect of operational performance in the relationship between the deployment of reverse logistics and the attainment of competitive advantage is grounded in the resource advantage theory of competition. According to the hypothesis proposed by Barney (1991), using distinct resources helps companies develop distinctive internal capabilities, which in turn allows them to establish a competitive edge in the market. The research found a strong and meaningful connection between the application of RL and operational performance, which leads to the creation of a competitive advantage. This finding provides evidence that the act of selecting resources influences how individuals or organizations achieve a competitive advantage (Hunt & Morgan, 2005). The operational performance was greatly influenced by the reverse logistics interaction, which played a major role in achieving a competitive advantage. When resources are used in a distinct manner, they provide a comparative advantage, resulting in the creation of a competitive edge (Dias & Braga Jr., 2016). Manufacturing enterprises in Iraq, the likelihood of attaining a competitive edge via the benefits of comparative advantage is directly proportional to the quality of their resource selection procedures. This demonstrates that acquiring operational proficiency is connected to attaining a competitive edge.

Conclusion

The research found that the strategic allocation regarding assets in a unique manner enhances operational efficiency, resulting in the attainment of a competitive advantage. This concept is presented through literature. Hence, the research enhances our understanding by proposing that the process of selecting resources might enhance comparative advantage. Consequently, this enhances competition. The study found significantly that the mediating effect of operational performance between the association of reverse logistics and competitive advantages.

Implications

The research provides empirical evidence of the mediating effect of operational performance in the relationship between the deployment of reverse logistics and the attainment of competitive advantage. The research specifically shows that competitive advantage may be achieved by utilizing reverse logistics via outsourcing, collaborative entrepreneurship, green methods, and recycling supply chain systems. This aligns with the concepts deliberated by Govindan et al. (2015) in a like manner. The research found that the significant mediating effect of operational performance in the relationship between the deployment of reverse logistics and the attainment of competitive advantage. Iraqi manufacturing enterprises should use resource selection techniques that enhance their ability to obtain a comparative advantage and, as a result, improve their competitiveness. The execution should be directed by a systematic approach that involves determining the distinctiveness of the resources possessed by the company and strategically allocating these resources in a way that enhances its edge over competitors (Hunt & Madhavaram, 2012). The research necessitates policy makers in the industrial sector to create strategies that reverse logistics can create edge over competitors. These actions should encourage the practice of reverse logistics to service providers specializing in returns. He and Wang (2005) suggest the establishment of industry groups or strategic alliances to support reverse logistics operations. Hung-Lau & Wang (2009) discuss the implementation of policies that promote the reuse, recycling, and remanufacture of products. Rogers and Tibben-Lembke (2001) explore the concept of recycling supply networks. Sangwan (2017) focuses on the development of these supply chains.

Limitations and Future Suggestions

Cross sectional data has been employed to assess the mediating effect of operational performance in the relationship between the deployment of reverse logistics and the attainment of competitive advantage. So, panel data can be used in future to enhance more robust result. Secondary data also be more reliable to gain comprehensive results.

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