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Mediation of Reverse Logistics in Sustainable Resources and Organizational Performance

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ABSTRACT

The world is going green to foster the challenges of climate change; every country is implementing environmentally friendly rules and regulations in every industry. While in the automotive sector in Pakistan, especially in reverse logistics or logistics, back from customer to company needs more attention. Thousands of vehicles go into the trash annually, resulting in considerable automotive waste in the country. This research aimed to find companies focused on reverse logistics in the automotive sector through questionnaires and collecting data through cross-sectional data collection techniques from 207 individuals in managerial positions at the automotive giants in the country. Moreover, analyzing this data through quantitative tools to determine how much finances and commitment is needed to cover all these automotive waste issues and contribute to a greener environment in the country through the concepts and techniques of the circular economy. Furthermore, the study aims to find how circular economy concepts can be adopted in reverse logistics in the automotive industry to reach a sustainable environment and organizational performance that, in reality, can contribute to all stakeholders of the country, including the environment.

Keywords: *Circular economy, Product recovery, Structural equation modeling, Reverse logistics, Sustainability, Green supply chain management, Quantitative Research*

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1. Introduction

The automotive business is one of the primary producers of toxic industrial waste, harming financial and environmental efficiency. The fast growth of car leftover and recovery issues brought on by the increased demand for automotive products have ultimately resulted in eco-friendly destructions. As a result, reverse logistics (RL), a maintainable corporate policy, is required to help firms utilize more materials while cutting expenses (Chan et al., 2020). Additionally, it aids in developing techniques with little environmental impact (Rashid et al., 2023a). By eliminating extra raw resources and trash for recycling, it is possible to improve operational and environmental performance. The ability of a company to properly manage product returns using its resources is known as RL (Rashid & Rasheed, 2023). Although Reverse Logistics is not something new for firms and businesses, it is a collaborative framework that must be created to facilitate RL-based circular economy operations. The businesses must have the capacity to meet consumer demand for coming back goods and dodge generating pollution and waste (de Campos et al., 2020). A circular supply chain with verifiable commercial value that can resist consumer rejection, recollection, change, and safe discarding is necessary for the automotive sector. Following eco-innovation principles, RL directly contributes to the design, implementation, and improvement of a circular supply chain model (Geissdoerfer et al., 2018). Increasing awareness of eco-friendly sustainability and cost reductions has also prompted industrial companies to start producing new goods utilizing circular corporate models. Solid administration structures and an intermediate stage focused on circular economy activities have been established due to the concept of RL (Guarnieri et al., 2020). Hashmi et al. (2021b) stated that indirectness would likely benefit society and businesses. RL has also taken a clear stance on sustainability and the circular economy. RL and the circular economy share a similar idea but are researched separately. How perfectly the cyclical economy emulates RL's principles was underestimated.

RL gives businesses in the automobile segment a chance to progress their monetary performance by generating revenue from the new marketplace, for instance, recycling and remaking. In order to achieve higher performance, less emphasis is placed on the functional RL constructs and resource allocation. Additionally, earlier research has demonstrated that firms are only partially driven to adopt RL projects because they need more outstanding commitment and investment (Abbas & Farooquie, 2020). After remanufacturing, the marketplace expansion added a 10% contribution to the entire automotive segment, with Malaysia's automotive industry contributing less. Additionally, due to the variable return rate, the reverse SCM system is hard to maintain (Tosarkani et al., 2020). Businesses are conducting in-depth research to understand how RL indirectly disturbs economic performance (Rasheed & Rashid, 2023). Profitability-wise, the present financial climate, during the lockdown, and worldwide competitiveness have impacted automakers (Pirttilä et al., 2020). The industry is directly pressured by declining sales, greater competition, and rising production costs (Rashid, 2016). The issues may be overcome by inventory management and forward logistics integration (Rasheed et al., 2023). According to the EU's Sustainable Development Policy, the best way to continuously improve well-being is to encourage sustainable consumption and production. Nevertheless, the locomotive sector increases greenhouse gas production and cannot handle automotive waste. However, the car industry produces greenhouse gas emissions and can't manage automotive leftovers. Worldwide, new car production increases yearly.

Product recalls, and returns have received much less attention than producer-to-consumer logistical activities (Baloch & Rashid, 2021). In order to increase their chances of making money, businesses must connect their proposed logistics process with the RL protocol. Nevertheless, there is a slight direction on using RL to improve organizational performance and achieve sustainability. While resource commitment and RL have received a great deal of attention in the literature, few empirical studies link this success to financial results. So, a problem needs to be addressed in how reverse logistics

can improve organizational performance. There is no proof to back up the idea that increasing financial success requires continual resource investment. Additionally, RL is only sometimes a crucial ability in the automobile sector. More environmentally sensitive industrial processes that follow recycling and reorganization architecture are required for new business models. Care must be taken to regulate material recycling, energy quality, and reusability. Decision-makers will benefit from it, be able to monitor them and make sure they adhere to operational requirements (Rashid et al., 2022a). Therefore, the following research questions will address the research problem:

RQ1: To what extent does the sustainable commitment affect RL-return, RL-recovery, and organizational performance?

RQ2: To what extent do the RL-return and RL-recovery mediate the relationship between sustainable commitment and organizational performance?

2. Literature Review

Businesses need to understand how environmental sustainability may help them succeed financially. Companies have long understood the need for effective resource management to advance a viable edge and enhancement of performance. The resource-based view theory (RBV) offers a fundamental paradigm for anticipating the facilitators of optimal resource management for presentation. The significance of capacity utilization was made clear by the RBV hypothesis also, in what way businesses may be able to gain a competitive edge through improved performance by managing their resources well. Maintaining a competitive advantage or consistently achieving high performance is challenging in the current corporate climate, where environmental and technological improvements are the main focus. As a result, according to (Davcik & Sharma, 2016), businesses' willingness to invest in their supply chain process or product should serve as the beginning point for resource management decisions. Consequently, resource commitment substantially impacts how a product's income is implemented overall (Maiti et al., 2020; Rashid et al., 2022b). Corporate performance is impacted by ecological practices, which also attract stakeholders' attention. The RBV hypothesis has also drawn criticism from prior scholars for disregarding firms' external environment. The natural RBV (NRBV) hypothesis was put out by (Hart, 1995) as a formidable rival and a cutting-edge tactic for competitive advantage by focusing on environmental and sustainability issues. This disagreement became more heated as a result of pressure from stakeholders for firms to take an active role in environmental preservation. Communal accountability is especially intriguing to those who accept the NRBV theory (Lopez-Becerra & Alcon, 2021). As a result, to attain competitive advantage and performance, the firms are no longer accessible to enough resources. RBV theory shortcomings prohibit it from offering the best direction for businesses to adjust to the complex and ever-changing needs of stakeholders that are based on the environment. According to (Michalisin & Stinchfield, 2010), NRBV, which explains the unpredictability of the limits accomplished by natural resources and displays eco-friendly behaviours as the significant drivers of performance, may be used to get beyond RBV's restrictions. (Hart, 1995) recommends three actions that businesses can take to improve their performance. Pollution prevention is the first method, providing businesses with cost-effective operational expenses by falling discharges and streamlining various processes. Another strategy is product stewardship, which lowers life-cycle costs through integrated supply chains and helps businesses become more financially competitive. The third strategy is ecologically sound, which aims to make the company a market leader by lowering environmental risks through collaboration with other industry participants.

Although the NRBV theory describes how businesses can maintain their efficiency and competitiveness by adopting sustainable practices, there is only one way that information is transferred. It does not differentiate itself from the resource commitment justification offered by NRBV theory and RBV theory (Hart, 1995; Rashid et al., 2023b). Even though pollution or waste reduction & product belongingness are the most important, researchers employ long-lasting or sustainable principles and progress methods to incorporate other industry- or research-specific environmental practices, such as sustainable supply chain management and operational management. (McDougall et al., 2019). Even though this study amended all three models through the connection of the circular-based economy and

reverse logistics offering or material return and recovery to fulfil the said resource or product commitment, product stewardship, and sustainable development objectives. Organizations can attain financial growth through maintainable resource commitment when they assign and devote resources proficiently to keep a competitive advantage. Contrarily, the RL is divided into sections depending on RL approaches for returned goods and recovery of products that return assets to companies' supply chains. By decreasing resource waste, such as the waste of materials, goods, and waste to reduce costs and increase profitability, RL approaches and the circular economy concept can be used to extend life. Furthermore, the practice of businesses committed to sustainable resources will be enhanced when RL is used as a resource, it stays in the lifespan longer, and waste is decreased. After that, firms can deploy resources wisely and use them to sustain their market position.

2.2 Hypothesis Development

Financial viability is the most crucial element in determining a company's strategy. Maximizing sales, increasing profits and manufacturing costs, and increasing equity involvement and cash flow all affect financial success. According to the literature, the sale of goods, dividend payments, and real estate transactions all contribute to the company's profitability. In contrast, return on the stockholder's equity is added to the shareholder's net profit or net loss that results from the cash in or outflows resulting from the negative or positive moment of stocks of a firm within a defined time frame. In earlier studies, researchers assessed the influence on organizational performance by analyzing disposal costs, reseller revenue, recall of returned goods, returned items cost, and RL inventory storing and carrying costs. (Maiti et al., 2020). The fact that controlling and recovering essential resources is the emphasis of resource commitment (Liu et al., 2020; Hashmi et al., 2020a). There are various groups that make up the contribution to resource management. Knowledge-based capabilities are included in the first group, whereas property-based assets are included in the second. Technology, knowledge of inventory data, and expert human intellect on resource utilization are essential for organizational transformation. According to the RBV hypothesis, it was found that increased resource commitment is accompanied by increased resource focus. Due to the limited quantity of natural resources, businesses should devote all of their attention to resource management and RL-product return and recovery. As a result, it will improve the companies' organizational performance. When businesses use their resources wisely, a commitment to sustainable resource management may help lower emissions and pollution. (Hart, 1995) recommended that firms apply excellence enhancement in their supply chains and operations to achieve sustainability objectives. However, more than continuous supply chain and operational development is required; firms must also manage their resources sustainably. So, its hypothesis is as under;

H1: Sustainable commitment has a positive and significant effect on organizational performance.

H2: Sustainable commitment positively and significantly affects an RL recovery.

H3: Sustainable commitment positively and significantly affects an RL return.

Raw resources, continuing stocks, and semi-finished things can be moved economically from the client to the point of origin thanks to the excellent manufacturing, execution, and supervision process known as RL. As a result, adding value or removing garbage is made more straightforward, and the necessary inventory is filled for the next cycle. RL aims to pique attention to increase economic output, client revenues, and market share (Guarnieri et al., 2020). Businesses reorganize supply chain activities to reduce energy use and emissions in response to financial, socioeconomic, legal, and political concerns. They do this by ignoring profit margin considerations. Customers who care about the environment favour businesses or companies that incorporate reverse logistics concepts and activities and actions that support long-term profitability and become cost-efficient through the efficient asset or raw material used to protect valuable resources and follow current norms for limiting environmental effects. A successful method for boosting the long-term competitiveness of firms is to strike a balance between cost reduction and environmental conservation through efficient resource usage (Ngu et al., 2020). Reverse logistics offers financial gains and rewards through low-cost raw material purchases, efficient inventory, and management of raw materials. After that, disposal through researching the

efficient or cost-saving places for product collection warehouses, reengineering product facilities, and then damaged or returned products to be remade and sent back efficiently. RL is increasingly important for companies pursuing greener manufacturing as a strategic differentiator (Dutta et al., 2021) despite the fact that some companies encounter hindrances and problems while integrating recovered old products into the current company-owned or sourced forward logistics facilities. Here, firms need to rebuild a sustained reverse logistics network or facility by analyzing the current system and resources so that the system matches the current facilities and warehouses and forward logistics. (Gao & Cao, 2020).

RL and the concept of circular-based economy work together to create value in both sustainable environmental and economic efficiency. Typically, manufacturing and operations sectors work together to produce and use goods in an environmentally friendly manner (Guarnieri et al., 2020). Nowadays, businesses are encouraged to create and recycle products in an efficient circular logistics concept to reduce waste and save environmental costs in an advanced business model and strategy(de Campos et al., 2017). Incorporating the circular economy concept is best suitable and preferred for this kind of innovation. However, business reorganizations and governmental mandates can affect the business model in specific ways and reduce its efficiency. The sector addresses resource scarcity in its entirety. In light of this, this article develops a RL-based model that provides businesses with direction for implementing sustainability-oriented actions that enable the business to fully utilize the circular logistics for raw material and manage its resources and operations on an effective and efficient model. It helped the company reduce unnecessary spending and pollution while promoting sustainable green business growth. The core ideas of reverse logistics and the circular-based economy are the foundation of RL. Though they are separate concepts, RL and the circular economy are complementary. Thus, using the Reverse logistics concept in a business directly connecting the business to customer loyalty, value or product creation, and efficient waste recycling may aid in sustainable growth (Dev et al., 2020)

The circular economy-based reverse logistics is expanded to include the literature from the current concepts and ideas of the circular economy using several criteria. The first requirement must be appropriate for strengthening the firm's sustainability, focusing on supply chain activities in particular. Complex concepts like reverse logistics and closed loop supply chain of the supply chain management rules are the 2nd criterion to create a sustained competitive advantage; the concept of RL must give increased value offerings and workable sustained solutions to the existing problems in the 3rd criterion. One of the sustainability principles that has been used within a corporation is RL. RL covers product returns to the company and product recovery to the customers. The following section will go through the RL domains in more detail. Given this justification, scholars have argued in favour of the circular economy, which is still relatively new (Pieroni et al., 2021). The product's life cycle ends when it is no longer useful to consumers, but by using the closed loop, the concept of supply chain management will prolong the life of the product or resources. The processing of these products or commodities to reenter the market through reverse logistics techniques. Getting the goods to the customer is part of the logistics process. Product disposal is more of a byproduct of product consumption than a supply chain activity. A product may be reused, recycled, or repaired if it can be returned to the supply chain network for reuse; otherwise, it is discarded. Additionally, Reverse logistics build a new secondary market to resell these recycled usable and permit the reintroduction of waste. Even modified wastes and pollutants collected by technology may be resold to make more money in a different market. To use fewer resources in various production processes, businesses might reconsider their practices, product designs, and resource allocation. Businesses may function more sustainably if they combine the traits of a closed-loop supply chain, RL, and company life cycles.

The government take initiatives with industrial bodies to smooth materials recycling in light of the growing environmental challenges and running expenses. The Industrial Revolution and the development of technology have made it possible (Govindan & Soleimani, 2017). Restoration not only increases the lifespan of the product but also saves money and resources (Chan et al., 2020). The industrial process flow devoted to recovering outdated items, parts, and components is known as product recovery services. So, product recovery aims to lower waste and raise environmental values. Reuse, repair, refurbishing, restoration, retrofitting, and commercialization are six recovery procedures

applied. The most efficient way to recycle a product is to acquire and resale unnecessary parts, items, or components. Reversal of goods measures has the power to boost financial growth significantly. A circular business model needs elements that are concerned with product recovery. The correlation between the company's dedication to adopting environmentally friendly factors and increasing existing performance will be strengthened by a RL-product recovery cycle, according to NRBV. The NRBV hypothesis states that a RL- reversal of goods is compatible with viable expansion and product ownership measures. According to this, how concerned are using viable resources to reduce their reliance on natural resources? The company will benefit from recovering RL products by keeping its closed-loop supply chain's scrap and undamaged materials in place. A company plan that aligns with supply chain networks must include product recovery.

The firm's organizational performance could be enhanced by supply chain networks that use RL-product recovery. Additionally, the business embraced and committed to adopting environmentally friendly methods and successfully recovered RL products, which can affect performance growth. The cost will reduce and trashes will be turned into usable goods. (Li, 2014) observed that the relationship between environmental innovation methods and financial success is favourably mediated by resource commitment. According to using sustainable resources by companies for competitive advantage is driven by the RL. According to this, committing to sustainable supply chain resources for operational efficiency may improve an organization's internal competence. According to others, RL is challenging when a company is reluctant to use viable solutions. In order to be profitable, the company must commit to and modify its supply chain activities. When business When networks cooperate well, businesses may acquire and keep a competitive advantage.

The reversal process of the product is challenging and complicated. The concerned pledge to resource allocation is essential for the success of product recovery. Businesses must invest a lot of time and money in cannibalization, manufacturing, and remanufacturing product returns in order to ensure that the quality of recovered items is comparable to that of new products. Sadly, the process for product returns and refunds still significantly affects business results. RBV-based competency was found to be a moderator of RL commitment, innovative skills, and manufacturing success by (Sinkovics et al., 2018); the literature contains tiny information about the potential benefits of resource commitment for enhancing the link between the reversal of goods and company growth. By serving as a middleman, preserving a sustainable resource may positively impact the effectiveness during the reversal of the product and beneficial consequences. According to this study, if product recovery were implemented correctly, a company may profit from trash if items were discovered to be beyond repair or reuse. The company will become more dedicated to utilizing environmentally friendly efforts for commercial expansion. If the reuse of components for product recovery is not appropriately managed, there is a danger that a product will break easily, harming its market shares and reputation. Generally, a company hesitates to commit when adopting sustainable action would only have a little financial payoff. As a result of product recovery, businesses dedicated to using the RL technique for sustainable resources will have a moderating influence on their organizational performance.

H4: RL recovery positively and significantly affects organizational performance.

H6: RL-recovery mediates the relationship between sustainable commitment and organizational performance.

When customers return the product to the company, it substantially impacts customer sales and financial strategies. Most firms and companies use shipping costs and product return fees as the foundation for their forecasts of unknown values. A business or firm can increase its earnings and environmental efficiency through operational performance (Zaid et al., 2018). Effective product return systems are closely related to profitable circular economies. Since the company's knowledge would directly improve organizational performance and competitive advantage, Firms' knowledge is a direct factor for the firm's organizational performance and getting sustained competitive advantage; this idea is consistent with the NRBV concept (Baah et al., 2021). The NRBV hypothesis states that to reduce costs, businesses should reuse resources and extend the life cycle of their products. In order to manage

and remanufacture recycled materials into products with higher added value, RL-product return must be appropriately implemented. Companies must develop a process for returning products that enables system-integrated product repair and reuse. The recovered goods or materials will be returned, saving resources for supply chain processes. According to this article, the firm would benefit financially from an adequately handled RL-product return. Our argument is in line with those who claim that managing product returns may impact organizational performance and resource efficiency. So, managing product returns directly impacts how competitive the company is. It is also connected to NRBV, particularly when formulating plans for sustainable growth and product stewardship in supply chains with an eye toward the environment. According to the NRBV hypothesis, if supply chain networks pool their resources to control product returns through technical partnerships, it will be beneficial to the company in terms of long-lasting viable solutions. If the company's internal resources and outside stakeholders are combined, it would be easier to replicate its method. The connection of reverting the product to the company in the supply chain is justified by this argument. The company must be committed and ready to use sustainability with all stakeholders' resources to support the efficient return of products. The firm has been forced to devote and optimize its sustainable resources for recycling and remanufacturing due to the strict ELV regulations that apply to the global automobile sector. (Mao et al., 2016) argued that it is possible to deduce the company's supporting stance from the resource allocation by using mediating factors. RL identified the enormous challenge of supply commitment as a critical section, but variations in organizations' and sectors' willingness to deploy resources had varying consequences on performance (Mahindroo et al., 2018). The combination of RBV and circular economy ideas in the study model claim may increase the impact of eco-friendly innovation on the functionality of recycled goods. The deployment of RL resources needed more guidance (Daugherty et al., 2005). It noted that the supply chain's overall cost was indirectly and directly impacted by the contradicting findings and various levels of commitment to processing product returns that last.

The principles for resource sharing need to be sufficiently explained by the NRBV. We contend that adequate product returns and avoiding fraudulent returns need ongoing resource commitment. The commitment to resource efficiency may strengthen the link between organizational performance and the product return process. A corporation's decision to invest in reusing and remanufacturing returned goods may have a positive financial impact. The impact of company goods returns could increase the company's choice to increase the money to boost financial growth. According to this study, Perfect reversal of goods to company management can strengthen a company's commitment to wise resource management; It will increase the volume of economic expansion. A dedication to a great management system may encourage creativity, cost-cutting, and long-term company viability. In this regard, the article argues that implementing RL-product return and recovery systems may boost confidence in business policy towards sustainable environments. Figure 1 illustrates the research model, and the following hypothesis was developed:

H5: RL-return has a positive and significant effect on organizational performance.

H7: RL-return mediates the relationship between sustainable commitment and organizational performance.

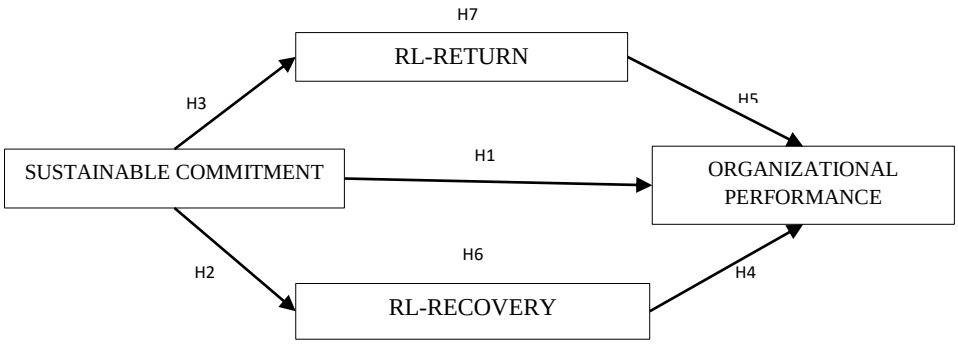

Figure 1: Research model
Source: Literature review

3. Methodology

A research methodology is a procedure for defining a plan and research methods that effectively carry out tests (Dzomonda, 2022; Hashmi et al., 2020b; Rashid & Amirah, 2017). There are primarily two research techniques to conduct the analysis; cross-sectional and survey research designs have been used. The study focuses on finding companies directly or indirectly involved in the RL supply chain for Pakistani locomotives (Khan et al., 2023). The knowledge you choose to constitute the research framework, the purpose, and the technique employed for the research are all contributions to the research design. It is a technique for gathering, analyzing, and reviewing data. It gives a good foundation for these findings, validates some judgements, and does not merely combine decisions with data collecting. The quantitative design is the first, and the qualitative design is the second since there are two research suggestions. As quantitative analysis projects employ correlation and causal techniques of quantitative research in this research, we apply the quantitative study design here (Khan et al., 2022b; Rashid et al., 2020). The analysis technique used for data analysis is Smart-PLS software, HTMT-Matrix, variance and hypothesis testing by PLS path model. It is an investigative tool used to determine a sample's result. Sampling is a crucial component of the research since it forms the foundation for the analysis. Sampling techniques fall into two categories: probability sampling and nonprobability sampling. (Afum et al., 2022; Rashid et al., 2021; Rashid & Rasheed, 2022)In this study, purposive sampling was employed to choose the sample since non-probability sampling means that only some members of the population had an equal chance of being chosen. The Sample size in this research was 200 participants. The 10 factories that makeup Pakistan's automotive industry are the study's target population. We have chosen the respondents for Supply Chain Managerial Reverse Logistics who held management roles within each organization and possessed the skills and expertise required to assist their particular businesses (Rashid et al., 2019; Romagnoli et al., 2023; Hashmi et al., 2021a). Additionally, they are picked due to their expertise in RL procedures, such as inventory recovery. The completed questionnaire has delivered to 10 manufacturing companies by industry specialists in the Pakistani car industry after a review of the questionnaire's validity in terms of its fundamental parts. In this study, the primary data was gathered by questionnaires. The questionnaire is constructed following the needs of the study to examine the influence of RL in supply chain management on the performance effectiveness within the Pakistan car industry. The 5-point Likert Scale Questionnaire utilized the following scale: 1-Strongly Agree, 2-Agree, 3- Neutral 4-Disagree, and 5-Strongly Disagree (Roopa & Rani, 2012; Hashmi & Mohd, 2020). Each manufacturing company received a questionnaire that can be completed by any staff member in charge of RL activities, such as an inventory manager, production manager, maintenance manager, or quality assurance manager. The questionnaires had distributed through social media and personal recommendations. Each manufacturing company must complete a questionnaire.

4. Analysis

4.1 Descriptive Statistics

Automobile sector companies were selected as responders, as indicated below. The descriptive statistics of the 213 respondents in our sample. The results showed that 79% of male employees and 20% of females, and the rest are others. Most of the respondents are from the managerial position, followed by some are retired, and some are youngsters as well. The education level of that company having employees. Most respondents (47.5%) have masters, and 45 % and 31% are doctorates or above.

4.2 Measurement Model

The use of the external loadings matrix in determining convergent and discriminant validity was investigated in a study by (Bagozzi et al., 1991; Hashmi et al., 2021b). Researchers should strive for external loadings of at least 0.5 to guarantee that their measurement model is valid and trustworthy, according to the study, which concluded that the external loadings matrix is a reliable method for evaluating the validity of a measurement model (Khan et al., 2021). The outer loadings matrix is a statistical tool used in data analysis to evaluate the relationships between observed variables and their

underlying constructs in a measurement model. The external loadings matrix provides information on the strength and direction of the relationship between each observed variable and its corresponding construct. A high outer loading indicates that the observed variable is a good indicator of the construct. In contrast, a low outer loading suggests that the observed variable may not be a reliable or valid measure of the construct. A construct may be a legitimate and trustworthy measure of the underlying concept if it has a high AVE value (for example, greater than 0.5), which denotes that the observed variables within the construct are related to one another and to the construct itself. A low AVE score, on the other hand, indicates that the construct might not be a true or accurate indicator of the underlying notion (Agha et al., 2021; Alrazehi et al., 2021). The study explored the relationship between Cronbach's alpha and other measures of reliability, such as test-retest and inter-rater reliability (Connelly, 2011; Das et al., 2021; Haque et al., 2021). The study found that Cronbach's alpha was a reliable and valid measure of internal consistency and that it can be used in conjunction with other measures of reliability to provide a complete picture of the reliability of a measurement instrument. Table 1 shows the validity results.

Table 1: Validity results

Constructs	Items		Loadings	CR	AVE	α
Organizational performance	FP1	Can applying RL reduce disposal costs?	0.979	0.962	0.893	0.960
	FP2	Through RL, sales income increases,	0.908			
	FP3	RL effectively manage cost minimization	0.947			
	FP4	Investment in inventory decrease	0.944			
Product Recovery	PREC1	Products that are simple to recycle?	0.986	0.992	0.909	0.975
	PREC2	Does your business have recycling policies?	0.914			
	PREC3	Protocols for handle	0.952			
	PREC4	Biodegradable content?	0.968			
	PREC5	Recycle materials from old items or parts?	0.946			
Product Return	PRET1	Returned old goods from consumers	0.924	0.985	0.862	0.968
	PRET2	Do you gather leftover packaging from consumers	0.923			
	PRET3	Vendors, to return packing materials?	0.845			
	PRET4	Does your business return goods to suppliers	0.984			
	PRET5	Return packaging to vendors for recycling or reusing?	0.935			
	PRET6	Client returns of items for fast refills?	0.952			
Resource Commitment	RC1	The right amount of technology resources	0.720	0.866	0.777	0.848
	RC2	Management resources to reverse logistics?	0.952			
	RC3	Financial support committed to reverse?	0.952			

Source: SmatPLS output

Researchers frequently utilize the HTMT matrix to evaluate the level of discriminant validity HTMT matrix is used to evaluate the discriminant validity value to overwhelm the problem. In order to get a satisfactory result, the ratio of HTMT must be smaller than 0.85. HTMT is used to determine the correlation between contract and their responding indicators. (Roemer et al., 2021). The matrix generally examines if there is a stronger correlation between two constructs than between their corresponding indicators. If there is a higher correlation between the constructs than between their corresponding indicators, there is a lack of discriminant validity. It may be challenging to comprehend the model's conclusions as a result. In a more recent study, the significance of the HTMT matrix in determining discriminant validity was again emphasized. According to the study, researchers should use the HTMT matrix in conjunction with other validity measures to ensure the accuracy and reliability

of their results, which discovered that the HTMT ratio is a valuable tool for identifying potential issues with discriminant validity in structural equation modelling. (Voorhees et al., 2016).

The table 2 shows the findings of a structural equation model (SEM) study to investigate various links between different construction hypotheses. The following are the explanations for the various columns: 1st column shows a list of hypotheses examined in the SEM analysis. The directional link between the predictor and the outcome variables is shown in the 2nd column. The standardized regression coefficients (beta weights) of the predictor variables on the result variables are shown in 3rd column. The intensity and direction of the association between the predictor and outcome variables are reflected in these coefficients. Understanding the Regression Coefficient in Linear Regression and How to Interpret It. 20(1), 32–44, Journal of Modern Applied Statistical Methods (Uyanık & Güler, 2013). The standardization procedure and the impact of the predictor and outcome variable units on beta coefficients are all covered in detail in this study's explanation of beta coefficients and how they should be interpreted in linear regression. (Fitzmaurice, 2016). Regression coefficient interpretation. This article explains the direction and strength of the association between the predictor and outcome variables, along with how to interpret beta coefficients in linear regression models. T-value: This column displays the t-values associated with each beta weight. (Mark & Goldberg, 1988). It is used to assess the statistical significance of each beta weight. A Word of Caution About General Guidelines for Variance Inflation Factors. 54(2), 399-407; Quality & Quantity. This paper issues a warning on using t-values in linear regression models, pointing out that if the variance inflation factor is likewise high, high t-values might be deceiving. Each t-value is displayed along with the p-values in this column, which signify the beta weights' statistical significance. The standard definition of statistical significance is a 0.05 p-value. f^2 Effect Size: The amount of variance in the outcome variable that the predictor variable can explain is represented by the effect size, defined by f^2. A value of f^2 of 0.02, 0.15, or 0.35 indicates a small, medium, or large effect size, respectively. R^2: This column displays the R-squared value, which shows the percentage of the outcome variable's variance that can be accounted for by all of the model's predictor variables (Jafari & Ansari-Pour, 2019). R^2: This column displays the R-squared value, which shows the percentage of the outcome variable's variance that can be accounted for by all of the model's predictor variables (Geissinger et al., 2022). It serves as a gauge of the model's general fit.

Table 2: A path analysis

Hypothesis	Path	β	T-value	p-value	Effect Size, f^2	R^2	Q^2
H1	RC → FP	0.045	1.199	0.002	0.004	0.013	0.004
H2	RC → PR	-0.112	1.465	0.144	0.021	0.014	0.001
H3	RC → PRT	-0.067	0.900	0.369	0.008	0.035	-0.007
H4	PR → FP	-0.033	0.899	0.373			
H5	PRT → FP	-0.070	2.126	0.134			
H6	RC → PR → FP	0.004	0.588	0.557			
H7	RC → PRT → FP	0.006	0.685	0.494			

Source: SmartPLS output

5.1 Discussion

In this research, the hypothesis generated for resource commitment positively impacting organizational performance is accepted as the result analysis was found to be positive. The reason is that reverse logistics practices are being implemented in the automobile sector of Pakistan. It needs to be properly implemented, but the companies implementing them have significantly impacted their financial issues. Waste management, recycling, reusing, reprocessing, material recovery, and design for RL are a few examples of RL practices. It can assist any organization in turning chances into profits (Sobotka & Czaja, 2015). Adoption of RL practices hence has a larger chance of improving RL performance and having a more substantial impact on enterprises' economic performance and financial improvement. With the study and effective implementation of varied reverse logistics and closed-loop management practices, organizations can be sure of improved sustainable and organizational performance (Agrawal et al., 2015). Therefore, financial and economic performance is more critical to manage sustainability when RL practices are adopted and their effects on the financial and

environmental performance of the organization.

The desire to offer the necessary resources and assistance to help a company accomplish its stated goals is a resource commitment (Pellegrini et al., 2018). In order to attain greater profitability performance, managers must devote more material, human, and financial resources to a process. The government of Pakistan has started to take initiatives against sustainability and reverse logistics policies and also initiated different projects to implement reverse logistics. Most companies have also incorporated reverse logistics, which must still be entirely operated and utilized. It still has some errors that should be resolved for better results. In order to create reverse logistics processes and enhance their associated performance, resource commitment should be a top priority. Additionally, it strives to develop techniques for long-term partnerships with stakeholders. The article concluded that no policies have been developed regarding the deployment of RL for end-of-life products (Mangla et al., 2016). In this research, the H2 hypothesis was rejected regarding resource commitment and product recovery. In Pakistan's automobile industry, resource commitment does not have a positive impact on product recovery because, in the Pakistan automobile industry, it was identified due to the economic-related issues and uncertainty in the economy. Companies must utilize and work on product recovery through better resource allocation in their manufacturing process. The assumption of businesses that the competitive advantage to be gained through RL is modest is the primary hurdle to its application (Armanios et al., 2017).

Mega-competition worldwide in today's industrial industry has resulted in significant changes to supply chains. Reverse logistics (RL) has gained prominence among supply chain management practitioners and researchers over the past few years. RL has received much attention in the academic literature on marketing and supply chain since it represents a company's ability to distribute its products through many channels. (MahmoumGonbadi et al., 2021). RL has significant financial ramifications for businesses and their suppliers throughout the supply chain. (Banihashemi et al., 2019). Due to several barriers, including high adoption costs, a lack of professionals with the necessary skills, a lack of corresponding laws, an inappropriate organizational culture, a lack of human resources, a lack of environmental awareness among stakeholders, and the absence of community pressure, reverse logistics adoption is still in its infancy in developing countries like Pakistan. Reverse logistics activities should be given priority by regulatory authorities and organizations since the production of 20 million tons of solid waste yearly, with a predicted annual increase rate of 2.4%, significantly contributes to Pakistan's environmental deterioration. (Szuster & Szymczak, 2016). Implementing reverse logistics can help companies fulfil their CSR commitments to environmental protection by encouraging them to learn more about improved product recovery technologies. (Zhao & Kim, 2021). Pakistani government officials and industrial companies should concentrate on reverse logistics procedures due to existing environmental policies, economic worries, social issues, and the need to recover numerous essential things.

The table shows that H4 and H6 are rejected because, in Pakistan's automobile sector, product recovery negatively affects the organizational performance of the company; product recovery, encompassing activities such as remanufacturing, refurbishing, and recycling of returned or end-of-life products, has a significant impact on the organizational performance of companies in the automobile sector. Reverse logistics is a field where difficulties with compliance and regulation are significant. The importance of following laws cannot be overstated, while our research we conclude that especially in industries like the automobile sector where products may have an impact on health or the environment. In order to maintain legal compliance, businesses using reverse logistics must navigate a complicated web of environmental standards, waste management rules, and disposal requirements (Oliveira-Dias et al., 2022). With specific requirements for hazardous materials, these regulations frequently specify how end-of-life products should be handled, recycled, or disposed of. The reverse logistics process must be carefully planned, documented, and tracked to satisfy these standards. Punishments from the law, harm to one's reputation, and environmental degradation can all arise from non-compliance. Therefore, organizations engaged in reverse logistics within the automotive industry must consider regulatory frameworks and adhere to them. The sale of recycled materials recovered from returned products can contribute to additional revenue streams (Shekarian, 2020).

The SEM data indicates that hypotheses H5 and H7 are not accepted because the Pakistani automobile industry needs to focus on product returns. However, we discovered during our survey that product returns have direct costs associated with them, such as repair or replacement costs, which can harm a company's profitability (Tzavlopoulos et al., 2019). The company's budget may be put under pressure, and its overall organizational performance may need to improve due to the requirement for additional resources to deal with the returned goods. Product returns may significantly impact how well-performing financially for businesses in the auto industry. Customers who have purchased automobiles or parts may return them for a variety of reasons, including flaws, discontent, or tastes that have changed. Both direct and indirect effects on organizational performance may result from these returns. Product returns may result in a decline in consumer loyalty and satisfaction, which could harm sales and market share (Nuseir & Madanat, 2015). Long-term indirect costs like diminished brand reputation and more intensive customer service can also have an adverse effect on financial success.

5.2 Recommendation

This research looked at how multiple constraining factors affected organizational performance in the automotive sector. These characteristics were gathered and organized into categories in Smart PLS software, and the effect on cost performance was investigated. The total results of our simultaneous analyses of numerous regressions show that organizational performance frequently improves when an organization shows a solid commitment to allocating resources towards its goals and objectives. Resource commitment is putting time, energy, and money into crucial areas like marketing, infrastructure development, recruitment of top people, and research and development. Due to the directors' resistance to change and green management practices, Pakistani manufacturing enterprises may need help implementing new managerial practices. The efficient continuation of reverse logistics operations depends on resource commitment. Hence reverse logistics must receive the appropriate consideration about resource commitment and organizational performance. The environmentally friendly RL invention increases consumer satisfaction and, as a result, a competitive advantage. Customers are more inclined to purchase more goods, increasing income and generating more revenue.

By implementing effective product recovery processes, companies can realize substantial cost savings. These processes reduce expenses associated with sourcing new materials and manufacturing from scratch. By reusing or refurbishing returned or end-of-life products, companies can minimize production costs, improving profitability and organizational performance. Moreover, product recovery offers opportunities for revenue generation. Remanufactured or refurbished products can be sold at a lower price point, attracting price-sensitive customers and expanding market reach. Additionally, the sale of recycled materials recovered from returned products can contribute to additional revenue streams. Furthermore, implementing robust product recovery processes enhances customer satisfaction and loyalty. By offering remanufactured or refurbished products, companies can meet customer demands for sustainable and cost-effective options, fostering more robust customer relationships. These satisfied and loyal customers are more likely to repurchase and recommend the company's products, further bolstering organizational performance. In conclusion, product recovery plays a crucial role in improving the organizational performance of companies in the automobile sector by reducing costs, generating revenue, and enhancing customer satisfaction and loyalty. Although reverse logistics provides a tremendous competitive advantage to the company by improving customer satisfaction, brand image, resource allocation, financing and others, it can only be done through the proper awareness of the organization's employees and all related people. In Pakistan, there is a lack of training and awareness about reverse logistics because of RL experts at the management level and a lack of personnel technical skills. Pakistan's economy is uncertain and facing some challenges, which also leads to the need for more awareness of RL. In most developing countries, including Pakistan, there is a lack of awareness of reverse logistics, a barrier to attaining a sustainable environment and circular economy.

5.3 Limitations of the Research

It is crucial to remember that this research was done precisely in the Pakistani metropolis of Karachi. Therefore, it may not be easy to generalize the results to other Pakistani cities like Lahore and

Islamabad. It is advised to incorporate a wider variety of big Pakistani cities in future research to improve its robustness and generalizability. A sample size of 200 individuals was also used in the current investigation, which may impact the statistical power and accuracy of the findings. A bigger sample size, such as 384 people, could be considered for future studies to produce more precise and trustworthy results. Additionally, information for this study was gathered from 10 automotive manufacturers. However, incorporating data from more businesses would provide future studies a broader perspective and boost the findings' external validity. A more thorough grasp of the subject can be attained by broadening the focus of future study to encompass a larger sample size and a more diversified variety of companies.

References

Abbas, H., & Farooquie, J. A. (2020). Reverse logistics practices in Indian pharmaceutical supply chains: a study of manufacturers. *International Journal of Logistics Systems and Management, 35*(1), 72-89. https://doi.org/10.1504/IJLSM.2020.103863

Afum, E., Agyabeng-Mensah, Y., Baah, C., Agyapong, G. K., Armas, J. A. L., & Al Farooque, O. (2022). Prioritizing zero-waste performance and green differentiation advantage through the Prism of circular principles adoption: A mediated approach. *Journal of Cleaner Production, 361*, 132182. https://doi.org/10.1016/j.jclepro.2022.132182

Agha, A. A., Rashid, A., Rasheed, R., Khan, S., & Khan, U. (2021). Antecedents of Customer Loyalty at Telecomm Sector. *Turkish Online Journal of Qualitative Inquiry, 12*(9), 1352-1374.

Agrawal, S., Singh, R. K., & Murtaza, Q. (2015). A literature review and perspectives in reverse logistics. *Resources, Conservation and Recycling, 97*, 76-92. https://doi.org/10.1016/j.resconrec.2015.02.009

Alrazehi, H. A. A. W., Amirah, N. A., Emam, A. S., & Hashmi, A. R. (2021). Proposed model for entrepreneurship, organizational culture and job satisfaction towards organizational performance in International Bank of Yemen. *International Journal of Management and Human Science, 5*(1), 1-9.

Armanios, D. E., Eesley, C. E., Li, J., & Eisenhardt, K. M. (2017). How entrepreneurs leverage institutional intermediaries in emerging economies to acquire public resources. *Strategic Management Journal, 38*(7), 1373-1390. https://doi.org/10.1002/smj.2575

Baah, C., Opoku-Agyeman, D., Acquah, I. S. K., Agyabeng-Mensah, Y., Afum, E., Faibil, D., & Abdoulaye, F. A. M. (2021). Examining the correlations between stakeholder pressures, green production practices, firm reputation, environmental and financial performance: evidence from manufacturing SMEs. *Sustainable Production and Consumption, 27*, 100-114. https://doi.org/10.1016/j.spc.2020.10.015

Bagozzi, R. P., Yi, Y., & Phillips, L. W. (1991). Assessing construct validity in organizational research. *Administrative science quarterly*, 421-458. https://doi.org/10.2307/2393203

Baloch, N. & Rashid, A. (2022). Supply Chain Networks, Complexity, and Optimization in Developing Economies: A Systematic Literature Review and Meta-Analysis. *South Asian Journal of Operations and Logistics, 1*(1), 1-13. https://doi.org/10.57044/SAJOL.2022.1.1.2202

Banihashemi, T. A., Fei, J., & Chen, P. S.-L. (2019). Exploring the relationship between reverse logistics and sustainability performance: A literature review. *Modern Supply Chain Research and Applications, 1*(1), 2-27. https://doi.org/10.1108/MSCRA-03-2019-0009

Chan, C. K., Man, N., Fang, F., & Campbell, J. (2020). Supply chain coordination with reverse logistics: A vendor/recycler-buyer synchronized cycles model. *Omega, 95*, 102090. https://doi.org/10.1016/j.omega.2019.07.006

Connelly, L. M. (2011). Cronbach's alpha. *Medsurg nursing, 20*(1), 45-47.

Das, S., Ghani, M., Rashid, A., Rasheed, R., Manthar, S., & Ahmed, S. (2021). How customer satisfaction and loyalty can be affected by employee's perceived emotional competence: The mediating role of rapport. *International Journal of Management, 12*(3), 1268-1277. DOI: 10.34218/IJM.12.3.2021.119

Daugherty, P. J., Richey, R. G., Genchev, S. E., & Chen, H. (2005). Reverse logistics: superior performance through focused resource commitments to information technology. *Transportation Research Part E: Logistics and Transportation Review, 41*(2), 77-92. https://doi.org/10.1016/j.tre.2004.04.002

Davcik, N. S., & Sharma, P. (2016). Marketing resources, performance, and competitive advantage: A review and future research directions. *Journal of Business Research, 69*(12), 5547-5552. https://doi.org/10.1016/j.jbusres.2016.04.169

de Campos, E. A. R., de Paula, I. C., Pagani, R. N., & Guarnieri, P. (2017). Reverse logistics for the end-of-life and end-of-use products in the pharmaceutical industry: a systematic literature review. *Supply Chain Management: An International Journal, 22*(4), 375-392. https://doi.org/10.1108/SCM-01-2017-0040

de Campos, E. A. R., de Paula, I. C., Ten Caten, C. S., Maçada, A. C. G., Marôco, J., & Ziegelmann, P. K. (2020). The effect of collaboration and IT competency on reverse logistics competency-Evidence from Brazilian supply chain executives. *Environmental Impact Assessment Review, 84*, 106433. https://doi.org/10.1016/j.eiar.2020.106433

Dev, N. K., Shankar, R., & Qaiser, F. H. (2020). Industry 4.0 and circular economy: Operational excellence for sustainable reverse supply chain performance. *Resources, Conservation and Recycling, 153*, 104583. https://doi.org/10.1016/j.resconrec.2019.104583

Dutta, P., Talaulikar, S., Xavier, V., & Kapoor, S. (2021). Fostering reverse logistics in India by prominent barrier identification and strategy implementation to promote circular economy. *Journal of Cleaner Production, 294*, 126241. https://doi.org/10.1016/j.jclepro.2021.126241

Dzomonda, O. (2022). Environmental sustainability commitment and access to finance by small and medium enterprises: The role of financial performance and corporate governance. *Sustainability, 14*(14), 8863. https://doi.org/10.3390/su14148863

Fitzmaurice, G. M. (2016). Regression. *Diagnostic Histopathology, 22*(7), 271-278. https://doi.org/10.1016/j.mpdhp.2016.06.004

Gao, X., & Cao, C. (2020). A novel multi-objective scenario-based optimization model for sustainable reverse logistics supply chain network redesign considering facility reconstruction. *Journal of Cleaner Production, 270*, 122405. https://doi.org/10.1016/j.jclepro.2020.122405

Geissdoerfer, M., Morioka, S. N., de Carvalho, M. M., & Evans, S. (2018). Business models and supply chains for the circular economy. *Journal of Cleaner Production, 190*, 712-721. https://doi.org/10.1016/j.jclepro.2018.04.159

Geissinger, E. A., Khoo, C. L., Richmond, I. C., Faulkner, S. J., & Schneider, D. C. (2022). A case for beta regression in the natural sciences. *Ecosphere, 13*(2), e3940. https://doi.org/10.1002/ecs2.3940

Govindan, K., & Soleimani, H. (2017). A review of reverse logistics and closed-loop supply chains: a Journal of Cleaner Production focus. *Journal of Cleaner Production, 142*, 371-384. https://doi.org/10.1016/j.jclepro.2016.03.126

Guarnieri, P., Cerqueira-Streit, J. A., & Batista, L. C. (2020). Reverse logistics and the sectoral agreement of the packaging industry in Brazil towards a transition to a circular economy. *Resources, Conservation and Recycling, 153*, 104541. https://doi.org/10.1016/j.resconrec.2019.104541

Haque, I., Rashid, A., & Ahmed, S. Z. (2021). The Role of Automobile Sector in Global Business: Case of Pakistan. *Pakistan Journal of International Affairs, 4*(2), 363-383. https://doi.org/10.52337/pjia.v4i2.195

Hart, S. L. (1995). A natural-resource-based view of the firm. *Academy of management review, 20*(4), 986-1014. https://doi.org/10.2307/258963

Hashmi, A. R., & Mohd, A. T. (2020). The effect of disruptive factors on inventory control as a mediator and organizational performance in the health department of Punjab, Pakistan. *International Journal of Sustainable Development & World Policy, 9*(2), 122-134. https://doi.org/10.18488/journal.26.2020.92.122.134

Hashmi, A. R., Amirah, N. A., & Yusof, Y. (2020a). The mediating effect of integrated systems on the relationship between supply chain management practices and public healthcare performance: Structural Equation Modeling. *International Journal of Management and Sustainability, 9*(3), 148-160. https://doi.org/10.18488/journal.11.2020.93.148.160

Hashmi, A. R., Amirah, N. A., & Yusof, Y. (2021a). Organizational performance with disruptive factors and inventory control as a mediator in public healthcare of Punjab, Pakistan. *Management Science Letters, 11*(1), 77-86. https://doi.org/10.5267/j.msl.2020.8.028

Hashmi, A. R., Amirah, N. A., Yusof, Y., & Zaliha, T. N. (2020b). Exploring the dimensions using exploratory factor analysis of disruptive factors and inventory control. *The Economics and Finance Letters*, *7*(2), 247-254. https://doi.org/10.18488/journal.29.2020.72.247.254

Hashmi, A. R., Amirah, N. A., Yusof, Y., & Zaliha, T. N. (2021b). Mediation of inventory control practices in proficiency and organizational performance: State-funded hospital perspective. *Uncertain Supply Chain Management*, *9*(1), 89-98. https://doi.org/10.5267/j.uscm.2020.11.006

Jafari, M., & Ansari-Pour, N. (2019). Why, when and how to adjust your P values? *Cell Journal (Yakhteh)*, *20*(4), 604.

Khan, S. K., Ahmed, S., & Rashid, A. (2021). Influence of social media on purchase intention and customer loyalty of Generation Y with the mediating effect of conviction: A case of Pakistan. *Pakistan Journal of International Affairs*, *4*(2), 526-548. https://doi.org/10.52337/pjia.v4i2.207

Khan, S. K., Rashid. A., Benhamed, A., Rasheed, R., & Huma, Z. (2023). Effect of leadership styles on employee performance by considering psychological capital as mediator: evidence from airlines industry in emerging economy. *World Journal of Entrepreneurship, Management and Sustainable Development, 18*(6), 799-818. DOI: 10.47556/J.WJEMSD.18.6.2022.7. Available at: https://wasdlibrary.org/download/wjemsd-v18-n6-2022-leadership-styles-airlines-industry/

Khan, S., Rasheed., R., Rashid, A., Abbas, Q., & Mahboob, F. (2022b). The Effect of Demographic Characteristics on Job Performance: An Empirical Study from Pakistan. *Journal of Asian Finance, Economics and Business*, *9*(2), 283-294.

Khan, S., Rashid, A., Rasheed, R., & Amirah, N. A. (2022a). Designing a knowledge-based system (KBS) to study consumer purchase intention: the impact of digital influencers in Pakistan. *Kybernetes*, *52*(5), 1720-1744. https://doi.org/10.1108/K-06-2021-0497

Li, Y. (2014). Environmental innovation practices and performance: the moderating effect of resource commitment. *Journal of Cleaner Production*, *66*, 450-458. https://doi.org/10.1016/j.jclepro.2013.11.044

Liu, S., Eweje, G., He, Q., & Lin, Z. (2020). Turning motivation into action: A strategic orientation model for green supply chain management. *Business Strategy and the Environment*, *29*(7), 2908-2918. https://doi.org/10.1002/bse.2580

Lopez-Becerra, E. I., & Alcon, F. (2021). Social desirability bias in the environmental economic valuation: An inferred valuation approach. *Ecological Economics*, *184*, 106988. https://doi.org/10.1016/j.ecolecon.2021.106988

Mahindroo, A., Samalia, H. V., & Verma, P. (2018). Moderated influence of return frequency and resource commitment on information systems and reverse logistics strategic performance. *International Journal of Productivity and Performance Management*, *67*(3), 550-570. https://doi.org/10.1108/IJPPM-05-2016-0101

MahmoumGonbadi, A., Genovese, A., & Sgalambro, A. (2021). Closed-loop supply chain design for the transition towards a circular economy: A systematic literature review of methods, applications and current gaps. *Journal of Cleaner Production*, *323*, 129101. https://doi.org/10.1016/j.jclepro.2021.129101

Maiti, M., Krakovich, V., Shams, S. R., & Vukovic, D. B. (2020). Resource-based model for small innovative enterprises. *Management Decision*, *58*(8), 1525-1541. https://doi.org/10.1108/MD-06-2019-0725

Mangla, S. K., Govindan, K., & Luthra, S. (2016). Critical success factors for reverse logistics in Indian industries: a structural model. *Journal of Cleaner Production*, *129*, 608-621. https://doi.org/10.1016/j.jclepro.2016.03.124

Mao, H., Liu, S., Zhang, J., & Deng, Z. (2016). Information technology resource, knowledge management capability, and competitive advantage: The moderating role of resource commitment. *International Journal of Information Management*, *36*(6), 1062-1074. https://doi.org/10.1016/j.ijinfomgt.2016.07.001

Mark, J., & Goldberg, M. A. (1988). Multiple regression analysis and mass assessment: A review of the issues. *Appraisal Journal*, *56*(1).

McDougall, N., Wagner, B., & MacBryde, J. (2019). An empirical explanation of the natural-resource-based view of the firm. *Production Planning & Control*, *30*(16), 1366-1382. https://doi.org/10.1080/09537287.2019.1620361

Michalisin, M., & Stinchfield, B. (2010). Climate change strategies and firm performance: an empirical investigation of the natural resource-based view of the firm. *Journal of Business Strategies*, *27*(2), 123-149. https://doi.org/10.54155/jbs.27.2.123-149

Ngu, H. J., Lee, M. D., & Osman, M. S. B. (2020). Review on current challenges and future opportunities in Malaysia sustainable manufacturing: Remanufacturing industries. *Journal of Cleaner Production*, *273*, 123071. https://doi.org/10.1016/j.jclepro.2020.123071

Nuseir, M. T., & Madanat, H. (2015). 4Ps: A strategy to secure customers' loyalty via customer satisfaction. *International journal of marketing studies*, *7*(4), 78. https://doi.org/10.5539/ijms.v7n4p78

Oliveira-Dias, D., Maqueira-Marín, J. M., & Moyano-Fuentes, J. (2022). The link between information and digital technologies of industry 4.0 and agile supply chain: Mapping current research and establishing new research avenues. *Computers & Industrial Engineering*, *167*, 108000. https://doi.org/10.1016/j.cie.2022.108000

Pellegrini, C., Rizzi, F., & Frey, M. (2018). The role of sustainable human resource practices in influencing employee behaviour for corporate sustainability. *Business Strategy and the Environment*, *27*(8), 1221-1232. https://doi.org/10.1002/bse.2064

Pieroni, M. P., McAloone, T. C., & Pigosso, D. C. (2021). Circular economy business model innovation: Sectorial patterns within manufacturing companies. *Journal of Cleaner Production*, *286*, 124921. https://doi.org/10.1016/j.jclepro.2020.124921

Pirttilä, M., Virolainen, V. M., Lind, L., & Kärri, T. (2020). Working capital management in the Russian automotive industry supply chain. *International Journal of Production Economics*, *221*, 107474. https://doi.org/10.1016/j.ijpe.2019.08.009

Rasheed, R., & Rashid, R. (2023). Role of Service Quality Factors in Word of Mouth through Student Satisfaction. *Kybernetes. Vol. ahead-of-print No. ahead-of-print.* http://dx.doi.org/10.1108/k-01-2023-0119

Rasheed, R., Rashid., A., Amirah, N. A., & Afthanorhan, A. (2023). Quantifying the Moderating Effect of Servant Leadership between Occupational Stress and Employee In Role and Extra-Role Performance. *Quality - Access to Success, 24(195), 60-68. https://doi.org/10.47750/QAS/24.195.08*

Rashid, A. & Rasheed, R. (2022). A Paradigm for Measuring Sustainable Performance Through Big Data Analytics–Artificial Intelligence in Manufacturing Firms. *Available at SSRN 4087758*. https://doi.org/10.2139/ssrn.4087758

Rashid, A. & Rasheed, R. (2023). Mediation of inventory management in the relationship between knowledge and firm performance, *SAGE Open*, *13*(2), 1-11. https://doi.org/10.1177/21582440231164593

Rashid, A. (2016). Impact of inventory management in downstream chains on customer satisfaction at manufacturing firms. *International Journal of Management, IT and Engineering*, *6*(6), 1-19.

Rashid, A. Rasheed, R., & Amirah, N. A. (2023a). Information Technology and People Involvement in Organizational Performance through Supply Chain Collaboration. *Journal of Science and Technology Policy Management. In press.* DOI: 10.1108/JSTPM-12-2022-0217

Rashid, A. Rasheed, R., & Ngah, A. H. (2023b). Achieving Sustainability through Multifaceted Green Functions in Manufacturing. *Journal of Global Operations and Strategic Sourcing, In press.*

Rashid, A., & Amirah, N. A. (2017). Relationship between poor documentation and efficient inventory control at Provincial Ministry of Health, Lahore. *American Journal of Innovative Research and Applied Sciences*, *5*(6), 420-423.

Rashid, A., Ali, S. B., Rasheed, R., Amirah, N. A. & Ngah, A. H. (2022a). A paradigm of blockchain and supply chain performance: a mediated model using structural equation modelling. *Kybernetes, Vol. ahead-of-print No. ahead-of-print*. https://doi.org/10.1108/K-04-2022-0543

Rashid, A., Amirah, N. A., & Yusof, Y. (2019). The statistical approach in exploring factors of the documentation process and hospital performance: a preliminary study. *American Journal of Innovative Research and Applied Sciences*, *9*(4), 306-310.

Rashid, A., Amirah, N. A., Yusof, Y., & Mohd, A. T. (2020). Analysis of demographic factors on perceptions of inventory managers towards healthcare performance. *The Economics and Finance Letters*, *7*(2), 289-294. https://doi.org/10.18488/journal.29.2020.72.289.294

Rashid, A., Rasheed, R., & Amirah, N. A., & Afthanorhan, A. (2022b). Disruptive Factors and Customer Satisfaction at Chain Stores in Karachi, Pakistan. *Journal of Distribution Science, 20*(10), 93-103. https://doi.org/10.15722/jds.20.10.202210.93

Rashid, A., Rasheed, R., Amirah, N. A., Yusof, Y., Khan, S., & Agha, A., A. (2021). A Quantitative Perspective of Systematic Research: Easy and Step-by-Step Initial Guidelines. *Turkish Online Journal of Qualitative Inquiry, 12*(9), 2874-2883.

Romagnoli, S., Tarabu, C., Maleki Vishkaei, B., & De Giovanni, P. (2023). The Impact of Digital Technologies and Sustainable Practices on Circular Supply Chain Management. *Logistics, 7*(1), 1. https://doi.org/10.3390/logistics7010001

Roopa, S., & Rani, M. (2012). Questionnaire designing for a survey. *Journal of Indian Orthodontic Society, 46*(4_suppl1), 273-277. https://doi.org/10.1177/0974909820120509S

Shekarian, E. (2020). A review of factors affecting closed-loop supply chain models. *Journal of Cleaner Production, 253*, 119823. https://doi.org/10.1016/j.jclepro.2019.119823

Sinkovics, N., Hoque, S. F., & Sinkovics, R. R. (2018). Supplier strategies and routines for capability development: Implications for upgrading. *Journal of International Management, 24*(4), 348-368. https://doi.org/10.1016/j.intman.2018.04.005

Sobotka, A., & Czaja, J. (2015). Analysis of the factors stimulating and conditioning application of reverse logistics in construction. *Procedia Engineering, 122*, 11-18. https://doi.org/10.1016/j.proeng.2015.10.002

Szuster, M., & Szymczak, M. (2016). Innovation, knowledge and information management in supply chains. *Engineering Management in Production and Services, 8*(1), 26-36. https://doi.org/10.1515/emj-2016-0003

Tosarkani, B. M., Amin, S. H., & Zolfagharinia, H. (2020). A scenario-based robust possibilistic model for a multi-objective electronic reverse logistics network. *International Journal of Production Economics, 224*, 107557. https://doi.org/10.1016/j.ijpe.2019.107557

Tzavlopoulos, I., Gotzamani, K., Andronikidis, A., & Vassiliadis, C. (2019). Determining the impact of e-commerce quality on customers' perceived risk, satisfaction, value and loyalty. *International Journal of Quality and Service Sciences, 11*(4), 576-587. https://doi.org/10.1108/IJQSS-03-2019-0047

Uyanık, G. K., & Güler, N. (2013). A study on multiple linear regression analysis. *Procedia-Social and Behavioral Sciences, 106*, 234-240. https://doi.org/10.1016/j.sbspro.2013.12.027

Voorhees, C. M., Brady, M. K., Calantone, R., & Ramirez, E. (2016). Discriminant validity testing in marketing: an analysis, causes for concern, and proposed remedies. *Journal of the Academy of Marketing Science, 44*, 119-134. https://doi.org/10.1007/s11747-015-0455-4

Zaid, A. A., Jaaron, A. A., & Bon, A. T. (2018). The impact of green human resource management and green supply chain management practices on sustainable performance: An empirical study. *Journal of Cleaner Production, 204*, 965-979. https://doi.org/10.1016/j.jclepro.2018.09.062

Zhao, L., & Kim, K. (2021). Responding to the COVID-19 pandemic: practices and strategies of the global clothing and textile value chain. *Clothing and Textiles Research Journal, 39*(2), 157-172. https://doi.org/10.1177/0887302X21994207