Effect of Re-Manufacturing On Supply Chain Performance Of Motor Vehicle Assemblers in Kenya

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ABSTRACT

Kenya motor vehicle assemblers face several challenges following liberalization of the economy in the last decade of the 20th century. Domestic industries have been suddenly exposed to competition from imported products. On one hand there are prospects for faster development of manufacturing capabilities, but on the other, imports provide consumers with affordable alternatives. Despite adoption of remanufacturing to gain a competitive edge, the performance of the motor vehicle assembly in Kenya is still on a downward trend. The aim of the study was the effect of re-manufacturing and to establish the effect of organizational policies on the relationship between remanufacturing and supply chain performance of the motor vehicle assemblers in Kenya. The study was anchored on Institutional theory. The study used descriptive survey research design. The target population was 32 respondents from 8 firms in the motor vehicle assembly in Kenya comprising of staff from; logistics departments, sales departments, stores departments and factory departments. Census sample was adopted. Primary data was collected using structured questionnaires and secondary data through downloaded published audited financial statements. Pilot test was done on Associated Vehicle Assemblers. The study used Cronbach's alpha to measure degree of reliability. The validity was tested through expert analysis and factor analysis. Both descriptive and inferential statistics were used to analyze the data. Descriptive statistics included mean, standard deviation and variance. Inferential statistics consisted of multiple linear regression analysis and Correlation analysis. Findings were presented in tables, graphs and charts. Regression analysis indicated that remanufacturing had a significant effect on supply chain performance with a coefficient of 2.105 without moderating effect of organizational policies and 2.851 with moderating effect organizational policies. The study depicted remanufacturing explains 32.7% and 34.9% variation in supply chain performance without and with moderating effect of organizational performance respectively. The empirical results of this study would assist policy makers including the Kenya association of manufacturers to identify challenges that still affect the motor vehicle assemblers particularly in the area of reverse logistics. Therefore, the study concluded that remanufacturing had a positive and significant effect on supply chain performance. The study recommended that motor vehicle assemblers should provide a mechanism on how to evaluate degree of damage on the products for refund.

I. BACKGROUND OF THE STUDY

The current dynamic business landscape has engendered a state of competitiveness among enterprises and their associated supply chains. Consequently, organizations are displaying a growing interest in improving the efficiency and effectiveness of their supply chain operations. The supply chain is commonly defined as a network of interconnected businesses that collaborate to facilitate the smooth movement of goods to the market. In this context, supply chain performance refers to the evaluation of a company's supply chain efficiency and effectiveness using established metrics. Therefore, it is crucial for organizations to consistently monitor, regulate, and assess their everyday activities in order to achieve the appropriate level of performance from their supply chains. The measurement of supply chain performance presents a considerable challenge due to the absence of a singular indicator that adequately captures the overall performance of a company's supply chain. Therefore, the evaluation of supply chain performance is most effectively conducted through a comprehensive framework that encompasses various dimensions, including costs, customer response, flexibility, profits, competitiveness, lead time, and agility (Kader & Nadeem, 2021)

The motor vehicle assembly supply chain is well recognized as being highly intricate and intricate in nature, making it one of the most complicated supply chains globally. The success of this sector is strongly dependent on the collaboration between several external entities, which collectively contribute to the timely provision of numerous components essential for the completion of manufacturing operations, hence ensuring the production of superior-quality goods. Automotive supply chain enterprises are consistently integrating novel technological advancements, thereby enabling them to gain access to extensive inventories. Additionally, with the aid of a comprehensive global logistics network, these entities are capable of transporting items to any location around the globe. Visibility poses a significant challenge for automotive supply chains, akin to several other industries. In general, an automobile consists of more than 30,000 distinct components that are meticulously designed to enable the seamless integration of supply chains, so guaranteeing a consistent

manufacturing process. Failure to include any aspect of the manufacturing process can have negative consequences for the procurement process, including inventory shortages and substantial delays. The comprehensive examination of communication, optimization of procedures, and utilization of predictive analytics will effectively address the issue of insufficient understanding among all stakeholders in the supply chain (Omoush, 2022).

Effective inventory management is of utmost importance in the motor vehicle assembly process, since excessive stock of raw materials that are not efficiently utilized might result in missed opportunities for profitability. In order to address the challenge of excessive inventory levels, automotive firms may opt to use third-party logistics providers who employ software systems to monitor quantifiable data and provide insights into product demand. The implementation of just-in-time production methodology aids organizations in effectively managing inventory levels and making informed decisions regarding daily stock requirements. The motor vehicle assembly business has increasingly prioritized an environmental agenda. It is imperative that both manufacturers and third-party partners adhere to the expectation and obligation of constructing automobiles in an ecologically conscientious manner. Regrettably, due to the phenomenon of globalization facilitating the transportation of goods over international borders, the perspectives on sustainability adopted by different regions diverge, hence giving rise to challenges within supply chain management (Kader & Nadeem, 2021).

The assembly of motor vehicles is a crucial component of the worldwide economy and plays a significant role in driving macroeconomic growth, ensuring stability, and fostering technical progress in both developed and emerging nations. This sector also has far-reaching effects on several related industries. The automobile sector serves as a foundation for several business segments, encompassing both upstream and downstream activities, as well as related businesses. This phenomenon results in a multiplier effect on both growth and economic development. In 2022, the industry's global direct employment was anticipated to be approximately fourteen million workers (Halonen & Liukkunen, 2021).

The assembly of motor vehicles generally contributes to the generation of government income, the promotion of economic development, the facilitation of human capital development, and the advancement of research and development (R&D) and innovation. Hence, the establishment of a robust automobile industry has the potential to generate positive externalities in the domains of agricultural and construction equipment manufacture, alongside other specialized equipment manufacturing sectors. The global automobile consumer market is seeing increasing maturity and a corresponding rise in market rivalry. The implementation of a recall for defective automobiles has the potential to enhance customer happiness, consequently contributing to the improvement of the product's recyclability and the reduction of environmental pollution. This sector faces intense competition from imported second hand vehicles this therefore, calls for creativity so as to be able to survive the stiff competition (Houshmand, Akbaripour, & Moghaddam, 2021)

Reverse logistics (RL) refers to the comprehensive range of operational activities that are involved in the repurposing and recycling of products and materials. Supply chain management refers to the deliberate coordination and supervision of the organized planning, implementation, and tracking of the efficient and cost-effective flow of raw materials, intermediate inventory, finished products, and related information from the point of consumption to the point of origin. The primary goal is to guarantee proper disposal. Reverse logistics refers to the systematic procedure of relocating products from their customary end point with the intention of extracting value or ensuring appropriate disposal. Reverse logistics (RL) has emerged as a significant concern and has garnered the attention of various organizations. This heightened focus can be attributed to the escalating influx of returned products. The driving factors behind the surge in reverse logistics include the depletion of natural resources, the implementation of environmentally friendly legislation, the recognition of value in reverse flow, the promotion of a positive e-business image, the cultivation of customer relationships, and the utilization of information systems (Aryee & Adake, 2023).

It is widely considered that the implementation of an efficient reverse supply chain can yield several immediate advantages, such as enhanced customer satisfaction, reduced resource investment requirements, and decreased expenses associated with storage and distribution. The retrieval of goods for the purposes of remanufacturing, repair, reconfiguration, and recycling has the potential to generate lucrative economic prospects. Enterprises that capitalize on economies of scale are likely to thrive, provided they possess the capacity to promptly and effectively manage product returns for appropriate interventions. Reverse logistics encompasses various aspects that contribute to competitive strategy, profit generation, customer happiness, and environmental and health protection (WambayaNamusonge&Sakwa, 2018).

A firm can gain a significant competitive edge and potentially increase its market share within the industry by implementing an efficient and standardized reverse logistics process. This advantage arises from the firm's ability to meet client requests effectively and surpass its peers and competitors in terms of process quality. In contemporary consumer culture, there exists a prevailing expectation among customers for a seamless and expeditious process of returning defective products, accompanied by prompt reimbursements or the timely fulfillment of right orders, all while minimizing costs. A company that successfully fulfills these escalating

client demands would likely secure customer loyalty and retention, potentially leading to an expansion of their overall market share. Reverse logistics refers to the systematic procedure of recovering the value of returned items and promptly reintegrating them into the market (Tian, Liu, Zhang, & Yang, 2019).

Reverse logistics has emerged as a prominent concern, particularly in the past decade, due to the convergence of various circumstances. One the one hand, there exists a legitimate concern over environmental issues and the pursuit of sustainable growth. In this context, numerous legislative measures have been enacted in various nations, with Germany and the Netherlands emerging as potential pioneers. Germany has implemented legislation pertaining to the return of packaging and electronic gadgets, while the Netherlands has established stringent laws concerning automobiles. The impact has rapidly disseminated across several regions, including Europe, the United States, and Japan, among other countries. Conversely, the significance of reverse logistics challenges has been amplified by economic factors (Letunovska, Pimonenko&Kwilinski, 2023).

Firms are becoming more inclined to prioritize efficiency in their operations due to the narrowing profit margins resulting from market competition. This interest in efficiency stems from the potential for savings in both material purchasing prices and labor and overhead expenditures. In recent times, reverse logistics has garnered heightened awareness and scholarly interest in both corporate and academic spheres. The breadth of this field has undergone significant expansion, now encompassing a diverse array of disciplines such as recycling, remanufacturing, information technology, warehousing, operations, and environmental sustainability, among various others (Narayana, Agdas& Rose,2020).

Through the utilization of returned products, organizations have the potential to regain constituent materials that are no longer required to be procured in equivalent amounts, or to acquire additional value. Logistics managers have become aware of the potential for enhancing efficiency and reducing costs through the reverse channel. Consequently, they have begun to prioritize this aspect and are utilizing reverse logistics as a means to differentiate themselves in the market and generate profits. The use of such differentiation strategies has the potential to enable companies to sustain or acquire a larger portion of the market, enhance their revenue, and potentially decrease transportation and inventory expenses by optimizing their supply chain operations (Houshmand, Akbaripour, & Moghaddam, 2021)

At the national level, the government has implemented a range of regulatory measures aimed at promoting sustainability in corporate activities and fostering environmentally-friendly business operations. In contemporary societies across the globe, it is commonplace to find legislative measures, commonly referred to as Acts of Parliament, dedicated to the regulation and oversight of environmental management. Furthermore, the existence of dedicated governmental or non-governmental entities specifically tasked with addressing environmental concerns is a prevailing characteristic in nearly all nations. At various levels within businesses, there is a tendency to adopt worldwide and national standards and policies in order to ensure sustainability and environmental conservation. Additionally, many organizations have also formulated their own internal standards and plans to address these concerns. Moreover, in the contemporary period, the performance of supply chains has emerged as a potent instrument inside the industrial sectors, facilitating the production of creative items. The ability to manage reverse logistics is a crucial competency for any enterprise that conducts operations inside the contemporary global market (Mwanyota,2021)

In the year 2022, the Kenya Motor vehicle sector documented a cumulative figure of 12,981 units of newly sold automobiles. Concurrently, the overall count of newly registered motor vehicles in that same year amounted to 109,751. The proportion of new car sales in relation to new registrations was found to be about 12%, while the remaining 88% comprised imported old vehicles. Additional examination reveals that a mere 53% of newly purchased vehicles were domestically built, while the remaining 47% were imported. Consequently, the registration of both new and used vehicles accounted for more than 90% of total new vehicle registrations. The practice of importing secondhand automobiles restricts the potential for new car production. Based on regional analysis, it has been determined that the East African Community region experiences an annual foreign exchange loss over US$ 2.01 billion due to the importation of motor vehicles (Kenya Association of Manufacturers, 2022).

II.   STATEMENT OF THE PROBLEM

The need to improve organizational efficiency, reduce waste, and overcome supply chain inefficiencies and to gain a competitive advantage has made companies in the motor vehicle assembly in Kenya to start considering remanufacturing from a competitive view point. Motor vehicle assembly is an enabler of the achievement, hence has the potential to create more jobs and lead to economic growth if supply chain inefficiencies are minimized. (Rahoma, Makhamch, Eneizan, & Alhamzah, 2018) Despite adoption or remanufacturing to gain a competitive edge, the Motor vehicles assembly in Kenya still face several challenges relating to production, efficiency, volume of sales, market share and other logistics challenges including increased packaging, transport, repairs and warehouse costs (Kenya Association of Manufacturers, 2022). In 2022, the Kenya Motor vehicle industry reported new vehicle sales of only 12% with the remainder 88% being

imports of used vehicles. Further, only 53% of new vehicles sold were assembled domestically while 47% were imported. Exports from the automotive industry decreased by 51% in 2021 (Kenya Association of Manufacturers, 2022). This shows a decline in assembling of new vehicles in Kenya. The studies done on remanufacturing have focused on other sectors such as building and construction and the retail industry and not the automotive industry. They have also ignored the moderating effect of organizational policies on the relationship between remanufacturing and supply chain performance. Therefore, the need to establish the effect of remanufacturing on supply chain performance of motor vehicle assemblers in Kenya.

Objectives of the Study

To assess the effect of re-manufacturing on supply chain performance of motor vehicle assemblers in Kenya.

Research Hypothesis

HO$_1$: Remanufacturing of has no significant effect on Supply Chain Performance of motor vehicle assemblers in Kenya.

Theoretical Review
Institutional Theory

The theory was proposed by DiMaggio and Powell in 1983. The utilization of institutional theory is a prevalent theoretical framework employed to elucidate the processes by which organizations formulate, structure, and execute strategies. The institutional theory postulates that organizations function within a defined set of guiding parameters. The guiding boundary refers to the frameworks that encompass the policies, procedures, and routine activities that govern behavior inside an organization. The institutional theory posits that the decision-making processes inside organizations regarding the implementation of remanufacturing and inventory management practices are influenced by three key concepts: normative, mimetic, and coercive forces (Bag & Gupta, 2020).

The normative idea is associated with the principles and standards of professionalism. The mimetic idea refers to the replication of practices in order to adapt to the dynamics of the corporate environment, whereas the coercive concept pertains to the political and institutional influence exerted on business practices. Organizations are compelled by normative authority to adhere to established standards and codes of conduct, particularly in the context of remanufacturing and inventory management. Recent studies have suggested that customers' impression undergoes a transformation when
Customers have challenges related to the timeliness of product delivery, pricing, and product availability. The level of consumer awareness regarding sustainable environmental programs has witnessed a notable increase, leading to a growing preference for green products. Organizations also engage in the implementation of remanufacturing strategies due to the fact that customers place a high level of importance on items that are ecologically sustainable (Maguire & Hardy, 2009).

In recent times, there has been a noticeable increase in client interest towards product specifications. Customers exhibit a diminished level of tolerance for products that fail to meet their specific requirements. Customers frequently engage in the act of returning things that do not align with their initial expectations or the terms of their purchase agreement. Organizations employ remanufacturing as a means to effectively address client product returns while simultaneously upholding a positive customer connection. The utilization of data obtained from the reverse flow has the potential to enhance various aspects of the product, including design, production, packaging, and price, thereby fostering improvements in quality and flexibility. The utilization of coercive power exerts influence on stakeholders, compelling them to compel their respective firms to adopt effective inventory management strategies and implement remanufacturing practices (Jain, & Tan, 2022).

Coercive pressure arises from the imposition of sanctions upon individuals who fail to comply. This pressure will compel organizations to prioritize the maintenance of high quality standards. Organizations are motivated to employ reverse logistics strategies due to the influence of mimetic power, which stems from observing the success achieved by their competitors. This phenomenon has led enterprises to emulate the inventory management and reverse logistics practices of their parent corporations or competitors. Customers frequently form either a favorable or unfavorable view regarding the manner in which a firm manages product returns and addresses environmental concerns (Houshmand, Akbaripour, & Moghaddam, 2021)

This theory played a crucial role in the study by providing insights into how the automotive industry can effectively strategize, plan, and execute policies, structures, and routine practices that govern organizational behavior, specifically in the context of remanufacturing, with the aim of attaining a competitive edge.

Conceptual Framework

This section shows the constructs of remanufacturing and supply chain performance as shown in Figure 1.1.
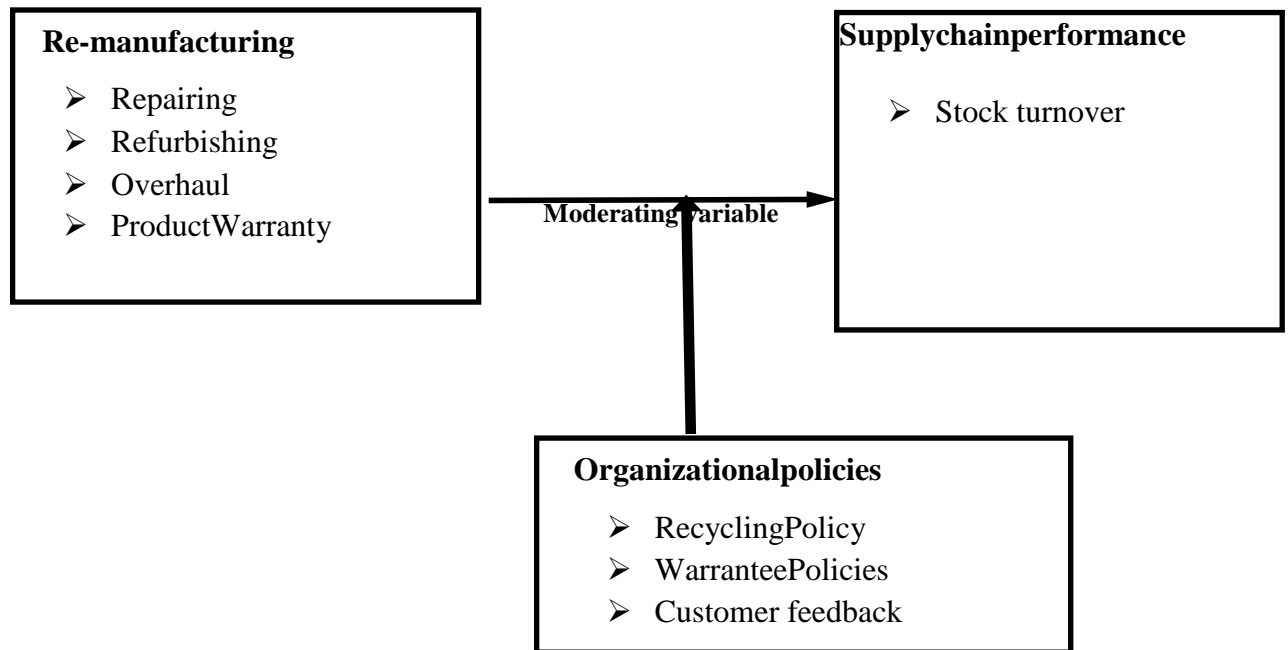
Independent Variable Dependent variable

Figure 1.1: Conceptual framework

Empirical Literature Review

Jemutai (2014) conducted a study that investigated the relationship between Green Supply Chain Management Practices and the performance of firms operating in the automobile industry. The study utilized a research design to collect data, and later performed descriptive statistics to analyze the gathered data. The study focused on enterprises functioning within the automobile industry in Nairobi, Kenya. The conducted research has provided evidence that Remanufacturing has a significant influence on the overall performance of firms operating in the automobile sector. The importance of Green Supply Chain Management Practices has been recognized by enterprises. The study also provided evidence for the importance of using Green Supply Chain Management Practices in order to improve organizational performance.

The study conducted by Okumu and Juma (2019) aimed to investigate the influence of reverse logistics techniques on customer perception in the specific setting of motor vehicle dealers in Kisumu County, Kenya. The current investigation utilized a descriptive research design. The target population of this study comprised of fifty individuals who were employed in various areas, including finance, procurement, sales, and warehousing, across seven motor vehicle dealerships located in Kisumu County. The primary emphasis of these dealerships was predominantly on the sale of new vehicles and automotive components. The research utilized a standardized questionnaire as a method of collecting primary data for the purpose of deriving conclusions. The data was subsequently evaluated by employing tables and percentages. The researchers utilized the purposive sampling technique. The data was subjected to analysis using the Statistical Package for the Social Sciences (SPSS). Furthermore, the study utilized inferential statistical methods, including correlation and regression analyses. The findings of the study indicated that the practice of product returns and subsequent remanufacturing had a significant and positive influence on customer perception within the motor vehicle dealership industry in Kisumu County.

Mwenda (2019) did a study to evaluate the many factors that impact sustainable supply chain management in a processing facility situated in Kenya. The chosen research methodology will involve the utilization of a descriptive survey design. The sample population consisted of 120 employees who were selected from the Iriani tea factory located in Nyeri South Sub County. The research employed a census sampling technique to gather data from the entire population of employees under investigation. The analysis of the primary data was conducted using the SPSS software to derive frequencies, means, and percentages. The researchers adopted the approach of content analysis to analyze qualitative data, while descriptive and inferential statistics were employed to evaluate quantitative data. The study's results indicated that the adoption of reverse re-manufacturing supply chain practices had a notable and favorable influence on the management of sustainable supply chains within the Iriani tea processing enterprise.

III.   METHODOLOGY

Research Design

This study employed a descriptive research design in order to involve the individuals who are the focal point of the research aims. This research design was appropriate for this study as it aimed to offer a thorough examination of the present condition of these variables and their interconnections within the particular context (Cooper & Schindler, 2015).

Target Population

The study's target audience consisted of 32 respondents from 8 motor vehicle assembling firms in Kenya. These respondents included logistics managers, sales managers, stores managers, and factories managers, as indicated in Table 1.1.

Table 1.1: Target Population

Category	Number	Percentage (%)
Factory Managers	8	25
Sales Managers	8	25
Store Managers	8	25
Logistics managers	8	25
Total	**32**	**100**

Sample Size and Sampling Technique

Since the target population was small, census sampling was used so as to avoid bias and improve objectivity of results.

Research Instruments

Structured questionnaires were employed to gather primary data. Questionnaires were advantageous over other data collection methods since questionnaire responses are can be used to uphold confidentiality. Open ended question will be used since they are precise and easy to analyze. Questionnaires are beneficial due to their anonymity which gives confidentiality to respondents. The collection of secondary data involved the utilization of public audited annual statements for the time frame spanning 2022 to 2023.

Data Collection Procedure

The distribution of questionnaires to the respondents was facilitated through the utilization of the drop and pick approach, with the assistance of research assistants. The questionnaires was collected after one week to give respondents adequate time to give feedback. The collection of secondary data was facilitated by acquiring public audited yearly financial statements. The data that was collected encompassed the cost of products sold as well as the opening and closing inventory.

Pilot Test

A pilot test was conducted at Associated Vehicle Assemblers, involving four respondents. The purpose of this pilot test was to assess the reliability and validity of the questionnaires. According to Cooper and Schindler (2015).

Reliability of the Research Instruments

Reliability refers to the extent to which a research instrument consistently yields similar outcomes throughout multiple iterations, hence providing a valid representation of the entire target population being investigated. The findings derived from assessing reliability aid in determining whether it is necessary to reformulate the questionnaire. The assessment of internal consistency among individuals' responses to several items on a test was conducted using Cronbach's alpha (Cooper & Schindler, 2015). Cronbach's coefficient alpha is a statistical measure used to assess the internal consistency reliability of a scale or measure, ranging from 0 to 1. Alpha values below 0.7 are generally considered to be less dependable and are not typically accepted. Values between 0.7 and 0.8 suggest an acceptable level of reliability, while values between 0.8 and 1.0 are considered to be quite reliable.

Table 1. 2:Cronbach's Alpha Reliability

Variable	Cronbach alpha	Number of items	Result
RM	0.843	11	Reliable
OP	0.888	11	Reliable
SCP	0.857	10	Reliable

Source: Data Source

From the results, remanufacturing, organizational policies and supply chain performance had a Cronbach alpha 0.843, 0.888 and 0.857 respectively implying all the constructs were reliable.

Validity of Research Instruments

Validity refers to the degree of precision with which a research instrument is able to measure the intended construct or phenomenon. Factor analysis was utilized to evaluate the construct validity of participants' scores on a measurement instrument, with a specific focus on the extent to which these scores were associated with other variables that would be expected to demonstrate such relationships.

Table 1. 3: KMO and Bartlett's tests

Construct	No of Items	KMO	Bartlett's test of Sphericity		
			χ^2	Df	P-value
RM	11	0.897	759.673	55	0.000
OP	11	0.928	816.237	55	0.000
SCP	10	0.904	753.374	45	0.000

Source: Data Source

The results showed that remanufacturing, organizational policies and supply chain performance had a KMO value of 0.897, 0.928 and 0.904 respectively and a Bartlett's test had a p value of 0.000 for all the constructs indicating that the was adequate and valid for conducting the study.

Data Processing, Analysis and Presentation

The collected data followed a series of procedures including editing, coding, and tabulation to detect any anomalies in the responses and assign accurate numerical values to each response for further research. The data underwent analysis utilizing both descriptive and inferential statistical methods. Descriptive statistics include several measurements such as the mean, standard deviation, and variance. Inferential statistics involved the application of several techniques such as multiple linear regression analysis and correlation analysis. Multiple diagnostic tests such as normality test, multicollinearity test, autocorrelation test and heteroscedasticity test were performed in order to assess the suitability of the data for regression analysis. The equations governing multiple linear regression can be derived and expressed as equations 3.1 and 3.2, as displayed.

$$Y=\beta_0+ \beta_1 RM+\varepsilon_0 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.1)$$

$$Y=a_0+a_1 RM.OP a_2 OP+\varepsilon_1 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.2)$$

Where;

Y	SupplyChainPerformance
β0	Constantwhenthere isnomoderatingvariable
β1	RegressionCoefficientswhenthereisnomoderatingvariable
RM	Remanufacturing
OP	OrganizationalPolicies
α0	**α0**representsregressionconstantwhenthereisorganizationpolicyasamoderatingvariable

Data Analysis, Presentation and Discussion
Descriptive statistics

From the descriptive statistics most of the respondents agreed that remanufacturing affects supply chain performance through replacement of damaged products, adherence to warranty policy and acceptance of returned goods by customers.

Inferential Statistics

The link between the independent and dependent variables was discovered by evaluating the data using inferential statistics.

Correlation Analysis

The study utilized the Pearson product-moment correlation coefficient to assess the magnitude and direction of the association between reverse logistics and supply chain performance. The correlation coefficient data demonstrate values ranging from -1 to +1. The correlation coefficient was assessed at a 95% confidence level using two-tailed testing. Consequently, the criteria for rejection were established using a significance level of 0.05, whereby values beyond this threshold were deemed statistically unimportant, while values falling below it were regarded as statistically significant.

Table 1. 4: Correlation Analysis

	RM	**Y**
RM	1	
Y	0.781*	1
	(0.001)	

Source: Study Data (2023)

Based on the findings presented in Table 1.4, the study found that there were significant positive correlations between re-manufacturing and supply chain performance, with correlation coefficients of 0.781 and p value of 0.001. These findings suggest a significant and strong positive correlation between re-manufacturing and the supply chain performance of motor vehicle assemblers, as indicated by the statistical significance of their p-values, all of which were below 0.05.

Model Summary[b]

The model summary presents information regarding the magnitude of the relationship between the variables in the model and the dependent variable. The coefficient R is a measure of multiple correlation that quantifies the strength and direction of the linear association between the observed model and the predicted values of the dependent variable. The coefficient of determination, commonly referred to as R square, quantifies the extent of variability observed in both the independent and dependent variables. The R-squared change provides insight into the extent to which organizational policies contribute to the regression model. The F change is a statistical test that utilizes the F-test to assess the significance of a change in the R square value. A statistically significant F change indicates that the inclusion of the variable has a substantial impact on enhancing the predictive capabilities of the model. The study's model summary results can be found in Table 1.5.

Table 1. 5: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change
1	.572[a]	.327	.312	.2437167	.327
2	.591[b]	.349	.323	.2123146	.022

Source: Study Data (2023)

According to the data presented, Model 1 exhibits an initial R-value of 0.572, indicating an association between reverse logistics and supply chain performance prior to the inclusion of the moderating effect. The R-squared value of 0.327 indicates that the absence of moderating effects from organizational policies results in a 32.7% variation in the supply chain performance of motor vehicle assemblers in Kenya. The remaining 67.3%

of the variances in supply chain performance can be attributed to other factors that are not accounted for in model 1.

According to the results presented in Model 2, a significant correlation of 0.591 was observed between the independent and dependent variables, after accounting for the moderating influence of organizational policies. This finding suggests a strong relationship between these variables. The R-square coefficient of determination, which is 0.349, indicates that remanufacturing, when considering the moderating effect of organizational factors, accounts for approximately 34.9% of the variability observed in the supply chain performance of motor vehicle assemblers in Kenya. The remaining 65.1% of the variability in supply chain performance can be attributed to additional factors that are not accounted for in model 2. These findings suggest that the relationship between remanufacturing and supply chain performance of Motor vehicle assemblers in Kenya is influenced by organizational policies.

The R square change was 0.022implying that the contribution of organizational policy on the relationship between remanufacturing and supply chain performance was 0.022.

ANOVA[a]

The application of Analysis of Variance (ANOVA) is employed to assess the reliability of a model in predicting a particular outcome. The study's significance level is established at 5%, and for a finding to be deemed statistically significant, the p-value must be less than 0.05. The analysis of variance for the study is presented in Table 1.6.

Table 1. 6: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7.149	1	7.149	10.982	.001[b]
	Residual	19.529	30	.651		
	Total	26.678	31			
2	Regression	9.321	2	4.661	7.788	.003[c]
	Residual	17.357	29	.599		
	Total	26.678	31			

Source: Study Data.

According to the findings presented in Table 1.6, Model 1 demonstrates an F-value of 4.833, which surpasses the essential F value of 2.95. This result suggests a strong association between remanufacturing and supply chain performance, independent of any moderating influence from organizational policies. The F-statistic yielded a p-value of 0.000, which was found to be less than the conventional significance level of 0.05. This result suggests statistical significance and indicates that the model adequately fits the data.

Model 2, which incorporates the moderating effect of organizational policies, demonstrates an F-value of 3.127. This value above the essential F critical value of 2.71, suggesting a strong relationship between remanufacturing and supply chain performance when considering the moderating effect of organizational policies. The F-statistics yielded a p-value of less than 0.05, which is the chosen level of significance. This result indicates statistical significance and suggests that the model is a good match for the data. These finding shows that organizational strategies moderate the association between the remanufacturing and supply chain performance of Motor vehicle assemblers in Kenya.

Regression Coefficients

The study employed binary linear regression analysis to examine the relationship between remanufacturing and supply chain performance in the context of motor vehicle assemblers. The regression coefficients were computed to illustrate the extent to which organizational policy moderate the effect of remanufacturing on supply chain performance. The regression findings are presented in Table 1.7.

Table 1. 7: Regression Coefficients

Model		Unstandardized Coefficients		T	Sig.
		B	Std. Error		
1	(Constant)	8.728	1.567	5.570	.000
	RM	2.105	.697	3.019	.003
2	(Constant)	8.698	1.755	4.955	.000
	RM	2.851	.882	3.233	.004
	OP	2.146	.664	3.232	.003

Source: Study data

a. Predictors: (Constant), RM, RP, RC
b. Dependent Variable: Supply Chain performance

Table 4.65 regression results produced a regression model (4.1) and (4.2).
Y=8.728 + 2.105 RM ………………………………………………. (4.1)
Y=8.698 + 2.851 RM + 2.146 OP ……………………………………(4.2)
The value of 8.728 and 8.698 shows the constants of the regression models without and with moderating variable of organizational policy respectively. All the constant values were significant since they all have a t critical values of 5.570 and 4.955 respectively that were less than a tabulated t value of 2.037. The probability value of all the constant were also less than a significance value of 0.005 (0.000<0.005). The constant of the first model where there is no moderating variable implies that when the motor vehicle assemblers have not adopted remanufacturing, the inventory turnover ratio stands at 8.728. The constant of the second model where there is organizational policy as the moderating variable shows that when the firms have not adopted remanufacturing, the inventory turnover stands at 8.698.

IV.   DISCUSSION OF THE FINDINGS

The first aim of this study was to evaluate the effect of re-manufacturing on the supply chain performance of motor vehicle assemblers in Kenya. The research was based on the null hypothesis that the re-manufacturing of motor vehicles had no significant effect on the supply chain performance of motor vehicle assemblers in Kenya.
The regression analysis presented reveals that the remanufacturing variable exhibited a regression coefficient of 2.105, accompanied by a p-value of 0.003. This suggests that the effect of remanufacturing on the performance of the supply chain is significant. The calculated t statistic of 3.019 is found to be greater than the t critical value of 2.037, indicating a statistically significant relationship between remanufacturing and supply chain performance.
Hence, the null hypothesis stating that the re-manufacturing of motor vehicles has no significant effect on the Supply Chain Performance of motor vehicle assemblers in Kenya was found to be rejected. The coefficients therefore indicated that adoption of remanufacturing as part of remanufacturing improves supply chain performance by 2.105 units.
When there is organizational policy as the moderating variable, the regression coefficient of remanufacturing increases to 2.851 with a p value of 0.004. The coefficient indicates that when remanufacturing is moderated with organizational policy, it would improve supply chain performance by 2.851 units. A derived t statistics of 3.233 is more than the t critical of 2.037 implying that remanufacturing has a positive and significant influence on supply chain performance. Therefore, the null hypothesis that organizational policies have no significant effect on the relationship between remanufacturing and Supply Chain Performance of motor vehicle assemblers in Kenya was rejected.
The results from this study resonate the findings from descriptive statistics where many respondents agreed that elements of remanufacturing such as replacement of damaged products, adherence to warranty policy and acceptance of returned goods by customers improves supply chain performance.
The findings of this study was similar to the findings of the study conducted by OkumuandJuma(2019) and found that remanufacturing had a positive and significant influence on customers perception on motor vehicle dealers in Kisumu County.

V.   CONCLUSIONS

The first objective of the study was to evaluate the effect re-manufacturing on supply chain performance of motor vehicle assemblers in Kenya. From the descriptive statistics most of the respondents agreed that re-manufacturing affects supply chain performance through replacement of damaged products, adherence to warranty policy and acceptance of returned goods by customers. From the inferential statistics, there was strong and positive relationship between remanufacturing and supply chain performance (correlation coefficient, r= 0.781 and p value 0.001<0.05). The study also had a regression coefficient of 2.105 and 2.851 without and with moderating effect of organizational policies respectively implying that there is significant influence of remanufacturing on supply chain performance. Therefore, the study concluded that with and without moderating effect of organizational policies, re-manufacturing significantly affects supply chain performance of motor vehicle assemblers in Kenya.

Recommendations
Descriptive statistics indicated that majority of the respondents disagreed that damaged goods returned by customers are effectively replaced. It was therefore recommended that motor vehicle assemblers should provide a mechanism on how to evaluate degree of damage on the products for refund. This will help in building

confidence in customers since they will be guaranteed of a refund in case of damage. This will also help in improving supply chain performance due to attraction of more customers.

Majority of the respondents disagreed that there is effective warranty policy in place which is adhered to. From these results, it is recommended that the organizations should formulate a working warranty that will provide mechanisms on the procedure to return any damaged product. This will help through ensuring the motor vehicle assemblers are able to monitor damaged products and provide refund to the products.

Majority of the respondents disagreed that damaged products are effectively refurbished to meet required quality. From these results, it is therefore recommended that the organizations should provide an effective way on how to refurbish their products in order to meet required quality by the customer. This will help through enhancing customer confidence and providing products that meets the customer preference.

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