ENHANCEMENT OF VALUE STREAM MAPPING THROUGH LEVERAGING INFORMATION TECHNOLOGY INTEGRATION: A GAME CHANGER FOR PERFORMANCE OF MANUFACTURING FIRMS IN KENYA

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ABSTRACT

This study explored how harnessing value stream mapping through leveraging information technology integration: a game changer for performance of manufacturing firms in Kenya. The study also analyzed the moderating role of leveraging information technology integration on relationship between value stream mapping in operation processes contribute to better performance of Manufacturing Firms in Kenya. The study adopted cross sectional research design. The target population was 533 manufacturing firms in Kenya. With a sample size of 322 manufacturing firms' Primary data was collected through use of questionnaires. 10% of the sample size was piloted to test for validity and reliability of the research instrument. Data collected was analysed using SPSS version 26. Descriptive and inferential statistics techniques were used to analyse the data. The study concluded that harnessed value stream mapping through leveraging on IT integration in operation processes positively and significantly impact on performance of manufacturing firms in Kenya.

INTRODUCTION

In an ever-changing business environment, organizational performance remains the central focus in utilizing value chain management. Manufacturing firms, too, operate in a dynamic market that motivates the utilization of models such as value chain management to achieve superior performance (Kurniawati & Susanto, 2021). Manufacturers may improve delivery times, save expenses, optimize their supply chain processes, and respond faster to market shifts thanks to this partnership. Value stream mapping (VSM) is considered as an important tool in lean manufacturing that allows analysts to visualize the actual situation that happens in the production value stream (Johnson & Weng, 2022).). However, in high-variety and low-volume factories, conventional VSM which is more static in nature, unable to give real vision of the variability problems concerning production process. Due to the increasing demand for product variation and product uniqueness based on the customers' requirements, manufacturing industries are compelled to upgrade their productivity and capability of their production and logistics processes, or called operational processes (Naas & Berass 2025). This is to ensure they stay competitive in both local and global markets by committing to on-time delivery of quality products to customers. As a response to these market-driven demands, many industries improved their internal flexibility and enhanced their operational processes by implementing lean manufacturing principles.

Integration of information technology is informed by the need to allow quicker and easier connectivity between suppliers and their customers (Ahmad & Siddiqui, 2021). It enhances

the visibility of the customers whose needs and expectations are changing with regards to response times, delivery times, and transparency. Several studies have found that organization that has implemented IT integration have enhanced information sharing and may benefit in various ways, which include a reduction in inventory levels, operational costs, automation of routine functions, better data documentation, and communication (Muhamad & Lukmandono, 2021). Value stream mapping (VSM) is considered as an important tool in lean manufacturing that allows analysts to visualize the actual situation that happens in the production value stream. However, in high-variety and low-volume factories, conventional VSM which is more static in nature, unable to give real vision of the variability problems concerning production process.

Over the period, lowest manufacturing growth rates were registered in 2012 and 2024 at 0.6% and -0.1% (Nyonges & Chege, 2020). Manufacturing companies such as cadbury Kenya closed down its manufacturing plant in Nairobi after its net profits fell by 58.7 per cent to $493,237 from $784,783 while Eveready Ltd reduced its production capacity to 50 million units annually, down from a previous high of 180 million per year (RoK, 2024). Management in manufacturing have focus on how to harness value chain mapping through leveraging of IT integration in an effort to achieve set performance goals with emphasize being on lead time, value-added activities, and a process cycle efficiency and improvement actions being executed to achieve waste, increase competitiveness and firm performance (Abade, et al. 2024). Integration of information technology in enhancing value stream mapping has gain momentum as firm sought measure to achieve performance goals (Okumu & Bett,2022). Value stream Mapping with information technology integration aims to identify and eliminate waste throughout the system, minimize resources used, and optimize organizational performance. However, it remains unclear how leveraging of IT integration could harnessed value chain stream mapping in operational processes to enhance performance in management firms in Kenya.

THEORETICAL REVIEW

The TOC was developed by Goldratt in 1980 as a way to manage the limiter that prevents the manufacturing companies from achieves performance (Demircioğlu et al., 2022). TOC assumes that to provide continuous improvement via managing and mapping value chains to achieve efficiency and overall performance (Salwin et al.2023). The theory of constraints assumes firm focuses on identification of value chain mapping constraints, making decisions to gain from the mapped value chains and promote value chain mapping. Teixeira and Pereira (2021) say that TOC has the proposal to improve manufacturing processes to improve processes; the company needs to work on the restrictive element of the process, the so-called bottleneck. With the application of TOC gains such as reductions in inventory and operating expenses, thus increasing profitability (Touzett-Cabellos et al., 2024). To increase productivity and eliminate possible wasted time and resources with the TOC, a well-designed method can improve operation efficiency, increasing the productivity or decreasing the working in progress inventory. In a given manufacturing process, throughput is increased when cycle time is reduced and tat work in progress decreases when the cycle time and throughput are reduced.
The VCOR model was developed from the perspective of being a value chain framework with the development of Seven Performance Attributes linking the three domains of Product Development, SCM and Customer Chain across the supply networks together (Casteel &

Bridier, 2021). IT integration within the Value Chain Operations Reference (VCOR) framework is crucial for enabling seamless information flow, collaboration among trading partners, and the development of robust, adaptive business models. The VCOR model, an extension of the Supply Chain Operations Reference (SCOR) model, focuses on integrating the concepts of the entire value chain (including product development, SCM, and customer chain) to manage processes from a customer-centric point of view. IT Integration in VCOR enables collaborations, foster flow of information, support virtuals firms, enable system integrations, ease decision making, enhance flexibility and adaptability (Sautma et al.2024).

The Resource-Based View (RBV) arose from a diversion since the early 1980's towards considering internal resources and capabilities as the primary source of competitiveness. Muhammad et al, (2020) developed the resource-based theory around the internal competencies of firms and turned the interest of strategic management towards the inside of the firm. According to RBV competitive advantage is rooted in a firm's assets that are valuable and inimitable (Sadikin, 2023). The new perspective expects firms to compete based on their unique or distinctive internal capabilities, competencies and resource capabilities. A firm's capabilities or competencies and management ability to marshal the resources and their deployment patterns to produce superior performance determine competitive advantage (Naas & Berass , 2025).

Conceptual Framework

In this study, the conceptual framework shows the expected relationship between the dependent, moderating and the independent variables. The independent value stream mapping for operation processes., moderating variable is leveraging information technology integration while the dependent variable is performance of the manufacturing firms. Figure 1 shows the conceptual framework for this study.

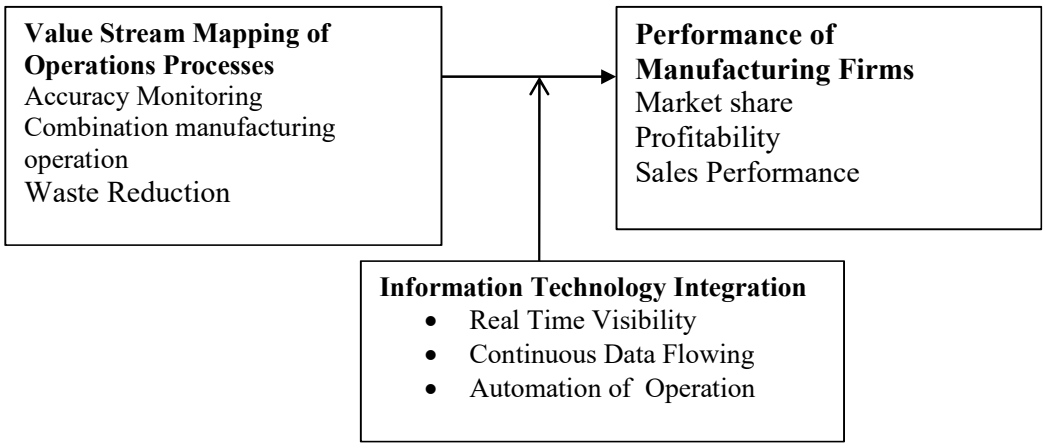

Figure 1.1: Conceptual Framework

Empirical Review

Sudarmi and Sunaryo (2024) assessed the relationship between enhancing monitoring accuracy and operational performance with ER across industries. This narrative review explores the role of Enterprise Resource Planning (ERP) systems in enhancing inventory management across industries. Drawing from empirical studies, theoretical reviews, and case applications over the past 15 years, it highlights how ERP systems improve operational efficiency, inventory accuracy, and supply chain responsiveness. The results also revealed that execution of enterprise resource planning system contribute significantly to operational efficiency in manufacturing firms, inventory accuracy, optimization stock handling and operational cost reduction within industrial enterprises, offering greater flexibility in production scheduling and faster product delivery cycles and shortened order cycle times in manufacturing firms.

Thulasi et al (2022) assessed the role of VSM in a dynamic context which is more efficient in today`s complex and dynamic manufacturing system. The study discussed the conventional VSM, its applications and limitations as well as how conventional VSM integrates with computer simulation to display more dynamic behavior. Both these conventional and dynamic VSM have their own benefits and drawbacks according to their applications in the manufacturing industry. As a conclusion, this paper shows that simulation applications can help to support VSM for companies that intend to transform to lean. This work is very useful for both scholars and companies to know how much an output can be produced within the predicted lead time before making physical changes to the system in order to save both money and time.

Touzett-Cabellos, et al. (2024) explored the extent waste reduction contributed to competitiveness and operational efficiency in the Peruvian Textile Industry through Lean Manufacturing. The study focused on case study on reducing defects and improving efficiency in Peruvian textile sector, representing 7.2% of the manufacturing GDP and providing approximately 422,000 jobs annually, faces significant challenges due to high wastage rates and process inefficiencies. The results demonstrated notable improvements, including a reduction in the wastage from 18% to 5%, an increase in 5S audit scores from 65% to 81%, and a decrease in the rework rate from 20% to 7%. The outcomes highlighted the model's effectiveness in enhancing productivity, quality, and operational efficiency, ultimately contributing to the competitiveness of the Peruvian textile industry.

An empirical review by Sautma et al. (2025) assessed the impact of technology information integration in the relationship between supply chain quality and supply chain resilience and firm performance in manufacturing firms. Collection of data was from the manufacturing companies in Java using purposive sampling found 162 companies that had received ISO certification. Middle managers were the respondents who had experience of at least three years. Data processing used partial least squares version 4 to answer all research hypotheses. The results revealed that information technology integration has a significant impact on supply chain quality integration by 0.588 and supply chain resilience by 0.523 and had no significant effect on increasing firm performance. Supply chain quality integration influences supply chain resilience by 0.288 and increases firm performance by 0.496.

RESEARCH METHODOLOGY

This study adopted cross-sectional research design (Hamed, 202). A cross-sectional study is a type of research design in which you collect data from many different individuals at a single point in time. In cross-sectional research, you observe variables without influencing them. Additionally, cross-sectional studies have been found to be robust for effects of relationships studies. This design was chosen because it applies closely to the research objectives of this study and is practical in testing the study hypotheses testing hypothesis value chain mapping has no significant influence on performance of manufacturing firms in Kenya.

The foundations of positivism can be found in empiricism, which states that all factual knowledge depends on positive information received through observable experiences (Jilcha, 2020). Only analytic propositions can be recognized as accurate via reason. Positivism holds that knowledge should be founded on facts rather than abstractions; hence knowledge is founded on observations and experiments based on current theory. In the positivist paradigm, an epistemological study is how the social world can be explored as natural science. Hypotheses must be tested using empirical methods. Target population is the entire set of individuals (or objects) having the same characteristics as pointed out in the sampling criteria used for the study. The target population makes a part of the universal population (Creswell, 2023). According to KAM (2022), there are 533 manufacturing firms in Kenya. Slovin's formula is used in statistical analysis as a tool to determine the sample size of 322 manufacturing firms in Kenya The study's research instruments used both structured and semi-structured questionnaires. The semi-structured questions give respondents freedom of expression while in structured questions, respondents are limited to the five-point likert scale questions. The data collected was quantitative and qualitative in nature. The analysis of quantitative data was done using descriptive statistics including frequencies and percentages. Mean and standard deviations were also used to describe the distribution of the various responses (Casteel & Bridier, 2021). The study also computed inferential statistics which include correlation and regression analysis.

The Multiple regression model took the form;

$Y = \beta 0 + \beta 1X1 + \varepsilon$ ……. Equation 1

Whereby; Y = Performance of Manufacturing firms (Dependent Variable)

$\beta 0$= constant

$\beta 1$= The coefficients of all Independent Variables

X1 = Value Stream mapping

ε = Error Term

The moderating effect was tested using model as follows;

$Y = \beta 0 + \beta 1X1 + \beta 2X1M + \varepsilon$……. Equation 3

Where, M = Leveraging information technology integration

X1M= the interaction between independent variable and the moderating variable

RESEARCH FINDINGS AND DISCUSSIONS

Prior to the final data collection, a pilot test was conducted on 16 respondents from the sample. Out of the 16 piloted questionnaires, 12 of them were returned forming a response rate of 75%. Cronbach alpha was used to test the reliability of the questionnaire. Cronbach alpha of 0.7 was required for the scales to be considered as reliable. The results in Table 1 indicate that all the variables value stream mapping for operational processes, leveraging information technology integration, and performance of manufacturing firms have a Cronbach Alpha of above 0.70. This indicates that the measures are reliable and no modification was required. The reliability criteria of $\alpha>0.70$ was met. All variables are considered to have reliable measures.

Table 1: Reliability Test Results

	Cronbach's Alpha	**Number of items**	**Comment**
Operations Management Mapping	0.829	9	Reliable
Information Technology Integration	0.705	9	Reliable
Performance of Large Manufacturing Firms	0,762	9	Reliable

The researcher distributed 322 questionnaires to the respondents during data collection process and 322 were fully filled and returned to the researcher thus making a response rate of 100%. That a response rate which is more than 50% is considered adequate while excellent response rate is usually above 70%. This implies that the response rate in this research is good for making conclusions as well as recommendations.

Value Stream Mapping and Performance of Manufacturing Firms

Descriptive statistics frequencies, mean, and standard deviation were deployed to establish the trend and status of operations management mapping in manufacturing aimed at achieving performance of manufacturing firms in Kenya. From the results in Table 2. 41.6% of the respondents agreed that there is accuracy in manufacturing processes well monitored, 23.3% strongly agreed while 35.1% of the respondents were neutral. On average, respondents agreed that there was monitoring of accuracy in manufacturing processes as supported by a mean of 3.8820 and standard deviation of 0.75611. This clearly indicate that monitoring of accuracy in manufacturing processes to achieve performance in manufacturing firms in Kenya. The results in Table 2. 52.5% of the respondents agreed that there are combined production lines to minimize downtimes 36.3% strongly agreed while 11.2% were indifferent. on an average, respondents agreed (M=4.2516 , SD=.64277) that there is combined production lines to minimize downtimes in manufacturing companies in Kenya.

From the results in Table 2, majority (62.7%) of the respondents strongly agreed (M=4.6273, SD=(.48427 that defection points are eliminated reducing defection rate in manufacturing firms in Kenya while 37.3% of the respondents agreed. The results clearly demonstrated that through elimination of defection points manufacturing firms reduces defection rate adding

value in manufacturing processes. From the results in Table 2, most (44.4%) of the respondents agreed, 42.2% agreed while 13.4% of the respondents were neutral. The results demonstrated that there was utilization of cross-functional collaboration to save on costs in manufacturing firms in Kenya.The findings in Table, 2. average, the responders agreed (M=4.3137, SD=0.66351) agreed that there is proper storage of products in manufacturing firms in Kenya. Redesigning of operations is key in value mapping in value chain in manufacturing firms. From the results in Table 1., majority (75.8%) strongly agreed that redesigning of operations is done to achieve decrease in operation time as supported by a mean of 4.7578 and standard deviation of .42910.

From the results in Table 2. respondents agreed (M=4.3851, SD=.48737) that perfect order delivery is deployed in manufacturing firms while 38.5% of the respondents agreed. The was evidence that in mapping value chain, manufacturing firms were deploying perfect order delivery in an effort to achieve performance level expected. From the results, majority of the respondents strongly agreed as supported by a mean of 4.7174 with a standard deviation that there is implementation of production planning while 28.3% agreed. From the results, respondents agreed that there is purchase order tracking in manufacturing firms clearly indicated that through purchase order tracking, operational management mapping was executed to achieve set performance goals in manufacturing firms in Kenya

Effective production scheduling is a critical value mapping aspects in operation management in manufacturing firms. The results in Table 2. Most respondents strongly agreed that there is effective production scheduling in operational management mapping in manufacturing firms in Kenya, (M=4.3882, SD=0.65680) that there is effective production scheduling clearly indicated that there is effective production scheduling in manufacturing firms in Kenya. Salwin, Pszczółkowska, Pał ˛ega, Kraslawski 2023) revealed that operation allowed for the optimization of the production process in terms of economy and energy consumption. From the results, majority of the respondents strongly agree that there is waste reduction in manufacturing processes. On average, respondents strongly agree waste reduction in manufacturing processes in manufacturing firms as indicated by a mean 4.5062 with a standard deviation of 0.66625. Further, from the result , most of the respondent agreed (m=4.2578, SD=.43808) that effort are made to achieve inventory optimization while 25.8% strongly agreed that effort are made to achieve inventory optimization in operational management mapping to achieve performance in manufacturing in Kenya. Al-Debei et al.(2020) aimed to investigate the impact of cross-functional coordination (cross-functional system, process and team coordination) on customer coordination (customer strategic and operational coordination) and operational performance and revealed that cross-functional system coordination is positively associated with customer operational coordination (COC) but not customer strategic coordination (CSC). Cross-functional process coordination increases both customer strategic and operational coordination

Table 2: Value Stream Mapping For Operations Processes and Performance of Firms

Statements.	Mean	Std. Deviation
Accuracy in manufacturing processes is monitored	3.8820	.75611
There is combined production lines to minimize downtimes	4.2516	.64277
Defection points are eliminated reducing defection rate	4.6273	.48427
The firm utilize cross-functional collaboration to save on costs	4.3106	.69476
There is proper storage of product	4.3137	.66351
Redesigning of operations is done to achieve decrease in operation time	4.7578	.42910
Perfect order delivery is deployed in our firm	4.3851	.48737
There is implementation of production planning	4.7174	.45097
There is purchase order tracking	4.2081	.51476
There is effective production scheduling	4.3882	.65680
There is waste reduction in manufacturing processes	4.5062	.66625
Effort are made to achieve inventory optimization	4.2578	.43808

Information Technology Integration and Performance of Man. Firms

The study assesses the extent of technology integration in manufacturing in Kenya. The deployment of technology in value mapping in manufacturing firms to achieve performance. The findings in Table 3. most of the respondents agreed as supported by M=4.208, SD=.46470 that manufacturing companies uses manufacturing firms in Kenya use radio frequency identification to facilitate inventory traceability. From the results in Table 3, most respondents strongly agree (M=4.6863, SD=0.46470) that use radio frequency identification to facilitate inventory traceability, most of the respondents strongly agreed (M=4.4845,SD=0.66610) that RFID tags provide real time visibility into manufacturing operations to enhance value chain mapping. Results in Table 3. respondents agreed (M=4.4161, SD=.49369) that RFID tags provides manufacturing operators with continuous data flow to improve decision making, while other respondents strongly agreed (M=4.4876, SD=0.73296 that manufacturing firm invests in upgrading and maintaining technological infrastructure to support manufacturing operations, 22.3% agreed and 14.3% were neutral . Innovative technologies play a great role in achieves value chain mapping in manufacturing firms. From the results in Table 3, respondents agreed that manufacturing firms actively seek out innovative technologies to improve production efficiency and product quality. Respondents strongly agreed that manufacturing firms updates and improves its technology and systems to ensure they are the latest and most efficient as supported by M= 4.4099, SD= 0.72749)..From the results in Table 3, most (of the respondents agreed that manufacturing firms had adequate employees with technical skills supported by mean of 4.4286 with a standard deviation of 0 .49564 clearly indicated that manufacturing firms deploy adequate employees with technical skills to enhance value chain mapping to achieve firm performance. Also, 4.26, majority of the respondents strongly agreed (M=4.7702, SD=0. .43590) that regular training is done on employees to equip them with technical skills in manufacturing firms. From the results, respondents agreed (M=4.0702, SD=0.43590) that Automation is a key aspect of our manufacturing processes, helping us achieve higher levels of consistency and precision, while other respondents agreed (M=3.718, SD=0.792) that they were satisfied with the effectiveness of technical capacity in manufacturing firms in Kenya.

Table 3: Information Technology Integration and Performance of Manufacturing Firms

Statements.	Mean	Std. Devi
The use radio frequency identification to facilitate inventory traceability	4.6863	.46470
manufacturing firms use radio frequency identification to facilitate inventory traceability	4.4845	.66610
RFID tags provides manufacturing operators with continuous data flow to improve decision making	4.4161	.49369
Our organization invests in upgrading and maintaining technological infrastructure to support manufacturing operations.	4.4876	.73296
We actively seek out innovative technologies to improve production efficiency and product quality.	4.2267	.59711
Our organization updates and improves its technology and systems to ensure they are the latest and most efficient	4.4099	.72749
Our organization had adequate employees with technical skills	4.4286	.49564
Regular training is done on employees to equip them with technical skills	4.7702	.43590
Am satisfied with the effectiveness of technical capacity in our organization	3.718	0.792
Automation is a key aspect of our manufacturing processes, helping us achieve higher levels of consistency and precision.	4.0702	.43590

Performance of Manufacturing Firms in Kenya

The study sought the extent manufacturing firms achieve performance goals. From the results in Table 43, respondents strongly agreed (M= 4.3882, SD= 0.86553) that manufacturing firms achieved market share through increase asset base. The results in Table 3., respondents agreed that there is increase in customer retention rate, clearly demonstrated that manufacturing firms achieve an increase in customer retention rate. From the result in Table 3 , respondents agreed that the manufacturing companies have increased on sale revenue, clearly indicated that value chain mapping has led to increased on sale revenue in manufacturing companies. From the results in Table 3, most of the respondents agreed (M=3.8789, SD=.5430) that manufacturing firms have experienced increased sale volumes due to value chain mapping. The results in Table 3. most 40.4% of the respondent agreed (M=3.9068, SD=0.96222) that manufacturing firms recorded increase in return on assets and return on investments. This demonstrated that enhance value chain mapping contributes to increase in return on assets in manufacturing firms in Kenya. The results in Table 3 most, respondents agreed (M=4.3199, SD=.46715) that manufacturing firms have improved on profitability due to value chain mapping. On the extent respondents agreed with the statement, the manufacturing forms reported increase in operational margin profit for the study period, agreed, (M=4.1087, SD=1.20124) that the manufacturing firms reported increase in operational margin profit due to effective value chain mapping. The results in Table 3, respondents strongly agreed there is increase in number of customers as supported by a M=4.3385, SD=.67001. Further, the results in Table 3, most of the respondents agreed that the manufacturing firms reported improvement in competitive advantage,

Table 3: Performance of Manufacturing Firm

Statements.	Mean	Std. Deviation
Our company has expanded its market share through increase asset base	4.3882	.86553
There is increase in customer retention rate	3.9534	.48754
The sales revenue of the company has increased	4.4224	.80218
Our firm have experienced increased sale volumes	3.8789	.54300
The company recorded increase in return on assets and return on investments	3.9068	.96222
Our company has improved on its profitability	4.3199	.46715
The company reported increase in operational margin profit for the study period	4.1087	1.20124
There is increase in number of customers	4.3385	.67001
The company reported improvement in competitive advantage	4.2019	.86085

Correlation Analysis

The study used correlation analysis results to detect the strength and the direction of the predicted relationship between operation management mapping and firm performance of manufacturing companies in Kenya. The finding in Table 4. indicated that there exists a strong, significant and positive correlation between operational value mapping and firm performance of manufacturing companies in Kenya as indicated by correlation factor, r=0.887, PV=0.003<0.01). The result predicts a strong, significant and positive correlation between operational value mapping and firm performance of manufacturing companies in Kenya.\

Table 4: Correlation Coefficients

		Performance of Firms
Value Steam Mapping	N	322
	Pearson Correlation	.887**
	Sig.(2-tailed)	.003
	N	322

4.4 Regression Analysis

Table 5: Model Summary For Value Stream Mapping and firm performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.337a	.113	.111	11.98763

a. Predictors: (Constant), Value Stream Mapping

The model summary in Table 5 indicates the R-squared is 0.810, indicating that there exists a variation between value stream mapping and firm performance of manufacturing companies in Kenya. The model summary finding indicates R2 =0.113, Std Error= 11.98763, revealing that value stream mapping contributes to a significant variation at 11.3% of performance in manufacturing firms in Kenya.

Table 5: Analysis of Variance for Value Mapping and firm performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5875.347	1	5875.347	40.885	.000b
	Residual	45985.042	320	143.703		
	Total	51860.388	321			

a. Dependent Variable: Firm Performance of Manufacturing Companies in Kenya

b. Predictors: (Constant), Value Stream Mapping

The ANOVA was used to determine whether the model was a good fit for the data. The ANOVA results in Table 6 indicate that the F-calculated was 40.885 with a PV 0.000< 0.05. The F-calculated is greater than f-critical; this clearly demonstrated that the simple regression model $Y = \beta 0 + \beta 3X3 + \varepsilon$ adopted by the study had significant goodness of fit as Fcal=40.885far exceeds the Fcri= 0.09 and PV=0.000<0.05. The F calculated 40.885, with PV=0.000 was far greater than F-Critical 3.8706. The condition FCal. = 40.885> FCri.= 3.8706) and PV=0.001 indicate that the null hypothesis is rejected and the alternative hypothesis is accepted that there exists a significant relationship between operations management mapping and performance of manufacturing firms in Kenya. Therefore, the model can be used to predict the influence of value stream mapping on the performance of manufacturing firms in Kenya.

Table 6: Regression Coefficients for Operations Management Mapping and firm performance

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	133.572	14.100		9.474	.000
	Value Stream mapping	1.712	.268	-.337	-6.394	.000

a Dependent Variable: performance of manufacturing firms in Kenya

The regression model was as follows:

$Y = 133.572 + 1.7120\ X3 + \varepsilon$

From the results in Table 6, value stream mapping for operations management has a significant positive influence on performance of manufacturing firms in Kenya 1.712, p-value= 0.000<0.05). The relationship was considered significant since the p value 0.000 was less than the significant level of 0.05. The findings clearly indicated that an increase in operations management mapping would contribute to increase by 1.712 of performance of manufacturing companies in Kenya. The condition of null hypothesis where $\beta 3 \neq 0$, PV=0.000<0.05 is rejected and the alternative hypothesis accepted. Therefore, value stream mapping has a significant and positive performance of manufacturing companies in Kenya.

Enhancing Value Chain Mapping Through Leveraging IT Integration

The study tested the moderating effect of leveraging Information technological integration on the relationship between value chain mapping and the market share of manufacturing firms in Kenya. Using the model as follows;$Y = \beta 0 + \beta 1X1 + \beta 1M + \varepsilon$. The condition R22> R21 and the differences in R squared being 0.238 as a result of the difference between R22=.0.900 and R21=0.632 in Table 7 indicate that the alternative hypothesis is supported. Unpon introduction of IT integration in value chain mapping , there was increased in variation of market share to 90.0% from 63.2% .This suggests that information technology integration has a significant and positive moderating effect on the relationship between value chain mapping and the market share of manufacturing firms. The beta coefficient of the interacting variable was significant, PV=0.0011<0.05, demonstrating that information technological integration significantly contributes to value chain mapping to achieve market share of manufacturing firms in

Kenya. The results concurred with Sautma et al. (2025) that leveraging on information technology integration has a significant impact on supply chain quality integration and quality integration increasing firm performance

Table 7: Moderated Multiple Regression Model on Value Stream Mapping and Firm Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.795a	.632	.627	.88066
2	.949a	.900	.898	.46013

Predictors: (Constant), Operations Management Mapping
Predictors: (Constant), Operations Management Mapping, Operational management mapping *Information technology integration
b. Dependent: Performance of Manufacturing Companies in Kenya.

The ANOVA finding in Table 8 further revealed that at 95% confidence level, the variables produce statistically significant values and can be relied upon to explain the moderating effect of Information technology integration on the relationship between operational management mapping and Performance of Manufacturing Firms in Kenya.

Table 8: ANOVA Analysis

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	105.415	1	105.415	135.919	.000b
	Residual	248.2	320	.776		
	Total	353.615	321			
2	Regression	600.611	2	120.122	567.356	.000b
	Residual	66.904	319	.212		
	Total	667.516	321			

a. Dependent Variable: Performance Of Manufacturing Firms in Kenya

b. Predictors: (Constant), Value Stream Mapping

c. Predictors :(Constant), Value Stream Mapping, Value Stream Mapping *Information technology integration

The F-calculated for both model were 91.017and 175.680 and PV = 0.000<0.05 hence there was a linear relationship between Operations Management Mapping, Operations Management Mapping, Operations Management Mapping *Information technology integration and Performance of Manufacturing Companies in Kenya.. In addition, the p-value was 0.000, which was less than the significance level (0.05).

Table 9: Beta Coefficients for Moderated Multiple Regression Model on Value Chain Mapping and Market Share

Coefficients a Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-33.561	2.604		-12.887	.000
	Value Stream Mapping	.604	.026	1.046	22.816	.000
2	(Constant)	-58.372	1.606		-36.343	.000
	Value Stream Mapping	1.036	.020	1.795	51.029	.000
	Value Stream Mapping *Leveraging IT Integration	.2630	.009	1.036	29.073	.000

b. Performance of Manufacturing Companies in Kenya.

The study examined the moderating effect of technology integration on the relationship between operations management mapping and the market share of manufacturing firms in Kenya. Multiple regression models were used to test whether Information technology integration had no significant moderating effect on the relationship between operations management mapping and the firm performance of manufacturing firms in Kenya. From the results, the interaction coefficient was found to be 0.260 demonstrating that IT integration in value stream mapping contributes significantly to improvement in performance of manufacturing firms in Kenya.

SUMMARY OF THE FINDINGS

From the correlation results the study established that exists a strong, significant and positive ($r=0.887$, $PV=0.003<0.01$).) correlation between operational value mapping and firm performance of manufacturing companies in Kenya. From regression results, an increase in operations management mapping lead to a significant (0.712, p-value= $0.000<0.05$) influence on performance of manufacturing firms in Kenya. This clearly indicated that operations management mapping through accuracy in manufacturing processes monitoring, combined production lines to minimize downtimes elimination of defection rate, utilization of cross-functional collaboration to save on costs .and proper storage of products, contribute significantly to performance in manufacturing firms in Kenya. Further, redesigning of operations, perfect order delivery, implementation of production planning, purchase order tracking in manufacturing firms, effective production scheduling, waste reduction in manufacturing processes and inventory optimization contributed to significant increase in performance in manufacturing in Kenya.

The Study established that upon introduction of information technology integration in value chain mapping, R22> R21 and the differences in R squared being 0.003 as a result of the difference between R22=0.735 and R21=0.535 affirming that information technology integration has a significant and positive moderating effect on the relationship between value

chain mapping and the performance of manufacturing firms. This demonstrated that information technological integration in value chain mapping significantly enhances the performance of manufacturing firms in Kenya. The results demonstrated that IT integration in value chain mapping through utilization of radio frequency identification to facilitate inventory traceability , use of RFID tags provide real time visibility into manufacturing firms operations, upgrading and maintaining technological infrastructure to support manufacturing operations, deployment of innovative technologies, updating and improves its technology and systems, automation is a key aspect of manufacturing processes enhance value chain mapping fostering performance in manufacturing firms in Kenya

Conclusions

From the findings, study concluded that exists a strong, significant and positive correlation between operational value mapping and firm performance of manufacturing companies in Kenya and that increase in operations management mapping lead to a significant influence on performance of manufacturing firms in Kenya. This clearly indicated that operations management mapping through accuracy in manufacturing processes monitoring, combined production lines to minimise downtimes elimination of defection rate, utilization of cross-functional collaboration to save on costs .and proper storage of products, contribute significantly to performance in manufacturing firms in Kenya. Further, redesigning of operations, perfect order delivery, implementation of production planning, purchase order tracking in manufacturing firms, effective production scheduling, waste reduction in manufacturing processes and inventory optimization contributed to significant increase in performance in manufacturing in Kenya.

The study recommend that firms in manufacturing sector in Kenya should sought measures to harness value stream mapping to achieve firm performance in manufacturing companies in Kenya and that increase in operations efficiency lead to a significant influence on performance of manufacturing firms in Kenya. Manufacturing's firms should devised measures to enhance monitoring accurancy in operations, combined production lines to minimize downtimes elimination of defection rate, utilization of cross-functional collaboration to save on costs .and proper storage of products, contribute significantly to performance in manufacturing firms in Kenya. Further, redesigning of operations, perfect order delivery, implementation of production planning, purchase order tracking in manufacturing firms, effective production scheduling, waste reduction in manufacturing processes and inventory optimization contributed to significant increase in performance in manufacturing in Kenya.

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