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LEAN SUPPLY CHAIN MANAGEMENT PRACTICES AND OPERATIONAL PERFORMANCE OF AIRLINES IN KENYA

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ABSTRACT

This study sought to examine the relationship between lean supply chain management practices and operational performance of airlines in Kenya. The study focused on two LSCM indicators which included waste management and processes standardization. The study adopted a descriptive research design and was carried among the 49 airlines operating in Kenya as at 31st December 2021. The study undertook out a census of the 49 airlines operating in Kenya and used primary data that was collected using questionnaires. Descriptive and inferential statistics was employed in data analysis using the latest available version of Statistical Package for Social Science (SPSS) software to analyze quantitative data. The statistical tools entailed standard deviation, mean, maximum and minimum values, and multiple regression model to examine the relationship between the dependent and explanatory variables. The study results revealed that a positive and significant relationship between waste management and operational performance of airline companies in Kenya. The study also found positive and significant link exists between process standardization and the Kenyan airline companies' operational performance. The study concluded that waste management and process standardization positively and significantly affected Kenyan airline companies operational performance. The study recommended that the management of the Kenyan airline companies should adopt effective waste management, process standardization practices to enhance operational performance.

Key Words: Lean supply chain management practices, Operational performance, Waste management, Operational performance, Airline companies

Background of the Study

The airline industry is known for its constant improvements, all in the pursuit of satisfying their customers (Malifete, Mulongo & Kholopane, 2018). Airlines in the world continue to make strategic choices in order to improve on their product offer, enhance better service delivery, to reduce overall costs and to improve operational performance (Shen & Lapide, 2020). The aerospace sector has however encountered a few major challenges which have affected their operational performance such as supply and supply chain challenges, rise in global competition as well as industry consolidation. To encounter these operational challenges, the aerospace sector can learn from the automotive sector where lean supply chain principals are developed (Beelaerts et al., 2019). The lean supply chain practices can also be used to attain greater performance of operations and minimize the costs associated with supply chain which entails quality, timely delivery of services and increased efficiency (Raza, 2019).

In the aviation sector, operational performance denotes the effectiveness of an airline company to convert inputs into outputs (Cudney & Elrod, 2019). It is the most common indicator for measuring operational elements among airline firms that include cost, quality and timely delivery of services. According to Khalfan (2020) operational performance is required to boost an airline's competitive edge through improvement of value, cost reduction, quality, persistence, time to market, and product development, client lead times, stock levels, and conveyance time. Measures of time and quality reflect the ability of a supply chain to deliver excellent customer service, while flexibility indicates the ability of airline companies to cope with rapid changes in demand or supply (Arif-Uz-Zaman & Ahsan, 2020).

Different practices have been used in the literature to measure the lean supply chain management (LSCM) which has influence on performance of operations in the aviation industry (Wu, 2008). Waste and demand management are the most used dimensions in the aviation industry, work standardization and cross enterprise collaboration (Dhárana, 2018). Like all other industries, the aviation needs demand management practices to run its business thus understanding the general concepts and understanding the dynamics of aviation clients in enhancing efficiency of supply chain process which impacts operational performance (Raza, 2019). Demand management decisions such as forecasting, sales and operations planning, inventory management and value-added activities have direct impact on airlines operation and financial performance. According to LakshmiMeera, (2018) good demand management in the aviation sector influences the quality and delivery of services by airline companies.

Due to an increasing competitive pressure for shorter lead times, lower costs and better quality, airline companies have incorporated waste management practices in their supply chain (Marodin et al., 2021). Airline companies eliminate waste through optimization and analysis of transportation methods, implementation of enhanced and suitable technology, and proper facility organization within the system so as to be cost efficient, have enhanced quality and ensuring that services are delivered on time (Sahoo & Yadav, 2018). The early step in the implementation of lean through waste management by airline companies includes eliminating waste of overproduction, reducing waste of waiting, transportation waste, waste from keeping inventories, processing waste, waste of movement, and waste from supplying defective products (Ugochukwu, 2022).

Airline companies work standardization yields several benefits including efficiency, reduced costs, improved flexibility, and enhanced competitiveness (Nimeh, Abdallah & Sweis, 2018). Further, work standardization ensures that value is transferred downstream in the most efficient way, and it requires a different business model, in which improved profits arise from the cooperation rather than bargaining or imposing power over supply chain partners (Marodin et al., 2021). In current

highly competitive aviation markets, work standardization is a crucial process to save operational costs. In view of low traffic and low yields, work standardization is significant in enabling the airline companies to expand their capacity without impairing productivity (Barac, Milovanovic & Andjelkovic, 2018).

Making and maintaining a strong, trustworthy, and healthy relationship with the airline firm partners is an important principle of lean supply chain (Manzouri & Rahman, 2018). Cross enterprise collaboration is a key means of enhancing competitiveness by improving efficiency and increasing flexibility at all stages of the aviation firms supply chain (Debas, 2018). Cross enterprise collaboration is adopted as an effective management approach that helps to reduce costs, offers better value to customers and achieves improved operational performance (Khairi, Dunay & Farsat, 2019). Collaboration encourages good flow of products and components which results to a reduced operating costs and inventory. In addition, cross enterprise collaboration allows a smooth flow of products, information, and technologies among supply chain partners without waste (Nimeh, Abdallah & Sweis, 2018).

Statement of the Problem

The pursuit for improvement in the performance of operations for the airline sectors has heightened the awareness for speed of operations, cost reduction, improved processes and highly quality services (Shobayo, 2021). Conversely, performance of operations in the airline sectors both in Kenya and internationally has been adversely affected by the tough and unforgiving competitive environment (Malifete, Mulongo & Kholopane, 2018). For instance, airline firms in India recorded a fluctuating trend in operational and production efficiency between 2012 and 2015 (Muthusamy & Kalpana, 2018). In the US, the industry has witnessed several very high profile airline failures such as JetBlue Airways and the Panama due to operational performance issues (Tiernan, Rhoades & Waguespack, 2018). In Kenya, a case at hand is the poor performance of Kenya airways which posted a 26 billion loss in the fiscal year 2015/2016 attributed to high operational costs. The Kenya airline in 2017 also reported a drop in profit to the tune of 170.7 million after tax, a 10% drop from the previous 2016 financial year profit of 189.5 million and huge rise in operating costs (Kiprono & Genga, 2018).

According to Arif-Uz-Zaman and Ahsan, (2020), companies across the world have remained competitive with high operational performance after adopting the philosophy of lean supply chain. Lean techniques, which include standardization, management of demand, management of waste and cross firm collaboration makes it possible for airline companies to gain competitive advantages by improving its quality, processes, costs and performance (Manzouri & Rahman, 2018). However, many airline companies in developing countries have struggled to implement LSCM practices due to lack of awareness and improper implementation approach (Tortorella, Miorando & Marodin, 2019). Further, although the concept of lean supply chain within the manufacturing sector has added a lot concern, there is a dearth of studies concerning lean implementation within the airline service industry which is available in the empirical study (Ambe, 2021).

In empirical terms, several studies have been undertaken across the globe among them Dunay and Shaban (2018) in Iraq who assessed the applicability of LSCM practices and documented that efficient application of LSCM practices was challenging. Al-Tit (2018) also examined how LSCM affect Saudi Arabian manufacturing firms' productivity and documented that LSC dimensions significantly affects productivity but the studies focused on the manufacturing industries. In the Kenya context, Ogollah (2018) studied the effect of Lean Supply Chain Management on the operational performance amongst manufacturing sectors and documented a positive relationship while Ambet (2021) assessed lean practices on operations performance of county governments and documented a positive relationship but the studies context was not the airline industry. From

the reviewed studies, it is evident that many researchers and practitioners have studied LSCM issues related to manufacturing and some service industry such as retail. However, little attention has been paid by researchers on performance of operations in relation to LSCM techniuqes in the aviation industry. In a different context, different LSCM gauges and methodologies were used. Therefore, it is essential to study the effect of lean supply chain management practices on airline operational performance.

1.3 Research Objectives

This research's general objective is to study the correlation between lean supply chain techniques and operational performance of Kenyan airlines.

i. To establish how waste management, affect the operational performance of Kenyan airlines
ii. To evaluate how process of standardization affect performance of operations in the Kenyan airlines

LITERATURE REVIEW

Theoretical Review

Transaction Cost Economics Theory

Coase (1937) proposed the transaction cost economics (TCE) theory explains how costs are involved in transactions of whichever nature based on information asymmetry between the parties involved. The theory indicates that when an organization is implementing institutional arrangements with other organizations, transaction costs arise because to obtain information, the process is expensive. Costs also arise from contract enforcement and monitoring of the tasks (Abushaikha, 2019). TCE combines the economic theory with the organization theory to determine the best type of relationship a firm should develop in the marketplace (Yousuf & Felföldi, 2020). The theory indicates that a firm could have all the activities within its boundary and operate as a hierarchy or it could outsource most of its activities, except for its core competencies, and operate as a virtual corporation, depending on the market for most of its input (Iyengar, 2018).

This theory suggests that organizations are created to improve on their operations as a result of maximizing their profits through reduction of transaction costs and transaction cost economics propose that a firm's ownership decisions focus on minimizing the sum of its transaction and production costs. However, there have been criticisms from a conceptual perspective of TCE, whereby some doubts have been raised about the significance and validity of the theory. TCE does not account for the benefits of transactions and neglects the knowledge-based view that also considers evolving capabilities and the knowledge of firms (Garfamy, 2021). The other weakness is in applying the idea of human interactions and exchanges as based on the contractual approach so that its most fundamental concept (contractual relations) remains undefined and does not lead to a dynamic perspective (Abushaikha, 2019).

Transaction cost economics is an economic theory that provides an analytical framework for investigating the governance structure of contractual relations within a supply chain (Garfamy, 2021). TCE uses the concept of transaction costs to explain the organization of firms and the method of their interactions along a supply chain by providing a conceptual framework for investigating some of the organizational challenges and economic risks that firms face. This theory explains how supply chain interact with market-based transactions or hierarchical-based transactions, using the length of the supply chains as a way to measure the overall effect of transaction costs. A decrease in overall transaction costs would decrease coordination and switching costs and hence would lead to market-based transactions.

Theory of Constraints

The theory of constraints (TOC) as developed by Goldratt (1984) suggests that managers should focus on effectively managing the capacity and capability of the few core constraints contained in the organization if they are to improve the operational performance of the organization. TOC is defined as a management philosophy that provides a focus for continuous improvement that result in enhanced organizational performance (Pacheco, 2019). TOC is based on the idea that every system has at least one bottleneck which can be defined as any kind of situation that impedes the system to reach high performance level in terms of its purposes (Harish, 2019). TOC focuses on system improvement and concentrates on the process that slows the speed of product through the system (Garfamy, 2021).

The theory suggest that companies should be more focused on understanding their own structure in terms of processes whether they are in the production or service sector (Pacheco, 2019). The fundamental notion of TOC is that constraints establish the limits of performance for any system in the organization (Manzouri & Rahman, 2018). Implementation of TOC helps managers to identify improvement projects which have greater impact on the bottom line. The approach of TOC is to continuously look for constraints as these changes with change in environmental conditions (Harish, 2019).

According to the theory, for a smooth production in a supply chain, the focus should be on making sure that the entire chain of suppliers is aligned and is as strong as one another. One weak supplier can become a bottleneck and can disrupt the whole chain and will lead to delayed delivery to the end consumer (Harish, 2019). This concept of constraints logic driven approach emphasizes on improvements of systems, which centers its strategies on continuous improvement. In this research , the lean supply chain management is seen as a strategy which plays an important part, as indicated in the TOC, in organization performance which implements it. Therefore, this constraints concept clarifies how the constraints which will be recognized in the lean implementation can be handled since theory of constraints acts as a thinking process and helps the managers in coming up with simple solutions to handle some of the most complex hitches.

Conceptual Framework

A conceptual model is a diagrammatical representation displaying the interrelationships between a study's dependent and independent variables. This study's conceptual model comprises of waste management, and process standardization as explanatory variables and operational performance as the dependent variable. Figure 1 shows the conceptual framework

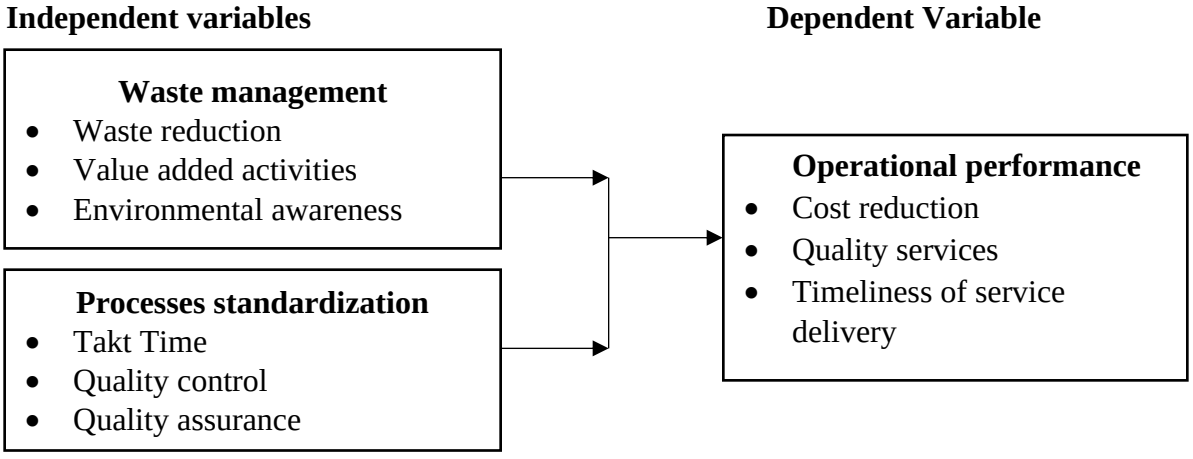

Figure 1: Conceptual Framework

Waste Management

Waste management is the process of eliminating processes which does not benefit the processes of manufacturing and upsurge the activities which add value and those which ensure high efficiency levels to the customer in delivering the end product. Furthermore, it identifying and eliminating waste are the most concepts used; as measured inventory,time and costs across the complete lean supply chain (Daud & Zailani, 2019). Waste reduction ultimately helps in saving cost and quantity of raw material which causes an impact in the firm's environmental and economic performance (LakshmiMeera, 2018). The reduction of waste leads to cost reduction and makes products and services more competitive by increasing market share (Dhárana, 2018). Eliminating all waste in the supply chain would create value for a smooth flow process of products and communication downstream in a supply chain network (Oko, 2018).

Elimination of wastes can be done by the optimization and analyzation of transportation machines and methods used in transportation processes, adopting suitable and enhanced technology, and appropriate organization of system facilities (Ugochukwu, 2022). Through timely delivery of goods and avoiding unnecessary costs, waste management in the supply chain can be measured and value added activities adopted contributing efficiency in availing the product to the customer (Yala, 2018). Waste elimination along entire value streams, creates processes which need reduced space, human effort, capital, and lesser time of making less cost products and services with few defects, compared to traditional business systems (Daud & Zailani, 2019).

Processes Standardization

Standardization of process or work involves making it consistent and repetitive by provision of fixed and acceptable approach which everyone and everything must follow in performing activities (Ugochukwu, 2022). Standardization is the use of standard procedures, materials, parts, and processes for designing and developing a product. Standardization is a benefit to customers who are using the products, and enhances serviceability (LakshmiMeera, 2018). Standardization assists in specification provision, cost reduction, achieving reliability, accuracy in quotation comparison, error reduction, less dependence on specialist and cost reduction in handling materials. From product standardization in the manufacturing or assembly processing, benefits can be earned by sharing sub-components across product lines (Yala, 2018).

Standardization process allow continuous flow - movement does not stop on the products or services through the company's systems and the customer. Standard work reduces waste, reduces workload and risks of accidents, and increases worker productivity and satisfaction (Pinto & Mendes, 2019). Process standardization enables continuous flow to occur, which forms the major step of lean manufacturing. Flow is the uninterrupted movement of a product or service through the system to the customer. The flow or value-stream perspective represents a shift from vertical to horizontal thinking (LakshmiMeera, 2018). With standardization in place, everyone adopts or rigorously follows the same approach to perform similar tasks; hence reproducing the same acceptable results (Dunay & Shaban, 2018).

Operational Performance

Debas (2018) defines operational performance as the level to which products and services supplied by an organization meet the customer expectation. It provides an indication of the potentiality of the supply chain in providing products and services to the customer. This metric is most important in supply chain management as it integrates the measurement of performance right from supplier to the customer end (Shobayo, 2021). Indicators of effective operational performance include: enhanced financial performance, lead time performance, efficiency/effectiveness, enhanced

responsiveness, client unwaveringness, advancement, quality items, and decrease in abundance stock levels and few or zero defects (Khalfan et al., 2020).

Operational performance affects businesses elements such as market share and customer satisfaction (Cudney & Elrod, 2019). Operational performance has a major impact on product cost, product reliability and cycle time. The most commonly used indicators for measuring operational performance include costs, quality, delivery and flexibility. Subsequently, the rate and speed of introduction of new products were included in the list of indicators (Bento, Schuldt & Carvalho, 2020).

Empirical Review

Waste Management

Nimeh, Abdallah and Sweis (2018) investigated how lean supply chain management (LSCM) techniques affect market and supply chain performance of Jordan's manufacturing companies. Data collection was done via a questionnaire from 308 respondents and regression for data analysis. The results revealed positive and significant effects of three LSCM practices on market performance, namely, waste management, flow of information, and customer relationship. In addition, demand management, flow of information, and customer relationship had a positive and significant effects on supply chain performance.

Rucha (2018) discovered third-party port-centric logistics (3PL) lean techniques and operational performance of the Kenyan firms. This research implemented a study design and data was collected from 164 firms. Using the regression analysis, the survey discovered a significant interrelationship between waste reduction and operational performance. It also discovered that through regulation relationships were moderated between lean techniques and performance of operations.

Sahoo and Yadav (2018) surveyed the extent to which lean management practices impacted the operational performance of sectors and how it was adopted by small and medium-sized manufacturing organizations in India. Questionnaires were used for data collection from 121 SMEs in India while correlation was adopted for data analysis. The study found that process improvement, flow management, waste minimization had a significant effect on SMEs operational performance. The study further found overall positive effects as a result of applying lean tools and philosophy in Indian SMEs.

Tortorella, Miorando and Marodin (2019) examined the relationship between LSCM practices and the performance of the supply chain. The study carried out a survey and collected data from 89 Brazilian companies. The study found that applying synergistic packages of Lean Supply Chain Management techniques simultaneously had a significant influence to the performance of supply chain. These outcomes suggests that LSCM techniques implementation - elimination of waste and continuous improvement contribute substantially to the supply chain performance.

Rahman, Laosirihongthong and Sohal (2020) surveyed the extent to which lean management techniques impact the firms' operational performance and how they are implemented by the manufacturing firms in Thailand. Collection of data was done using questionnaires from 187 respondents and factor analysis and multiple regression for data analysis. The results revealed that all the three lean constructs relate significantly to the operational performance. JIT has a higher level of significance in large enterprises compared with SMEs, whereas for waste minimization there is a higher level of significance for SMEs compared with large enterprises. Flow management has a much lower level of significance for both SMEs and large enterprises.

Processes Standardization

Amrani and Ducq (2020) using a case-based approach analysed the implementation of lean practices in a company operating in the aerospace industry. The study was based on the analysis of the industrial context, linked to different practices and tools issued from LP. Lean practices, such as the cellular layout, the one-piece flow, visual management, takt time, standardization, multiskills, poka yoke and single-minute exchange of dies (SMED), were used in the proposed model and yielded significant gains. The study found that defect rate dropped by 66%, the cycle time was reduced with 43% of savings, waste elimination was achieved, and the work-in-progress inventory decreased.

Bento, Schuldt and Carvalho (2020) investigated the influence of supplier integration and lean practices on operational performance indicators: cost, quality, delivery, flexibility and speed of new products introduction. The proposed relationships were analyzed using survey data from a sample of 112 medium-sized textile companies in Brazil. The results suggested that supplier integration is significantly and positively associated with the speed of new products introduction, while lean practices are significantly and positively associated with operational performance indicators, except delivery. In addition, supplier integration does not support lean practices for any of operational performance indicators tested.

Pinto and Mendes (2019) investigated how environmental improvements can be achieved through operational practices of lean manufacturing. The adopted research method consisted of a single case study, by providing greater depth and detail of the study. The instruments for data collection were semi-structured interviews, direct observation and document analysis. The study found that relationship between the practices of Lean such as Kaizen, PDCA (plan, do, check, act), Poka-Yoke, and standardized work had positive impacts on the organization.

Cudney and Elrod (2019) investigated the effectiveness of lean techniques and their applications in supply chain using a survey administered across multiple industries to individuals familiar with lean concepts and techniques. Lean performance was assessed both within the organization and their supply chain based on the specific techniques and strategies for implementation. This survey realized that supplier training and lean technique standardization helps in the provision of significance in time and benefits in finances.

RESEARCH METHODOLOGY

A research design is a plan which helps in performing research strategies and analyzing the data collected (Saunders, Lewis & Thornhill, 2019). A research design documents the undertaken kind of research which is used to convey the appropriate research problem solutions. Therefore, a descriptive research design was implemented in this survey. According to the Kenya Civil Aviation Authority (KCAA), there were 49 airlines in Kenya as at 31st December 2021. The study's target population was therefore be made up of the supply chain managers and operations managers or their equivalents of the 49 Kenyan airlines. A census design was considered since the population is small, finite and easily accessible.

The study used a questionnaire for data collection which was segmented into two parts. In addition, a questionnaire was employed because as is the mostly utilized technique within the descriptive research strategy besides being economical and convenient to administer. According to Gay et al. (2018), (10%) of the population is sufficient for pilot testing. The research employed 10% of the targeted population for pilot testing. The respondents was selected randomly. Descriptive and inferential statistics was employed in data analysis using the latest available version of Statistical Package for Social Science (SPSS) software to analyze quantitative data. The statistical tools entailed standard deviation, mean, maximum and minimum values, and multiple regression model

to examine the relationship between the dependent and explanatory variables. The findings were presented using tables, pie charts and graphs.

RESEARCH FINDINGS AND DISCUSSIONS

The study undertook a census of the 49 airlines in Kenya as at 31st December 2021 where two respondents were selected from each of the sampled airlines. Questionnaires were used for data collection upon which the researcher dropped and picked the questionnaires after two weeks. However, complete data was gathered from 40 airlines that led to 81.6% response rate that was deemed sufficient since it was more than 50%. According to Babbie (2004), 50 percent response rate is reasonable for publication and analysis, 60 percent are good whereas 70 percent are excellent

Lean Supply Chain Management Practices

The researcher sought the respondents' opinions on the lean supply chain management techniques implemented in their respective airline companies. The respondents of this research were requested to give answers to various questions on a scale of 1-5, where 5 indicated to a strongly agree, 4 denoted agree, 3 represented neutral, 2 denoted disagree and 1 indicated strongly disagree. The results are as follows.

Waste Management

Table 1: Waste Management

Statement	Mean	Std. Deviation
Airline firms can reduce waste through adoption of appropriate and improved technology, and proper organization of facilities	4.1132	.89299
Through analysis and optimization of transportation methods and machining process airline firms can significantly reduce waste	4.2146	.86380
Value-added addition and services efficiency by airline firms can be enhanced through waste management	4.0271	.80224
Reduction of waste leads to cost reduction and makes products and services more competitive by increasing market share	4.3012	.81019
Waste reduction helps airline firms to cut cost that enhances their environmental and economic performance.	4.1002	.62224
Composite mean and standard deviation	4.1513	.79829

Table 1 shows that the respondents agreed that airline firms can reduce waste through implementation of a suitable and enhanced technology. It can also be done through appropriate facility organization (mean=4.1132, SD=0.89299) and that through optimization of transportation methods and machining process and data analysis, airline firms can significantly reduce waste (mean=4.2146, SD=0.86380) respectively. Further, the findings indicate that the respondents agreed that value-added addition and services efficiency by airline firms is enhanced through waste management (mean=4.0271, SD=0.81019) and that reduction of waste leads to cost reduction and makes products and services more competitive by increasing market share (mean=4.3012, SD=0.81019) respectively. The results also indicate that the respondents agreed that waste reduction helps airline firms to cut cost that enhances their environmental and economic performance (mean=4.1002, SD=0.62224) respectively.

The composite mean of 4.1513 (SD=0.79829) indicates that the respondents largely concurred that waste management affect airline companies operational performance. The finding thus indicates that waste management practices including waste reduction through technology and facilities organization, optimization of transportation and machining processes, value addition and services

efficiency largely enhances operational performance. In support of the above results, Daud and Zailani (2019) supports that waste elimination along entire value streams, instead of at isolated points, creates procedures which requires less space, time, capital and less human efforts to produce services and products at minimal costs and few defects. Panwar et al. (2018) found out that lean practices were positively associated with timely deliveries, productivity, first-pass yield, elimination of waste, reduction in inventory, reduction in costs, reduction in defects and improved demand management.

Process Standardization

Table 2: Process Standardization

Statement	Mean	Std. Deviation
Through standardization airline firms enhances the quality of services, products and work in progress	4.2350	.61550
High level of the process standardization enables airline firms to expand its capacities without impairing production	4.1205	.63599
Standardization of work should be based on the best ideas or approach generated by the team doing the work	4.0411	.77625
Standardization helps in providing accurate comparison of quotation and less dependence on specialist suppliers	4.3340	.79703
Standardization allow continuous flow of products or services through the company's systems and the customer	4.2030	.72324
Composite mean and standard deviation	4.1867	.70960

Table 2 shows that the respondents agreed that through standardization airline firms enhances the quality of services, products and work in progress (mean=4.2350; SD=0.6155) and that high level of the process standardization enables airline firms to expand its capacities without impairing production (mean=4.1205, SD=0.63599) respectively. Further, the findings indicates that standardization helps in providing accurate comparison of quotation and less dependence on specialist suppliers (mean=4.0411, SD=0.77625) and that standardization assists in the provision of accurate quotation comparison and less dependency on expert suppliers (mean=4.3340, SD=0.79703) respectively. The results also indicate that standardization allow continuous flow of products or services through the company's systems and the customer (mean=4.2030, SD=0.72324) respectively.

The composite mean of 4.1867(SD=0.7060) indicates that the respondents agreed that standardization affects airline companies operational performance. According to the findings, standardization enhances products and services quality, expands airline firms' capacity without production impairment, provides accurate quotations comparison and less dependence on particular suppliers and further allows continuous products and services flow. In support of the above results, Sahoo and Yadav (2018) documented that the adoption of lean initiatives such as standardization and demand management enables firms to identify and determine the operational success indicators such as reduced cost and enhanced quality of services. LakshmiMeera (2018) supports that standardization assists in the provision of specification, achieving reliability, minimal errors, accurate quotation comparison, less dependency on expert suppliers, and the reduction of material handling cost.

Operational Performance

Table 3: Operational Performance

Statement	Mean	Std. Deviation
Reduction in costs	3.6503	.97534
Improvement in the quality services	4.2250	.91952
Speed in offering services	3.8011	.82275
Service delivery timeliness	3.6740	.76418
Composite mean and standard deviation	3.8376	.87045

Table 4 indicates that the airline companies had moderately reduced costs (mean=3.6503) but had largely improved the quality of services they offered (mean=4.2250, SD=0.91952) respectively. Further the findings indicates that the airline firms had moderately enhanced their speed of offering services (mean=3.8011, SD=0.82275) and had moderately enhanced their service delivery timeliness (mean=3.6740, SD=0.76418) respectively. The composite mean of 3.8376(SD=0.87045) indicates that the airline companies operational performance over the last two years was moderate.

Regression Analysis

Regression was undertaken to assess the interrelationship between the explanatory (lean supply chain management practices) and the response variable (operational performance). The regression findings consists of the model summary, variance analysis (ANOVA) and the coefficients of regression. The outcomes were revealed as follows.

Model Summary

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.869[a]	.755	.726	.53891

a. Predictors: (Constant), Waste management, Process standardization

Table 4 shows that the studied lean supply chain management techniques (waste management, process standardization) explains 75.5% of the variation of operational performance. This is shown by the R-square value of 0.755 (75.5%). On the other hand, the findings indicate that 24.5% of the variation is accounted for other indicators that were not incorporated in the research.

Analysis of Variance

Anova findings help to determine whether the adopted regression model was the model appropriate for estimating the effects of the independent variables on the dependent variable. Anova results are presented in the table below.

Table 5: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.422	4	7.606	26.188	.000[b]
	Residual	9.874	34	.290		
	Total	40.296	38			

a. Dependent Variable: Operational performance

b. Predictors: (Constant), Waste management, Process standardization

Table 5 depicts that regression is suitable and statistically significant for the study. This is shown by the value of F-statistics (26.188) which is statistically significant (P-value = 0.000<0.05) at 5% significance level.

Regression Coefficients

Table 6: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.057	.423		7.233	.000
	Waste management	.619	.136	.452	4.556	.000
	Process standardization	.710	.144	.500	4.938	.000

a. Dependent Variable: Operational performance

The results shows a positive (B=0.619) and significant (P-value=0.000<0.05) relationship between management of waste and operational performance of airline sectors. This indicates that implementation of waste management techniques improves airline firm's operational performance therefore waste management directly and significantly influences performance of airline sectors. In support of the above results, Nagaaba (2018) suggests that with the unprecedented competition, airline firms in the Indian and Asian countries have implemented waste and demand management techniques to satisfy the demands of the customers and improving the operational performance. Milambo and Phiri (2019) documented that waste management practices affects airline firms' operational performance.

Further, the results indicate that a positive (B=0.710) and significant (P-value=0.00<0.005) link exists between process standardization and the airline companies' operational performance. This implies that adoption of process standardization practices enhances airlines companies' operational performance thus process standardization significantly and positively affects airline companies operational performance. In support of the above results, Daud (2020) observed that operational performance of airline companies had been enhanced through adoption of the lean supply chain techniques which includes forecasting of demand and standardization of processes. A study by Mwangangi and Achuora (2019) documented a significant positive relationship between lean supply chain and organizational performance.

Conclusions

the findings also revealed a positive and significant relationship between management of waste and performance of operations of Kenyan airline firms. The study thus concludes that waste management practices enhance airline companies' operational performance thus waste management positively and significantly affects operational performance of Kenyan airline companies.

This study further documented that process standardization had a positive and significant relationship with airline companies' operational performance. This research therefore revealed that standardization of process techniques improves airlines firm's operational performance therefore process standardization positively and significantly influences operational performance of airline firms in Kenya.

Recommendations

This survey has also observed that waste management positively and significantly influences the performance of airline entities in Kenya. Therefore, this research recommends that the

management of the airline companies should adopt effective waste management practices such waste reduction through technology and facilities organization, optimization of transportation and machining processes, value addition and services efficiency to enhance the airline companies' operational performance.

Third, the study concluded that process standardization significantly and positively affects Kenyan airline companies' operational performance. Thus, it is recommended that the management of the airline companies should adopt effective process standardization practices that enhances products and services quality, expands airline firms' capacity without production impairment, and provides accurate quotations comparison and less dependence on specific suppliers.

Suggestions for Further Research

This study's model summary showed that waste management and process standardization explains 75.5% of the variation of operational performance. This means there are other metrics that this study did not incorporate which affects the operational performance of the airline companies. This study makes a recommendation for research on determinants of airline firms' operational performance. This study's context was airline firms' in Kenya. This delimited the scope and findings generalization to the Kenyan context. A similar study can be undertaken to focus on other entities within the aerospace industry.

In addition, structured questionnaires were adopted for data collection. However, structured questionnaires contain closed ended questions, which require a particular response making it impossible to obtain an in-depth views and opinions of the respondents regarding the study variables. This study based on this observation recommends that a similar study be undertaken through other research instruments such as interviews that will incorporate qualitative views and opinions of managers.

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