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EFFECTS OF LEAN PRODUCTION ON ORGANIZATIONAL PERFORMANCE: A CASE STUDY OF FLOUR PRODUCING COMPANY IN KENYA.

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ABSTRACT: *Global competition in business has forced most production sectors to realign their strategies to achieve competitive advantage. In flour producing companies in Kenya, the problem of broad production has been in place and as advanced technology takes its roots in Africa, there has been an increasing demand for quality output by the industry; which can be achieved by effective adoption of various production systems. The paper sought to assess the effects of lean production on organizational performance. The study was designed determine the elements of lean production, effect of lean production systems on product quality, strategies for waste reduction and the challenges of adopting lean production. The study adopted a descriptive research design. Data The study found out improving management style and involving all employees at all levels, as well as better inventory management leads to a more efficient practice of lean production. Material management and physical distribution are positively related and are therefore critical determinants of successful lean production practice within the organization. With a response rate of 75% the study concluded firms should adopt the use of lean production system as a means to improved performance.*

KEYWORDS: Organizational Performance, Lean Production System, Total Quality Management, Just-In-Time, Inventory Management System.

INTRODUCTION

Organizations can gain competitive advantage from lean production practices. Such practices enable the organization to get superior performance through reduction of wastes and other related costs (Ohno, 2008). Industries are nowadays facing a problem of broad production in their organizations thus resulting to lots of wastage. This has seen many companies experience problems of waste along the supply chain and the liability to make the right products for cutomer satisfaction. Procurement managers are bound to embrace the essence of adopting lean production which is a business initiative to reduce waste in manufacture production. To this extent therefore, this initiative leverage companies to achieve long term competitive advantages by putting in place the proper production systems and technologies particularly with regard to product quality, shortening product design time, the reducing of wastage improving end customer satisfaction and inventory management (Womack &Jones). According to Bruce and Larco (1999), lean production is both a concept that can be viewed and implemented at a number of levels and also a commitment process of relentless improvement that can significantly impact upon an organizations health wealth and competitiveness. Lean production can resolve severe organizational problems and be a powerful approach to gather and unite change initiatives that are running currently through a business. Traditionally, companies used broad production systems which made it difficult for them to improve on their productivity thus customer satisfaction (Bicheno, 2007). However for most companies, use of recent technologies for lean production system has become critical and is a standard practice for achieving greater performance gains (Emiliani, 2006).

The Concept of Lean Production

Lean production refers to a business model that emphasizes on meeting customers' expectations by delivering quality products at the least cost when required. The Lean Aerospace Initiative (2002) has defined Lean thinking as the dynamic, knowledge driven and customer focused process through which all people in a defined enterprise continuously eliminate waste with the goal of creating value. According to Bruce and Larco (1999) Lean is both a concept that can be viewed and implemented at a number of level and also a commitment process of relentless improvement that can significantly impact upon an organizations health, wealth and competitiveness. James & Daniel (1996) states that lean can resolve severe organizational problems and additionally can be a powerful approach to gather and unite several change initiatives that are running through. Bicheno, (2007), claims that in batch production, about 98% of time activities is not value adding time. In order to implement the concept of lean manufacturing successfully, many researchers emphasizes on commitment by top management (Alavi, 2003). Most organizations pursue lean in response to their need to fundamentally improve business competitiveness by reducing cost while increasing quality and customer responsiveness including meeting delivery time. According to Boyer & Sovilla, (2003), managers should also work to create interest in the implementation of lean. The business competitiveness needs can manifest through increase in direct global competition or from evolving customer or supply chain expectations. Lean practitioners often acknowledge that successful lean implementation can require a real or perceived business crisis to justify or foster receptiveness to the significant transformation that lean requires to an organization culture and process. Studies have been done to show the role of lean production system. According to a case study of Kodak Canada Inc., Kodak's Director of Global Manufacturing and Logistics, Charlie Brown steered the company towards adopting lean productions in 1998, by adopting Kodak Operating System (KOS). Lean therefore has not only improved procedure, reduced inventory and enhanced ergonomics, but it allows the company to fine-tune its chemistry and keep pace with changes in demand'' .

Lean Manufacturing Management and Competitive Skills

The driving force behind lean production is the essence of creating substantial performance. The drawing force behind lean production is the essence of creating substantial value with the purpose of utilizing resources to their best advantage. It is imperative to note that lean production can only be realized in an environment which its top level management of the firm/ company invariability support its implementation. Such abrupt policy changes require a top-down approach to decision making (Kobayashi, 1995). Boyer, (1996) stated the successful implementation of lean production relies on well-trained employees. In a lean production environment, training is pivotal in order to develop a workforce, which is capable of shouldering the increased responsibilities, to develop multi-skilled workers, and to create an environment in which workers have the skills and ability to push for continuous improvement. In reference to Womack, *et al*. (1990), Boyer concluded that plants which allocate greater resources for the training of the workforce have been shown to have increased productivity. Forrester, (1995) stated that lean manufacturing is usually accompanied by a shift towards exposure and problem solving. This changes calls for a new approach in problem solving. Boyer, (1996) mentioned that teamwork and group problem solving is a critical component of TQM and JIT. In tandem, teamwork and group problem solving serve to crash barriers and to improve the flow of information through a company, thus leading to improved productivity. Working as groups, while utilizing appropriate problem solving techniques, will also increase efficiency and pride in work improvement

outputs (Gatchalian, 1997).The design of a lean manufacturing system depends on attributes that may influence the behaviour of the buyer. According to Chase, Jacobs and Aquilano (2006), different clients are attracted by different attributes. For example some customers are more sensitive to the price of a product or service and therefore companies emphasize on cost reduction. Skills applied to competitive business strategies can be presented in different perspectives or dimensions for instance, those based on resources (Wernerfelt, 1984), on dynamic capabilities (Teece *et al.*, 1997), on business relationships (Dyer & Singh, 1998), on essential characteristics (Hamel & Prahalad, 1995) or on competitive priorities.

The seven wastes and lead time reduction

The basic idea to reach a desirable state is the principle of using Kaizen or continuous improvement to reduce waste. According to Shingo (1989) waste is any activity that does not contribute to operations and there with does not contribute to operations and there with unpacking supplied parts or waiting for lots to be finished. Value adding activities transform materials changing form or quality they turn raw materials into parts or productions. Lareau (2003) additionally, has identified four groups of office waste such as people waste (i.e. lack of goal alignment, waiting and motion process waste (i.e. control the sense of only monitoring, variability lack of standardization and errors), information waste (i.e. missing irrelevant and inaccurate information) and asset waste (office inventory buildings and offices that are not fully used and transportation of information. According to Womack and Jones (2003) the continuous improvement lies on the time line from which the money is collected. The time line is reduced by eliminating the non value added waste. The above lean production techniques focus on equipment reliability, balanced or level productions, JIT material control techniques, align systems and processes, sharing the vision, empowering the work force and ensure the use of proper measurement system. The waste concept includes all possible defective work and activities, (Taj &Berro, 2006). Waste can be classified into eight categories (Womack & Jones, 2003): motion waste, waiting waste, correction waste, over processing waste, overproduction waste, unnecessary transportation waste, inventory waste and knowledge waste. Lean production typically represents a paradigm shift from conventional 'batch and queue' functionally - aligned Mass production to "one-piece flow", product aligned pull production . This shift requires highly controlled processes operated in a well maintained , ordered and clean operational setting ,maintained , ordered and clean operational setting that incorporates principles of just in time production and employee involved system -wide continual improvement.

Key approaches to successful lean

There are several key approaches to make lean successful throughout the supply chain of a manufacturing company. The manufacturing company has to be fact based and not just rely on rhetoric about the improvements to be gained. The manufacturing company has also to be willing to share information at a very detailed level to help the supplies see the savings potential. The manufacturing company has to demonstrate a commitment to the long term with its implementation of the lean strategies. Most importantly, the manufacturing company has to give its supplier's support in terms of training and troubleshooting. Basically, the manufacturing company and suppliers are in it together and the benefits work both ways. The manufacturing company helps its suppliers, and they are more willing to work with the manufacturing company on issues. Finally, the manufacturing company should demonstrate the potential benefits of lean not only for their own company but also for all their suppliers.

Benefits of lean manufacturing/production:

According to Altekar (2005), establishment and mastering of a lean production system would allow you to achieve the following benefits: Waste reduction by 80%, Production cost reduction by 50%, Manufacturing cycles time decreased by 50%, Labour reduced by 50% while maintaining or increasing throughout, Inventory reduction by 80% while increasing customer service levels, Capacity in current facilities increase by 50%, Higher quality, Higher profits, Higher system flexibility in reacting to changes in requirements improved, More strategic focus and Improved cash flow through increasing shipping and buying frequencies. However, by continually focusing on waste reduction, there are truly no end to the benefits that can be achieved. Sohal and Eggleston, (1994), suggest that two-thirds of the companies said that a strategic advantage had been generated with the greatest improvements stemming from market competitive positioning, customer relationships and quality constraints. Lathin (2001), maintains that traditional mass producers can expect a reduction of 90% in lead-time, 90% in inventory, 90% in the cost of quality and a 50% increase in labour productivity. Chase (1999), considers that getting lean also means that the business is examined in its entirety, including how orders are processed, the way materials are purchased and the way manufacturing is done. Lathin and Mitchell (2001), subscribe to the total approach, the issue they stress is the need to combine the socio-technical systems, that all work organizations combine a technical, i.e technology, and a social-system (business and structures).

Criticisms in lean management

Key criticisms include lack of contingency and ability to cope with variability, lack of consideration of human aspects, narrow operational focus on the shop-floor. Others include: Objections by trade unions, Increases in workers responsibilities that can lead to pressure and anxiety not present in the traditional system, Expansion of job requirements without comparable increases in pay, The Company is the main beneficiary of employee generated improvement; Inability to deal with turbulence and change, Pursuit of perfection may eliminate the scope for flexibility. It depends on a stable business environment, as then it can maximize its efficiencies of scope.

The challenges facing the implementation of lean production include complacency, using lean manufacturing/ production to facilitate downsizing effort, role of clarity issues from senior Management, opposing from middle management, poorly defined measurement systems, short term versus long term thinking, inadequate union involvement, lack of commitment and ability to just do it.

MATERIALS & METHODS

The study followed survey research design with a target population of 42 from a flour producing company. The research focused on production, procurement, finance and sales departments because they are core to the topic of study with involvement in lean production. Respondents were identified by use of stratified sampling technique where the target population of 42 was divided into production, procurement, finance and sales departments. Malhotra et al (2006) states stratified sampling is precise as it includes all important sub-populations (as cited in Polonsky & Waller, 2011, pg. 141). Thereafter 10 respondents were picked by random sampling from each stratum as the technique is projectable. The sample studied was 40 respondents (67%). According to Mugenda and Mugenda (1999), Nachmias and Nachmias (1996) when a target population is less or equal to 40 the sample should be 40.

Qualitative data was analyzed using descriptive statistics where Measures of Central Tendency (averages and frequencies) and Measures of Dispersion (Standard deviation) were used from responses on a five point Likert Scale. Data analysis was done using Statistical Package of Social Sciences (SPSS 16.0). Data was presented on tables, graphs and charts by use of frequencies and percentages.

RESULTS

The study identified the challenges of adopting lean production, the elements of lean production, the effect of lean production systems on product quality and lean production strategies for waste reduction.

Elements of lean production

The elements of lean production were identified by the most popular approaches used by the organization for enhancing lean production and the features of lean production. Twenty seven percent of the respondents stated flexible manufacturing is a major approach used, 20% ascertained JIT and Kaizen while 17% said TQM and lean manufacturing. Table 1 summarizes this information.

Table1 : Approaches used by the Organization to Enhance Lean Production

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TQM	5	16.7	16.7	16.7
	JIT	6	20.0	20.0	36.7
	Flexible Manufacturing	8	26.7	26.7	63.3
	Kaizen	6	20.0	20.0	83.3
	Lean Manufacturing	5	16.7	16.7	100.0
	Total	30	100.0	100.0	

The major feature of lean production was identified as waste management at 30%. Sixteen percent of respondents added integrated value chain and production forecasting while 13% indicated small batch production. Coordination of processes and inspection were stated by 10% and finally 3% singled out JIT. Figure 1 represents this information where features of lean production are plotted against the frequency of response.

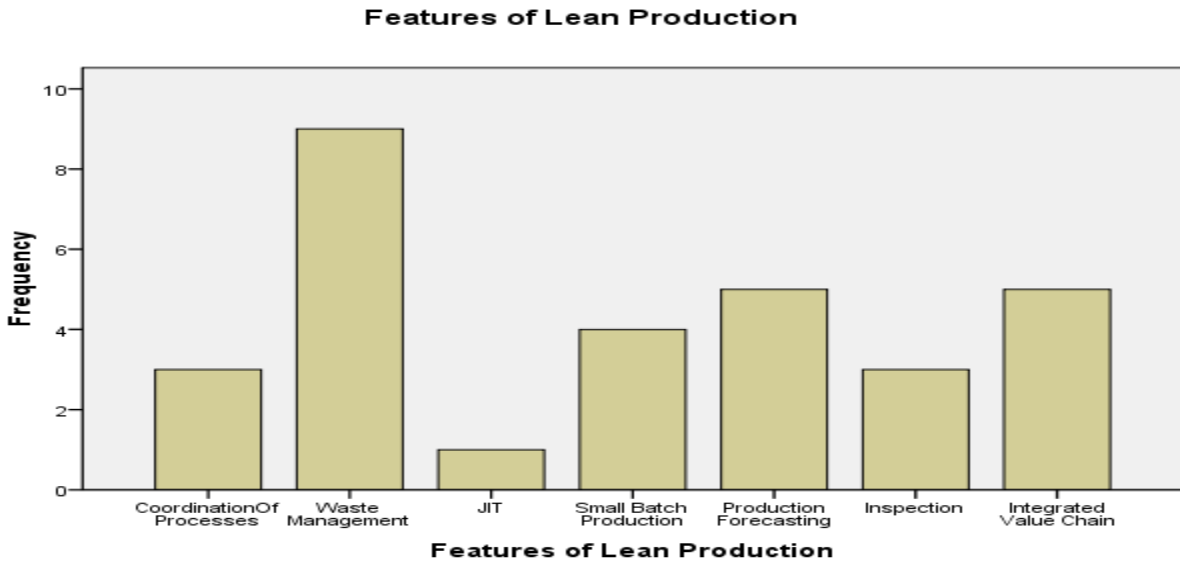


Figure 1: Features of Lean Production

Effect of Lean Production Systems

The effect of lean production systems was determined by its effect on product quality, employees and organization performance. The shortcomings of broad production were also identified. Basing the responses on a Likert Scale of 1 to 5, the respondents strongly agreed that high product performance, conformance to specifications and product durability are effects of lean production on product quality while they agreed reduced product defects, product reliability and product perceived features are also effects. However, standard deviations of responses show that "conformance to product specification" (0.45) and "product durability" (0.46) are normal than "high product perceived performance" (0.8). On the variables agreed upon by respondents, "reduced product defects" (0.5) has a normal deviation from the mean than "product reliability" (0.6) and "product's perceived performance" (0.8). The table below shows the response on the effects of lean production on product quality.

Table 2 : Effect of Lean Production on Product Quality

Effects of Lean Production on Product Quality	Reduced Product Defects	High Product Performance	Conformance to Specifications	Product Reliability	Product Durability	Product Perceived Performance
N Valid	30	30	30	30	30	30
Mean	4.43	4.53	4.73	4.37	4.60	4.40
Std. Deviation	.504	.507	.450	.615	.498	.814

Effects of Lean Production on Employees

Responses on effects of lean production on employees were identified. On a 5 point Likert scale, the means show respondents strongly agreed lean production "reduces re-work", "lessens supervision and builds autonomy", "reduces inspection" and "improves team work and coordination." However the standard deviations confirm "re-work" (0.25) is more normal

than "less supervision and autonomy" (0.4). Responses on "reduced inspection" (0.46) and improvement in "teamwork and coordination" (0.57) are more polarized. It was agreed that "reduced employee stress", "building cross sectional competence" and "reduced staff turnover" are impacts of lean production on employees. Standard deviations indicate "reduced staff turnover" (0.49) is normal than deviations of reduced employee stress" (0.62), "building cross sectional competence" (0.65). Table 3 summarizes this information.

Table 3: Effect of Lean Production on Employees

Effects of Lean Production on Employees		Reduces Re-work	Reduced Inspection	Reduced Employee Stress	Improved Teamwork/ Coordination	Building Cross Sectional Competence	Less Supervision & Autonomy	Reduced Staff Turnover
N	Valid	30	30	30	30	30	30	29
Mean		4.93	4.70	4.23	4.53	4.30	4.80	4.38
Std. Deviation		.254	.466	.626	.571	.651	.407	.494

Effects of Lean Production on Organization Performance

Lean production impacts on organizational performance in a number of ways. Respondents strongly agreed that it leads to "increased sales", "low stock levels" and "low production costs". The deviations show responses on "increased sales" (0.4) is normal than "low stock levels" and "low production costs" (0.5). Respondents further agreed that "customer numbers", "profitability", "investment", "continuous improvement", "customer responsiveness", "low supervision costs" and "reduced cycle times" were results of lean production. The standard deviations further indicate "increased customer numbers" (0.5) and "profitability" (0.5), are normal whereas "investment" (0.7), "continuous improvement" (0.7), "customer responsiveness" (0.7) and "low supervision costs" (0.7) and "reduced cycle times" (0.58) are more polarized. Table 4 shows these findings.

Table 4: Effects of Lean Production on Organization Performance

Effects of Lean Production on Organization Performance	Sales	Profitability	Customer Numbers	Low Supervision Cost	Low Cycle Times	Low Production Cost	Low Stock Levels	Customer Responsiveness	Investment	Continuous Improvement
N Valid	30	30	30	30	30	30	30	30	30	30
Mean	4.73	4.43	4.47	4.03	4.07	4.50	4.57	4.13	4.13	4.13
Std. Deviation	.450	.504	.507	.718	.583	.509	.504	.730	.730	.730

Disadvantages of Broad Production

The study identified the shortcomings of broad production to lean production. It was strongly agreed "increased inspection", "more defective products", "employee turnover" and "increased delivery times" are experienced. Results of the standard deviations indicate "increased inspection" (0) is the number one disadvantage with "more defective products" (0.47), and "increased delivery times" (0.5). Response on "employee turnover" (0.57) was not normal.

It was agreed "increased waste", "poor quality products", "less coordination of user departments", "high stock level costs" and "poor product forecasting" are also shortcomings of broad production. Standard deviations confirm "poor product forecasting" (0.47) "increased waste" (0.5) and "poor quality products" (0.5), have normal deviations than "high stock level costs" (0.62) and "less coordination of user departments" (0.68). Table 5 represents this information.

Table 5: Disadvantages of Broad Production

Disadvantages of Broad Production	Re-work	Increased Inspection	Defective Products	Poor Quality Products	Increase Delivery Times	Poor Product Forecasting	Employee Turnover	Stock Level Costs	User departments Un-coordination	Increased Wastes
N Valid	30	30	30	30	30	30	30	30	30	30
Mean	4.70	5.00	4.67	4.43	4.57	4.33	4.53	4.43	4.47	4.47
Std. Deviation	.466	.000	.479	.504	.504	.479	.571	.626	.681	.507

Challenges of Lean Production

The adoption of lean production comes with challenges to the organization. Respondents strongly agreed "having skilled personnel" (SD 0.5) is a major challenge. Respondents agreed "training cost", production forecasting", "staff resistance", "ICT infrastructure", "complexity of the value chain integration", "close supplier relations and "increased capital outlay". Standard deviations indicate responses on "ICT infrastructure", (0.47) "training cost" (0.5) and "close supplier relations" (0.55) are normal while "increased capital outlay" (0.64), "production forecasting (0.7), "complexity of the value chain integration" (0.75) and "staff resistance" (0.85) are far from normal. Table 6 represents the findings on challenges of lean production.

Table 6: Challenges of Lean Production

Challenges of Lean Production	Increased Capital	Skilled Personnel	Close Supplier Relations	ICT Infrastructure	Training Cost	Implementation Time	Production Forecasting	Staff Resistance	Complexity of Value Chain Integration
N Valid	30	30	30	30	30	30	30	30	30
Mean	4.00	4.56	4.20	4.33	4.47	4.13	4.47	4.37	4.30
Std. Deviation	.643	.506	.551	.479	.507	.730	.730	.850	.750

Approaches influencing Lean Production

Respondents indicated the strategies that can be used to improve lean. All respondents unanimously strongly agreed that "JIT", "TQM", "technology integration", "inventory management systems" and "staff involvement" improve on lean production. Consequently standard deviations indicate "JIT" (0.18), "TQM" (0.3) and "Technology Integration" (0.34) have normal responses than "inventory management systems" and "staff involvement." Table 7 shows this information.

Table 7: Approaches Influencing Lean Production

Approaches Influencing Lean Production	Technology Integration	TQM	JIT	Standardization of Processes	Inventory Management Systems	Staff Involvement
N Valid	30	30	30	30	30	30
Missing	0	0	0	0	0	0
Mean	4.87	4.90	4.97	4.77	4.83	4.73
Std. Deviation	.346	.305	.183	.430	.379	.450

Effects of lean production

Out of the 100% respondents indicate what they observed as effects of lean production. These include reduction in cot (27%), standardization of processes (10%), increase in profit (10%), high quality products (7%) and finally re-engineering, loss of job, killing employee creativity, customer responsiveness, and high implementation costs all at 3%. The graph on Figure 2 presents this information where the effects of lean production are plotted against the frequency of response.

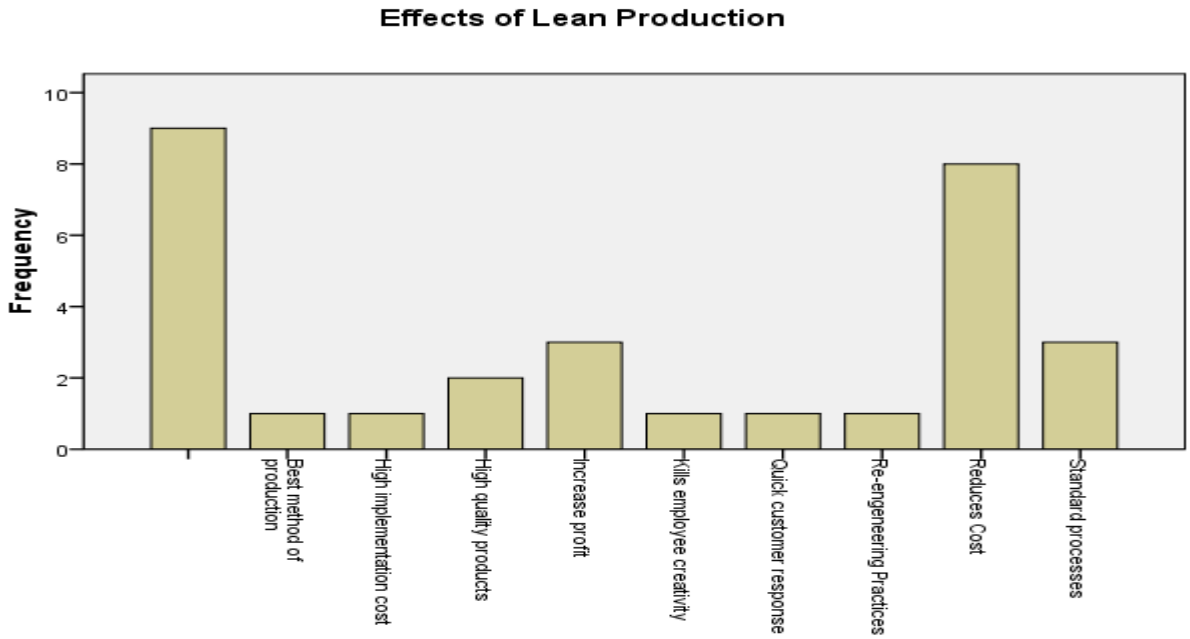
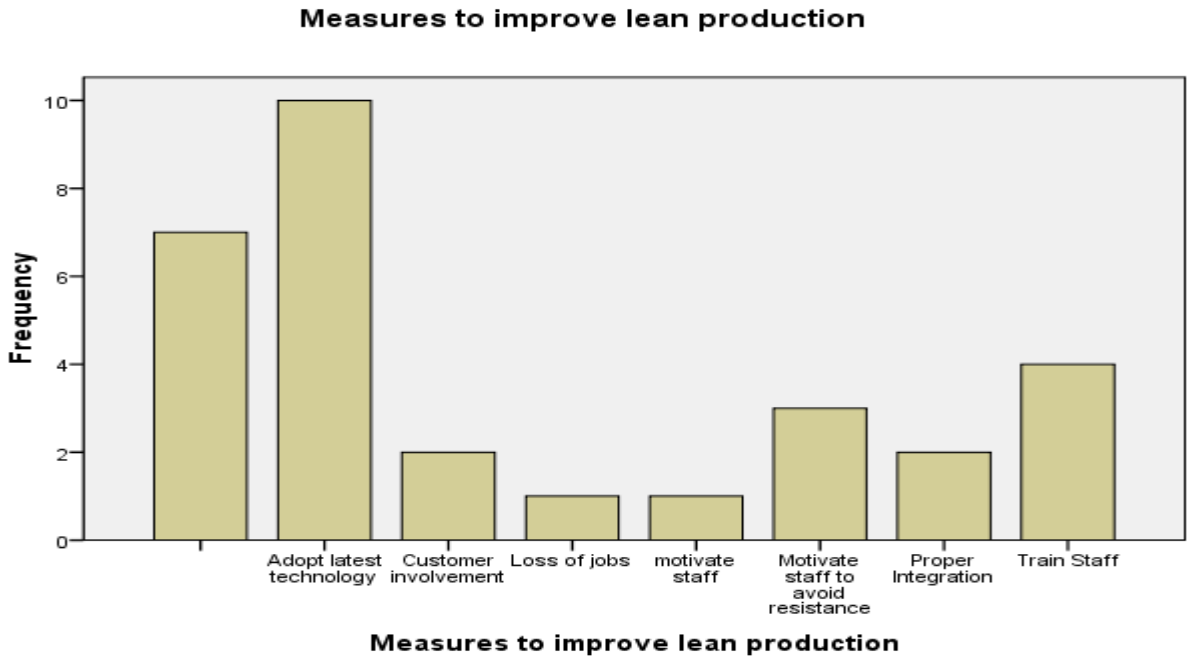


Figure 2: Effects of Lean Production

Measures to improve on lean production

Out of 100%, 73% suggested more measures and strategies that should be used to enhance lean production. These include 33% indicating adoption of the latest technologies, 13% said staff involvement, 13% suggested staff motivation to reduce resistance, 7% said customer involvement and 7% stated proper integration of systems in the value chain. The graph on the figure below depicts this information where the measures to improve lean production are plotted against the frequencies.



DISCUSSION

The study sought to assess the following: elements of lean production, the effect of lean production systems on product, employees and organizational performance, challenges of adopting lean production and lean production strategies for waste reduction. From the results, it is evident that flexible manufacturing is a major approach that firms can use to enhance lean production, as this is shown from 27% response rates. The results also show that 20% of the response rates ascertained that JIT and Kaizen are other approaches that firms can use to enhance lean production. From the results, firms can improve lean production by adopting latest technology, involving staff, customer involvement, staff motivation to reduce resistance and proper integration of systems in the value chain, thus reducing wastes and increasing organizational performance.

Besides high product performance due to integrated value chain and production forecasting, conformance to product specification due to standard processes and product durability which was evidenced by the present study as the major effects of lean production systems on product quality, product reliability and product perceived features were also other effects noted which led to reduced product defects and product durability.

The study also indicated the effects of lean production on employees, and as noted, majority of the respondents agreed that reduced re-work, less supervision and autonomy, reduced inspection and improved teamwork and coordination are the major impacts. In addition, from the findings above, it is also confirmed that reduced employee stress, building cross-sectional competences and reduced staff turnover are other impacts of lean production on employees. However, it has other negative impacts which include loss of job of the employees and also killing employee creativity.

Generally, the effects of lean production on organizational performance cover a broad spectrum. Among the major ones were increased sales, low stock levels and low production cost. The results also showed that increased customer numbers, profitability, investment, continuous improvement, customer responsiveness, low supervision costs and reduced cycle times were other notable effects of lean production on organizational performance; hence firms should adopt lean production to improve their performance.

The study also indicated that firms encounter a lot of challenges while adopting lean production. From the results, it is evident that increased capital needs and other related costs as a percentage of either total costs or total income of the organization; need for skilled personnel and the talent available for the assignment, an area where many Kenyan firms have really failed because very few professionals are trained in their areas of specialization; need for close supplier relations; need for ICT infrastructure; implementation time; production forecasting; staff resistance and complexity of value chain integration were found to be the main challenges that organizations face while adopting lean production system. Not all firms can adopt lean production system as it is most suited with large firms who have a lot of resources employed with a well managed database system. Otherwise, small organization sees it very expensive. Subsequently, most Kenyan firms have yet to adopt lean production. With the tremendous improvements in information technology, the increasing emphasis on the competitiveness has led to new attention on competitive advantage through effective utilization of firm's resources and modern ways of production. It is therefore essential to address competitiveness through lean production system, because through it, firms can gain such advantages as cost reduction, waste reduction, reduced product defects, increased sales,

increased profitability, customer responsiveness, low cycle times, product quality and reliability among others.

CONCLUSIONS AND RECOMMENDATIONS

James & Daniel (1996) states that lean can resolve severe organizational problems and additionally can be a powerful approach to gather and unite several change initiatives that are running through. Most organizations pursue lean in response to their need to fundamentally improve business competitiveness by reducing cost while increasing quality and customer responsiveness including meeting delivery time. For companies to remain competitive and profitable, they should adopt lean production practices. In order to sustain such practices, it is of paramount importance that several approaches as well as sufficient strategies implemented to help mitigate their effects and thus improve the organizational performance. Where such practices are implemented, as previous literature have illustrated, significant savings are attainable, resulting in reduction of production costs, low cycle times, low supervision cost, customer responsiveness, increased sales, increased investment and increased profit margins. There are significant approaches and strategies influencing lean, and from the findings, it was strongly agreed that JIT, TQM, technology integration, inventory management systems (IMS) and staff involvement improves lean production. This study established that there are several challenges encountered in lean production, and among the challenges include increased capital needs, need for skilled personnel, close supplier relationship, ICT infrastructure, training cost, implementation time, production forecasting, staff resistance and complexity of value chain integration.

In order to boost production in Kenya, the Kenyan Government should provide adequate infrastructural support particularly in the areas of power and transport. Lack of trained personnel in lean production locally has contributed to lack of recognition of the function. Owing to the huge resources companies spend on production, much emphasis and attention should be given to lean production to enable firms to achieve the best optimal cost structures, and as such firms need to create departments dealing with lean production function to enable easy control and monitoring costs. The company is encouraged to increase its resource commitment to staff training so as to develop skills and to update knowledge on lean production. As such, professionalism should be encouraged at all levels of the organization. It should not be restricted to the top management only. Quality consciousness through capability surveillance, that is, constant touch with suppliers/factory to ensure manufacturing conforms to product specification and quality, should be constantly advocated. This can further be necessitated by adopting the lean production strategies such as TQM, JIT, IMS, technology integration and staff involvement.

Furthermore, the company should integrate the supporting functions into the lean rollout and build internal customer and supplier relationships. As lean is a fully integrated management philosophy it is recommended that the idea of continuous improvement is also transferred into those organizational functions which support manufacturing and operations. It is therefore relevant that all departments understand their role in the lean transformation process. The best way to do that is by creating internal customer and supplier relationships.
Ensure that the board and top management actively drive and support the change with strong leadership especially the top management support during the whole change process. Strong senior manger availability on the shop floor, regular Kaizen event and lean training participation are mandatory if an organization seeks to implement the lean production.

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