

# **Assessment of the Influence of Just in Time (JIT) delivery of Materials in Managing Cost Levels in the Pharmaceutical Industry in Kenya**

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DOI: 10.6007/IJARBSS/v3-i11/331 URL: <http://dx.doi.org/10.6007/IJARBSS/v3-i11/331>

## **Abstract**

This article assesses the influence of Just in time (JIT) delivery of materials in managing cost levels in the pharmaceutical industry in Kenya. Non - probability sampling technique under the category of purposive sampling was used. The population of interest was composed of twenty three pharmaceutical manufacturing firms located in Nairobi, registered in the Kenya Fact book 16th Edition, 2001 & The Kenya Telephone Directory 2004 and nine pharmaceutical companies , 23 employees in manufacturing, finance, procurement, warehousing were selected out of the target population of 28. The research instrument was a questionnaire. Analysis of the data was done using descriptive statistics and inferential statistics .The study affirmed by 63.2% that JIT production strategy and 62.4% respondents affirmed that JIT vendor strategy had a statistically significant association with the cost level management hence the relationship between the variables was not due to chance. The study recommends that pharmaceutical companies in Kenya should fully adopt lean manufacturing in order to manage its cost levels hence give the firm a competitive advantage.

**Key Words:** JIT production strategy, JIT vendor strategy, cost levels, lean manufacturing, Pharmaceutical companies in Kenya.

### **Introduction**

Lean manufacturing was conceived as a novel means of cost reduction with the primary features of waste elimination and the organization of production around a demand-pull flow (Chiarini, 2013) Besterfield, (2011) demand-pull flow ensures that the companies only manufacture items that are required thereby promoting total efficiency in manufacturing. According to (Womack, T. M., Jones, & Roos, J., 2007) Toyota's production system has proven to be a successful paradigm shift from traditional mass production in methods of production for mass markets. (Shah & Ward, 2003) mention that Lean manufacturing has become an integrated system composed of highly inter-related elements and a wide variety of management practices, including Just-in-Time. JIT enables a company to produce the products its customer's want, when they want them, in the amount they want. JIT techniques work to level production, spreading production evenly over time to foster a smooth flow between processes. Varying the mix of products produced on a single line, often referred to as shish-kebab production, provides an effective means for producing the desired production mix in a smooth manner. JIT frequently relies on the use of physical inventory control cues (or kanban), often in the form of reusable containers, to signal the need to move or produce new raw materials or components from the previous process. Many companies implementing lean production systems are also requiring suppliers to deliver components using JIT. The company signals its suppliers, using computers or delivery of empty containers, to supply more of a particular component when they are needed. The end result is typically a significant reduction in waste associated with unnecessary inventory, WIP, packaging, and overproduction.

With increased globalization and internationalization of firms, Pharmaceutical companies in Kenya are facing several challenges in their production process. International pharmaceutical companies located in technologically efficient countries have now entered the Kenyan pharmaceutical market hence taking the competition levels a notch higher. In order to be competitive in such an environment, it is important that Kenyan Pharmaceutical companies adopt lean manufacturing so as to eliminate unnecessary wastes in its pharmaceutical production process. Local pharmaceutical companies in Kenya face competition on two fronts; they compete with each other and collectively, they face stiff competition from imports. A number of factors have contributed to the flood of imported pharmaceuticals, many of which are substandard, into Kenya, including; Foreign drugs are easy to register with the PPB as Kenya was one of the first countries in the region to reduce its pharmaceutical import tariffs to zero, At the same time, local pharma producers are disadvantaged on a number of fronts; Since they lack WHO pre-qualification, they are excluded from donor-funded procurement, Since many are small firms, they do not have the capacity to participate in large volume tenders, They are facing severe price competition from imports and they are financially strained by delayed reimbursements from the government of duties and VAT already paid (Waithaka, 2005). From the above discussion, it is evident that the Pharmaceutical companies in Kenya need to adopt lean manufacturing whole heartedly.

In view of the above review the following study was investigated:

To assess the influence of Just in time (JIT) delivery of materials in managing cost levels in the pharmaceutical industry in Kenya.

**Methodology**

Non - probability sampling technique under the category of purposive sampling was used. The population of interest was composed of twenty three pharmaceutical manufacturing firms located in Nairobi, registered in the Kenya Fact book 16th Edition, 2001 & The Kenya Telephone Directory 2004 and nine pharmaceutical companies , 23 employees in manufacturing, finance, procurement, warehousing were selected out of the target population of 28. The research instrument was a questionnaire. Analysis of the data was done using descriptive statistics and inferential statistics using Statistical Package for Social Scientists (SPSS) software in analyzing data. Analysis of the data was done using a combination of designs including descriptive statistics, frequencies and percentages. The former included means, standard deviations, and latter entailed Pearson’s Chi-square test of association.

**Results and Discussion**

**Assessment on Just – in – Time (JIT)**

In this section the researcher sought to find whether respondent’s understood the concept of JIT and its implication to cost levels in pharmaceutical industry.

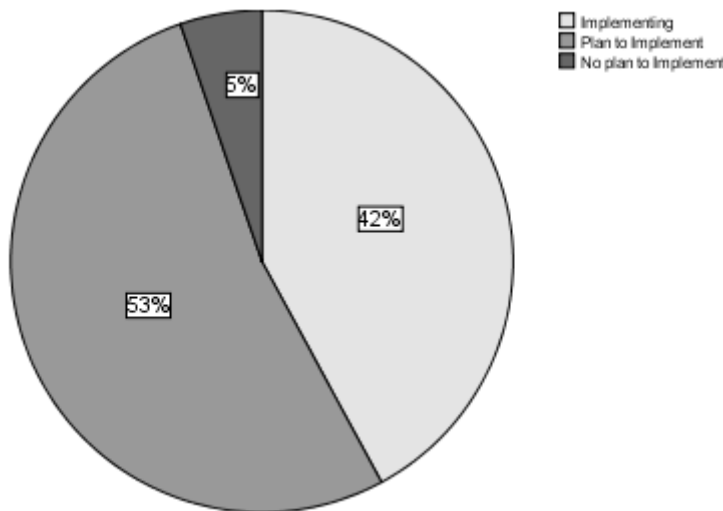


Figure 1: Just in time system

Figure 1 indicates that Table 11 indicates the responses of the current situation related to Just in Time system. 42% of the respondents reported that the system was been implemented, 53% said plans to implement the system was underway, the other 6 % said that there was no plan to implement the system.

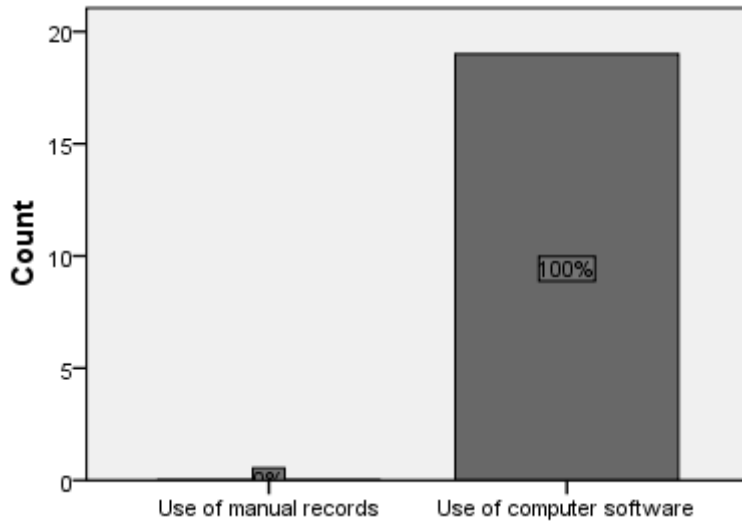


Figure 2: Inventory tracking system

Figure 2 Figure 12 all the firms use some form of computer software to track inventory either as raw materials and/or finished goods.

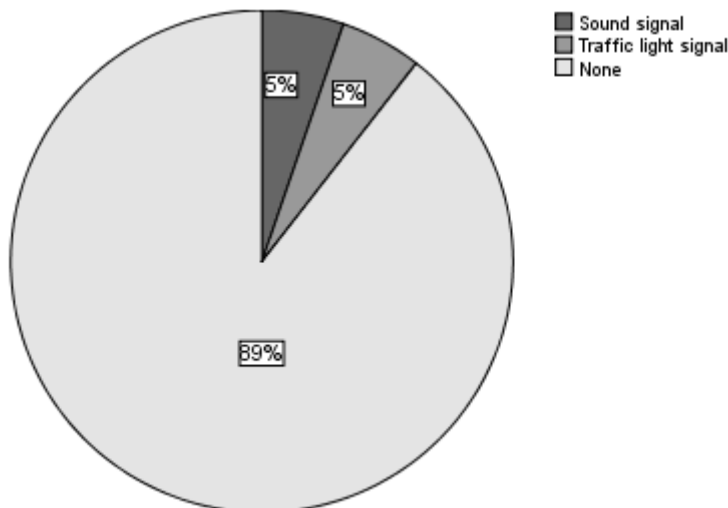


Figure 3: Kanban system

Figure 3 indicates the various types of KANBAN system used by respondents in the ware house. Majority 89% of the respondents firms did not use kanban systems, 6% used sound signal system while 5% used traffic light signal.

Table 1: JIT production strategy.

JIT production strategy	Frequency	Strongly agree	Agree	Not sure	Disagree	Strongly
Rapid setups are established (less than 10 minutes) for most machines and lines	19	(0%)	(32%)	(32%)	(36%)	(0%)
Cycle times of each workstation , cell or line are matched to upstream and downstream times	19	(16%)	(53%)	(16%)	(16%)	(0%)
Production Processes are grouped into product family (group technology) cells or lines	19	(42%)	(47%)	(0%)	(11%)	(0%)
Workers can perform many tasks within the production process	19	(37%)	(47%)	(0%)	(16%)	(0%)
Manufacturing engineering is located in the production area and is immediately available for problem resolution	19	(5%)	(68%)	(11%)	(16%)	(0%)
Scheduled preventive maintenance is considered an important part of production performance	19	(47%)	(42%)	(5%)	(5%)	(0%)
Labor is not "kept busy" by building product when not needed at the next operation	19	(21%)	(32%)	(42%)	(5%)	(0%)
Equipment is idle most of time to support high customer services level	19	(11%)	(16%)	(21%)	(47%)	(5%)
Daily rate and level schedules are used and usually meet due dates	19	(26%)	(37%)	(32%)	(5%)	(0%)
Weekly or daily delivery of 80% or more of production materials is made to the plant and directly to	19	(21%)	(21%)	(42%)	(16%)	(0%)

the production line points of use

Inventories are continually reducing	19	(11%)	(63%)	(16%)	(11%)	(0%)
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Table 1 shows the responses of JIT production strategy; this is represented by their frequencies and percentages.

Setups are non value-adding activities, costly and potentially wasteful. The measurement of setup time is the time taken to change over a given piece of equipment from the last good part from the preceding batch to the first good production part from the succeeding batch. In a JIT system, a common approach for setup reduction is to do as much of the setup as possible while the machine is running. Internal setup refers to any activity that can only be done with machine shut down, while external setup refers to any element that can be done with the machine still running. The ideal goal of setup reduction is zero time, or at least it should be such a minimum time that it wouldn't hold up the flow of other parts through the cell. From the survey only 32% agreed with the set up should be less than 10 min. manufacturing cells may be composed of a single machine, several machines, or several operators or assemblers using the same tools or equipment. The favorable response of group technology techniques means that most of the respondents have high potential to reduce workspace demands and provide flexible changeovers hence 89% of the respondent's agree. Under JIT production, the plant layout is arranged for maximum worker flexibility. This type of layout requires the use of "multi-function workers". Workers should have skills necessary to perform many tasks rather than one or two highly specialized tasks hence 84% of the respondents agree. Preventive maintenance is any action that will prevent machinery breakdown. It ensures the quality and reliability of the process and should be an ongoing and integral part of the workplace. Preventive maintenance is not solely the responsibility of one individual or maintenance department in a plant, rather the responsibility should be spread throughout the manufacturing organization. The organization should ensure that machines are capable of operating at all times within specified tolerances hence 84% of the respondents agree.

Table 2: JIT vendor strategy

JIT vendor strategy	Frequency	Strongly agree	Agree	Not sure	Disagree	Strongly
Materials are purchased in small quantities with frequent deliveries	19	(11%)	(52%)	(11%)	(26%)	(0%)
Key volume suppliers are local	19	(21%)	(42%)	(5%)	(32%)	(0%)
Single source suppliers make up greater than 50% of all suppliers	19	(16%)	(58%)	(21%)	(5%)	(0%)
Delivery lead time for most parts range from one day to one week	19	(16%)	(47%)	(5%)	(32%)	(0%)
suppliers provide on-time and reliable deliveries	19	(11%)	(58%)	(11%)	(21%)	(0%)
Most paperwork, material handling transportation and quality waste has been eliminated between suppliers and plant	19	(5%)	(26%)	(32%)	(37%)	(0%)
You have long term contract agreement with suppliers	19	(42%)	(32%)	(11%)	(16%)	(0%)

Table 2 above shows the responses of JIT vendor strategy; this is represented by their frequencies and percentages.

63% of the respondents agreed that materials are purchased in small quantities with frequent deliveries as manufacturing is the continuous flow of small lots of materials. As the lot sizes get smaller, it will lead to more efficient use of space, less material handling and greater visibility of problems. JIT demands that inventory be kept to a minimum. The 26% unfavorable response implies that some manufacturers tend to purchase materials in large quantities to avoid running out of stock and facing other disruptions.

The rule of geographical location of supply source is: the closer the better. If daily deliveries are needed, the freight issues are minimized when suppliers are local hence 63% do agree with this premise. The results show that some suppliers of manufacturers are usually local. Under JIT purchasing, buyers are encouraged to buy from a small number of suppliers, ideally one for each material or class of materials. Single sourcing means to utilize only one supplier of the available sources. This single source model also provides incentives for vendors to invest the time and resources needed to improve the products, process and reliability of delivery, and provides for a product with zero defects.

A shorter supplier lead time means greater customer satisfaction. The favorable response of 63% indicates that reliable deliveries can be promised, however 32% disagree.

74% of respondents do agree that most suppliers have long-term contract agreement with suppliers hence , their relationships are usually tight and close. Trusting relationships with just a few suppliers will assist in the creation of a more efficient company in terms of timeliness of deliveries.

The study affirmed by 63.2% that JIT production strategy and 62.4% respondents affirmed that JIT vendor strategy had a statistically significant association with the cost level management hence the relationship between the variables was not due to chance. As seen in the literature, JIT production strategy and JIT vendor strategy significantly related to the potential level of JIT implementation. The results obtained from this study suggest that Pharmaceutical manufacturers possessed partial prerequisites of JIT implementation.

Table 3: Tests of association between JIT production strategy and cost levels management

	Pearson Chi-Square ( $\chi^2$ ) value	df	sig
Workers can perform many tasks within the production process vs purchase pricing	13.179 <sup>a</sup>	4	<b>0.010</b>
Scheduled preventive maintenance is considered an important part of production performance vs purchase pricing	13.000 <sup>a</sup>	6	<b>0.043</b>
Production processes are grouped into product family (group technology) cells or lines vs product costing	5.625 <sup>a</sup>	2	<b>0.060</b>
Workers can perform many tasks within the production process vs product costing	4.621 <sup>a</sup>	2	<b>0.099</b>



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Scheduled preventive maintenance is considered an important part of production performance vs product costing	8.229 <sup>a</sup>	3	<b>0.042</b>
Labor is not "kept busy" by building product when not needed at the next operation vs product costing	0.281 <sup>a</sup>	2	0.869
Equipment is idle most of time to support high customer services level vs product costing	2.644 <sup>a</sup>	4	0.619

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This level of analysis aimed at determining whether there was any association between JIT production strategy and cost levels management. In order to accomplish this, the Chi Square Test of Independence which tests the association between two sets of categorical variables, were computed. Only the output from the statistically significant findings was presented in the body of the discussion. Below, are the findings generated from testing for the bivariate relationship between waste elimination and cost levels management.

The overall relationship between JIT production strategy and cost level management was statistically significant as shown from the elements of JIT which shows an association between workers being able to perform many tasks within the production process and purchase pricing at ( $\chi^2=13.179$ ,  $df =4$ ,  $p=0.010$ ), there is an association between scheduled preventive maintenance which is considered an important part of production performance and purchase pricing at ( $\chi^2=13.000$ ,  $df=6$ ,  $p=0.043$ ), there is an association between production processes being grouped into product family (group technology) cells or lines and product costing at ( $\chi^2=5.625$ ,  $df=2$ ,  $p=0.060$ ), there is an association between workers being able to perform many tasks within the production process and product costing at ( $\chi^2=4.621$ ,  $df=2$ ,  $p=0.099$ ) and there is an association between scheduled preventive maintenance which is considered an important part of production performance and product costing at ( $\chi^2=8.229$ ,  $df=3$ ,  $p=0.042$ ) . This implies that this association did not occur by chance but rather that there was a conscious effort by the pharmaceutical companies to minimize cost levels through JIT production strategy.

Table 4: Tests of association between JIT vendor strategy and cost levels management

	Pearson Chi-Square ( $\chi^2$ ) value	df	sig
Single source suppliers make up greater than 50% of all suppliers vs scrap factor	19.720	6	<b>0.003</b>
suppliers provide on-time and reliable deliveries vs scrap factor	12.883 <sup>a</sup>	6	<b>0.045</b>
Long term contract agreement with suppliers vs scrap factor	16.691 <sup>a</sup>	6	<b>0.010</b>
suppliers provide on-time and reliable deliveries vs purchase price variance	13.005 <sup>a</sup>	6	<b>0.043</b>
Long term contract agreement with suppliers vs purchase price variance	16.264 <sup>a</sup>	6	<b>0.012</b>
suppliers provide on-time and reliable deliveries vs purchase price variance	13.005 <sup>a</sup>	6	<b>0.043</b>
Long term contract agreement with suppliers vs purchase price variance	16.264 <sup>a</sup>	6	<b>0.012</b>
Long term contract agreement with suppliers vs product costing	5.657 <sup>a</sup>	3	0.130

This level of analysis aimed at determining whether there was any association between JIT vendor strategy and cost levels management. In order to accomplish this, the Chi Square Test of Independence which tests the association between two sets of categorical variables, were computed. Only the output from the statistically significant findings was presented in the body of the discussion. Below, are the findings generated from testing for the bivariate relationship between waste elimination and cost levels management.

The overall relationship between JIT vendor strategy and cost level management was statistically significant as shown from the elements of JIT which shows an association between single source suppliers making up greater than 50% of all suppliers and scrap factor at ( $\chi^2=19.720$ ,  $df =6$ ,  $p=0.003$ ), there is an association between suppliers providing on-time and reliable deliveries and scrap factor at ( $\chi^2=12.883$ ,  $df=6$ ,  $p=0.045$ ), there is an association

between long term contract agreement with suppliers and scrap factor at ( $\chi^2=16.691$ ,  $df=6$ ,  $p=0.010$ ), there is an association between suppliers providing on-time and reliable deliveries and purchase price at ( $\chi^2=13.005$ ,  $df=6$ ,  $p=0.043$ ) and there is an association between long term contract agreement with suppliers and purchase price variance at ( $\chi^2=16.264$ ,  $df=6$ ,  $p=0.012$ ). This implies that this association did not occur by chance but rather that there was a conscious effort by the pharmaceutical companies to minimize cost levels by smart choices in their vendor strategy.

### **Conclusion**

Findings from the study revealed that there was a significant association between JIT production strategy / JIT vendor strategy and cost level management in pharmaceutical industries in Kenya. This implies that this association did not occur by chance but rather that there was a conscious effort by the pharmaceutical companies to minimize cost levels through JIT. It is so clear now that lean manufacturing has become an integrated system composed of highly inter-related elements and a wide variety of management practices, including Just-in-Time. JIT enables a company to produce the products its customer's want, when they want them, in the amount they want, results in a significant cost reduction. However there is lack of a general understanding of lean manufacturing practices and the pharmaceutical companies have not employed a systematic approach in their implementation. Companies have implemented these practices in isolation and have therefore not reaped the full benefits of lean. According to (Herron, & Braident, C., 2007) lean tools should not be implemented in isolation; they were developed for a reason, which was to support an overall strategy. They have also suggested that it was better to embrace more lean tools rather than practicing one or two isolated ones.

### **Recommendation**

The study recommends that, the feedback received from the respondents who participated in the survey indicated that the Lean manufacturing systems implementation was successful. Lean Manufacturing is based on the Toyota Production System (TPS). Lean Manufacturing implementation is a never ending improvement based on customer focus and waste elimination. There is no single recognized standard for the implementation of Lean. It is dependent on the organization and what the organization has perceived as its value creating activities that will influence the implementation. Lean can be implemented only when there is support from the senior team. If the Chief Executive of the organization does not support it, the progress of the Lean implementation will be limited. It is suggested that the organization first establish senior management support and then communicate this to all, in order to understand the importance of the project. Implementation of lean manufacturing practices should support the company business strategy. The implementation should be in line with the corporate vision, mission, values and plans including communication and evaluation plans to build employee buy-in and communicate results. This will ensure that performance is measured to track actual performance against expectations, new initiatives, budgets including resources needed for new initiatives and current operations for lean projects.

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