2015 SUSTAINABLE INDUSTRIAL PROCESSING SUMMIT
Volume 11: Recycling & Environmental
Edited by F. Kongoli, T. Havlik, F. Pagnanelli, FLOGEN 2015

LEAN MANUFACTURING ADOPTION AND IMPLEMENTATION IN NIGERIA MANUFACTURING INDUSTRIES

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Keywords: Industry; Management; Production; Sustainability; Waste.

ABSTRACT

Lean manufacturing is one of the most stringent manufacturing productivity tools. Developed countries have aggressively pursued the strategy of implementing lean manufacturing and other productivity improvement tools, which has resulted in major improvement in their production output. Since the late 1990's Nigeria manufacturing industry has suffered a decline in their production level which has resulted in low productivity in some factories or in some cases outright shutting down of the plant. The aim of this study is to investigate the implementation of lean manufacturing adoption in the Nigerian manufacturing industry. The study was conducted using primary and secondary data. The primary data were obtained through a questionnaire survey while the secondary data was obtained from peer-reviewed articles. Results emanating from the study revealed that most manufacturing companies are not familiar with productivity improvement tools such as lean and also there is a lack of technical know-how of implementing the tools.

INTRODUCTION

The Nigerian government has set a deadline to attain its goals of become a global economic powerhouse by the year 2020[1], called vision 2020. key objectives of this vision are as follows Stimulate Nigeria's economic growth and launch the country onto a path of sustained and rapid socio-economic development Place Nigeria in the bracket of top 20 largest economies of the world by the year 2020, able to achieve a GDP of not less than $900 billion and a per capita income of not less than $4000/annum by the year 2020[1]. Hence manufacturing plays a major role in the development of any economy, thus for Nigeria to attain its vision 2020 amongst others the manufacturing industry has to be revamped to improve the level of productivity. A search in the literature reveals very little publications on Nigerian companies adopting productivity improvement practices, which may suggest low application of productivity improvement tools. The Nigerian manufacturing industry is one of the lowest contributor to the GDP of the economy estimated at 6.8% [2] therefore this it has led to an adverse effect on the economy which has led to limited production of goods, hence which has led to the large volume of importation of goods and also an increase in the preference of foreign goods to local goods because of wide difference in the quality.

Lean manufacturing has been identified as one of the most powerful productivity tools. Lean manufacturing is a productivity improvement tool which eliminates waste from the production process [3]. Lean production is focused on the removal of activities that does not in whatever way add value to the end product, which leads to the production of goods at a lower cost and increases the companies' competiveness [4]. The aim of this study is to examine the adoption and implementation of lean manufacturing in the Nigerian manufacturing industry, hence this study identifies the barriers of the adoption and implementation of lean manufacturing in the Nigeria manufacturing industry as a manufacturing productivity tool. The understanding of the challenges in the adoption of the implementation and implementation of lean manufacturing as a manufacturing tool can lead to the formulation of strategies to implement efficiently this productivity tool. With this knowledge Nigeria can take a major step towards achieving the Vision 2020.

LEAN MANUFACTURING

Lean manufacturing is a methodical method for the elimination of waste within a manufacturing process. Lean takes into account waste created through overstrain and waste created during the manufacturing process. Lean manufacturing adds value to the product being produced, Value-added activities are activities that are necessary to create value for the end customer. Value is thus defined as any activity carried out during the course of producing a product/service that the customer would be willing to pay for [4]. Fundamentally, Lean is centered on adding value by reducing waste.

Lean manufacturing is a management philosophy started by Toyota motors which was called Toyota production system (TPS) in the 1990's. TPS is known for its attention on reduction of the original Toyota seven wastes to improve the overall customer value [3, 5]. Lean is a set of tools that help in the identification and elimination of waste, hence as waste is eliminated the quality improves, while production time and cost are reduced. The list of such tools would include Single minute exchange of die (SMED), Value stream mapping, Kanban (pull systems), Poka-Yoke (error proofing), Total Productive Maintenance, elimination of time, the list is non-exhaustive. A second approach to lean manufacturing is that which is promoted by Toyota called the Toyota way, which focuses on the improving of the flow of work, thereby gradually eliminating waste through the system. Techniques used to improve flow include production levelling, Pull production (Kaban Method), and the Hejikuna Box [6].

Lean concepts evolved from Japanese industries with Toyota the leader in the concept of lean manufacturing [7]. Lean manufacturing is the minimization of waste to maximize the value of the product. Principles of lean are as follows: the value of the product/service as supposed by the customer, making the flow in-line with customer pull and always motivated to push for perfection through continuous improvement to eliminate waste by sorting out Value Added Activity and Non Value Activity. Activities associated with Non Value Activity are Transportation, Inventory, Motion Waiting over-production and over processing. These wastes can be eliminated through successful implementation of lean elements [7].

Lean elements consist of the following process; Push and Pull System which describes, the Pull system relies on customer prerequisite whereas push system rely on programmed timetable. [8], Cellular Manufacturing defines the facility combination in order to produce the product with least process time, waiting time, and transportation by smoothen the process flow. Further fluctuating line flow is improved by U-line concept and line balancing concept, Kanban is Material Flow Control mechanism (MFC) which delivers the right quantity of parts at right time [9]. Stages of this Kanban implementation are production stage and withdrawal stage. One piece flow ensure just-in-time production system in order to adopt straightforward schedule without interruption,

backflow or scrap, relaxing the Take time and decreasing the risk of machine failures and operator mistakes [10]. Single Minute Exchange of Dies (SMED)/One-Touch exchange of Die (OTED) is systematic reduction of changeover time by converting possible internal setting time (Carry out during machine stoppage) to external time (performed while the equipment is running) and to simplify and streamline the remaining activity [11]. Production Levelling enhances production volume as well as production mix and production efficiency by means of reducing waste, unevenness, and overburden of people or equipment [6]. Levelling of parts leads to successful implementation of Every Part Every Interval (EPEI) concept, Employee perceptions include Belief, commitment, work method and communication, for lean transition the motivation for cultural change is needed to improve employee perception.

METHODOLOGY

The research methodology consisted of a survey of lean manufacturing within Nigerian Manufacturing industries. A survey questionnaire was developed, which asked a series of question as regards the understanding of lean, barriers to the adoption of lean, and benefits as a result of the implementation of lean. The research was focused on the south west of Nigeria as the sample, with concentration in Lagos due to logistical constraint. Appointments was made to meet the production manager, engineering manager and quality manager. Fifty (50) questionnaires were distributed but thirty-three (33) were completed and returned. Secondary data comprises of literature. To determine lean manufacturing, adoption barriers respondents were provided a sample of 10 lean manufacturing tools to identify. Identify barriers limiting them from the adoption of the tools. The tools provided are KPI (key performance Indicator), smart goals, total productive maintenance, total quality management, overall equipment effectiveness, standardized work, Kaizen, Continuous flow, Plan do check Act (PCDA). Limitation of this research, is the using of Lagos to represent all of south west Nigeria.

RESULT AND ANALYSIS

Thirty three companies returned completed questionnaires, giving a response rate of 66%. The companies targeted were SMEs. A SMEs is defined by the Central Bank of Nigeria as business whose annual turnover is less than 100million naira and less than 300 employees [15].

Adoption barriers

The main barrier to lean adoption is Lack of top management support in adopting which is 35% of the research participants, 60% out of the 35% citied cost while the remaining 40% of the 35% citied management was not familiar with the tools. Not familiar with the tools to implement tools is 25%, which shows that people to implement this productivity tools are not totally familiar with the mechanics of the tools, thus they are not aware of the full benefit that could be obtained from lean implementation. Table 1 provides the barriers identified by the research participants.

Tab I. Major barriers to adoption of Lean manufacturing tools	
	Percentages
Not familiar with tools	25
Tools too costly to implement	15
Lack of staff with sufficient knowledge to implement tools	25
Lack of top management support in adapting tools	35
Lack of co-operation with suppliers to establish lean supply chain	0

The next barrier identified is the lack of staff with sufficient knowledge to implement the productivity tools; is 25% which indicates that they are aware of the benefits of lean implementation but are unable to adopt the lean tool because of lack of practical knowledge of the staff on how to implement the tool, this finding is consistent with research carried out by Lean Enterprise Institute in which 31% research participant identified lack of implementation know-how as a barrier to Lean adoption [12]

Implementation Barriers

Table 2 provides challenges experienced by participating companies during implementation of lean manufacturing tools. Results show that the main challenges to lean implementation are 'lack of skilled employees' and 'coping with change'. Of the participating companies, 30% felt that these were the biggest hindrances to their lean effort.

Table II. provides challenges experienced by the participating companies during the implementation of lean manufacturing tools	
Number of employees	Percentage
Coping with changes	30
Lack of commitment from top management	17
Financial problems	24
Lack of co-operation from suppliers to establish Lean supply chain	10
Cultural & Social barriers to changes	9
Lack of skilled employees	30
Lack of collaboration between different functions	5
Employee resistance to change	27

Lack of skilled employees, identified by 30% of the participants, this may also aid to explain why the adoption of lean in Nigeria manufacturing companies is low. Without appropriate skills, it is a very big task to get lean implementation right. As observed by Holweg [5] and Balle [13], many organizations are not able to adapt and ready themselves properly for the daunting challenges, most particularly keenness of personnel and understanding the real core of lean manufacturing ideas. To succeed, this requires employees who understand the principle of lean and change management processes.

From the results it shows that when the organizations embarked on the implementation of Lean they were not ready for the change accompanied with it, making it a major challenge for the

organization when the implementation of Lean begin. Strategies were not put in place to deal with the changes accompanied with Lean. Lack of management commitment also indirectly is connected to the high resistance of change, this is so because management did not put relevant structures to allow staff to deal with the changes better. Also connected to coping with change is the high percentage of employee resistance to change which is 27% to the implementation of Lean. This goes to show that companies are not ready for changes that accompanies lean manufacturing due to lack of familiarity of the tools for fear they might lose their jobs.

Financial problems is also a major challenge when implementing Lean. This finding is due to the fact that the companies that participated are small and medium organizations as observed by the 24% as seen in the result, the high cost accompanied with the implementation of lean keeps the SME's from implementing it.

CONCLUSION AND RECOMMENDATIONS

Lean manufacturing is one of most effective productivity improvement tools of the 21st century. Organizations who has implemented Lean and are reaping the benefits that comes with it. Nigeria struggles with productivity, because of that the implementation of Lean is on a slow pace. The Aim of this study is to investigate the adoption and implementation challenges faced by Nigerian manufacturing industries preventing them to adopt and implement Lean. Results show that they suffer from lack of resources needed for the successful implementation Lean manufacturing. Major challenges associated with adoption of lean manufacturing in Nigeria were identified as Lack of Management support, not familiar with the tools and lack of staff with knowledge to implement lean. This is as a result of the size of manufacturing organization, the manufacturing firms do not have the resources and manpower to adopt this productivity tool, also management is not in support of this productivity tool due to cost and not being familiar with the tool.

The main challenges identified in the implementation of lean were identified as, resistance to change, lack of skilled staffs, employee resistance to change, financial commitment. These challenges has led to the inability of the manufacturing companies to be able to implement lean manufacturing. With the analysis and result of this research study, a number of recommendations are summarized below:

- It is important for government agencies supporting the Manufacturing industries mainly SMEs to come up with policies and awareness programs to support them;
- When planning, there is need for organizations to include productivity improvement tools, to ensure when they want to implement them they have adequate resources (staffs, financial); and
- To ensure the problem of non-familiarity of the tool is avoided, employees should begin training in several productivity tools before investing in training for lean elements.

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