



A REVIEW OF IMPLEMENTING OF VALUE STREAM MAPPING AND KANBAN METHOD FOR IMPROVED AND SUSTAINED PRODUCTION IN PISTON MANUFACTURING

Ashish Mishra¹, Prof. M.S Pardri²

^{1,2}Department of Mechanical Engineering, SIRT, Bhopal

ABSTRACT

The aim of this paper is to study and idea about Kaizen and Kanban technique for a small improvement in a manufacturing company. The review is made by considering various factors including variations of Kanban, production systems adopted in various types of organizations, and analytical tools and techniques adopted for modeling the system. One of the important finding is the behavior of modified Kanban and its effects on production systems. The results of various studies would also help in designing a novel production system which might be better than the existing systems. This review serves as guidelines for implementing Kanban system in various production systems and also to identify the critical parameters. The paper describes basis definition of Kaizen philosophy & a review on Kaizen concept and its implementation. Kaizen is one of the most important techniques of continuous improvement.

Keywords: Kanban technique, Kaizen technique, value stream mapping, manufacturing process, Small scale industry; Bottleneck process.

I. INTRODUCTION

The global market has dramatically modified throughout the past years. Consequently, product with quality, long interval, and limited selection are not any longer acceptable among customers. Customers' demands are increasing by time and traditional production systems cannot meet this new level of demand. Hence, applying new production strategies so as to provide prime quality product, in brief time, with low value becomes

essential for survival in current competitive international market.

Lean production is one among the approaches that has been utilized by several corporations round the world to realize these competitive benefits. However, lean production was developed by giant companies and supported their characteristics. Giant companies aren't the only vital enterprises and little and Medium sized Enterprises (SMEs) have a large share within the world economy: for instance 55.5% of all the additional value in Europe comes from SMEs (European Commission, 2005). Therefore, it's vital to find out; whether or not SMEs may enjoy the benefits caused by applying lean production. Since lean production isn't tailored for SMEs and their characteristics, these companies might face some difficulties with implementation of it in their organizations.

A. KANBAN

Kanban could be a signal that's wont to trigger an action. The kanban is Japanese word and its meaning suggests that "card you'll see."

In production area, Kanban starts with the consumer's demand and follows production downstream. At its simplest, kanban could be a card with a listing variety that's connected to an area. Before installed the right part; the kanban card is removed and referred up the supply chain as an appeal for a different part. In a very lean production atmosphere, an area is basically manufactured (or ordered) if there's a kanban card for it. As a result of all requests for components are force from the order, kanban is usually referred to as a "pull system."

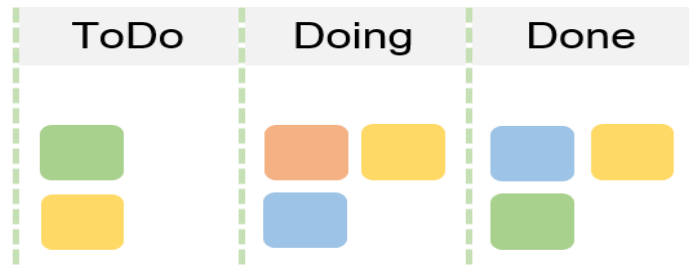


Fig.1.3 Kanban procedur

B. VALUE STREAM MAPPING

It is a lean-management process for investigating the current state and planning a future state for the series of events that precedes a product or service from its start over to the

customer with reduced lean wastes as matched to current map. A value stream concentration on regions of a firm that add value to a product or service, whereas a value chain discusses to all of the activities within a company.

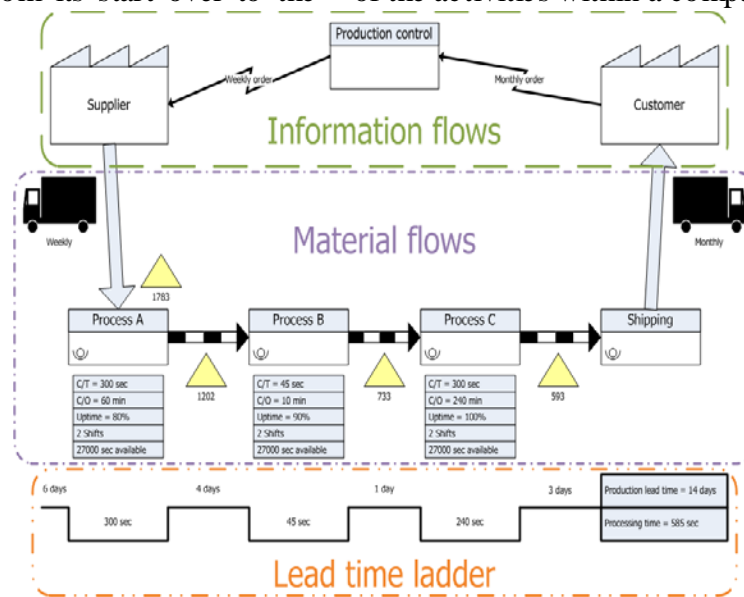


Fig.1.2 Value Stream mapping procedure

II. LITERATURE REVIEW

(Verma and Sharma, 2017) mentioned case study, work has been done on characteristic the waste connected areas as a study of lean manufacturing. it's been found that the explanation for non-value additional activities are because of wrong handling material, long distance, defect and improper inventory. when literature study within the field of lean tools we tend to terminated that the VSM is an efficient tool for eliminating these wastes and study additionally advised the ways that to reduce non price additional times during a producing method. Giant reductions in time consumption may be achieved by reducing the waiting time of employment throughout production method. Most significant purpose is that during this improvement method, no new machines were purchased nor were operators

expected to work faster or harder; only procedures and layouts were modified to permit the product to flow additional smoothly through the producing method. And this activity reduced the producing interval intern increased the productivity of a small scale industry.

(Yadav et al., 2018) showed that “lack of management commitment and leadership”, “lack of communication” and “lack of resources” are the most important barriers thus these ought to be thought-about because the foundation of any lean implementation project in SMEs. The study conjointly advised that elementary data of lean moreover as its advantages ought to be known to the staff at associate early stage for their active involvement. Moreover, lack of resources was found to be a dominating factor in SMEs. The

management might explore for various sources of money to fund the lean initiatives.

(Thanki and Thakkar, 2018) findings of this analysis clearly suggest that the govt support and prime management commitment and decent allocation of funds are extraordinarily necessary for a successful preparation of lean-green initiatives. The repercussion for small- and medium-scale business is that they will reap substantial improvement in their operational and business performance through lean-green implementation if they take the advantage of presidency schemes and awareness programs, specifically launched for SMEs. As a final remark, despite the high impact of SMEs on the economy of developing country, operational efficiency and environmental property continues to be a part which needs a lot of analysis to explore its true potential in industrial context. Productivity losses go unnoticed in Indian small- and medium-sized industries; and thence such studies would aid practitioners in addressing lean-green implementation challenges a lot of with success.

(Ruben, Vinodh and Asokan, 2018) expected to supply sustainable advantages, LSS framework with insights on environmental aspects are useful achieve integrated operational and environmental advantages. Although the abstract framework for LSS with environmental insights has been projected, the framework has got to be check valid empirically and quantitatively to derive its practical implications. The framework should be valid through industry-related studies and simulations so as to explore its application potential, improvement possibilities and its limitations. Additionally, the developed framework is additional increased by incorporating eco-design and environmental sustainability options. Additional this study provides a short summary on numerous views of LSS concerning producing sectors derived from the literature. It additionally helps the researchers in gaining information regarding the environmental insights throughout LSS implementation and provides initiatives for implementing the projected framework to deliver combined operational and environmental enhancements.

(Meena et al., 2018) solved the matter of rejection because of internal distance and

concentric diameter as shown in Tables 9 and 10, that are improved through the successful implementation of DMPEAIC. The calculable savings once a year with the assembly of the engine is 39, 28,000 in Indian rupees. The developed DMPEAIC framework helped the organization to reduce searching within the fulcrum lever of the distribution pump. The results of this case study have helped establish the target to go forward with another DMPEAIC implementation within the alternative product among the organization.

(Aboelmaged, 2018) The model is through empirical observation valid by suggests that of the PLS-SEM technique using information from 238 homeowners and managers from a large spectrum of Egyptian SMEs. This study demonstrates that environmental pressures, management support and employees' engagement predicts SMP in Egyptian SMEs. In contrast to existing literature, this study establishes that technology infrastructure, technology competency, and environmental regulations don't considerably influence SMP. Curiously, the link between SMP and competitive capabilities of Egyptian SMEs is absolutely vital that supports the contribution of SMP to enhance firms' competitive performance. From a managerial perspective, the current analysis offers policy manufacturers and managers a frame of relevance boost SMP within the context of SMEs not only to patronize managers' and employees' environmental responsibility towards varied pressures from customers, suppliers and public media however additionally to encourage their engagement in developing property programs. Therefore, increasing managers' awareness, information and specialized training regarding sustainability problems in SMEs are of great importance. Moreover, Egyptian environmental authorities ought to establish an institutional framework and structure capability that mirror SMEs' variations and feedback to enforce the implementation of environmental laws. So that, accessing, observance and coverage actual environmental information by the managers of SMEs cannot be a tough method that's scattered among varied authorities. nice prospects are expected from property producing technology once the govt considers SMEs capability building by matching technology investments

with actual property wants while observance the SMEs role in making property value at a strategic level.

(Sahoo and Yadav, 2018) suggests that implementing lean in small and medium producing companies is by no means that a straightforward task, because it is heavily burdened by many internal and external structure barriers. Additionally to the identification of the most important barriers to implementation of lean producing in Indian SMEs, the paper additionally investigated the impact of lean producing implementation on Indian SMEs performance. The result provides insights into the extent of lean producing implementation in SMEs within the Indian context and provides any evidence that lean practices are important in enhancing OP. The results show that everyone the 3 lean constructs are considerably associated with OP. each PI and WM constructs show a high level of significance, whereas FM has shown a moderate level of significance with OP. One possible reason can be that "PI" and "WM" lean implementation in SMEs need less capital investment, and are targeted upon hardcore maintenance and quality improvement techniques that optimize instrumentality effectiveness, eliminate breakdown and integrate the capabilities of the work force for continuous improvement of production parameters to achieve excellence. There's little doubt concerning the similar connection of FM practices that have a moderate level of association with OP parameters. The explanation can be the dearth of strategy for integration of data technology and traditional producing processes like MRP (Material demand Planning), MRP II (Manufacturing Resource Planning) and ERP (Enterprise Resource Planning), that are extensively utilized by large-scale makers. even so, the adoption of those systems could lead on to a high cost, as a results of serious investment within the IT infrastructure, internal coaching and after-sale service, that is unaffordable to most SMEs. Lean producing implementation needs time, money, energy and full company commitment. The employment of rigorous 5S and preventative maintenance seems to be a widespread follow among Indian SMEs. Because of limited resources, it's impossible to

use all lean tools and techniques at just the once.

(Contreras González *et al.*, 2017) Value stream mapping will be a vital tool for development method improvement. region industry experience indicates that each a decent set important stream mapping tools and a lean context correlate with method improvement success. No single best observe but, lean terminology was found. Reassessed to use to PD combined with many complementary worth stream mapping ways, give an efficient set of tools for PD worth stream mapping.

(Marodin *et al.*, 2017) presented empirical proof regarding however the implementation of disc practices is related to enhancements in operational performance of Brazilian automotive provide chain corporations. We tend to valid our form and performed variable regression analysis with information from 64 Brazilian corporations. The results recommended that our preliminary assumption was correct, as a result of the link between LP practices and performance in Brazilian corporations looks to be different from different countries. Above all, the businesses within the Brazilian automotive provide chain have experienced reduction in time interval because of the implementation of TPM practices, and reduction of Inventory due to the employment of JIT practices.

(Samantroy, 2017) determines the crucial factors for successful implementation of Lean conception in Indian SMEs. For this, numerous SME industries have taken into thought for information assortment, wherever some ideas of Lean have already been implemented and also the issues faced by them throughout implementation, conjointly the SMEs people who are interested to use Lean, the Procedure for that's described during this Paper. Lean producing conjointly called Toyota Production Systems was 1st introduced by Toyota that could be a price additive method by eliminating all wastes by correct method Management. Now days, the majority sectors industries significantly SMEs try implement Lean in their Organization. This Paper tries to resolve some common issues faced by them throughout the implementation stage.

(Prakash, 2016) Levels of SS deployment are increasing, especially in large organizations in the US, UK and the

Netherlands, and in some SMEs in developing countries such as India, the number of available SS publications is increasing accordingly. The application of SS methodology in the manufacturing sector has demonstrated the significant benefits that can be gained, along with motivation factors. Equally importantly, the limitation and impeding factors which need to be overcome are also stated. There are many gaps in the available literature that need to be covered in future research, and although a great deal of work has been undertaken on individual Six Sigma themes. In the past there has been little written on Six Sigma as a coherent strategy for business improvement and this is one of the more immediate gaps that needs to be bridged.

III. EXPECTED METHODOLOGY

In this section, the method to develop kanban system is presented. Then evaluation of performance was carried out once the Kanban system was adopted in manufacturing area. The adoption of continuous flow system is essential prior to any kanban system implementation.

To achieve the objective of case study, the method was structured as follow;

- i. Designing kanban flow
- ii. Gathering relevant parameter of manufacturing and customer
- iii. Calculating number of kanbans to determine optimum level of inventory
- iv. Establishing pull mechanism and rule to assist production associate in daily operation
- v. Evaluating kanban using lean parameter

The Kanban numbers were then determined using two equations which are Production Instruction Kanban (PIK). The model of calculation is as follows;

$$\text{Part interval} = \frac{\text{Number of part variant}}{\text{possible number of change over}} \quad (1)$$

$$\text{Part interval} = \frac{\text{Available Time}}{\text{Part demand}} \quad (2)$$

$$PIK = \left(\frac{(W_k + T_L) \times c}{T_t + \alpha} \right) + T_w \quad (3)$$

Where, kanban variables are:

W_K = withdrawal time,

T_L = time to replenish part

T_T = part takt time,

T_W = time for waiting kanban,

α = safety stock

c = container capacity

IV. CONCLUSION

From the above literature, determined that there is a huge literature existing on Kanban technique, which describes a liberal review of past practices and researchers carried out. The main focus of lean manufacturing is to eliminate waste, doing things better in half of the resources as mass production requires, providing higher quality with lesser cost. It concluded that the VSM is an effective tool for eliminating these wastes and study also suggested the ways to reduce non value added times in a manufacturing process. Large reductions in time consumption can be achieved by reducing the waiting time of a job during production process. The study of how to implementation of Kanban technique leads to continuous improvement in productivity of the various manufacturing companies. This technique is widely accepted philosophy in manufacturing companies and more research work is taken in this area. Kanban is an approach focused on improving productivity, reducing variation and eliminating waste, improve lead time, use of space in an arrangement. Kanban is most important for step by step small improvement and gets better results in a production line. This study achieves from this literature review to different Kanban tool apply in a different company as per necessary but Kanban techniques, 5s and Value Stream Mapping are much effective and use full tool for the finding of waste and improvement of the process. And also Kanban technique is applying in any industry and development benefits.

V. REFERENCES

- Aboelimged, M. (2018) 'The drivers of sustainable manufacturing practices in Egyptian SMEs and their impact on competitive capabilities: A PLS-SEM model', *Journal of Cleaner Production*. Elsevier Ltd, 175, pp. 207–221. doi: 10.1016/j.jclepro.2017.12.053.
- Contreras González, B. *et al.* (2017) 'Hipertensión arterial no controlable en el primer trimestre de la gestación. Hiperparatiroidismo primario, a propósito de un caso', *Clínica e Investigación en Ginecología y Obstetricia*, pp. 8–13. doi: 10.1016/j.gine.2017.02.001.
- Marodin, G. A. *et al.* (2017) 'Lean

production and operational performance in the Brazilian automotive supply chain', *Total Quality Management and Business Excellence*, (October), pp. 1–16. doi: 10.1080/14783363.2017.1308221.

Meena, M. L. *et al.* (2018) 'Process improvement in an Indian automotive part manufacturing company: a case study', *International Journal of Productivity and Quality Management*, 23(4), p. 524. doi: 10.1504/IJPM.2018.090263.

Prakash, R. (2016) 'Six Sigma Implementation in Small and Medium Scale Electronic Industries : A Case Study', 5(11), pp. 169–173.

Ruben, R. Ben, Vinodh, S. and Asokan, P. (2018) 'Lean Six Sigma with environmental focus: review and framework', *International Journal of Advanced Manufacturing Technology*. The International Journal of Advanced Manufacturing Technology, 94(9–12), pp. 4023–4037. doi: 10.1007/s00170-017-1148-6.

Sahoo, S. and Yadav, S. (2018) 'Lean

implementation in small- and medium-sized enterprises: An empirical study of Indian manufacturing firms', *Benchmarking*, 25(4), pp. 1121–1147. doi: 10.1108/BIJ-02-2017-0033.

Samantroy, P. (2017) 'Implementation of Lean and Challenges in Sme ' S', 4(2), pp. 35–43.

Thanki, S. J. and Thakkar, J. (2018) 'Interdependence analysis of lean-green implementation challenges: A case of Indian SMEs', *Journal of Manufacturing Technology Management*, 29(2), pp. 295–328. doi: 10.1108/JMTM-04-2017-0067.

Verma, N. and Sharma, V. (2017) 'Sustainable competitive advantage by implementing lean manufacturing "a Case study for Indian SME', *Materials Today: Proceedings*. Elsevier Ltd, 4(8), pp. 9210–9217. doi: 10.1016/j.matpr.2017.07.279.

Yadav, V. *et al.* (2018) 'An appraisal on barriers to implement lean in SMEs', *Journal of Manufacturing Technology Management*, p. JMTM-12-2017-0262. doi: 10.1108/JMTM-12-2017-0262.