Available online at www.sciencedirect.com

ScienceDirect

Procedia Economics and Finance 7 (2013) 174 – 180

Procedia Economics and Finance

www.elsevier.com/locate/procedia

International Conference on Economics and Business Research 2013 (ICEBR 2013)

Lean Manufacturing Case Study with Kanban System Implementation

Nor Azian Abdul Rahman[a]*, Sariwati Mohd Sharif[b], Mashitah Mohamed Esa[c]

[a,b,c] *Faculty of Business Management, Universiti Teknologi MARA, Shah Alam, 40450, Selangor, Malaysia*

Abstract

Lean manufacturing has been the buzzword in the area of manufacturing for past few years especially in Japan. The Kanban system is one of the manufacturing strategies for lean production with minimal inventory and reduced costs. However, the Kanban system is not being implemented widely by manufacturing companies in Malaysia. Thus, the objectives of this case study are 1) to determine how does the Kanban system works effectively in multinational organization; and 2) to identify factors hindering Malaysian small and medium enterprises (SME) from implementing Kanban. Findings of the study suggest that top management commitment, vendor participation, inventory management and quality improvement are important for Kanban deployment and towards lean manufacturing.

Selection and peer-review under responsibility of ICEBR 2013

Keywords: **Just-in-time; lean manufacturing; kanban system; inventory management; operations strategies**

1. Introduction

In general, there are varieties of tools and techniques used in determining effective manufacturing system in a company. Kanban system is just one of the tools and techniques used in lean manufacturing besides other techniques like Quality Circle, 5S Housekeeping, and continuous improvement and many others. Lean is a set of tools that assist in the identification and elimination of waste that might improve quality as well as production time and cost.

* Corresponding author.
Email address: norazian9829@salam.uitm.edu.my

2212-5671
Selection and peer-review under responsibility of ICEBR 2013
doi:10.1016/S2212-5671(13)00232-3

Lean manufacturing is one that meets high throughput or service demands with very little inventory. In lean manufacturing system, Kanban as a tool may control the levels of buffer inventories in the system to regulate production. When a buffer reaches its preset maximum level, the upstream machine is told to stop producing that particular part type.

In order to remain competitive in global competition and to be able to meet unprecedented market changes, organizations must not only design and offer better products and services; but need to improve their manufacturing operations. One of the strategies is by deploying lean manufacturing practices that can be used to improve the operational performances. Lean manufacturing basically refers to manufacturing processes without waste. Waste is anything other than the minimum amount of equipment, materials, parts, and working time, which absolutely are vital to production. Despite the availability of extensive operations management knowledge and resources, many organizations are still struggling to become lean. Hence, organizations need to evaluate and **assess** the current state of operations in their manufacturing facilities. Therefore, one of the key thrust in good manufacturing practices is setting up lean manufacturing with an effective Kanban system.

2. Literature Review

2.1 Lean Manufacturing

Lean means manufacturing without waste. Waste ("muda" in Japanese) has seven types: waste from overproduction, waste of waiting time, transportation waste, inventory waste, processing waste, waste of motion, and waste from product defects. Despite the wide knowledge and available resources, many companies are struggling to stay "lean" (Shahram, 2007). The goals of lean manufacturing are to reduce waste in human effort and inventory, reaching the market on time, and managing manufacturing stocks that are highly responsive to customer demand while producing quality products in the most efficient and economical manner (Bhim et al., 2010). The concept of Lean Thinking (LT) originated from Toyota Production System (TPS) that determined the value of any process by distinguishing value-added activities or steps from non-value-added activities or steps; and eliminating waste so that every step adds value to the process (Antony, 2011). Lean manufacturing focuses on efficiency, aiming to produce products and services at the lowest cost and as fast as possible. For lean manufacturing, Kanban serves as a tool to control the levels of buffer inventories in the production; in simpler terms to regulate production quantities. When a buffer reaches its preset maximum level, the upstream machine is directed to stop producing that part type. Hence, in the manufacturing environment, Kanban are signals used to replenish the inventory of items used repetitively within a facility (Balram, 2003).

2.2 Kanban

Kanban system is one of the tools under lean manufacturing system that can achieve minimum inventory at any one time. Kanban system provides many advantages in managing operations and business in the organization. Using Kanban system is a strategic operational decision to be used in the production lines. It helps to improve the company's productivity and at the same time minimize waste in production. The Kanban system requires production only when the demand of products is available. Manufacturing companies especially in Japan have implemented Kanban system successfully as this system originates from this country. However, it was found that not all companies in Malaysia, particularly, among the small and medium enterprises (SME) in manufacturing sector, are deploying the Kanban system. Even though there are small

medium enterprises (SMEs) using the Kanban system, they are facing problems in making the system effective. Thus, understanding the Kanban system is crucial in lean manufacturing.

Kanban (kahn-bahn) is a Japanese word; when translated it literally means "visible record" or "visible part" (Surendra *et al*., 1999). General, it refers to a signal of some kind; thus in manufacturing, it refers to Kanban cards. The Kanban system is based on a customer of a part pulling the part from the supplier of that part. The customer of the part can be an actual consumer of a finished product (external) or the production personnel at the succeeding station in a manufacturing facility (internal). Likewise, the supplier could be the person at the preceding station in a manufacturing facility. The premise of Kanban is that material will not be produced or moved until a customer sends the signal to do so (Surendra *et al*., 1999). Nowadays in order to achieve manufacturing excellence, most organizations developed various techniques and methods to make their production operations productive and effective. Most Japanese companies implement the Kanban system because it save costs by eliminating over production, developing flexible work stations, reducing waste and scrap, minimizing the waiting times and logistics costs; thus reducing the inventory stock levels and overhead costs (Surendra *et al*., 1999).

Based on the literature, there were key determinants in setting up the Kanban system. In order to ensure the implementation of Kanban system a success, certain factors should be considered such as inventory management, vendor and supplier participation, quality improvements and quality control and employee and top management commitment (Kumar, 2010).

Inventory. According to Heizer and Render, 2005, the company never achieves a low-cost strategy without good inventory management. These authors quoted inventory are classified into four categories. They are raw material inventory, work in progress inventory, finished goods and maintenance, repair, operating inventory. Since inventories are important in organization, managing these inventories becomes complicated since it involved storage and holding costs and space in manufacturing plant. Inventory management is a complex problem area owing to diversify of real life situations (Kobbacy and Liang, 1999).

Supplier Participation. Kanban system requires supplier commitment in providing fast services to provide effective supply of raw materials. Basically Kanban system only requires minimum level of inventories in the production line where the inventories number should be equal with the production numbers. Therefore supplier commitment play an important role in order to ensure production lines operates smoothly and efficiently. There are five important criteria when choosing suppliers includes quality, willingness to work together, technical competence, geography, and price. The aim of just in time (hereafter termed as JIT) is to eliminate stocks rather than move them to another point in the supply chain. And, again, the way to achieve this is through the co-operation (Donald, 2003). The Japanese Kanban process of production is sometimes incorrectly described as a simple just-in-time management technique, a concept which attempts to maintain minimum inventory. The Japanese Kanban process involves more than fine tuning production and supplier scheduling systems, where inventories are minimized by supplying these when needed in production and work in progress in closely monitored (Donald, 2003).

Quality Improvement and Quality Control. Kanban system not only assists company in saving their cost by having fewer inventories but it also controls and maintains quality improvements of the output. Just in Time (JIT) is one of the elements constituted in total quality management (hereafter termed as TQM) system (Flynn *et al*., 1995). For an effective JIT, all delivered parts and products must achieved certain level of quality standards before those parts and products are accepted for the next operations or reaching the customer

incoming end (input). This is due to the four main reasons includes improved processes can make products with guaranteed high quality, high quality gives producers a competitive advantage, consumers have become used to high quality products, and will not accept anything less and high quality reduces costs such as prevention, appraisal, internal failure and external failure costs (Bernstein, 1984). Traditional companies believe quality is costly, defects are caused by workers and the minimum level of quality that can satisfy the customer is enough. Organizations practicing the Kanban system believe that quality leads to lower costs, that systems caused most defects, and that quality can be improved within the kaizen framework (Balram, 2003).

Employee Participation and Top Management Commitment. Nowadays, commitment and good rapport between employees and management become as culture in organization to ensure their people in organization able to corporate with each other to achieve their objectives. The researcher has classified Japanese culture issue into two broad categories worker related and management related. This distinction between workers and managers has helped Japanese management implement JIT successfully (Narender et al., 1995). All employees should be concerned and fully participative with the success of the new system and the success of the organization for the future; thus they should be treated equally and fairly. For the Japanese workers, they are totally committed to their work and the company. They are loyal, co-operative, flexible and willing to work long hours when needed (Altman, 2000).

3. Research Methodology

A qualitative research design was adopted for this research. Since this study had been widely studied abroad, the researcher adapted the previous findings of past research done; and to investigate the Kanban's implementation in Malaysian business environment and local context. This case study was carried out on one purposively-selected Malaysian manufacturing company that has implemented lean manufacturing system deploying the Kanban practices. The informants in this study were the employees and management staff who were also purposively-selected from the departments that relate to Kanban system implementation, namely from the production, store and logistic departments. Data collection was conducted internally within the company through observation and structured interview techniques with these respondents. Structured interview was conducted with the managers in the manufacturing company so as to understand the manufacturing operations and to gather accurate information on their current kanban system used in the facility. This was followed by on-site visit to the premise.

4. Findings and result

Three managers were purposively selected as respondents for the study and interviews were conducted in their respective offices. This organization is an automotive manufacturer in the local automotive industry which produces and assembles varieties of cars, parts and services for local as well as international market. From the interviews, transcribing was done where keywords were captured and noted down in writing.

Analysis found that all three managers reiterated the same factors supporting the needs for Kanban system and with good production practices. The study suggested that inventory management, vendor and supplier participation, quality improvement and quality control, employee and top management commitment were the factors that lead to successful implementation of the Kanban system in this organization. As a result , based on the interview, it can be concluded that the factors that hinder SME companies from implementing the Kanban system were identified as ineffective inventory management, lack of supplier participation, lack of quality improvements and quality control and lack of employee participation and lack of top management commitment toward the implementation of Kanban system in the production.

Figure 1.0 below illustrates the Kanban flow based on the several observations at the manufacturing company. The Kanban system in the manufacturing company starts with the production worker called line leader or A-Man. Basically when inventory has been used in the production line, the Kanban card attach at the inventory will be put in the child post, which is provided by the manufacturing company to locate the card. In general, A-man is responsible for collecting the Kanban card in every child post for every workstation; thus the line leader will deliver the Kanban card to the mother post which is one centre point at the end of the production line. At the mother post, the B-man is responsible for collecting the Kanban card and sent to Kanban sorter room for sorting Kanban card by using Kanban sorter machine. During the sorting process of Kanban card, the information of the raw materials that already used in production process will be stored in a system known as E-SIMS database. E-SIM's is the communication software (web-based). This electronic ordering system can be viewed by their vendors through internet connection. All information required regarding the materials or inventory will be stored in the system and thus the production workers as well as vendors can easily identified every single part in their production line. After completion of the sorting process, the Kanban card will be placed in the shopping bag according to the serial number stated in the Kanban card and finally the shopping bag will be placed at the logistics rack. Basically, the manufacturing company provides different shopping bag for different suppliers. Finally, the C-man will put the shopping bag in the mini truck and he will drive the truck at the loading bay outside the factory in order for supplier to arrange their materials in the shopping bag according to the Kanban card. The process will be continued with a cycle time of 38 minutes per cycle. If one of the production workers responsible in handling the system which are A-man, B-man or C-man delayed the collection of Kanban card around the production line, the overall production process will be interrupted and the effectiveness of the system were be disrupted.

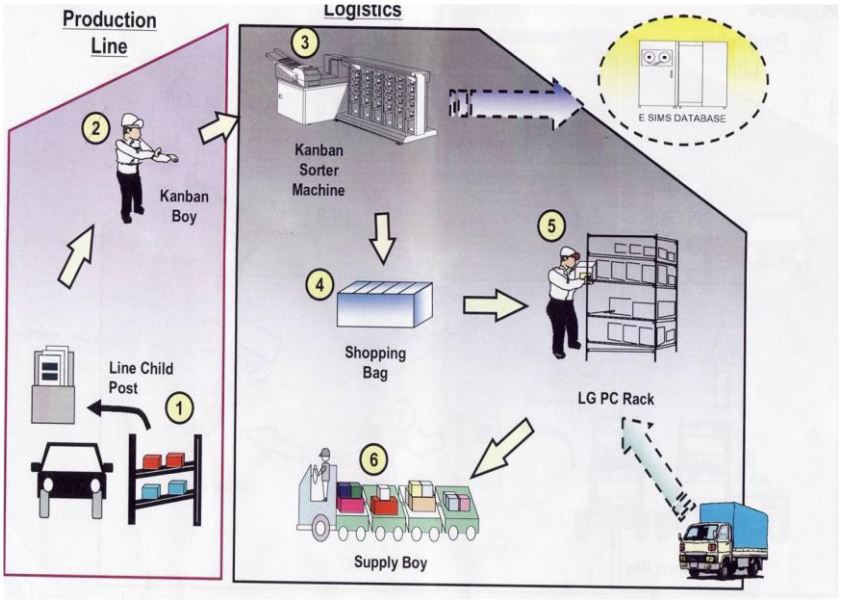

Fig. 1. Internal Kanban Flow

5. Conclusions

In conclusion, the Kanban system implemented in this manufacturing company was found to be adequate due to the many benefits such as the operational costs, wastes, scraps and losses were minimized, over production stocks were controlled with flexible work stations. The factors that hinder SME companies from implementing the Kanban system are identified as ineffective inventory management, lack of supplier participation, lack of quality improvements and quality control and lack of employee participation and top management commitment. Implication of this study suggest that further research needs to be done on more SMEs so as to have more conclusive findings on Kanban implementation and barriers faced by the SME entrepreneurs. Other than that, the company must develop standard operating procedures for all processes involved in production line by improving the existing policy in order to make production process more efficient in future and it can be implemented by other manufacturing companies.

Acknowledgement

This research project cannot be materialized without the support and help from the employees in the organization. Acknowledgment and thanks to the research team members for their kind cooperation to realize this study. My appreciation also goes to my mentor for the constructive comments for this paper.

References

Altman, R. 2000. Understanding Organizational Climate: Start Minimizing Your Workforce Problems, Water Engineering and Management, p.31-32.

Antony, J. 2011. Sig Sigma vs Lean: Some perspectives from leading academics and practitioners, International Journal of Productivity and Performance Management. Vol. 60, No.2.

Balram, B., 2003. Kanban systems: The Stirling Engine Manufacturing Cell, University of Manitoba, Department of Mechanical & Industrial Engineering Shahram, T., 2007. Lean manufacturing performance in China: assessment of 65 manufacturing plants, Vol.19, No. 2, p. 217-234.

Balram, B., 2003. Kanban Systems: The Stirling Engine Manufacturing Cell. University of Manitoba, Department of Mechanical & Industrial Engineering.

Bernstein, J. 1984. GM exec discusses commitment to kanban; system has tremendous potential, Automotive News, Nov 19, p. 48.

Bhim, S., Garg S.K., Sharma, S.K., Grewal, C., 2010. Lean implementation and its benefits to production industry, International Journal of Lean Six Sigma. Vol. 1, No. 2, p 157-168.

Donald W., 2003. Inventory Control and Management, 2nd Edition, John Wiley & Sons Ltd.

Flynn, B.B., Sakakibara, S., Scroedar, R., 1995. Relationship between JIT and TQM: practices and performance, Academy of Management Journal. Vol.38, No.5, p. 1325-1360.

Heizer, J. and Render, B. 2005. Flexible Version: Operation Management, 7th edition, New Jersey: Prentice Hall.

Kobbacy K., Liang Y. 1999. Towards the development of an intelligent inventory management system, Integrated Manufacturing Systems. p. 354-366.

Kumar, V., 2010. JIT based quality management: concepts and implications in Indian context. International Journal of Engineering Science and Technology. Vol. 2, p. 40-50.

Narender, K. R., Mehra, S., Frolick M., N., 1995. A comparative analysis and review of JIT implementation

research. International Journal of Operations & Production Management. Vol. 15, No. 1, p.38 – 49.]
Surendra, M.G.,Yousef, A.Y., Ronal, F.P. 1999. Flexible Kanban system. International Journal of Operations and Production Management. Vol. 19, No. 10, p.1065-1093.