

# Warehouse Management System and KANBAN Technique: A Review

ISSN (e) 2520-7393  
ISSN (p) 2521-5027  
Received on 28<sup>th</sup> Feb, 2020  
Revised on 17<sup>th</sup> Mar, 2020  
www.estirj.com

Syed Ahsan Ali<sup>1</sup>, Dr. Zahid Ali Memon<sup>2</sup>, Dr. Shakeel Ahmed Sheikh<sup>3</sup>, Muhammad Haris Khan<sup>4</sup>

<sup>1</sup>Postgraduate Student- Operations Managements, MUET, Jamshoro.

<sup>2</sup>Institute of Science Technology & Development, MUISTD MUET, Jamshoro.

<sup>3</sup>Industrial Engineering & Management, MUET, Jamshoro.

<sup>4</sup>Department of Mechanical Engineering, MUET Khairpur Mir's.

**Abstract:** Lean manufacturing is the study of identifying waste and reduce those waste using lean tool and techniques to improve the quality of working life. The basic goal of almost every organization is to achieve maximum output of minimum resources. However, organizational faces the issues related wastes that creates hinderance in achieving the organizational effectiveness and efficiency and those waste need to be highlighted and assessed properly. This study therefore, aims to analyse the effect of lean manufacturing technique, KANBAN TOOL, on improving the warehouse management system as a case study of the FMCG sector's warehouse management. For this purpose, this study conducted a comprehensive secondary literature review-based research and developed a conceptual context that showed the warehouse management indicators such as elimination of over production, optimum level of inventory, and reduction of waste and scrap can be used to explain change in firm performance of manufacturing firms.

**Keywords:** Lean, KANBAN, FMCG, WMS, Just in Time, Logistics, Inventory Management.

## 1. Introduction

Inventory and warehouse are the integral parts of modern organizations, every kind of organization whether they are manufacturers, distributors and retailers belonging to all sectors have inventory and warehouses. The important thing worth mentioning is that this area of organization has received lesser importance and is subject to ignorance at the hands of researchers. However, warehouse and inventory management play significant part in increasing and decreasing of profits. According to the study of effective inventory is responsible of increase in productivity of an organization [1]. Warehouse management and inventory management do not only impact productivity, but they have significant impact on number of other departments such as production, sales and finance. Production department cannot produce until raw material is available in warehouse; similarly sales department cannot sale the product until it is present in finished form in finished goods warehouse. Fast Moving Consumer Goods (FMCGs) have an especial requirement of highly effective warehouse management system because they have limited time and in that time; they have to make deliveries in effective manner [2]. The key to make management of warehouse an effective and efficient KANBAN system is introduced.

## 2. Warehouse Management Systems

Warehouse management system (WMS) is application software that controls and manages the day to day activities of a warehouse. The software helps to keep the check on the inventory, raw material, and shipment details and customers feedback. In the past years, ware house systems only use to provide the basic information. But since the

advancement in technology has turned the world into a global village, everything has taken a 360 degree change and companies are now working through these technologies. It reduces the chances of errors during the shipment phase as it uses and maintains data very rapidly that helps in company's productivity as they can produce more and more goods. The benefits of using WMS are utilisation of space, energy and time saving, more productivity, accuracy in results, better quality of service etc. [3] [4]. Continuous monitoring and maintaining records enable the tracking and tracing of the quality of the products easier which helps in non-stop operations of the warehouse [5]. The effectiveness of the ware house management systems providing high quality of service to the clients and utilising space, workforce and the equipment's used in the FMCG sector [6].

## 3. Overview of KANBAN Scheduling System

KANBAN is the most effective tool in the lean production of any manufacturing sector. It plays a major role in eliminating the inventory wastes that occurs after the production [7]. KANBAN is the most convenient and inexpensive scheduling system used to control manufacturing and inventory in the manufacturing sector. It is related to Just in Time production which tells what, how and when to produce. KANBAN is used to improve the process of flow of information from purchasing raw material to delivering it to the customers. It basically covers the whole supply chain process. The idea of lean manufacturing is to reduce maximum waste due to the initiation of eco-friendly environment. There are several ways to reduce the waste from FMCG sector. The type of waste includes inventory wastes, process wastes, scrap and dirt waste etc. The lean manufacturing has been introduced

in many of the manufacturing sectors which bring efficiency and effectiveness to the whole production of the business. KANBAN is the most important and used system all over the world now. KANBAN scheduling system was first introduced by the researchers of Japan in 1950s. It is defined as the pointer which indicates exact timings of products that when they are reached to an inventory point that is also identified from before [8]. The technique allows the companies to know exactly when the products are out of stock and needs to be restocked again. Since it is so accurate, the FMCG sectors know exactly if the inventory is excess and needs to be cut down. KANBAN system has a great significance in the FMCG sector all over the globe. KANBAN is utilised best when the consumption rate is not too high or the market is very stable. The best example to review KANBAN is in the retail store. Every portion has specific product with specific quantity arranged in a particular manner so that it gets easier for the consumers to find their desired products with less hassle. Once a specific amount of item has been purchases by the customer, then the retail manager will immediately order the next one from, the warehouse. In early days, KANBAN used multi-coloured cards to maintain and check the inventory record [9]. The most common of KANBAN are withdrawal, signal and production; they are used to relocate products from one area at of work to another, replacement of consumed and sold goods and for starting off the production of initial items. The benefits of KANBAN are reduction of overall costs, standardization of the products, increase in efficiency, reducing obsolete inventory, improvisation in team work, improves responsiveness to changes in demand and prevents overproduction [10].

#### 4. Factors of KANBAN Technique That Influences Warehouse Management

The factors of KANBAN that influence the inventory system of the FMCG sectors are mentioned in detail below.

##### 4.1 Elimination of Overproduction

Overproduction in the factory is in large amounts due to poor planning. It increases the overall cost of warehouse, degrades the quality and add-on to the waste of the factory. Overproduction takes more space and requires more energy to look after the waste material. KANBAN was introduced to minimize the excessive production in the factories. It allows the warehouse managements to improve the company's strategic planning and decrease the excessive amount of production. The levels of inventory are calculated beforehand to reduce the factory waste to the maximum. With the help of KANBAN technique the logistics team can manage things very effectively no matter what inventory levels or waste of production is. It basically controls the overall manufacturing and other costs in the FMCG sector.

##### 4.2 Optimum level of inventory

Excessive inventory is a massive waste in the warehouse management system. The amount of products which are not in demand by the consumers is considered to be the waste. To reduce the inventory level waste to its lower level, Just in time concept was introduced. KANBAN scheduling system maps out an excess inventory issues and provide the ways to transform the production levels purely based on the consumer needs [11]. It is also merged with the good levels of inventory to produce smooth optimum inventories and eliminate the total warehousing cost. It makes the overall process from purchasing raw material to the products being delivered to the supplier more smooth and reliable.

##### 4.3 Reduction of Waste

The profits of the FMCG sectors increase if the wastes can be reduced. The wastes include wastes of transportation, waiting, motion, overproduction, over-processing, defects, resources and creativity. The reduction in these wastage costs helps with the profitability and productivity of the factory. KANBAN provides solution to reorganize the factory layouts. It suggests that the handling of the material should be proper and at the shortest possible distance, so the transportation costs can be reduced. It helps the poorly planned strategies which interrupts the flow of the production as a whole with insufficient communication tools.

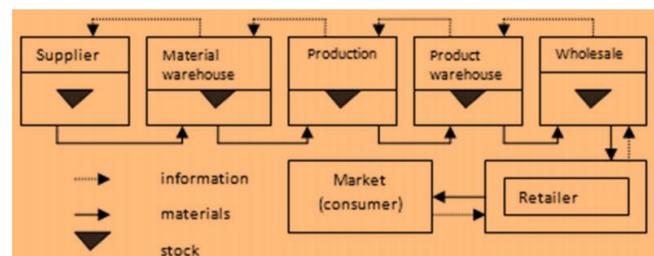


Figure 1: Inventory Management Streams, Adaption: Kot, Grondys & Szopa (2011)

#### 5. KANBAN System and Reduction of Waste

This is one of recognized systems of the strategies of manufacturing for lean production with least inventory and decreased cost. KANBAN system offers numerous benefits that can attain the least inventory at any particular single time. This system has many benefits in managing and handling functional processes and business in the corporation. In production lines of the organisations strategic operational decision is used when organisations are applying the KANBAN technique. It assists to enhance the productivity of the corporation and at a similar period of time, this technique lessens the waste in the production. Majority of companies' are using this technique, the reason of using is that it decreases the cost by removing over production, reducing logistics expense and waiting time,

developing malleable work places, decreasing scrape and waste; hence decreasing the increased expenses and inventory stock levels [12].

This technique needs production only at the time when the demand and desire of the product are available. The KANBAN system initiated by Japan and manufacturing corporations of Japan mainly implemented this system in their organisations. To understand this system is not an easy task, it was originated that in Malaysia not all corporations were using KANBAN system and even small-medium enterprises (SMEs) were operating KANBAN system however they were confronting a lot of issues in making efficient system. Hence to understand this system is important and in warehouse systems to decrease the waste through this system [13].

### 5.1 Access Inventory

A different survey from numerous studies [14] depicts that due to inventory there is 60 percent of wastes in manufacturing. These inventories are categorised into the Finished Goods (FG), Work in Progress (WIP) and Raw Material (RM). The enhancement in one of category FG, WIP or RM results in direction to less turnover of inventory. Inventory performs an important role in the turnover of the company. It has been described that from 1000 renowned manufacturing companies of the world exposed that 34% companies efforts to enhance the turnover of the inventory for at least a time period of a decade [15]. KANBAN technique attains an inventory of minimum level. It guarantees the supply of exact part at the exact time, in the correct place and in the accurate quantity. It is the technique that castoff to control the flow of material throughout the entire process in the manufacturing companies [16].

### 5.2 Unnecessary transport

The core focus of KANBAN is to create value by removing waste that has no any value and there are 7 wastes in the manufacturing and production system that are transportation, defects, waiting time, unnecessary processing, unnecessary movements, overproduction, and inventory. Due to inappropriate predictions, the plant is handling enormous finish Good (FG) inventories to fulfil the distinct desires and demands of the consumers [17]. Unnecessary transportation is seen in the plant the reason behind it is the inappropriate layout.

### 5.3 Over-Processing

This is the processing that is due to needless packaging, alteration in packaging and handling of employees. The manufacturing and production of imperfect or defective goods can cause the over process in the warehouse system of the company. Production and manufacture levelling by

decreasing batch size in direction to generate the greatest consumption of resources. The capability to changeover from one product to other in short span of time to permit minor but more frequent manufacture runs of a similar product. This lessens the over process of the production [18].

## 6. Impact of KANBAN Technique on the Performance of FMCG sector's Warehouse Management

The most common impact of KANBAN is that it is connected with JIT tools and improves the companies pull system, KANBAN visual control, one-piece flow, cell production, and manufacturing, malfunctioned employees, levelled production and JIT purchasing [19]. In the current great competitive international market place, the pressure on the corporation to originate and implement modern and innovative ways to generate value and offer it to their consumers that results in strong customer growth. The growing requirement for a corporation to challenge with its products in an international market through service, cost and quality dimensions has provided upsurge to the need to progress more effective strategies of warehousing. Warehousing has tended to be familiar as a different function with the increase of Mass Production System (MPS). The impactful management of warehouses assists to optimize the current distribution and production procedures and offer a great benefit in the objective of cost reduction and increment of service. Companies operating today's competitive atmosphere must utilise the sources they have and operate at the greatest efficiency and deliver quality services to guarantee profitability.

## 7. Warehouse Management System & Logistic in FMCG's

The aim of every business is to operate with the lowest cost possible and provide superior quality. As an FMCG company, the company has distinct costs like as Cost of Goods (COGs), warehousing costs, shipping cost, insurance costs, salaries, electricity, distribution cost, rent expense, and assets acquisition. The logistics industry has developed as a specialised sector with a broad range of services and facilities comprising route management, the fulfilment of an order, and fleet consolidation, etc. However, between numerous operations of supply chain transportation and warehouse which comes in the Logistics category, in relation to its high financial cost and environmental influences can importantly contribute in direction to the sustainable attainments. The effective and efficient logistic management is required to meet the enhanced target market the main reason in the enhancement of the market is the globalization [20].

Warehouse Management system is important for small and big companies. The usage of WMS is beneficial for

organisations of all sectors and currently, companies are improving the regulation of operations of WMS [21]. To improve and build their warehouse more effective, Fast-moving consumer goods (FMCG) companies have initiated the barcode systems in their warehouse operations, that initiative assists companies to handle the inventory system effectively. The entire efforts and struggles are managed and observed under the supervision of Good Warehousing Practices (GWP).

## 8. Analysis and Discussion

The aim of this study was to analyse the effect of warehouse management system, for instance; KANBAN on the performance of the FMCG sector's warehouse management. For this purpose this study conducted a comprehensive secondary literature review based research and developed a conceptual framework that showed that warehouse management indicators such as elimination of over production, optimum level of inventory, and reduction of waste and scrap can be used to explain change in firm performance of manufacturing firms. In order to test the impact of these indicators the study developed tentative hypotheses and conducted a survey questionnaire with 100 managers and employees in FMCG sector as sample. The results of the study showed that there is significant positive relationship between firm performance and elimination of over production, optimum level of inventory, and reduction of waste and scrap.

Moreover, considering the arguments gathered, this research accounts that Overproduction increases the cost of warehouse, and declines the quality. Also, grounded on the debate procured, this inquisition illuminates that Overproduction tends to take more space and demands more energy to look after waste material. Moreover, based on the facts furnished, this research endorses that Overproduction is highly costly, and is one of the worst type of waste. Moreover, in the light of the empirical information found, this inquisition submits that KANBAN technique plays an important role in overcoming the issues related to overproduction.

## 9. Conclusion

Warehouse management indicators such as elimination of over production, optimum level of inventory, and reduction of waste and scrap can be used to explain change in firm performance of manufacturing firms. In order to test the impact of these indicators the study developed tentative hypotheses and conducted a survey questionnaire with 100 managers and employees in FMCG sector as sample. The results of the study showed that there is significant positive relationship between firm performance and elimination of over production, optimum level of inventory, and reduction of waste and scrap.

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This work clarifies that Lean business process is the most useful approach to eliminate wasteful practices. Also, based on the analysis obtained, this work demonstrates that Excessive inventory is one of the major issues of warehouse management system. Furthermore, grounded on the discussions rendered, this work gathers that Excessive inventory creates space problems, and increase space cost. Moreover, using the data collected, this investigation infers that tracking all product information is a key for ensuring optimum level of inventory. Additionally, using the deductions produced, this investigation declares that Analysing supplier performance is important for maintaining optimum level of inventory. Also, based on the discussions obtained, this study demonstrates that KANBAN technique helps in reducing warehousing cost by ensuring the optimum level of inventories

Furthermore, in the light of the inferences supplied, this work records that the profits of FMCG sectors are highly subjected to their effective practices in waste management. Moreover, considering the empirical data found, this study validates that Reduction in waste and scrap enables the company to reduce its overall production cost. Furthermore, taking into account the proofs obtained, this inquiry determines that Effective manufacturing practices are crucial for reducing scrap and waste. Furthermore, based on the arguments collected, this investigation figures that Enhancement of change management and communication process is important for reducing waste and scrap. Additionally, using the proofs provided, this investigation affirms that KANBAN technique plays an important role in reorganizing factory layout, which eventually reduces waste. Furthermore, considering the empirical data gathered, this investigation denotes that Elimination of overproduction can positively influence the performance of manufacturing firms.

Additionally, based on the empirical data put up, this work evinces that the performance of manufacturing firms are highly linked with their practices in waste management. Moreover, using the inferences contributed, this research affirms that the reduction in waste and scrap leads towards enhancing the performance of manufacturing firms.

Moreover, grounded on the deductions discovered, this inquiry relates that Effective management of inventory level is one of the key determinants of manufacturing firm's performance. Furthermore, based on the debate collected, this research reckons that the incorporation of KANBAN techniques positively influence the performance of manufacturing firms.

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## About Authors

Syed Ahsan Ali ,BE Mechanical, Post Graduate Student at Mehran UET Jamshoro, **Research Interest:** Operations & Supply Chain Management.

Dr. Zahid Ali Memon, Professor Mehran UET Jamshoro **Ph.D Research Interest:** Science Technology & Innovation Policy, Corporate Social Responsibility (CSR), Corporate Governance, CSR and Sustainable Education.

Dr.Shakeel Ahmed Sheikh, Assistant Professor Mehran UET Jamshoro **Ph.D Research Interest:** Human Factors Engineering, Total Quality Management, Motion Capture Analysis, Cloud Manufacturing.

Muhammad Haris Khan, Lecturer Mehran UET Khairpur Mir's **Ph.D** (Enrolled)