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A CASE STUDY ON IMPLEMENTATION OF JIT KANBAN SYSTEM FOR INVENTORY MANAGEMENT

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Abstract

Many reputable businesses have adopted the Kanban approach to enhance their production process as a result of the uncertainty caused by changes in demand and client demands. Without enhancing production flexibility, the usage of the Kanban system has resulted in the downsizing of assets. The Kanban system's application aims to shorten lead times, save inventory costs, and make it easier to use storage space efficiently. The plant's output increased as a result of this study from 57 seats per day to 84 seats per day, a 41 percent increase, and it also improved its inventory and lowered its raw material costs by 46 lakhs. Additionally, the delivery time was shortened from 15 to 10 days. As a result of this study, the just-in-time (JIT) system is eventually adopted since the Kanban method enhances the production process.

Keywords-MOQ, Lead time, JIT, Kanban, Pull System, Inventory Management

1. INTRODUCTION

A large inventory of items to meet consumer demand is the main objective of the traditional production strategy, which is driven by a "Push" approach. The planning schedule is used to move material from one site to another as a production authorization procedure. Large WIP inventories, out-of-sync manufacturing processes, and the production of undesirable items were all major problems that the individuals working on the floor had to cope with as a result. As waste is a non-value-added phrase for the industry, continuous improvement (CI) will eliminate it from the process. Overproduction and inventories are constant problems for the production line. Long implementation times, discontinuous flow, and batch production can all contribute to this issue. The primary tool for implementing lean is inventory. Operations are balanced against the aforementioned difficulties using inventory. Inventory levels eventually have an impact on floor space and financial investments. As a result, solving this issue helps the business make money. By only manufacturing what was necessary, the Kanban system placed an emphasis on minimum inventory levels. It guarantees delivery of the appropriate good at the appropriate time, in the appropriate amount, and at the appropriate location. The Kanban system becomes useful and synchronies all manufacturing processes with consumer demand. [A. Agus, M. Hajinoor]. Every operation on the floor is managed by a Kanban system that adapts to the demands of the moment. In general, a company's production system efficiency is determined using a variety of instruments and approaches. One of the tools and methods used in lean manufacturing, along with others like Quality Circle, 5S Housekeeping, Continuous Improvement, and many others, is the Kanban system. A set of tools known as lean can be used to find and remove waste, which can enhance quality as well as production time and cost. A key component of the Just-in-Time (JIT) and Lean Manufacturing philosophies is the work and inventory release mechanism known as Kanban. [VM Nistane and Srinivas Viswanath et al 2013]. [Wilson L et al 2009]. As a result, well-known businesses like Toyota Motor Corporation have used the Kanban technique to advance their manufacturing strategy. The implementation of the Kanban method increased company productivity and production flexibility in response to consumer demands. According to N. Singh, K. Shek, and D. Meloche, a Kanban system is a pull system that permits production at a specified rate and at a specific time to replenish a portion that has already been eaten by the client. The Kanban system, which emphasizes minimum inventory levels by generating only what is required, is one of the lean manufacturing tenets. It guarantees delivery of the appropriate good at the appropriate time, in the appropriate amount, and at the appropriate location. When all production processes are coordinated with customer demand, the Kanban system becomes operational [Nor Azian Abdul Rahmana*, Sariwati Mohd Sharifb, Mashitah Mohamed et al 2013]. Every operation on the floor is managed by a Kanban system that adapts to the demands of the moment. When a Kanban system is used, the product manufacturing process is more effective and efficient.

1.1 JIT System (Just in Time)

With a just-in-time (JIT) inventory system, production schedules and supplier orders for raw materials are directly synchronised. Using this inventory method, businesses can cut costs by only purchasing things when they are actually needed for production, improving efficiency and decreasing waste. Manufacturers must precisely forecast demand using this strategy. The main goal of a JIT manufacturing system is to continually reduce and, eventually, eliminate all types of waste (Brown et al. 1991, Ohno et al 1998, Sugimori et al. 1977). Japanese businesses operate with relatively minimal amounts of inventory and attain very high levels of quality and productivity based on this idea (Richard J. Tersine et al 1994, James H. Greene et al 1987). The old push manufacturing

system with material requirements planning (MRP) has been replaced with a pull kind of JIT manufacturing system as a result of technical improvement in order to keep up with the global competitiveness. With this system, work-in-process (WIP) can be managed and controlled more precisely than with the push-production system (Mason Paul et al 1997).

Key Takeaways of JIT system

- ❖ "Producing the Right Item at the Right Time in the Right Quantity" is the guiding philosophy behind it.
- ❖ It entails a coordinated set of processes/activities intended to increase productivity while using little inventory.
- ❖ The just-in-time (JIT) inventory system is a management technique that reduces inventory while boosting productivity.
- ❖ Due to Toyota's adoption of the method in the 1970s, just-in-time manufacturing is often referred to as the Toyota Production System (TPS). (1976, TPS et al.
- ❖ Kanban is a scheduling system that is frequently combined with JIT to prevent work-in-process overcapacity.
- ❖ The JIT production method depends on consistent output, excellent craftsmanship, no equipment failures, and dependable suppliers.
- ❖ The terms short-cycle manufacturing, used by Motorola, and continuous-flow manufacturing, used by IBM, are synonymous with the JIT system (IBM et al 2007) (Motorola Inc et al 1987).

1.2 Originality of the Work

This work is performed as a research project work at one of the plant units of Furniture manufacturer based in Bangalore, (Karnataka) India i.e., Sofa Unit which was involved primarily in the manufacturing of Sofas, Tables, Beds. This Plant unit was experiencing a loss due to excess inventory and weak inventory management system. Addressing the issue for inventory management the existing system were reviewed and thoroughly studied. An improved Inventory Management system i.e., JIT Kanban system were introduced and this system was selected and implemented in sofa unit plant. As an outcome, after using Kanban, the output of the plant increased from 57 seats/day to 84 seats/day which is a 41 percent increment, it shows improvement in inventory and also reduced by 46 Lakhs in raw material. Additionally, it made the goods flow more easily and saved space. Additionally, the delivery time was shortened from 15 to 10 days. Additionally, the Kanban system reduced overproduction and inventory dumping.

2. OBJECTIVES

2.1 Gaps identified

a) Mass production. When production volume is high and there is no product variation, Kanban's inherent flexibility is put to the test.

(b) Bottlenecks. It makes more sensible to pause the Kanban production plan and concentrate on fixing the bottleneck when there are system bottlenecks.

c) Lengthy delivery times and adjustments. When equipment changeover durations make it difficult for Kanban to respond quickly to production changes or when the lead time from production start to completion lengthens, Kanban becomes less advantageous.

d) It was discovered that the conflict between the minimum order quantity (MOQ), supplier price, and various supplier raw material purchasing alternatives is not resolved by the Kanban method.

e) Activity studies demonstrate that companies with repetitive and large manufacturing are better suited for the Kanban system. The implementation and use of Kanban methods are not reported in occupations like couch manufacture, nevertheless.

Objectives of the Research

1. Reducing Lead Time is one of Kanban's primary goals. It speaks of the interval between the start and end of a production process: The Company becomes more efficient and is able to accurately predict how quickly products can be supplied with the help of lead time optimization. With the help of mentoring and knowledge exchanges, the Kanban Method strives to reduce lead times through overlapping skill sets.

2. Lower the stock level

3. Lower Expenses Linked to Higher Inventories

4. Making use of available space to facilitate material movement

3. METHODS

3.1 Kanban System

The goal of the Kanban workflow management technique is to help you see your job, increase productivity, and be agile. a process for controlling the movement of goods between the plant and external suppliers and customers as well as within the plant. utilising signal cards that automatically replenish stock when additional commodities are required.

The Japanese word "kanban" (Kahn Bahn) literally translates to "visible record" or "visible component" (Surendra et al., 1999). In production, it generally refers to a signal of some form, like Japanese word "kanban" (Kahn Bahn) literally translates to "visible record" or "visible component" (Surendra et al., 1999). In manufacturing, it refers to Kanban cards because it generally relates to a signal of some type. The Kanban system is based on the part customer purchasing the part from the part supplier. The customer of the component may be the production staff at the following station in a manufacturing plant or the final user of the finished product (external) (internal).

What is produced → When it should be produced → How much to be produced

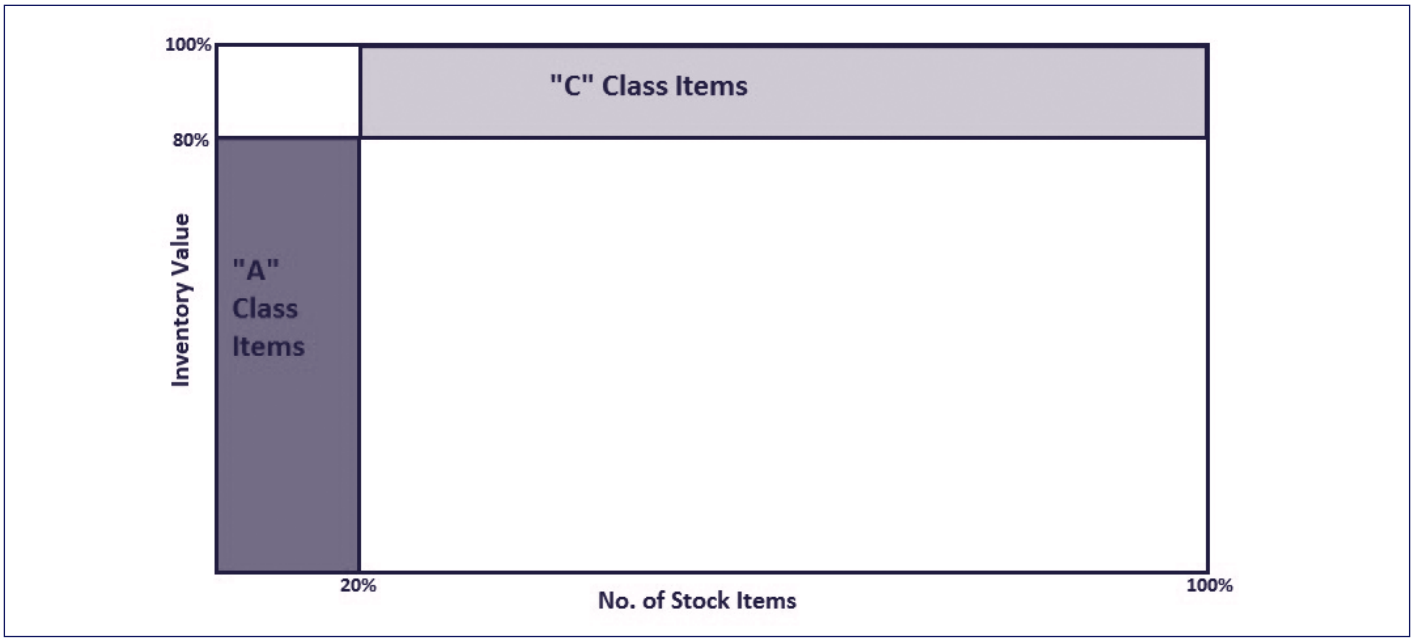
3.2 Research Methodology

ABC Analysis

- ❖ The process used to establish the relative importance of an item is ABC Analysis
- ❖ Thumb rule: List all items in order of Highest annual value usage to lowest

- A: Top 20% of the items represent 80% of the Value
- C: 80% of the items represent 20% of the value
- A Class Items would be monitored very closely, C Class items will have far less control

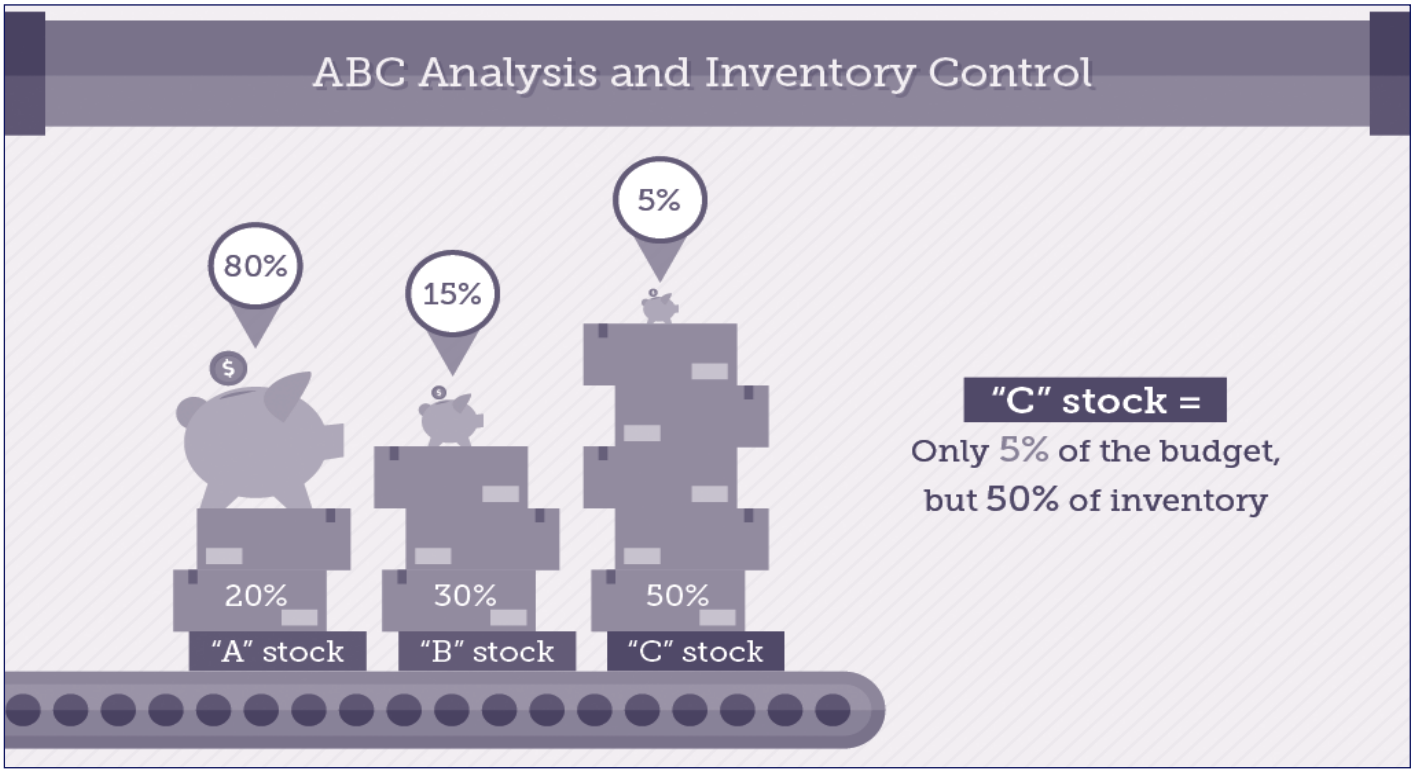
Fig 1. ABC Analysis



Approach

For A Class Items we will design model for value reduction whereas for C Class we will design System that limits no. of transactions.

Fig 2. ABC Analysis Approach (mechnaggs.blogspot.in)



Various problem like overproduction, waste, non-continuous flow of material etc. will eliminated by developing Kanban system.

To Implement Kanban System some points are need to be follow

- Studying the process flow – The current situation process flow will help in knowing the bottleneck and pace making process, which were identified.

- ABC analysis or Pareto Analysis – The ABC analysis was done for the products for which Kanban has to be moved along with the products.
- Kanban sheet preparation and analysis

3.3 Current Situation at Industry

Table 1. Current Situation at Industry

S.no	Section	Factors	Remark
1	RM	Bulk and Repeat ordering	No classification of items, consumption pattern
2	RM	Invariably High MOQ	MOQ's are too high due to non-standardization
3	RM	No concept of Lead time	Items are ordered once a month irrespective of their respective lead times- No categorization
4	RM	No penalty clauses/ Over deliveries protection	Current systems oblige all receipts and this leads to overstock
5	WIP	Overproduction, Planning, Gaps, Breakdown	Push based manufacturing/ Section wise resource optimization
6	FG	Forecast without analysis	In case of no demand ends in inventory

3.4 Problem Statement

- This Research has been done in the Medium Scale Industry in Bangalore which manufactures Beds, Chairs and Sofas. Basically, the raw materials need to manufacture these products are somehow similar to each other.
- Due to changes in consumer demands, uncertainties in the manufacturing sector have resulted in greater inventories, longer production lead times, and higher associated costs. Therefore, in order to enhance their operations, organizations adopted the concepts and principles of lean manufacturing. In this research project, Kanban and JIT (Just in Time) will be used.
- Non-constant streamlining of the business's procedures - It's critical for any manufacturing sector to streamline its operations across the board, from the front office to distribution. Efficiency is evident, and the maker can operate at peak efficiency. Reduced production costs and accelerated time to market result from discontinuing these processes. A key element of Kanban is "Continuous Improvement." This means that there are continuous opportunities to become more KANBAN.

3.5 Challenges to be addressed

The challenges to be addressed for the smooth working and functioning of the manufacturing unit, sofa manufacturing as well as the functioning of the warehouse as mentioned below**:**

a) Higher Inventories

b) Waste Identification

c) High Production Lead Time

d) Space Utilization

e) Costs Associated with Inventory

3.6 Implementation of Kanban System

We have created a Sheet on MS Excel called as Kanban Sheet in which we have consolidated the lead time and bin quantity according to the demand so that we get only what we want at right time and in right quantity so that inventory won't pile up.

Various problems like overproduction, waste, non-continuous flow of material, etc. are eliminated by developing the Kanban system. The inventory level in the plant was significantly reduced after the demand, bill of material and demand forecast data analysis were done to create a self-replenishment model for raw material.

Table 2. Kanban Summary of Raw Material regarding Inventory Cost.

Row Labels	Count of SKU Name	Sum of Avg. Consumption Value	Sum of Current Stock Value	Sum of Future Physical Stock Value Estimated	Inventory In days	Projected inventory in days
A	151	1,12,37,858	70,48,741	49,65,784	12.3	8.2
B	89	9,05,266	7,87,215	2,56,474	18.5	7.9
C	341	5,68,413	10,47,165	1,05,235	42.3	6.3
Dead	1768		7,85,147			
Total	2349	1,27,11,537	96,68,268		16.1	8.9

Table 3. ABC analysis summary of raw material.

	BTO		BTS		Others		Total Count of SKU Name	Total Count of Current Order
Row Labels	Count of SKU Name	Count of Current Order	Count of SKU Name	Count of Current Order	Count of SKU Name	Count of Current Order		
A	74	18	63	52			145	74
B	52	6	19	11			82	17
C	264	14	33	9			302	24
NM	248				2		255	
NM/Dead	357	1	2		965		1365	1
Total	995	39	117	72	967		2149	116

4. RESULTS

Table 4. Results after Kanban Implementation

S.no	Parameter	Before System	After System	Conclusion
1	Inventory Cost (Rs)	8478967	3878967	46 Lakhs Reduction
2	Inventory Quantity	>250000	<110000	Space Reduce
3	% Error in System	Unbalance System	Less Error	Smooth Flow
4	Lead Time	15-20 days	10 or less than 10 days	Increases Production rate

One of the best strategies for gaining a competitive edge through high-quality production and development is the use of Kanban. After using Kanban, the plant's output increased by 41 percent, from 57 to 84 seats per day, demonstrating improved inventory management. Raw material costs were also cut by 46 lakhs. Additionally, it made the goods flow more easily and saved space. Additionally, the delivery time was shortened from 15 to 10 days. Additionally, the Kanban system reduced overproduction and inventory dumping.

5. DISCUSSION

In this paper, an actual industrial case study of a manufacturing plant's use of a Kanban system is presented. The Kanban system, according to research findings, is required to make sure that parts move freely throughout the production system. The Kanban system must be implemented with complete and systematic dedication if it is to be effective and, eventually, to satisfy customers. Ineffective inventory management, a lack of supplier involvement, a lack of quality improvement and quality control, a lack of staff involvement, and a lack of top management commitment are all barriers to the deployment of a Kanban system. The consequences of this study point to the necessity for additional research in a related field to provide definitive understanding of the application of Kanban and the challenges management faces. The Kanban system is critical to the success of Just in Time manufacturing and ensuring a constant flow of segments throughout the production process, according to research findings. To ensure the success of the Kanban system and, ultimately, customer happiness, it must be implemented with complete organisation and dedication. Delivery times, work-in-progress and finished goods, as well as a finished space, should all improve as a result of the implementation. Additionally, production pace will be managed and adjusted based on market need. Thus, it can be said that the production system has been improved through the use of the Kanban system. All material management tasks were thus perfectly disciplined thanks to Kanban. This programme will reduce waste of all kinds and improve financial performance. The overall productivity of the business will rise as a result. One of the best strategies for gaining a competitive edge through high-quality production and development is the use of kanban. After using Kanban, the plant's output increased by 41 percent, from 57 to 84 seats per day, demonstrating improved inventory management. Raw material costs were also cut by

46 lakhs. Additionally, it made the goods flow more easily and saved space. Additionally, the delivery time was shortened from 15 to 10 days. Additionally, the Kanban system reduced overproduction and inventory dumping.

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