IMPLEMENTATION COMPARISON ANALYSIS METHOD JUNBIKI WITH KANBAN REVIEWED BY METHOD OF JUST IN TIME FOR ITS COMPANY PRODUCTIVITY

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ABSTRACT

Along with the globalization era where every company is required to be able to compete with similar companies, PT. Topjaya Antariksa Electronics as a company engaged in the production of electronic goods both at home and abroad also must be able to utilize existing resources effectively and efficiently so that the products can compete in terms of quality and price. In this case, the timeliness in producing and distributing products to consumers worth more attention. Talking about the timeliness of a production, the company will use the production system on time or often called Just In Time. The company has been using the Kanban method as a kind of Just-in-time, but felt not optimal. Therefore, this study attempts to examine the implementation of a development method for the production system that is still a part of the Just in Time, which is the method Junbiki. Junbiki is a development of the Kanban method. Both methods Junbiki and Kanban methods, both lead to cost reduction. The results of these two methods can be seen in the analysis of the data shows that productivity Junbiki method to existing production systems outweigh the Kanban method. As one result is, the efficiency of man power requirements for both methods, the extremely high value of the method Junbiki ie by 75%. Thus, the conclusion is that companies can implement this method in improving productivity Junbiki.

KEY WORDS : Just In Time, Kanban, Junbiki, Productivity

1. INTRODUCTION

Timeliness in producing and distributing products to consumers will affect the quality and price of the product. Therefore, the management of a company should be more careful in managing existing production systems.

The production system is a collection of subsystems that interact with the aim of transforming inputs into outputs of production. Inputs may include raw materials, labor and capital, while production output is the product following its byproducts, such as sewage, information, and so on. One of the production system is a subsystem of the production planning and control.

Some manufacturing companies are now beginning to think about what are the efforts that can be done along with the times and the acceleration time is moving very fast. Production planning and control right will also help facilitate the production system implemented. Inventory is seen as a cost that is always there or waste, rather than value added, in contrast to traditional accounting.

In a production system, the technical term Timely Production System or better known as Just In Time (JIT) Manufacturing System. JIT is a system that ensures the right amount of purchase, making the time and the right quality, so there is no waste.

JIT implementation methods are numerous, including companies that have used the Kanban. But not only that, those Junbiki from Japanese means preparation, is a sequence of production in the same production line sequence produced at the supplier. It is very supportive of the implementation of the JIT system and can reduce inventories to a minimum.

From some of the above illustrate, it is necessary to review about Junbiki, considering both an implementation of Just In Time. In addition, a review was conducted in order to determine which production system will be used in determining the productivity of the company.

2. LITERATURE

Theories that form the basis of this study, described as follows:

2.1. Production System Concept

In order to carry out the functions of the production well will require a series of activities which will form a production system. The production system is a collection of subsystems that interact with the aim of transforming inputs into outputs of production. Inputs may include raw materials, machinery, labor, capital, and information, while production output is the product following its byproducts, such as sewage, information, and so on.

The subsystems of the Production Systems include Production Planning and Control, Quality Control, Production Facilities Maintenance, Operations Standards Determination, Determination and Determination Production Facilities Cost of Production.

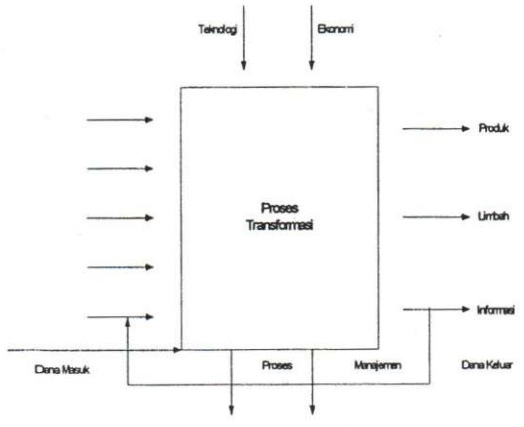

Figure 1. Input-Output Production System (Nasution, 2005)

According to Nasution (2005 [1]), sub-systems of the production system will be established production system configuration. The reliability of this production depends on the system configuration of the products are made and how to make it (the production process).

2.2. Toyota Production System

Toyota Production System (TPS) or better known as the Toyota Production System, an approach in production toyota company using lean (lean manufacturing). Definition of lean manufacturing is as a process that consists of five steps, which defines the value (value) for customers, set the value stream, creating a pull system driven by the customer, and strive to achieve the best (Liker, 2006 [2]).

With the lean manufacturing is expected to also improve the quality of excellence. The tools and methods introduced by Toyota in improving the quality of the just-in-time, kaizen, 5S, one piece flow, jidoka and heijunka (Liker, 2006).

Lean manufacturing itself also should focus on the process. The focus of lean manufacturing is to eliminate waste or waste. Waste in a sense is anything that does not add value to the products that are processed or not give physical form. The other thing of lean manufacturing can be done, among others, to build quality into workplace systems, finding a cheap but reliable alternatives to expensive new technology change, improve business processes, and build a culture of learning for continuous improvement (continuous improvement).

Toyota Workers use the term young Japanese when they talk about a waste. Young Eliminating the focus of most of the lean manufacturing efforts. But there are two "M" Another equally important to make lean manufacturing runs, and the third "M" was co-exist as a single system. The three "M" is a young, mura, and muri. The third word is taken from the Japanese. The following illustration shows the relationship between the young, mura, and muri.

Figure 2 below, is the relationship between a young, mura, and muri. The figure shows that each "M" that is interconnected. This often happens in a company, which is only young but did not think think "M" other. 3M must be considered entirely to give good results in the company. These images and presentation of the 3M:

Figure 2. Muda, Mura, dan Muri (Liker, 2006)

2.3. Just In Time System

The basic concept of production on time (Just In Time / JIT) manufacturing is required, the time needed by consumers, in an amount according to customer needs, at every stage of the production systems, and in the most economical or efficient (Gaspersz , 2002 [3]).

JIT was originally developed and promoted by the Toyota Motor Corporation in Japan, so it is often referred to as the Toyota Production System. This strategy was later adopted by many Japanese firms, especially after the oil crisis in 1973. The main purpose of this timely production system is to reduce production costs and increase the overall productivity of the total industry through eliminating waste (waste) continuously in the company (Monden, 2000).

JIT goal is eliminating waste through continuous improvement (continuous improvement). Under the JIT philosophy, everything is good material, machinery and equipment, human resources, capital, information, management, processes, etc. that do not add value to the product, called waste (waste). Value-added products, is the key word in the JIT. Expenses incurred without adding value to a waste product. To understand the philosophy of JIT is complete, we must understand the JIT approach to quality and quality control (quality control). The principle of JIT is Work Properly In First Time (Do It Right At The First Time). Monden (2000 [4]) says that, JIT approach to integrated quality control (Total Quality Control) aims to develop an attitude that is based on three main principles, namely:

1. The first principle; defect-free output is more important than the output itself.
2. The second principle; defects, errors, damage, congestion, etc. can be prevented.
3. The third principle; prevention is cheaper than reworking (rework).

The dream of minimum inventory in the industry has become a reality thanks to Toyota. Therefore, JIT production system is also known as the Toyota Production System.

2.4. Just In Time Philosophy

Just in time (JIT) deserves to be studied more deeply. Because, with more understanding about it, it's easy to learn how to win the competition, especially from such a competitor Japanese firms. Japanese companies are companies that excel in competition mainly due to the company's ability to eliminate waste. Companies in Japan could reduce waste because natural conditions limited.

Industries in the United States usually have difficulty in saving existing resources, because it is in America these resources are available in large quantities. Thus, Americans are not familiar with Just In Time but that there is a Just In Case.

Eliminating various waste, by eliminating unnecessary activities, the company's productivity will increase.

JIT based on eight key, namely:

1. Produce products according to a schedule based on demand.
2. Producing in small quantities (small lot size).
3. Eliminate waste.
4. Improving the flow of production.
5. Enhancing the quality of the product.
6. The people who respond.
7. Eliminate uncertainty.
8. Emphasis on long-term maintenance.

According to Liker (2006), basically a waste is defined as any activity that does not hold or deliver added value. In a production system known there are at least seven sources of waste, among others:

1. Wastage due to excess production of consumer demand (market).
2. Waste because the waiting time.
3. Waste because of transportation within the plant.

4. Waste because inventory (inventory).
5. Waste because the movement (motion).
6. Wastage due to manufacturing defects.
7. Waste because the production process itself is not effective and efficient (if the product was not supposed to be made or that the process should not be used).

But there is one kind of extravagance again put into the category of waste that does not add value, which is a waste because of the creativity of employees who are not used.

2.5. Just In Time Production Strategy

According to Monden (2000), the production strategy of Just in Time (JIT) is applied to the whole system of modern production since the process engineering (engineering), ordering materials from suppliers (suppliers), materials management in industry, industrial manufacturing process, to the distribution of industrial production to consumers.

Some of the main objectives to be achieved from the JIT production system is as follows:

1. Reduction of scrap and network.
2. Increasing the number of suppliers participating JIT.
3. Improving the quality of industrial processes (orientation zero defect).
4. Reduce inventory (inventory zero orientation).
5. Reduction of the use of factory space.
6. Factory output linearity (producing at a constant rate over time).
7. Reduction of overhead.
8. Increasing the productivity of the overall industry total.

2.6. Kanban System

The most famous JIT production is based kanban cards developed by Toyota. Kanban comes from the Japanese word meaning signs. However, in an operational context described that Kanban is a card that is used to accommodate the needs of material parts in the process of operation. Kanban system is an information system that is matched controls production of products in the quantities required at the time required in each process (Monden, 2000).

According to Monden (2000) in a JIT production system, Kanban system is supported by the following:

1. Production fluency
2. Standardization of work
3. Reduced setup time
4. Improvement activities
5. The design layout engine
6. Autonomasi

Monden (2000) states that Kanban is a card which is usually placed in a rectangular envelope. Monden (2000) also stated that the Kanban system known as 2 pieces types of kanban, the kanban pull (withdrawal kanbans) and Kanban production (production kanbans).

Two kanban flow which has been described, there is in figure 3.

2.7. Determination of Number of Kanban Cards

In manufacturing firms, planners material (material planner) to the person responsible for issuing the cards kanban, kanban both pull and kanban production.

How that can be used to determine the number of kanban is to use the following formulation.

$$Kanban = \frac{D \times LT \times (1+SF)}{N} \qquad (1)$$

Keterangan :

D	=	*Demand per Day*
LT	=	*Lead Time*
N	=	*Ukuran Lot*
SF	=	*Safety Factor*

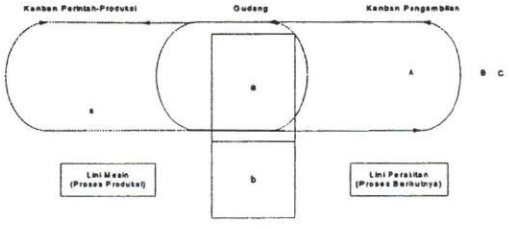

Figure 3. Two Kanban Flow
(Monden, 2000)

Desired condition here is SF = 1, which means that the ideal of JIT Production System. The smaller the SF, the less kanban cards in circulation and the better the circulation process.

2.8. Junbiki System

In a Kanban system implementation undergone many developments, one of which is the implementation of the system Junbiki. Junbiki derived from the Japanese word meaning prep (preparation). The meaning here is that the preparation of the production sequence are the same production line with the existing sequence produced suppliers. It is very supportive of the implementation of the JIT system and can reduce inventories to a minimum. Thus, junbiki is a system deliveries (delivery) using the ordering system (order) by using a facsimile, in accordance with the order of production (heijunka pattern) on the production line.

This method has several objectives:

1. Reduced component (stock parts) in the production line and in the warehouse (warehouse) components.
2. Keeping mistakes to the installation of the required components.
3. Reduce the cost of production (labor, energy, investment).
4. Improving the performance of JIT.

According Andriantono (2004 [5]), in implementing this system Junbiki the most influential and that must be considered is the time (time) crucial. In this regard, it should be taken into account in production time customers (takt time), while production at suppliers (production time) and delivery time (handling and delivery time).

To send information about the sequence of production as well as acting as kanban retrieval, we use a dedicated fax machine for this purpose. This technology is called e-Kanban (Electronic Kanban). To run the system Junbiki, lead time should be more than the lead time lead time plus shipping handling, or can be formulated as follows:

processing time > time information

Takt time is the time available to produce one unit or a part based on operational time available compared to the number of products required, or can be formulated as follows:

$$Tact\ time = \frac{waktu\ operasional}{jumlah\ produk\ yang\ diperlukan} \quad (2)$$

In a production system that uses a conveyor belt (conveyor), takt time is usually used to determine the working time of each post.

Lead time of departure and arrival intervals truck supplier to the company can be determined by the following equation:

$$Lts = T \times Q \quad (3)$$

with :

Lts	: *Lead time* arrival of *Supplier* truck
T	: *Tact time* production each unit
Q	: *Lot* in 1 times delivery

A part or component, can be treated as part junbiki if it fulfills the following requirements: (Andriantono, 2004)

1. Dimension (big parts), part or lorry or pallet.
2. Part has to be unique, unique here is that the part is despite having the same shape, but have different specifications (harigami), for example, in terms of color, composition type material.
3. An assembly part (part mounted directly on the product), not sub assembly parts (requiring further processing).

Besides part should qualify, suppliers must also meet the following requirements:

1. Time information <time processing, time information here includes the time loading, receiving faxes from the company, the company's shipping and unloading time.
2. The tool should be able to offset the transportation lead time or interval departure from the suppliers to the company.

The requirements to be met at the absolute top companies to fulfill this method, if one of the conditions are not met, then the company may not implement this method Junbiki.

2.9. Company Productivity

Philosophy and the spirit of productivity has been around since the beginning of human civilization since the meaning of productivity is the desire (the will) and effort (effort) people to always improve the quality of life and livelihood in all fields.

In general, productivity implies a comparison between the results achieved (output) to the overall resources used (inputs). Related to the productive mental attitude, among others, regarding the attitude:

1. Motivational.
2. Discipline
3. Creative.
4. Innovative.
5. Dynamic.
6. Professionals.
7. Soulless Warrior.

Understanding productivity has two dimensions, namely the effectiveness and efficiency (Sedarmayanti, 2009 [6]). The first dimension relates to the achievement of maximum performance, in the sense of achieving the target in terms of quality, quantity and time. Meanwhile, a second dimension relates to the attempt to compare inputs are actually used or how the work is carried out.

Efficiency is a measure to compare the use of inputs (input) planned to use materialize actual input (Sedarmayanti, 2009). If the actual input is used the greater the savings, the higher the level of efficiency, but the smaller the input that can be saved, so the lower the efficiency. Understanding efficiency here is more oriented to the inputs while the output problem (output) less of a concern.

Effectiveness is a measure that gives an idea of how far the target can be achieved (Sedarmayanti, 2009). Understanding the effectiveness is more oriented to the output, while using less input problem to the attention of scholars. If efficiency is associated with the effectiveness despite an increase in effectiveness is not necessarily improved efficiency.

According Hadiguna (2009 [7]), input-oriented efficiency and effectiveness-oriented output. So it can be concluded that the definition of productivity is as follows:

$$Produktivitas = \frac{Efektivitas\ menghasilkan\ keluaran}{Efisiensi\ penggunaan\ masukan} \quad (5)$$

The system will always be important to determine the efficiency and effectiveness of a company (Hadiguna, 2009).

3. THE RESULT AND ANALYSIS OF EXPERIMENT

This study shows how big a role Junbiki method in improving the company's productivity. This is shown in the three following discussion.

3.1. Area Needs

Area needs to Junbiki System, refer to the dimensions and composition of the lorry as it can reduce wide area. Lorry composition of his images themselves can be seen in the picture below.

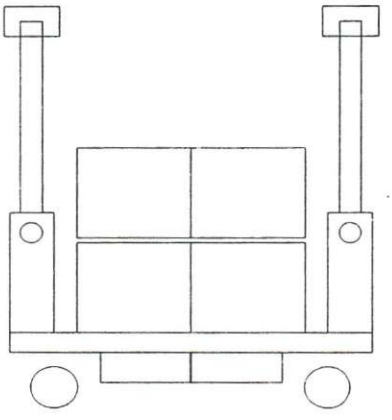

Figure 4. Lorry Composition For Junbiki System

Here is the calculation:

- Process fax to order stuff done 1 time, where 1 fax = 10 boxes.
- 1 box contains 20 units.
- Capacity 1 Lorry = 10 boxes.
- Total Lorry each shipment = 2 pieces.
- Total deliveries = 200 units.
- Dimensions Lorry (p x l) = 2500 x 2000 mm.

Thus the need for space for hex bolt part is:

$$L = \frac{2500\ x\ 2000}{1000000} = 5\ m^2$$

Sr = *Stock Require*, where here is the total Lorry each shipment = 2

Need for space = Sr x L
= 2 x 5
= 10 m²

The need for space is given leeway (allowance) of 20%, in order to avoid collisions between Lorry. Thus, the space requirement for Junbiki

System to 12 m². Because the concept Junbiki System is zero stock, the space requirements needed for each period is the same, ie 12 m².

Table 1. Comparison of efficiency and productivity needs with Junbiki area Kanban System

Periode	Kebutuhan Area		Reduksi (m²)	Efisiensi (%)
	Kanban System	Junbiki System		
Januari	237 m²	12 m²	225	94,94
Februari	232,5 m²	12 m²	220,5	94,84
Maret	239,5 m²	12 m²	227,5	94,99
April	242 m²	12 m²	230	95,04

From Table 1 above, it appears that the area needs to Junbiki System smaller than the Kanban System. Because the area is used for Junbiki System Junbiki area, which is part of the truck unloading area from suppliers. Meanwhile, the area used for the needs of Kanban System consists of warehouse area, area and area jundate empty lorry.

It appears that the implementation Junbiki System, the area needs to increase efficiency dramatically. Especially at the highest production per period, ie in the month of April 2012, the value Junbiki System efficiency is very high at 95.04%.

3.2. Man Power Requirement

Calculation of man power for Junbiki method and Kanban systems is done only for indirect labor (administration) and direct labor (operational), for the administration of man power is calculated kanban is part of the collection (for Kanban systems) and good receipt (receiving part) to the second method, while for operational, man power is calculated is part of the reception area and checking (for the Kanban system), and the acceptance and distribution (supply) for Junbiki method.

Table 2. *Job Description Man Power* for *Kanban System*

No.	*Man Power*	*Job Description*
1.	*Warehouse*	Set up and take down the parts that will be used as a buffer stock. In addition, this section also regulate which parts are in and out.
2.	*Jundate*	Prepare supply parts from suppliers to Lorry according to production line.
3.	*Good Receipt*	Received and recorded part of the very first to come to the factory and match with PO (Purchase Order) sent by the manufacturer.
4.	Production Line	Receiving part of the area that had been set forth Jundate to be forwarded to the production line.
5.	Withdrawal *Kanban*	Collecting Kanban from the production line, also pass and recorded in Kanban Board Maintenance.

As for the need for man power Junbiki System, the amount of man power it is less than the Kanban System. In Junbiki System, man power in the warehouse area, and the withdrawal Kanban jundate no. There is only the man power for good receipt and man power supply and receiving area. For the calculation of the amount of its man power in each area can be calculated by the following formula:

$$MP = \frac{\Sigma Wt}{Total\ Jam\ Kerja} \qquad (5)$$

Where, previously had to know in advance the value of its **Wt** obtained from:

Wt = Waktu untuk melakukan pekerjaan X frekuensi pekerjaan

After determining Wt, then specify the working hours. Measures taken by the Company for working hours are:

- Total hours worked = 8 hours
  = 8 x 60 minutes
- Total break = 60 minutes
- Working hours = 480 - 60 minutes
  = 420 minutes
  = 420 minutes x 60 seconds
  = 25,200 seconds

Table 3. Comparison of efficiency and productivity man power between Junbiki and Kanban System

Periode	Kebutuhan *Man Power*		Reduksi (orang)	Efisiensi (%)
	Kanban System	Junbiki System		
Januari	8	2	6	75
Februari	7	2	5	71,43
Maret	7	2	5	71,43
April	8	2	6	75

From Table 3, the need for man power between the junbiki kanban system, it can be seen that the man power junbiki less than Kanban system. This is because, due to the junbiki working elements of man power is less than the kanban system, so that the total time required to junbiki method is smaller than the kanban method.

In addition to the elements a little work, the method checks kanban junbiki activities came to the factory are excluded because the preparation and delivery of parts to the store area by the supplier, so that the operator on duty to check each kanban that comes not there, just make sure the operator sequence part must match the tag suppliers listed on the lorry.

It is clear that the implementation Junbiki System, the efficiency needs of man power (MP) increases. Moreover, in April 2012, the value Junbiki System efficiency is very high at 75%.

3.3. Material Handling Needs

Material Handling used in two different systems. For the Kanban system, Material Handling Forklift used is, while for Junbiki system, Material Handling used is Lorry. From the graph shows that by using Junbiki, the number of Material Handling Material Handling constant is 1, whereas the Kanban system in the range of 6 Material Handling. Material Handling Requirements in Kanban System caused more by the amount of production per period of his. The higher the production, the Material Handling unit will be more widely used. Meanwhile, for Junbiki Material Handling System requirements tend to be stable.

For computation efficiency, can be seen in Table 4, which shows the comparison of the need for Kanban and Material Handling System Junbiki.

Table 4. Comparison of efficiency and productivity material handling between Junbiki and Kanban System

Periode	Kebutuhan *Material Handling*		Reduksi (unit)	Efisiensi (%)
	Kanban System	Junbiki System		
Januari	6	1	5	83,3
Februari	6	1	5	83,3
Maret	6	1	5	83,3
April	6	1	5	83,3

It is clear that the implementation Junbiki System, Material Handling increased efficiency requirements. Moreover, in all periods showed high efficiency values, ie 83.33%.

4. CONCLUSION

Based on the above data, it can be concluded that the overall Junbiki system is better than Kanban System. It can be seen from the comparison area needs, the needs of man power and material handling needs, it junbiki system efficiency value is higher than the kanban system.

It can also be concluded that:

a. Junbiki System is used both at the level of large production and large variations.
b. The higher the volume of production, the more effective the system Junbiki.
c. Junbiki method is good enough to be applied to the industry that has thecharacteristics can be produced in large quantities (mass production), with a lot of variations of this model.

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