Strategy and policy for increasing work productivity of operators in the steel industry through work improvement with lean method (journal review)

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Abstract. Increasing tight of competition in the steel market and then need to be taken to make efficiency and effectiveness in the company. Not achievement of production targets which have been set that it will can have a negative impact for the company. Therefore it is necessary to create a good strategy to make the right policy to solve in the internal problems of production company. One the right of strategy for a manufacturing company is to use the Lean Method. Due to some approaches and tools can be used by manufacturing companies. This article use balancing analysis and work standards. Some tools in lean method can be adjusted to situation and the conditions of the company that can also improve the standardization of work and improve productivity of manufacturing. Therefore it is necessary to conduct more in depth empirical studies in applying this method. Based on the results of this review literature study is expected readers can implement lean method in accordance needs of manufacturing companies.

1. Introduction
Business competition in the world and industry today certainly not realesed from the role and use of existing resources. The resources used in efficiency and effectiveness. The meaning resources in generally include Human, Money, Raw Materials, Machinery and Energy.

One of them is human, human role to contribute more in managing the organization or business world and industry. The optimum utilization of human resources in increasing productivity is expected to be very helpful in achieving high productivity. Therefore, the utilization of human resources in various sectors, both profit and non profit is significant, so the utilization of human resources is one of the effective efforts to improve the quality of production, cost and minimum processing time.

Nasution (2015) in reality the physical capital is created or engineered by human capital, the result of human engineering is used as a machine and equipment used to process raw materials become a products. While human capital is engineered by humans through the mastering of science, skills and abilities possessed by humans, the human made engineering is make humans work and behave with methods. and the latest methods, with human engineering it is expected that results will be more efficient and effective. [9] Productivity describes the level of efficiency, effectiveness and presentation of performance development and performance a company. Productivity is one of the important factor that must be considered by the company if they want to continue to be competence in industry world, where in increasing productivity in the production area will be improve employee welfare and achieve
the goals of the company. With analysis of productivity, the manufacturing will be assess the conversion of efficiency existing resources. This can be used as a consideration for issuing the right target policy.

Sinulingga (2015) if the productivity figures show an increasing trend from one period to the next then it can be said that the ability of management in utilizing production resources better and vice versa if it shows a decreasing tendency then the ability of management in utilizing production resources decline[12]. Various literature is obtained from reliable sources such as sciencedirect and articles obtained from reading materials related to industrial and manufacturing. The literature will be discussed briefly related to lean methods and strategies used. So there needs to be a theoretical study to further support the lean method and later can be used for empirical studies in the field for the future. Finally, this review literature can provide readers insight to determine strategies and policies related to increased productivity. In the next part of this literary review will be divided into several sections consisting of methods, result and discussions, conclusions and lastly references.

2. The Development of Productivity Theory
Regarding the meaning of the word productivity more increasing. The notion of productivity was first put forward by Quesnay in 1776. The results of research from Biswas, et.al (2016) stated that in measuring productivity is an important thing to do for all types of industries. Increased productivity is one of the main things to increase profit with the one resources. Increased productivity can make satisfied customers and reduce time to deliver products [1].

Usubamatov (2017) adds that in general the theory of productivity is universal and can be applied to all types of industries such as manufacturing, textiles, transportation, chemicals and others. So the understanding of productivity itself has grown a lot [11]. Sinulingga (2015) the measure of productivity is the ability of one unit input to produce output. Which one of the inputs is labor besides there is also materials, capital, energy and others [12].

Moktadir et.al (2017), asserted that Productivity is the ratio between the wealth output and the input resources used in the production process [7]. Organization for European Economic Cooperation (OEEC) that productivity is the result obtained by comparing output with one of the factors of production. It is possible to discuss the productivity of capital, investment or raw materials referring to outputs associated with capital, investment or raw materials. So productivity has an effective relationship with performance measures in the utilization of existing methods.

3. Lean Method
Work system is a set of working procedures that form a pattern in order to do a job. Kleiner (2006), work system consists of two or more people working together that interact with technology in an organizational system characterized by a physical and cultural environment [3]. Mustafa et al.(2009), working systems in the manufacturing industry have complex systems covering humans, machines and organizations [8]. The improvement of work a better way is needed to improve or eliminate the ineffective and inefficient work process. One way that can be used is to use Lean manufacturing concept which is a way to minimize waste in a work activity. This should be done by all members of the organization. Lean manufacturing focuses more on minimizing waste in production operations. Lean Manufacturing is beneficial to improve work productivity by eliminating waste, eliminating unnecessary work, at lower costs, improving product quality and reducing leadtime so that it is shorter. Botti et.al (2017) lean thinking is a strategy production to increasing profits with a little bit resources[5]. This implementation, waste reduction, Just-in-time (JIT), defect-free, remedial strategies, and work standardization are the point of lean thinking. The goal of lean production is to reduce costs and increase productivity by eliminating waste.

Lean production is a systematic concept to identify and eliminate existing wastes of activities that do not add value to production activities. Utilization of this concept creates a production process adjusted to customer demand. Thomas at.al (2017) who did research on $^{239}$Pu manufacturing with the
findings that Theory of Constraints and Lean Manufacturing, and discrete event simulations were formed to study these alternatives[13]. H.T.S Caldera at.al (2017) Proposed that industry practitioners can benefit from such systems, which can change the performance of their organizations through sustainable business practices that are well integrated and aligned[2]. Antosz & Sładnicka (2017) in a study using Lean Manufacturing found that many micro businesses are to apply lean philosophy[4]. Manufacturing want to the operations and need for waste eliminated. The point waste is waiting for material (49%), unnecessary movement (41%) and engine failure (39%). One of reason for implementing Lean Manufacturing is the intention to improve the company's operations (81%) and the need competitive advantage (50%).Vivek Korde at.al (2017) with implementation of lean manufacturing, the evaluate processing time is the point achieved by value stream mapping tools. The reduction in takt time from 46 minutes to 26.6 minutes[14].

Likers, (2006) the good operational is partly in tools and methods of improvement by Toyota in some company in the world, such as just in time, kaizen, one piece flow, jidoka and heijunka. Such engineering techniques have helped to create a lean manufacturing revolution[6]. Ortiz (2010) states that to understand the lean phenomenon, one that needs to be learned is how to see between tools with the philosophy intertwined. Lean Tools itself consists of: Kaizen; 5S; Standard Work; Set-up Reduction; and Quick Changeover[10]. Wilson (2010), explains that Lean's overall approach in four key strategies[14]:

A. Strategy synchronize external
To synchronize externally is supply product to all customers what they needed, the rate demand normalized to production schedule. The supply to customer needs but it will not overproduce and create excess inventory. The tools allow balance to be achieved. In order to properly synchronize to the customer, it must meet the volume of demand according to the contract need to handle the normal. if this thing want to be synchronized external to the customer. This variation will require buffer stock inventory.

a. Tools used:
- The takt time formula (Feld, 2000)

\[ TT = \frac{\text{Available work time per day}}{\text{Customer Demand per day}} \]  

- Cycle Stock, Buffer stock, and Safety Stock are inventories.
- The product or Leveling of Model Mixes is used when more than one product is made on a given production line.

b. Wastes reduced
Overproduction is the waste targeted here.

B. Production Internally.
Synchronize production internally is to divide the necessary work in processing steps. The tools are used:

a. Tools used
- Balancing is done by completing the basic time study.
- Standardization Work is a technique used to review the performance.

b. Wastes reduce
Waiting is the key waste removed, and while inventory is often reduced, the goal is a one-piece flow.
C. Create flow.
The concept of flow is such that we do not want the production unit to stop, except for value-added work. The flow concept has both overall measures and a local measures. The local measures would be cycle time.

a. **Tools used**
- SMED (Single Minute Exchange of Dies, quick changeover) to reduce changeover times and needed inventory to sustain production.
- Jidoka.
- 5 Why is a problem solving method which employs the technique to continue to ask “why” to explore the cause and effect relationship, in an attempt to find the root cause.
- OEE (Overall Equipment Effectiveness).

b. **Wastes reduced**
- Transportation is the waste of moving parts around. It occurs between processing steps, between processing lines and happens when product is shipped to the customer.
- Waiting is simply workers not working for whatever reason. It could be short term waiting, such as what occurs in an unbalanced line or longer waits, such as for stock outs or machinery failure.
- Overprocessing
- Moving
- Inventory
- Defect.
- Overproduction

D. Pull demand system.
The pull system has two characteristics. First, they have a fixed inventory, so the supply cycle, plus buffer and safety stock must be determined. Secondly, they are activated when the product is removed and this signifies the upstream process to produce - no signal, no production. All kanban systems provide this function.

a. **Tools used**
- Kanban.

b. **Wastes reduced**
- Overproduction and Inventory is reduce.

4. Conclusion
Based on the above, the application or lean method has four strategies in improving work productivity as well as improve standardization work for existing individuals or organizations, it will return to individual or organization each will choice strategy will be used, because each strategy has different results, so also one of the existing strategies is not necessarily the same applied to an individual or organization to one another.

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