LEAN MANUFACTURING IMPLEMENTATION: AN APPROACH TO REDUCE PRODUCTION COST

Iraswari
Helmy Adam

Universitas Brawijaya, Jl. MT. Haryono 165, Malang
Email: helmyadami@gmail.com

Abstract: Lean Manufacturing Implementation: An Approach To Reduce Production Cost. *Opportunities to improve production processes and reduce production cost through the implementation of lean manufacturing in small medium garment manufacturing are presented in this research. This research shows that there is a possibility of decrease in production cost and increase in return on sales. Lean manufacturing implementation can eliminate waste in the production process. This is a set of techniques for identification and elimination of waste gathered from The Ford Production, Statistical Process Control and other techniques. Improvement of quality could be carried out while time and cost of production are being reduced.*

Abstrak: Implementasi Lean Manufacturing: Suatu Pendekatan Biaya Produksi. Kesempatan untuk memperbaiki proses produksi melalui implementasi lean manufacturing di sebuah usaha produksi garmen kecil dan menengah, dipresentasikan dalam artikel ini. Riset ini menunjukkan bahwa ada kemungkinan untuk mengurangi biaya produksi dan meningkatkan tingkat pengembalian penjualan. Implementasi lean manufacturing dapat mengeliminasi pembuangan dalam proses produksi. Ini merupakan suatu set teknik pengeindentifikasian and pengeliminasian pembuangan yang diambil dari The Ford Production, Statistical Process Control dan teknik lain. Perbaikan kualitas dapat diperbaiki pada saat yang sama waktu dan biaya dapat direduksi.

Key Word: *Lean Manufacturing, Visual Factory / 5-S, Value Stream Mapping, Process Value Analysis, Value Stream Costing*

In Indonesia, small scale industry known as Industri Kecil dan Rumah Tangga (IKRT) has an important role especially if observed from the amount of labours absorbed as well as the numbers of business unit (Kuncoro and Supomo, 2003). In this constellation, desire to make growth and development for IKRT are at least based on that role.

One of the form of small medium businesses that has a big potency to grow is garment industry. It is based on the Javanese term "sandang, pangan, papan" as a primary need of human being, so it produces clothes that has an important role in human life. However, there are some problems that should be faced by small medium garment entrepreneurs, and it becomes constraint for an optimal operation.

In general, the small medium garment entrepreneurs start off from experience of seeing other entrepreneurs or by beginning their careers from employer in a business unit garment industry. They then increase themselves with legal capital, two or three sewing machines, to be small medium garment entrepreneur. Usually, they naturally are forced to become entrepreneur from this situation without having any learning process experience in production techniques.

With this condition, it can be seen that the small medium garment entrepreneurs were to implement activity of patch up production and add a few experiences of

Jurnal Akuntansi Multiparadigma
JAMAL
Volume 3
Nomor 1
Halaman ....
Malang, April 2012
ISSN 2086-7603

trial and error during range of production run. Thereby it is excusable that production ability did not significantly increase in time, so the level of productivity from time to time did not show much of improvement.

Every company, both small and big companies are trying to be able to stay in the business competition. Since there are many foreign corporations having expansion in Indonesian business competition map, they have to make various repairs of quality in their companies. These requirements are necessary for reaching their companies purpose. Besides produce out-put (either goods or service) with a great quality and can be permeated by the consumer candidates, the company also must execute production process in control and directional as according to the company vision and mission. This is done to reach level of operation effectiveness and efficiency that the company want, which is making an improvement of company profit and reach level of production effectively.

In production process, it is almost certain that there are many opportunities for the waste to happen. However, the important thing to question is the level of company awareness of things that have potency to become loss. If illustrated like ice mountain phenomenon, it shows that some issues is a potential losses that are easy to be realized or it is just like top of the mountain which can be seen, this condition exemplified in production process like existence of production waste material (scarp), repair (rework), and also inspection process. Whereas, there are also things that potentially become loss, for example set up process, existence of delivery cost, cycle time which is too long and etc. are considered to be fair thing. Like part of ice mountain, a kind of this things haves no direct seen and tended to forgotten.

This condition required a method and good production implementation, such as lean manufacturing approach which had been introduced since the Second World War. For approach that is mostly applied, lean manufacturing is a set of technique for identification and elimination of waste. With waste disposal, repair of quality could happen when time and cost of production are being reduced.

From that reason, to develop small medium garment industry, with all the constraints owned by it, the objective of this research is to measure the possibility of production cost reduction at small medium garment industry passed in perspective of lean manufacturing by eliminating waste in the production process.

Conceptually, lean manufacturing also looks like lean enterprise Ford system. Contribution Shingo and Ohno overcome various mistakes and weakness in Ford system. Employee empowerment, team structures, cellular manufacturing, reduce setup time, and small batches all came into being in Toyota Production System and are integral parts of lean manufacturing system (Hansen and Mowen, 2008:341). Lean manufacturing is distinguished by the following five principles of lean thinking: (1) Precisely specify value by each particular product, (2) Identify the "value stream" for each, (3) Make value flow without interruption (4) let the customer pull value from the producer.

The history of lean manufacturing is described by Emery et. al. (2009):

> "The origin and general evolution of the lean philosophy and some of the basic techniques first brought into use by the Toyota Corporation is discussed by Papadopoulou and Ozbayrak. The Toyota Production System (TPS) and what it brought to manufacturing as well as the Just-in-Time (JIT) philosophy are the original lean implementations. The "lean manufacturing philosophy" is simply the extension of these first efforts to eliminate waste in manufacturing. Lean as a general idea is comparable, though sometimes more broad in scope, to other manufacturing approaches such as time-based manufacturing, quick response manufacturing, customer-order driven production, and adaptable production. Extensive overlap among the practices of these approaches makes them fall into subsets of the more recent ideal of "lean enterprise", with the goal of eliminating waste from all areas of an enterprise. (Emery et. al., 2009)

As being discussed by Emery et al. (2009), the success of a specific lean technique depends on many factors including type of industry, type of product of service, and scale of operations. These variables require that organizations select specific techniques from a vast and complicated library of possibilities, or develop a solution that has no existing model.

Some of these tools that already explained by Emery et al. (2009) are: (1) Value stream mapping tracks product flow from order to delivery and evaluates each step the product takes on its journey. If a step does not increase the value to the customer, then it has no place in the process. (2) Visual Factory a.k.a. 5S visualizes a shop floor in an attempt to make the shop an orderly environment in which the disorderly stands out, and can thus be addressed. This technique effectively makes every employee a workplace inspector and decreases the chance of mistakes, defects, and lost employee man hours associated with a chaotic workplace, (3) Poke-Yoke is mistake proofing and is associated with the design phase of a product. It is most often a mechanism to prevent defects, or minimize the damage caused by mistakes, (5) Single minute exchange of dies (SMED), or quick changeover, streamlines processes, allowing a machine or shop floor to shift easily from one production task to another. This lean technique makes a production system more adaptable or agile and provides vital support for other lean practices such as production leveling (6) Kanban production signaling aids the use of single piece flow or small lot sizes. It reduces the dependence of a manufacturing system on production estimates. It is generally an indicator, often physical, that a particular work station in a production line needs a component from a work station upstream. Since this technique allows each station to produce only what is required by the station immediately downstream, it makes single piece flow practical by reducing or eliminating inventory on the line and preventing line overproduction (7) Many companies use standardized work without knowing that it can be classified as a lean technique. Each process in a production stream is standardized and documented so that it is done the same way by every employee, whether new or experienced. By thus reducing variability in a process, production is stabilized, and waste due to defects is reduced (8) Heijunka, or production leveling, matches the production schedule to the demand of the customer. In other words, products are manufactured in the leveled order; i.e. in the order in which they are required. For example, if a customer requires six red widgets and two blue widgets, a leveled order might Red-Red-Red-Blue-Red-Red-Red-Blue. This technique allows the supplier and customer who use only a certain type of product to function continuously with smaller inventories.

According to Hansen and Mowen (2008), numerous changes in structural and procedural activities that already discussed for lean firm also change traditional cost management practices. The traditional cost management system may not work well in lean environment. In fact, the traditional costing and operational control approaches may actually work against lean manufacturing. Standard costing variances and departmental budgetary variances will likely encourage overproduction and work against the demand-pull system needed in lean manufacturing. For example, emphasis on labor efficiency by comparing actual hours used with hours allowed for production encourages production to keep labor occupied and productive. Similarly, emphasis on departmental efficiency (e.g., machine utilization rates) will cause non-bottleneck departments to overproduce and build work-in-process inventory. From the study of activity-based costing that in a multiple-product plant, the use of a plant-wide overhead rate can be distorted product cost to focused manufacturing assignments or activity-based assignments (Hansen and Mowen, 2008).

This is similar with the opinion expressed by Maskell and Baggaley (2005):

> "Everybody working seriously to implement lean thinking in their company eventually bumps up against their accounting systems. It soon becomes clear that traditional accounting systems are actively anti-lean: They are large, complex, wasteful processes requiring huge amounts of non-value work; They provide measurements and reports like labor efficiency and overhead absorption that motivate large batch production and high inventory levels; They have no good way to identify the financial impact of the lean improvements taking place throughout the company. On the contrary, the financial reports will often show that bad things are happening when very good lean change is being made (Maskel and Baggaley,

2005)."

In process of forming lean accounting, it has some main purpose besides as accounting systems that accommodated for lean method user. That thing expressed by Maskel and Baggaley (2005):

> "We started with a vision statement and then drilled down to the practical tools used to make the vision a reality. Our vision is that Lean Accounting will: provide accurate, timely, and understandable information to motivate the lean transformation throughout the organization, and for decision-making leading to increased customer value, growth, profitability, and cash flow; Use lean tools to eliminate waste from the accounting processes while maintaining thorough financial control; Fully comply with generally accepted accounting principles (GAAP), external reporting regulations, and internal reporting requirements; Support the lean culture by motivating investment in people, providing information that is relevant and actionable, and empowering continuous improvement at every level of the organization (Maskel and Baggaley, 2005)."

Lean accounting reports and methods actively support the lean transformation. This information drives continuous improvement. The financial and non-financial reporting reflects the overall value stream flow, not individual products, jobs, or processes. Lean accounting focuses on measuring and understanding the value created for the customers, and uses this information to enhance customer relationships, product design, product pricing, and lean improvement (Maskel and Baggaley, 2005).

With the implementations of lean manufacturing, every single activity that had been done is an activity that gives an extra value to the product. According to Hansen and Mowen (2007) value is the determined by the customers, at the very least; it is an item or feature for which the customer is willing to pay. Adding features and functions that are not wanted by the customers is a waste of time and resource, and lean manufacturing method is use to cut that waste.

It was proven by the experience from Metalwork Inc., the improvement that Metalwork made in reducing waste and increasing operational efficiency by using lean manufacturing, resulted in the company recently winning the prestigious 2008 Shingo Prize for Operational Excellent. Leading up to its winning the national Shingo award, Metalwork achieved several milestones, including improving quality with 75% reduction in customers complains per million, while achieving a 68% reduction in scarp/rework as a percentage of sales in the past four years. The efforts also resulted in a $6.27 million cost savings in over the past five years, including a 15% reduction in direct labor costs (Waurzyniak, 2008).

METHOD

The research type is descriptive qualitative research, with aim to describe systematically, factual and accurate of fact, nature of cultures between phenomenon, which has been investigated by research object. The approach applied in this research is case study approach. Case study approach is a research with characteristic issue related to the background and the existing condition from research subject (Indriantoro and Supomo, 2002: 32-33). This research had been done in PT.X which is a medium scale garment manufacturing enterprise.

Based on Stainback in Sugiyono (2008), there are no guidelines in qualitative research for determining how much data and data analysis are necessary to support an assertion, conclusion, or theory. Based on the following statement, every data in this research are analyzed by using lean manufacturing method with two of its tools, which are 5-S and value stream mapping. The process starts with analyzing activities that are non-value added and waste activities, then the next step is eliminate them for reducing production cost.

FINDINGS AND DISCUSSION

Layout has an important role in production facility. It also has an important effect to the product which can be evaluated from productivity and quality perspective. Layout must be arranged in such a manner so the production flow can be done correctly and efficient. Layout arrangement also must take into accounts things that are related to working safety.

Based on the observation had been

done by researcher, Production process layout of PT.X are using three floors building. Each of the floors will be shown in Figure 1, Figure 2, and Figure 3. By using three floor building for the production process, there is a high level of transport and moving time for sending goods to another process.

In the production process PT. X applies job order production system, where the costs were accumulated based on its job. In a job order system company, accumulations of costs per job are providing important information for management (Hansen and Mowen, 2006).

In this case, the researcher obtains some information of costs calculation relating to four orders of PT.X in 2009. These four orders are; PDH, TU-Safety Vest, FI-Safety Vest, and Training Suit. Each of the information will be explained in the Table 1 and Table 2.

Based on the observation in PT.X, materials that used in the production process ware textile fabrics, accessories like embroidery yarns, buttons, punch ink, zippers, company emblem and other additional features, and material for packaging. All of materials usage has been standardized based on the raw material used when sample product was made; this thing needs to get raw material usage efficiency.

Every material will be used periodically according to the process in the production division. Textile fabrics will be used in cutting process at cutting division, which then will be sent to follow up division for adding any kind of accessories, such as embroidery, punch, and reflective material like 3M or Unitika Sparklite to make glow in the dark part in product safety vest. Other materials applied are buttons, company emblem (depends on order) and packaging usage will be used in finishing process.

Determination of production department labor wages was based on two payroll system, which is payment based on office hours and payment based on pieces rate. Payment based on office hours is determine by number of labor hour needs in producing the products, while in pieces rate, there have been an agreement between management and production department in determining their wages until the product finish, usually is being adjusted by the deadline time for finishing the product.

Based on inquiry result with company's controller, it showed that the company had difficulties to assigned factory overhead cost

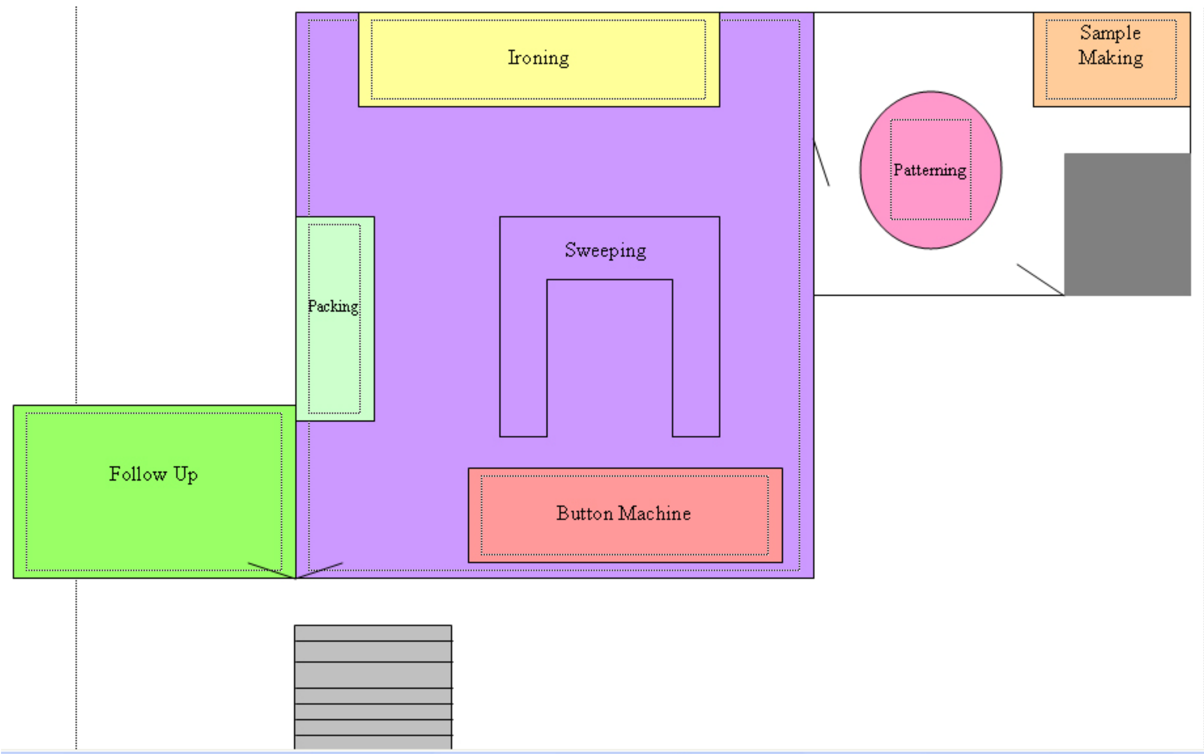

Figure 1.
Production Department Layout 1st Floor

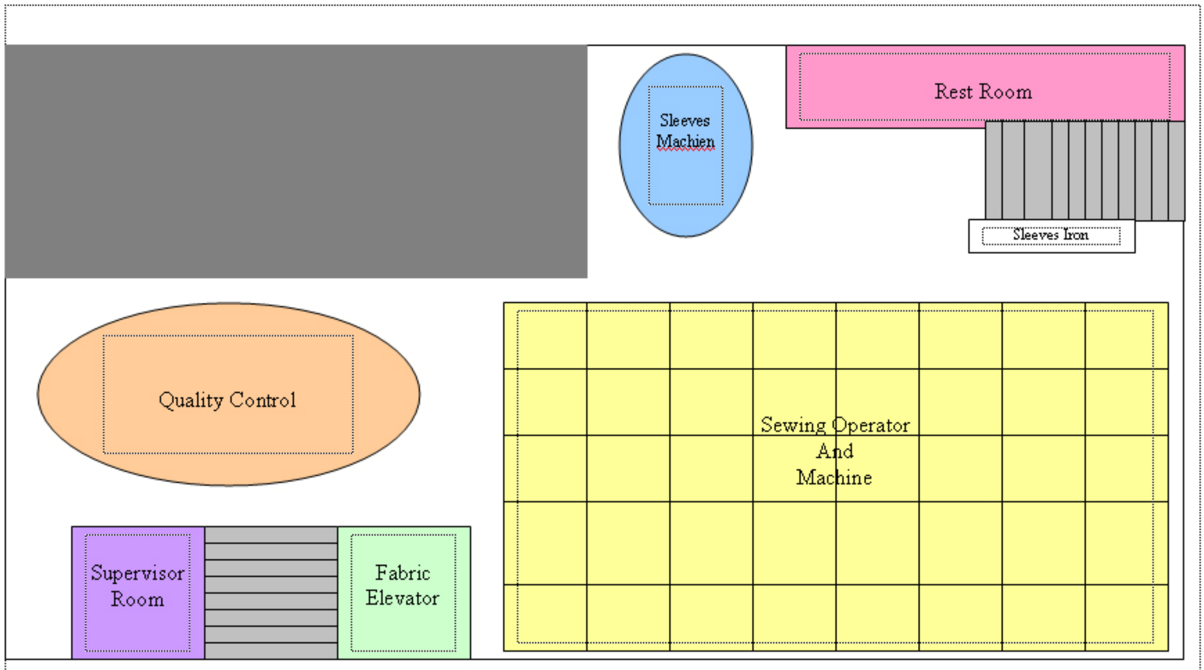

Figure 2.
Production Department Layout 2nd Floor

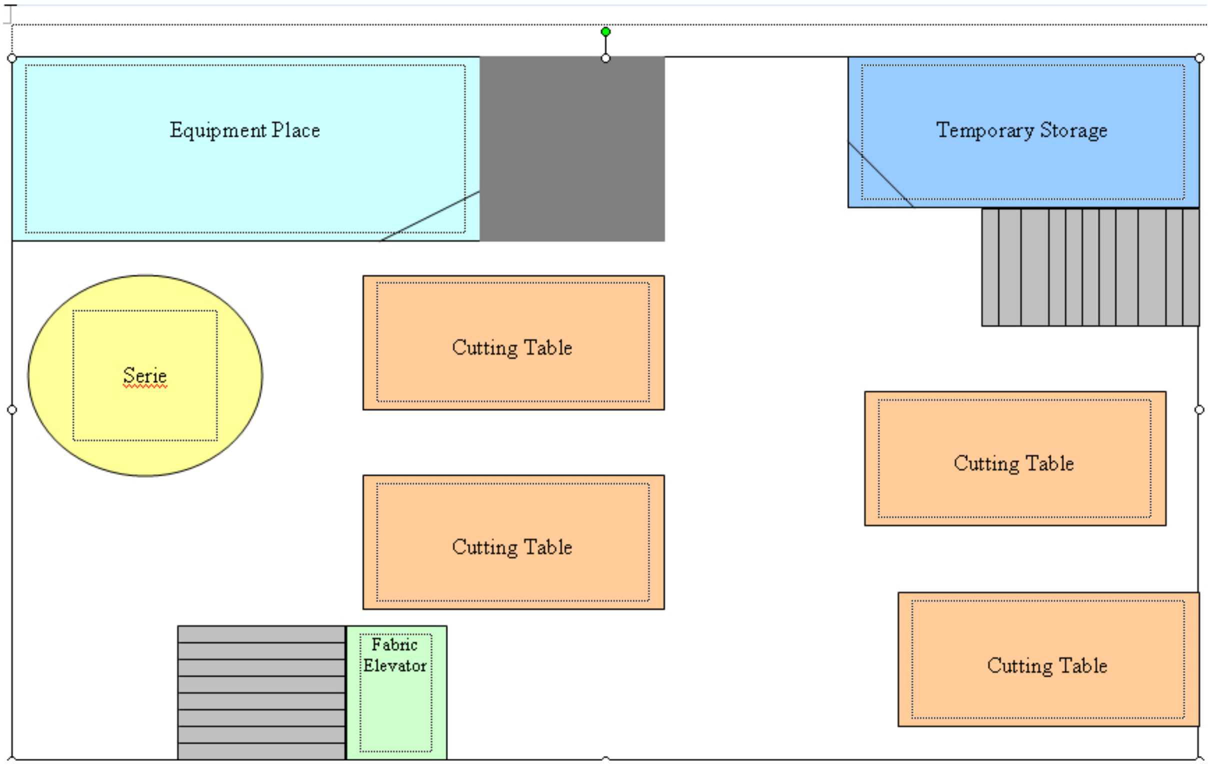

Figure 3.
Production Department Layout 3rd Floor

Table 1.
Job Order Cost Assignment

Description	PDH		TU-Safety Vest		FI-Safety Vest		Training Suit	
PT.X — Production Cost Assignment using Traditional Manufacturing								
	Product							
	In Thousand							
Bahan Textile	Rp.	1,123,694	Rp	26,832	Rp	171,144	Rp	96,573
Asesoris	Rp.	143,779	Rp	13,321	Rp	301,535	Rp	9,439
Sample	Rp.	532	Rp	-	Rp	-	Rp	4,025
Bordir, Sablon, Punching	Rp	44,253	Rp	371	Rp	9,345	Rp	3,095
Packaging	Rp	6,338	Rp	1,715	Rp	2,447	Rp	1,581
Upah Bagian Produksi	Rp	162,181	Rp	8,524	Rp	55,336	Rp	19,856
Uang rajin Bag. Produksi	Rp	3,206	Rp	35	Rp	553	Rp	175
Lembur Bag. Produksi	Rp	28,008	Rp	2,624	Rp	22,243	Rp	10,860
Upah Subcon and Lainnya	Rp	145,721	Rp	572	Rp	77,041	Rp	14,129
Uang makan karyawan	Rp	21,658	Rp	1,791	Rp	6,175	Rp	1,598
Biaya Angkut Bahan	Rp	2,262	Rp	-	Rp	16,612	Rp	575
Biaya Produksi Total	Rp	1,681,632	Rp	55,784	Rp	662,431	Rp	161,906
Unit Produksi		15000		5362		41659		1600
Biaya Produksi per Unit	Rp	112	Rp	10	Rp	16	Rp	101

to their product, and it became the main reason why they did not assigned factory overhead cost. This problem made every indirect cost component, such as utilities usage, machine depreciation, stationery usage as indirect material, is become part of operational expense in ended period income statement.

"5-S implementation methodology is a system to reduce waste and optimize productivity by maintaining an orderly workplace. The use of visual reminders helps to achieve consistent improvements as well. 5-S implementation "cleans up" and organizes the workplace, without changing its existing configuration, and it is typically the first lean method which an organization puts into effect (Hough, 2008)."

5-S method implementation is a system needs to reduce waste and improve productivity by maintain the workplace orderly. According to Araki (2009), core from this method is values awareness that buried in every step of 5-S. It will make every employee to have a positive working environment, which will be realized in working area, working process and of course result of the work, which in the end will give gain to company, employee and customer.

These analyses are meant to assess concordance of workplace to reach production efficiency. The first S standard, sort, is focuses on identifying unnecessary items from the workplace which are not needed for day-to-day operations. Then, the second S focuses on identifying the storage method in the workplace, so every item in the workplace needs to locate easily. The third S sometimes referred to as shine as well. Sweep means that the workplace is clean, free from clutter and broken things. Based on the observation, it showed that some production process workplace of PT.X doesn't fulfill the first effort to implement lean manufacturing; it was reflected in the Figure 4.

In this phase, every production process activity was being analyzed based on the activity classification, which are value-added, value-added non efficient, and non-value-added. For the analysis process, criteria of the three activities are needs to determine the value of each activity.

From the following analysis result, it showed that production process of PT.X still contained by non-value-added activities. According to Hansen and Mowen (2008), non-value-added activities are the source of waste.

Based on Hansen and Mowen (2008)

Table 2
Revenue and Profit Calculation

PT.X REVENUE AND PROFIT In Thousand	Produk			
	PDH	**TU-Safety Vest**		**Training Suit**
Sales	Rp 2,997,419	Rp 144,910	Rp 1,125,826	Rp 325,801
Deduct:				
COGS	Rp (1,681,632)	Rp (55,784)	Rp (662,431)	Rp (161,906)
Gross Margin	**Rp 1,315,787**	**Rp 89,126**	**Rp 463,394**	**Rp 163,895**
Deduct: Sales and Adm. Expense	Rp (1,673)	Rp -	Rp (8,706)	Rp -
Net Profit/(Loss)	**Rp 1,314,113**	**Rp 89,126**	**Rp 454,689**	**Rp 163,895**
Production Unit	15,000	5,362	41,659	1,600
Profit/Unit	**Rp 88**	**Rp 17**	**Rp 11**	**Rp 102**
ROS	44%	62%	40%	50%

described eight sources suggested as the major forms and source of waste: (1) defective products, (2) over production of goods not needed, (3) inventories of goods awaiting further processing or consumption, (4) unnecessary processing, (5) unnecessary movement of people, (6) unnecessary transport of goods, (7) waiting, (8) The design of goods and services that do not meet the needs of customer.

From the observation, it was showed that production process of PT.X has a high level of waiting time and unnecessary movement. These problems still become main sources of waste and extravagance. Beside these problems, sometime there still be product return from the customer, this issue showed that the design of product did not fulfilled the customer requirement.

Value stream is made up of all activities, value-added and non-value-added, required to bring a product of group or services from its starting point to a finished product in the hands of the customer. There are several types of value streams; one of the types is new product value stream, which focuses on developing new products for new customers. The value stream reflects all that is done, both good and bad, to bring the product to customer. Thus, analyzing the value stream allows management to identify waste. Activities within the value stream are value-added or non-value-added. Non-value- added activities are the source of waste (Hansen and Mowen, 2008:342).

From the observation, the researcher showed it in the figure 5 about the current value stream of order fulfillment in PT.X. While the value stream for the six main process of production were figured in the picture by using timeline icon and addition explanation box. This value stream still contained by non-value-added activities such as high level of waiting and moving time because of workplace layout, and also there still have inspecting activities in quality control process.

Based on the following value analysis, researcher determine to eliminate all of non-value added activities, make a new value stream using cell production system and one floor workplace to cut off moving time for work in process. This new value stream will be shown in the figure 6 and 7 based on the following order.

Value stream A is an order fulfillment value stream for PDH and TS orders, where these orders have typical product specification. Their also have a similarities of labor and overhead usage; these can facilitate management for future calculation. While value stream B is an order fulfillment value stream for TU-Safety Vest and FI-Safety Vest orders. In the value stream production process, each unit will be produced by using batch system. For value stream A, each batch are consist with 100 unit products, and for value stream B, each batch are consist with 200 unit products.

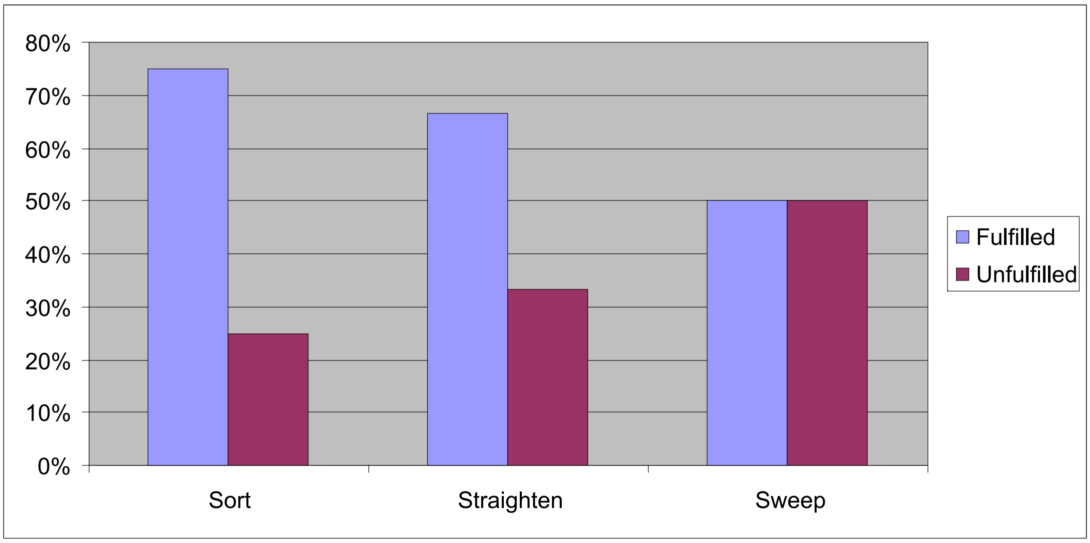

Figure 4.
Workplace Management Analyses

In a traditional manufacturing setup, production organized by function into departments and products are produce in a large batch, moving from department to department. This approach requires significant move time and wait time as each batch moves from one department to another and waits for it turn if there is a batch-in-process in front of it. Beside that, traditional batch production is not equipped to deal with product variety. Further more, move and wait time are source of waste (Hansen and Mowen, 2008:343-344).

Lean manufacturing can resolve the problems that appeared in traditional manufacturing by reducing wait and move time dramatically and allows the production of small batches (low volume) of differing product (high variety). The key factors in achieving these outcomes are lower setup times and cellular manufacturing (Hansen and Mowen, 2008). In reducing move and wait time, lean manufacturing is reducing setup and change over times. With large batch, setups are infrequent and the fixed cost of a setup is spread out over many units. Typical results produce complexity in scheduling and large work in process and in finished goods inventories. Reducing the time to configure equipment to produce a different type of product enables smaller batches is greater variety to be produce. It also decreased the time it takes to produce a unit of output, thus increasing the ability to respond the customer demand.

Besides reducing setup and change over time, lean manufacturing uses a series of cells to produce families of similar products. A lean manufacturing system replaces the traditional plant layout with a pattern of manufacturing cells. Cell structure is chosen over departmental structure because it reduces lead time, decreases product cost, improve quality, and increase on-time delivery (Hansen and Mowen, 2008: 345).

From the statement above, it is assumed that by using lean manufacturing approach production cost can be reduced. This statement was support by the observation in PT.X. It was showed that there is a possibility of production cost reduction by implement lean to cut every waste appeared in the process. This calculation was using value stream costing, which is a simple summary direct costing of the value stream. The value stream costs are typically collected weekly and there is little or no allocation of overheads. This calculation is figured in Table 3 for Value Stream Costing Calculation and Table 4 for Value Stream. Direct material usage for each value stream still based on the actual used of direct material for completing these orders in the historical data. Direct labor cost assignment will be calculated based on direct labor hour use in the production process. Direct labor hour data that being used was

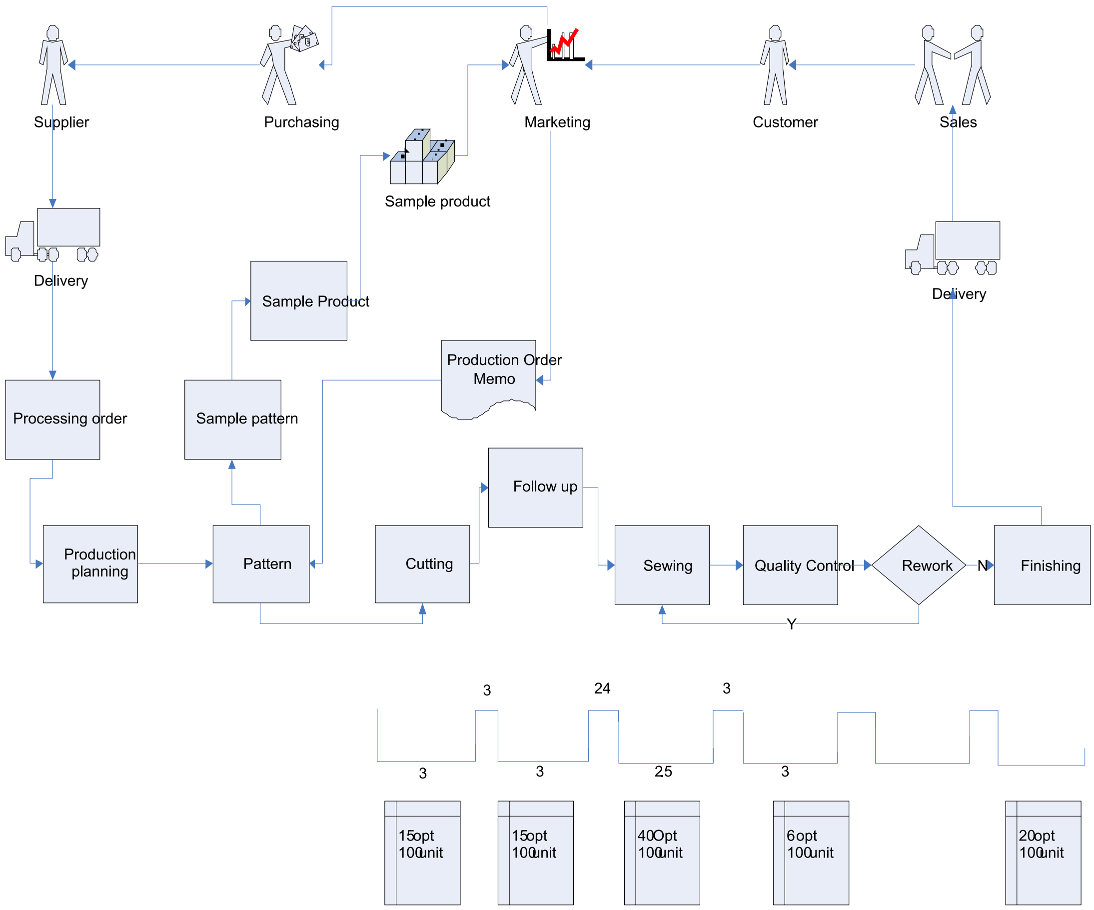

Figure 5.
Current Value Stream for Order Fulfillment

ideal hour for producing and being adjusted by the observation of hours need to finished the product in design and sample division. While factory overhead cost assignment for both of value streams are using driver tracing, where the calculation are using activity based costing (ABC) method.

After calculating the value stream cost, the next step is answering the main problem in this research, which is the possibility of production cost reduction by implementing lean manufacturing for the following order. This calculation was showed in the Table 5.

According to the current job order cost assignment, production costs for PDH order and Training Suit order were Rp1.681.632.256 and Rp.161.905.661. Production cost total for these orders was Rp.1.843.537.917, while production cost from value stream A; that consist by these two orders, was Rp.1.376.345.242. From this calculation is showed that lean manufacturing implementation will reduce Rp.467.192.675 production cost for the following orders.

For others order, which is TU-Safety Vest and FI-Safety Vest, PT.X are losing Rp.55.783.413 and Rp.662.431.318 for producing this orders. Production cost total for these orders was Rp.718.214.731, while production cost from value stream B; that consist by these two orders, was Rp.586.244.245. This calculation also showed that there is Rp.131.970.486 production cost reduction from the following orders.

Another comparison also measured from increasing return on sales. Return on sales PT.X while implementing traditional manufacturing was 44%, from diving process between sales profits Rp.2.021.823.886 with sales revenue Rp.4.593.955.284. For lean manufacturing implementation, PT.X will get 52% return on sales.

CONCLUSION

There are several limitations for this research, which are this research was based on the intensive condition from common garment medium enterprise. It has unique situ-

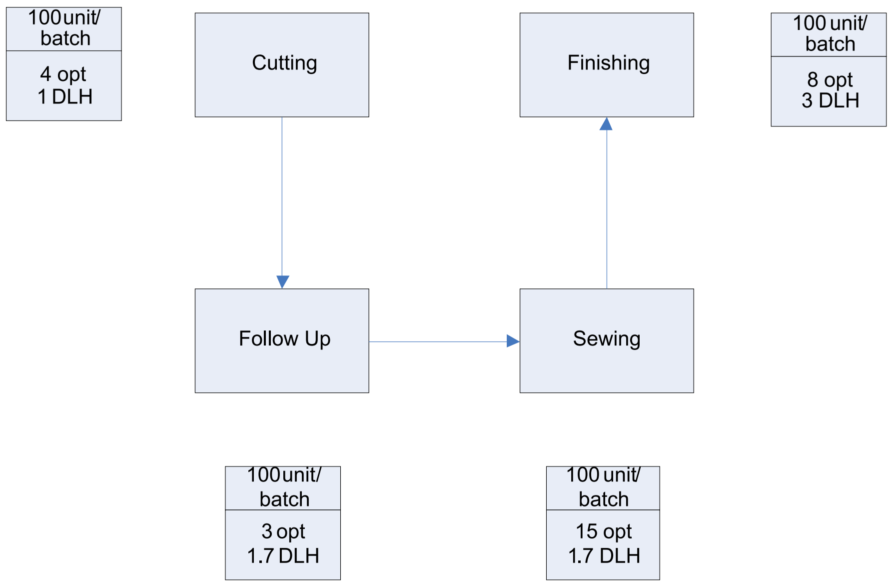

Figure 6.
Future Value Stream A

ation and difference to others company that have a different manufacturing type. Additional information about lean experiences in industries with little lean involvement will be crucial to understanding how these industries can increase efficiency and reduce waste as other industries have done using lean philosophy.

The other limitation of this research is some of the calculation is using ideal condition in the operational process such as non-variety labor skill, common opinion or historical experiences. This research is using comparison between ideal conditions of lean manufacturing with historical condition of traditional manufacturing in 2009 period. It is possible that the actual implementation have a significant difference to ideal conditions.

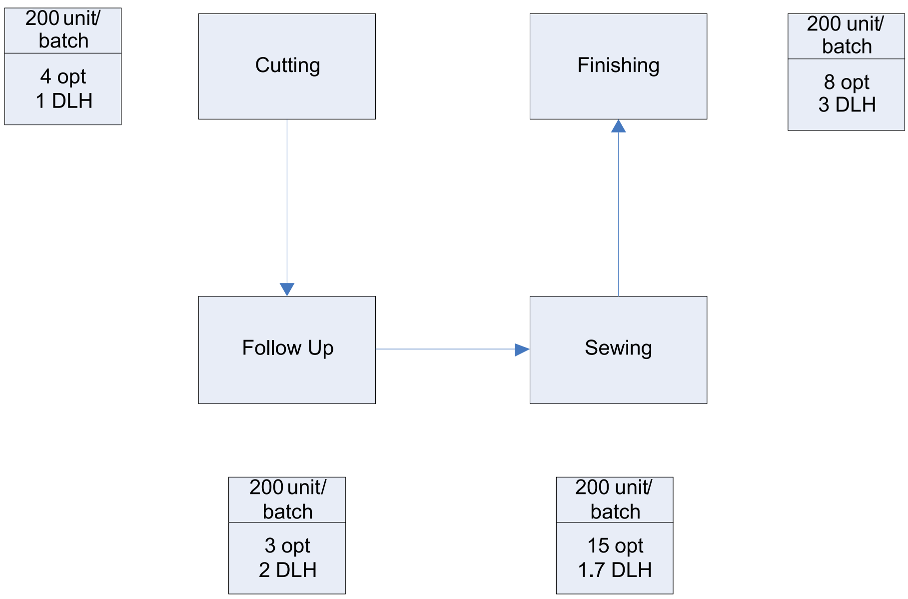

Figure 7.
Future Value Stream B

Table 3.
Value Stream Costing

V.S A	Direct Material	Direct Labor	Machining	Others	Total Cost
Cutting	1,133,131,728	8,758,400	1,300,665	1,784,340	1,144,975,134
follow up		6,568,800	4,422,262	1,338,255	12,329,317
Sewing		32,844,000	4,422,262	6,691,275	43,957,537
Finishing	153,217,375	17,516,800	780,399	3,568,680	175,083,254
Total	**1,286,349,103**	**65,688,000**	**10,925,589**	**13,382,550**	**1,376,345,242**

V.S B	Direct Material	Direct Labor	Machining	Other	Total Cost
Cutting	197,975,993	5,057,470	7,396,555	2,511,945	212,941,962
Follow Up		3,793,103	1,849,139	1,883,959	7,526,200
Sewing		18,965,513	6,287,071	9,419,794	34,672,378
Finishing	314,855,392	10,114,940	1,109,483	5,023,890	331,103,705
Total	**512,831,385**	**37,931,025**	**16,642,248**	**18,839,588**	**586,244,245**

A more extensive survey with a larger respondent pool should be performed to provide more statistically significant evidence for the qualitative conclusions reached here. The area of lean implementation offers many avenues for further research.

Greater insight could be gained from investigation of the human factor in implementation strategies. From the shop floor technician to the CEO, each individual involved in the continuing lean process must know how best to participate to achieve the most effective results. Although a manager can derail a process from above, a technician on the floor can also cause failure. All involved employees at every level of the organization must know and accept their responsibility for the success of a process improvement project. A study of how each organization level reacts to a lean implementation would provide valuable information about how best to present and implement a program to ensure acceptance and enthusiasm from technicians and administration alike.

Table 4.
Value Stream Report

	Value Stream A	**Value Stream B**	**Sustaining Cost**	**Plant Total**
Revenues	3,323,219,849	1,270,735,435		4,593,955,284
Direct Material Cost	**(1,286,349,103)**	**(512,831,385)**		(1,799,180,488)
Conversion Cost	(89,996,139)	(73,412,860)		(163,408,999)
Value Stream Profit	**1,946,874,607**	**684,491,190**		**2,631,365,797**
Value Stream ROS	59%	54%		
Labor Cost			(241,432,150)	(241,432,150)
Other Cost			(10,378,750)	(10,378,750)
Plant Profit				**2,379,554,897**
Plant Return on sales				52%

Table 5.
Comparison between Traditional and Lean

(In Thousand)	Traditional	Lean	Changes
Revenues	4,593,955	4,593,955	
Manufacturing Cost:	(2,561,753)		(347,353)
Direct Material Cost		(1,799,180)	
Conversion Cost		(415,220)	
Plant Profit	2,032,202	2,379,555	
Plant Return on sales	44%	52%	8%
	Traditional		**Lean**
	TU-PDH Trakindo 2009	FI-Training Suit	Value Stream A
Manufacturing Cost	1,681,632	161,906	1,376,345
Cost Reduction			467,193
	TU-Safety Vest 2009	FI - Safety Vest 2009	Value Stream B
Manufacturing Cost	55,784	662,431	586,244
Cost Reduction			131,971

R EFERENCES

Araki, T. 2009. Upaya Peningkatan Produktivitas melalui Penerapan Kaizen: Pengalaman Terbaik PT. Dayani. Garment Partneship Indonesia: Jakarta.

Emery, S., E. A. Cudney, and S. Long. 2009. “An Evaluation of Lean Technique Effectiveness”. Industrial Engineering Research Conference. pp.1108-1113

Hansen, D. R. and M. M. Mowen. 2006. Akuntansi Manajemen. Salemba Empat: Jakarta.

Hansen, D. R. and M. M. Mowen. 2008. Akuntansi Manajemen. Salemba Empat: Jakarta.

Hansen, D. R. and M. M. Mowen. 2007. Accounting Management. Thomson South-Western: USA.

Hough, R. 2008. “5S Implementation Methodology”. Management Service Summer 2008. Vol. 52 (2). p. 44

Indriantoro, N and B. Supomo. 2002. Metodologi Penelitian Bisnis untuk Akuntansi dan Manajemen. BPFE UGM: Yogyakarta.

Kuncoro, M. and I. A. Supomo. 2003. ”Analisis Formasi Keterkaitan, Pola Kluster dan Orientasi Pasar: Studi Kasus Sentra Industri Keramik di Kasongan, Kabupaten Bantul, D.I Yogyakarta”. Jurnal Empirika.

Maskell, B. H. and B. L. Baggaley. 2005. “Lean Accounting: What’s It All About”. Association of Manufacturing Excellent. pp. 35-38

Sugiyono. 2008. Metode Penelitian Kuantitatif, Kualitatif, dan RandD. Alfabeta Bandung: Bandung.

Waurzyniak, P. 2008. “Lean Manufacturing Wins in Metal Work”. Manufacturing Engineering. p 82