IMPROVEMENT OF THE SUPPLY CHAIN OF A LOCAL ELEVATOR/ESCALATOR COMPANY IN THE PHILIPPINES

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ABSTRACT

Multiple studies have shown that quality goods and services cannot stand alone without an efficient and effective supply chain. That is why operations management is very important in handling such key decisions for an efficient and effective supply chain. The elevator and escalator industry is fast growing in a country like the Philippines. This research defines the importance of the improvement in the supply chain of Lifter Systems, Inc. and enumerates the bottlenecks, evaluates the efficiency and effectiveness of the current supply chain, and determines the major gaps in the current system. The researchers used qualitative descriptive method to further describe the logical pattern of this research and used mean and weighted mean to gather data. Results showed that there are a number of bottlenecks in the supply chain and these bottlenecks contribute to the delay of delivery of products to the clients of the company. The elimination of these bottlenecks is the primary motive of this research. But most importantly, the management system needs to be adhered. The research revealed that one of the problems of this company is there is a lack of management system. Similarly, this also contributes to the delay of the delivery of products.

Keywords: Improvement, Supply Chain, Bottlenecks, Efficiency, Effectiveness

INTRODUCTION

Ivy Wigmore (2013) stated that a supply chain is the network of all the individuals, organizations, resources, activities and technology involved in the creation and sale of a product, from the delivery of source materials from the supplier to the manufacturer, through to its eventual delivery to the end user. A study in 2013 by a market research firm named PWC, states that the concerns of 500 surveyed executives were: profitability, cost management, customer satisfaction, and a shift in global supply chain that includes reducing of cost and reconsidering management processes (Scott Swartz, 2016). Furthermore, David Berrios (2014) stated that the one of the biggest challenges that companies globally are facing is how to reduce their supply chain cost in order to satisfy customers' price expectations.

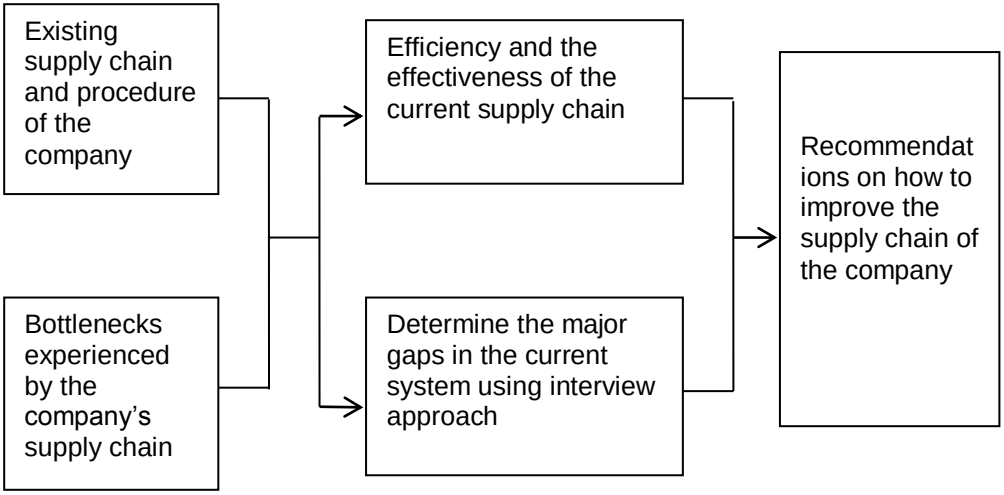
Four companies, 3 in the Philippines, and one in Malaysia, have

differences in their industry context and supply chain and despite that, they similarly face similar challenges and problems in demand, supply, and logistics management (Talavera, 2015). This means that supply chain problems along the region are existing. On another note, the efficiency and cost-effectiveness of a country's supply chain affect regional and global business especially if it is deeply embedded in the world's supply chain (Lu, 2012)

Supply chain management in small and medium enterprises has not been widely studied (Thakkar, 2008). According to a research conducted by Dr. Aida L. Velasco (2014), Business in the Philippines is dominated by SMEs or Small and Medium Enterprises. To reach the domestic market, large organizations have no choice but to move the goods using distributors, wholesalers, and retailers. The top 3 "most problematic factors for doing business" in the Philippines, according to the WEF Global Competitiveness Report respondents, are corruption (24.4%), inefficient government bureaucracy (18.3%), and inadequate supply of infrastructure (16.5%). This means that 16.5% agreed that the Philippines is uncompetitive in the areas of supply and logistics.

Due to time constraint and the huge gap between global and local literary facts, this research focused on the different bottlenecks in the supply chain of Lifter Systems, Inc., a local elevator/escalator company in the Philippines. The study separated from previous studies in terms of the industry context of the organization, the values used throughout the research, and the propositions that was made. The researchers chose this kind of study because it would be helpful in the awareness of the operations inside a real company.

Conceptual Framework



Objectives of the study

This thesis aimed to (1) describe the existing supply chain and procedure of the company using the Value Stream Mapping approach, (2) enumerate the bottlenecks experienced by the company using the current system, (3) evaluate the efficiency and effectiveness of the current supply chain using the standards set by the company, (4) determine the major gaps in the current system using interview approach, and to (5) propose recommendations on how to improve the supply chain of the company.

METHOD

This research used the qualitative descriptive method that was very useful when researchers wanted to know, regarding events, that were involved, what was involved, and where did things take place. Verd (2004) stated that the goal of qualitative descriptive studies is a comprehensive summarization, in everyday terms, of specific events experienced by individuals or groups of individuals. The researchers selected ten employees from Lifter Systems, Inc. These ten respondents were composed of four Project Engineers, who are in charge of managing the site of installation of the elevator and escalator units and also the ones who are creating the drawings or plans in accordance with the customer's specifications; two Purchasing Personnel, who are in-charged of placing orders to SJEC China and also monitoring the purchasing process; two Sales Personnel, who are responsible for finding potential clients and partners for Lifter Systems, Inc. and also they are responsible in the contract signing process the two companies; one Accountant, who is responsible for the financial aspects of the firm; and one Logistics Officer, who is responsible for assessing existing logistics operations systems, providing technical and operational support to the field office, and ensuring the implementation, monitoring and evaluation of new initiatives and procedures related to logistics. The researchers interviewed the company's Logistics Officer, Mr. Jefferson M. Camasis, for the purpose of having knowledge on the process of the supply chain of the company. The researchers chose Mr. Camasis because he is knowledgeable on the supply chain and would contribute profuse information in the research. The information stated by Mr. Camasis was used in describing the current supply chain using Value Stream Map. The researchers also had a questionnaire validated by their Operations Research professor, Mr. Ramon George O. Atento. After the approval, the researchers then went to the company to hand out the questionnaires to the employees chosen. The interviewees were also chosen because the researchers believe that they were the most knowledgeable on the supply chain of their company and they could help in completing the research. The researchers used the mean

specifically in question number 2 part I of the questionnaire in order to know the central tendency for every question. Specifically in part II, they used the weighted mean in order to interpret the data gathered; the mean is defined as the average value of the data. After the weighted means were computed, they were ranked accordingly to their magnitude from the largest to the smallest and was interpreted in the light of their positional.

RESULTS AND DISCUSSION

Current Value Stream Map

Through the use of symbols, the organization can easily check and decide which process makes the system of Lifter Systems, Inc. slow. Symbols used in Value Stream Mapping give a huge impact in terms of time management which helps the person look for the problem immediately. In the current Value Stream Map of Lifter Systems, Inc, there are twelve steps in the supply chain. The several steps that delay the company are: Drawing of plans, Confirm and Sign Shop Drawing, Shipping to Philippines and Payment of Taxes & Duties.

Figure 1 shows the Value Stream Map of the supply chain of Lifter Systems, Inc., where the Lead Time (LT) is calculated by the researchers which shows 24.5 days and 36 hours while the Production Time (PT) is 53 days and 18 hours. After getting the Lead Time and the Production Time, the researchers calculated the Value Added which amounts to 0.48%.

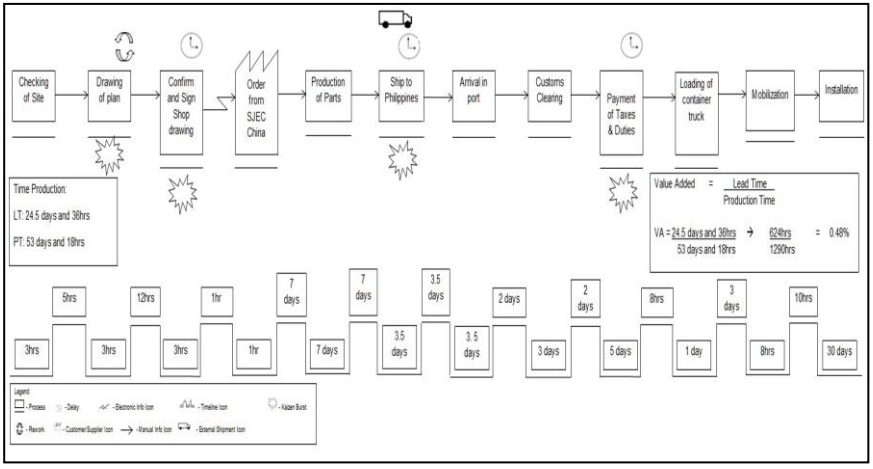


Figure 1. Current Value Stream Map

Efficiency of the Current Supply Chain

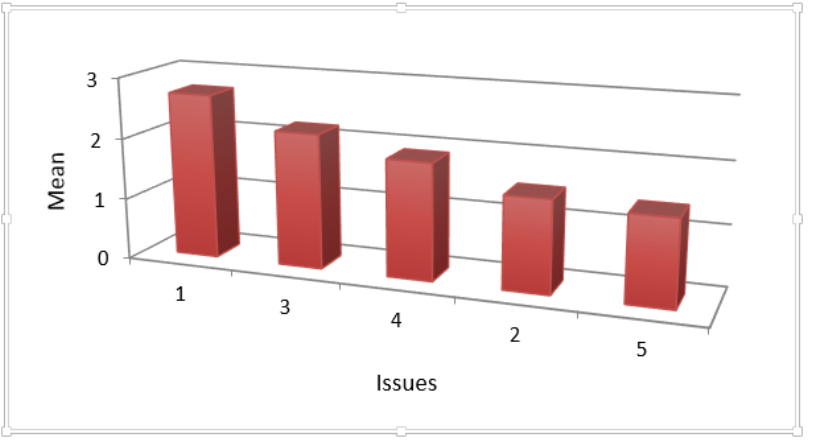


Figure 2. Issue Occurrences in the Current Supply Chain

Issue on late payment or no budget has the highest mean of 2.7. This means that late payment/no budget is the issue that mostly occurs in the supply chain of the company. Late payment can greatly affect the company's operations because there will be no money that will be exchanged between the supplier and the customer, therefore, no transaction will be placed and it will cause a delay.

Finalization of drawing plan has the next highest mean which is 2.2. This explains that this process affects the supply chain of the company. Drawings and plans are expected to be finished on time because this is where the employees rely on. If the drawings and plans are delayed, the entire operation will be delayed too.

Issue on custom clearance has the third highest mean of 1.9. It explains that customs clearing problems also has an effect on the company. It is evident that we cannot predict what will happen in the customs clearing but good management shall plan beforehand of what alternative actions must be implemented in order to abide with the problems in customs clearing.

Issue on long holidays in China has the second to the lowest mean of 1.5. It only explains that long holiday without work in China does not have a big effect on the supply chain of Lifter Systems, Inc. unlike the other three issues. It connotes that Lifter Systems, Inc. prevents ordering during the long holidays so it will not have delays in the delivery.

Other issues have the least mean of 1.4. This explains that other factors or issues that are happening in the company do not have so much effect on the operations of the supply chain of Lifter Systems, Inc.

Effectiveness of the Current Supply Chain

Table 1. Effectiveness of the Current Supply Chain Ranking

Questions	Weighted Mean	Interpretation
I am complying with the standards we have in our company.	3.50	High
Our supply chain is effective in terms of quality.	3.30	High
I am knowledgeable of the standards that our company has.	3.20	High
Our supply chain is effective.	3.10	High
Our supply chain is effective in terms of timeliness.	2.90	Above Average
Our supply chain is effective in terms of accuracy.	2.90	Above Average
Our supply chain is effective in terms of delivery.	2.80	Above Average

Legend: 3.51 – 4.00 = Very High, 3.01 – 3.50 = High, 2.51 – 3.00 = Above Average, 2.01 – 2.50 = Average, 1.51 – 2.00 = Low, 1.00 – 1.50 = Very Low

I am complying with the standards we have in our company ranked first with a weighted mean of 3.50/4.00. Its interpretation is "high" which means that employees of Lifter Systems, Inc. are complying with the standards they have in the company. Employees who always follow the standards of the company are less likely to have a problem in their workplace. Having this statement as the highest gives an idea to the researchers that the employees have lesser problem in their workplace.

Our supply chain is effective in terms of quality ranked second with a weighted mean of 3.30/4.00. Its interpretation is also "high" which explains that the company's supply chain is effective in terms of quality. The quality that the company gives to the market is good. Although the company has problems in the distribution process, the company always set their goals on giving a good quality standard in the market.

I am knowledgeable of the standards that our company has ranked third with a weighted mean of 3.20/4.00. Its interpretation is also "high" which means that the employee of the company is knowledgeable on the standards that the company has. It is good to see employees who always follow rules and regulations set by the company. Having this with a high interpretation gives a company a good reputation in having an employee with quality. This proves that the company is focused on giving a proper training with their employees.

Our supply chain is effective ranked fourth with a weighted mean of 3.10/4.00. Its interpretation is also "high" which means that the company's supply chain is effective. Although ranked fourth but with an interpretation of high, it is also good to see the company does have an effective distribution process. Though having this in fourth place in the high interpretation category gives the company a bad image in the effectiveness in the distribution process part.

Our supply chain is effective in terms of timeliness ranked fifth with a weighted mean of 2.90/4.00. Its interpretation is "above average" which means that the company's supply chain is effective in terms of timeliness but not in high caliber. The distribution process of the company in terms of timeliness ranked fifth which gives an idea to the researchers that the timeliness of the product in the market is not good, probably the distribution is late or delayed.

Our supply chain is effective in terms of accuracy tied with *Our supply chain is effective in terms of timeliness* in the fifth place with a weighted mean of 2.90/4.00. Its interpretation is also "above average" which means that the company's supply chain in terms of accuracy needs improvement because it is not in the high level. In terms of accuracy, the distribution process of the company is also not in a good shape which is equally tied with statement 4 in terms of ranking. Accuracy is a must in a certain business so that it will prevent customers or the market to get frustrated.

Our supply chain is effective in terms of delivery ranked sixth with a weighted mean of 2.80/4.00. Its interpretation is also "above average" which means that the company's supply chain in terms of delivery has the lowest weighted mean and it denotes that it needs improvement in that area. Ranking in the sixth or the last place means that the company's delivery process in the distribution needs improvement.

Having this at the lowest is a serious issue because distribution is about goods being delivered. If the company is not effective in terms of delivery, how can they have a good process. As interpreted in the table above, the company's supply chain in terms of delivery has the lowest percentage which is 70%. So it is the crucial part that needs to be addressed upon by Lifter Systems, Inc.

Major gaps in the current system

In figure 3, it shows the major gaps in the current system. The researchers, together with the Logistics Officer, brainstormed and came up with these results.

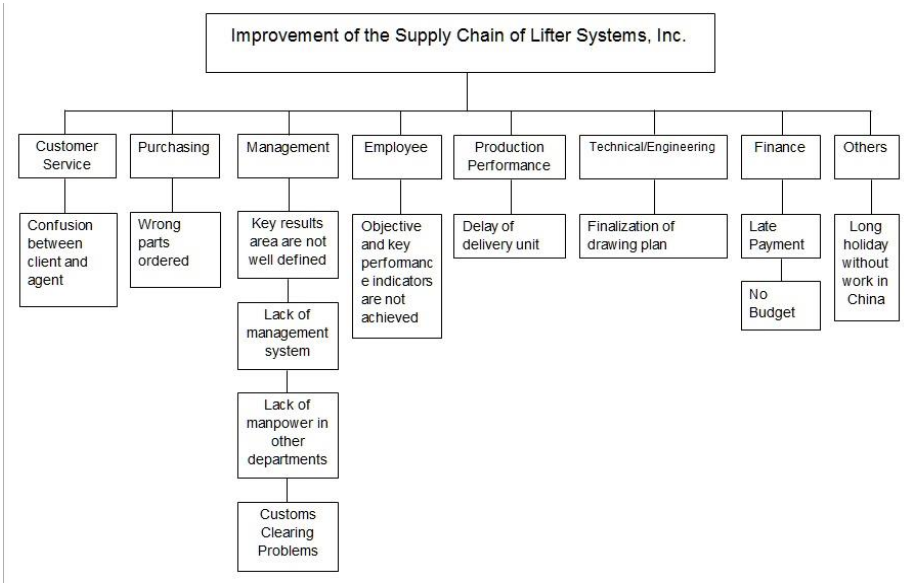


Figure 3. Affinity Diagram of the Major Gaps in the Current System

The Affinity Diagram shows the eight main headers namely Customer Service, Purchasing, Management, Employee, Production Performance, Technical/Engineering, Finance and Others.

All issues that are related to customer or client will be part of 'customer service'. Customer service is very crucial in a certain business because no matter what happens, customer is always right.

All issues that are related to order and buying stuffs will be part of 'purchasing'. Businessdictionary.com defined 'purchasing' as "the activity of acquiring goods or services to accomplish the goals of an organization."

Issues that are related to the management of the company will be part of the 'management'. The management is the one who runs the company, without good management system, the company will have lots of problems and unsatisfied employees and customers.

Issue that are related to the behavior, goals and achievements, rules and conducts that needs to be followed by the employees will be part of the 'employee'. Employees should know how to the company works. Employees should also know what the target quota on that day in order to reach specified goals.

Issues that will make the production performance slow will be under 'production performance'. Delay of delivery unit will cause the production performance slow leading to loss and not reaching the target quota for the month.

Finalization of drawing plan will be part of the 'technical/engineer'. Drawing plan needs to be accurate and the data should be complete in order for the employees of the company to perform well.

Issues that are related to money will be under 'finance'. Finance is really critical in a certain organization. Money is the one who makes the industry alive. Finance department should focus on the flow of money if it is flowing properly, if it does not, there is a chance that the company will become bankrupt.

To further prove that management is the root cause of the problems occurring in Lifter Systems, Inc., the researchers used the relationship diagram to depict what is the root cause or driver and what is the outcome.

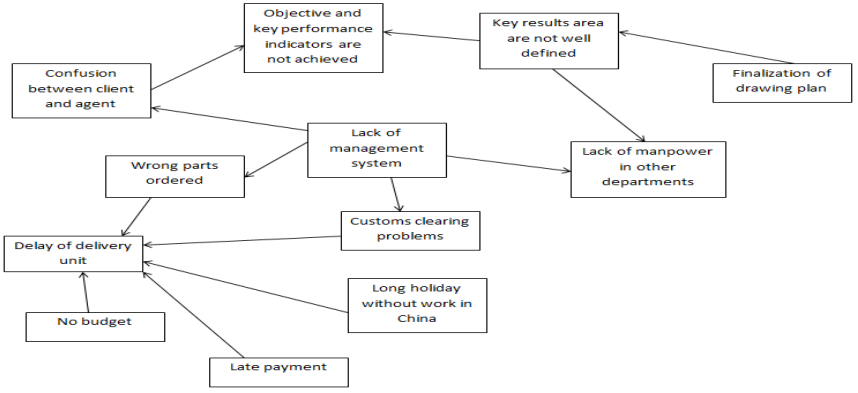


Figure 4. Relationship Diagram of the Major Gaps in the Current System

Root Cause/Driver: Lack of Management System
Outcome: Delay of Delivery

Lack of management system is the main cause of the delay of delivery. The root cause is the lack of management system because it is the one that sends a total of four arrows, though the "key results area is not well defined" can also be a factor. It is really noticeable that the management of Lifter Systems, Inc. is responsible for the issues that the company is experiencing. Lack of management systems means that the company does not have any good system that makes a company run smoothly.

The outcome is the delay of delivery unit receiving a total of five arrows from the issues, although "lacks of manpower in other departments" and "objective and key performance indicators are not achieved" can also be a factor. These two issues can also lead to a faulty system of the company, though the delay of delivery unit is really the main point of this diagram. No delivery unit means no production, and no production means no profit, and no profit means the company will be insolvent. Delay of delivery unit is crucial in a company because if the company does not have any units to assemble, the company will not earn any profit.

Using the relationship diagram, the researchers proved that the main gaps in the current system are caused by the management. The management must be responsible in all operations and must practice good quality standards in order for the process to work smoothly and accordingly.

Tree Diagram

The researchers used the Tree Diagram to propose solutions to three major headers that are believed to have the most effect on the supply chain of the company. The three headers that are most needed to improve in the supply chain of Lifter Systems Inc. are the employee, the management and the technical/engineering. In this case, the researches look for possible solutions for this issue. In the next page is the tree diagram that is constructed by the researchers.

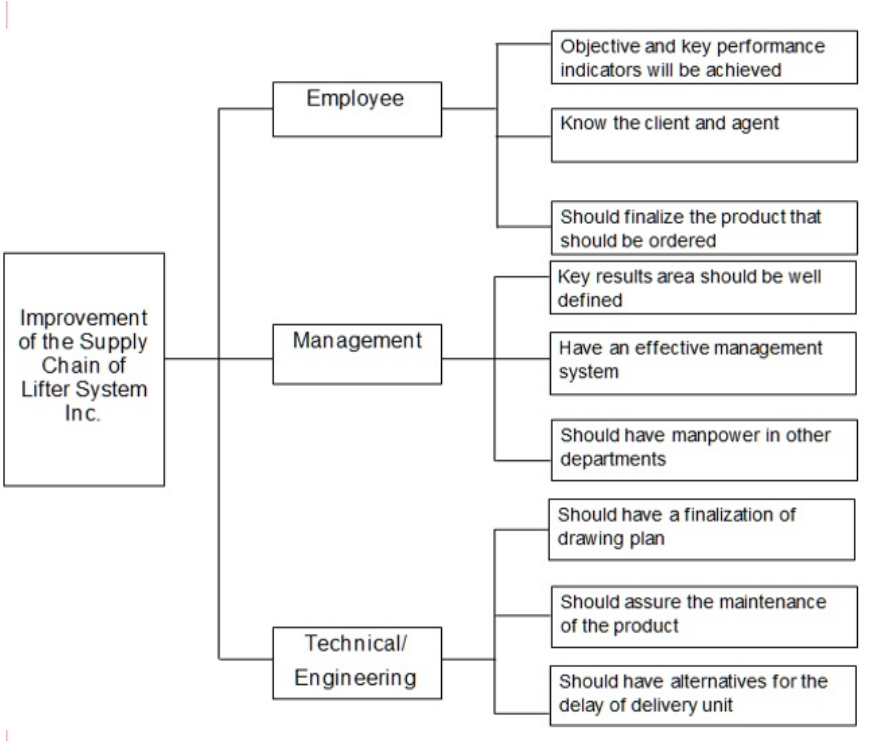


Figure 5. Tree Diagram of the Improvement of the Supply Chain of Lifter Systems, Inc.

In the part of employees, the problems that are commonly encountered are the objectives and the key indicators of the Lifter Systems are not achieved. This became one of the bottlenecks of the company. In this case, the researchers proposed a solution that may improve the effectiveness of the employee like having a proper training of employees for them to know their clients and agents so as to eliminate the confusion during ordering as well as to finalize the product to lessen the waste they may encounter.

As for the management, they should be aware on the status of other departments so as to have an effective management system. The researchers also proposed that the management of the Lifter Systems, Inc. should have manpower for the improvement of their products. In the key areas, the management should also define it for their product to be standardized.

As for the technical/ engineering, they should finalize the product design first before ordering from SJEC, the supplier of the parts of elevators and escalators of Lifter Systems, Inc. Having regular maintenance of the products to be delivered and keeping enough stocks of supplies in the warehouse may lessen the issues in terms of product maintenance and delayed delivery of the products. These practices may give their customers a better quality product which in turn may also increase customer satisfaction.

Future Value Stream Map

From the current value stream map, the researchers made a future value stream map that entails improvements in the areas that has delays. Those areas in particular are Drawing of Plan, Confirm and Sign Shop Drawing, Ship to Philippines, and Payment of Taxes & Duties. The researchers reduce the time of processing of these delays in order to increase the percentage of Value Added to the supply chain of the company. Doing this, the researchers have calculated the Lead Time of 24 days and 6 hours, Production Time of 46 days and 16 hours, and the Value Added turned into 0.53% from 0.48% which increases by 0.5%. This increase is a proof that reducing the processing time of the areas in the supply chain can improve the whole process. And if the company implemented this, it will be of great help to them.

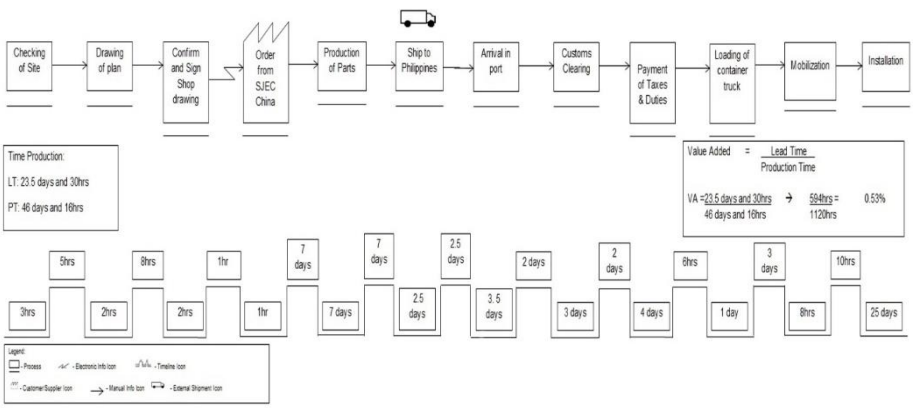


Figure 6. Future Value Stream Map

CONCLUSIONS

By this study, the researchers had a broader knowledge about the supply chain itself and how important it is in the company especially in the Lifters Systems, Inc. The researchers learned that the problems that are acquired in the company may be minimized in terms of implementing improvements in the process of their supply chain and also in the management system of the company.

In terms of looking for the possible solution on the supply chain, the researchers used the value stream mapping to determine the flaws in their current supply chain. By then, bottlenecks that are also seen have a factor on the effectiveness of their current supply chain wherein local and foreign flaws occur. By eliminating or minimizing those bottlenecks, it may minimize the delay of their process.

The researchers found out that the lack of management system is the major gap and it is really palpable that the company must ponder upon this aspect. And by using two tools, the value stream map and the tree diagram, it will be a powerful method in determining recommendations for the improvement of the company. This in turn will lead to easier reference for the company that they can use in order to improve their supply chain and the lack of management system

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