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The Benefits of Implementing Lean Six Sigma in a Malaysian Plantation Company

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ABSTRACT

Lean Six Sigma (LSS) is a method focused on continuous improvement of quality, elimination of waste and minimisation of defects in an organisation. LSS has been applied extensively to Multinational Corporations (MNC) for cost savings and benefits. Many LSS studies were conducted in Western countries, with relatively few studies focused on developing countries, particularly in plantation industries. This study explores the benefits of implementing LSS in a Malaysian plantation MNC. It contributes to the benefits of implementing LSS, particularly in plantation MNCs in developing countries.

Keywords: *Benefits, Lean Six Sigma, Multinational Corporation, Plantation,*

INTRODUCTION

The business processes of many global organisations are integrated with Six Sigma (SS). The SS approach improves the efficiency and effectiveness of global supply chain networks. It is beneficial for organisations' strategic, tactical and operational plans to accelerate managerial decisions and improve customer satisfaction. Roberts (2004) studied a large financial service provider in the USA and identified that the organisation was one of the pioneers of adopting SS and was able to improve its business. By implementing hundreds of SS projects in its business area, the organisation increased customer satisfaction by 10.4% and reported a 24% reduction in customer problems (Roberts, 2004). Following the same trend, GE Capital Corp., SunTrust Banks and Morgan Chase improved customer requirements and satisfaction after implementing SS (Roberts, 2004).

According to Antony (2008), Lean and Six Sigma are successful concepts in quality management. For Bridge (2016), Lean is a principle-based management philosophy that strategically eliminates waste,

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increases customer value, and continuously enhances cycle time and productivity. The Lean principle argues that what organisations do daily fails to add value since they cannot enhance value addition, reduce waste and enhance customer satisfaction (Bridge, 2016). It has been suggested that an organisation must develop a unique combination of resources and competencies to achieve the benefits of Lean Six Sigma (LSS) by adopting a rigid data-driven approach to achieve higher quality performance in the long term (Hilton & Sohal, 2012). Based on Galli and Kaviani (2018), LSS identifies waste and eliminates its sources. This results in the long-term, systematic improvement of business operations. It is ideally suited for a fast-growing firm dealing with complicated difficulties. To avoid becoming a burden, LSS projects must be applied efficiently. The tools should be focused on outcomes rather than execution. It should be chosen depending on objectives, priorities, and organisational structure (Galli & Kaviani, 2018).

In addition, Syaputra et al. (2020) found that during the Covid-19 pandemic, LSS proved to be an excellent tool for improving manufacturing processes, such as quality improvements, productivity, cost reduction, and better safety. LSS may be used in businesses to boost production, save costs, minimise rejections, and improve delivery. LSS is a tool for learning and training that can improve the skills of all company personnel. It is also a tool for improving the image or reputation of the company in the eyes of customers and all stakeholders (Syaputra et al., 2020). However, there is a lack of studies on the benefits of implementing LSS and combining Lean and SS tools in developing countries, particularly in large organisations.

The Objective of the Study and Research Question

The benefits achieved in implementing LSS should be a focus of other organisations towards implementing LSS. This study examines LSS in MNCs of developing countries to contribute to the success of implementing LSS in other organisations by implementing LSS in MNCs in developing countries. The present research concentrates on investigating the benefits of LSS in Palma, one of the MNCs in Malaysia. Thus, the objective is:

RO1: To explore the benefits of the LSS system in a multinational corporation in Malaysia.

To accomplish the research objective, the research question has been constructed: RQ1: What are the benefits of implementing the LSS system in a multinational corporation in Malaysia?

Thus, LSS is an important tool that an organisation can use to improve its performance. This study examines the benefits of LSS because it has proven successful with leading benefits gained upon implementing it, particularly in MNCs in developed countries.

LITERATURE REVIEW

The LSS system is an approach that enables firms to enhance their processes so that they can be in a position to fulfil organisational requirements and satisfy the needs of customers. The principles of LSS aim at improving the quality and efficiency of organisational processes by integrating the strategies of Lean and Six Sigma (Bridge, 2016). The term Lean Six Sigma was introduced around the year 2000. The Six Sigma principles are based on quality, while Lean principles are based on speed. These work collectively to achieve Lean Six Sigma (George, 2002). To understand the basics of LSS, examining the aspects associated with “Lean” and “Six Sigma” is essential.

Benefits Of LSS Implementation

The economic benefits of the LSS system occur when an organisation can reduce its production cost to achieve the set profit goals. The LSS system is used in different industries as it assists them in

achieving their production goals. The management must implement LSS in production to minimise waste during the processes while maximising profits from production (Anandarajan & Sylla, 2000). The company can come up with a production process that is highly effective for quality products that will make the organisation acquire a large market share.

LSS combines the capability of Lean and Six Sigma and is capable of providing more benefits than a stand-alone methodology. The LSS systems have various uses in an organisation, including financial, strategic, consumer, competitive, stakeholder and standardisation. The organisation in implementing LSS gains benefits.

Cost Savings and Improved Cycle Time

Jayaraman and Teo (2012) summarised that LSS is an improvement method, particularly as a cost-reduction mechanism. Other benefits of LSS can be found in cost savings and cycle time. Cost improvement can be categorised into direct and indirect cost savings. Direct cost can be claimed through project savings in a certain period while indirect cost is based on cost avoidance in an organisation. In contrast, cycle time is based on a target set by the organisation on the lead time of each stage in the value chain and achieving the targets set consistently (Atmaca & Girenes, 2011).

The study by George (2003) with a company in the USA identified that the organisation could gain business improvement with LSS. The improvement and benefits achieved are: the inventory orders are at record levels, debts are decreasing from the post-acquisition level, and the organisation improved the cycle time and customer satisfaction which results in billions of dollars every year (George, 2003).

Green (2000) analysed the key factor of tremendous cost savings by implementing Lean and Six Sigma in a large US firm. Its industrial control team was able to generate a 500% growth in revenue resulting in an increase in operating profits of several million dollars by developing a reliable, cost-effective family of chips and assembled components for the data communication market. The industrial control team benefitted from reducing the cycle time by 35% and increasing yields from 75% to 93% (Green, 2000).

Reduced Waste and Defects

LSS is defined and identified as continuous improvement in all business areas, and one of the dimensions is reducing waste and defects. To achieve an organisation's target performance and profitability, eliminating waste impacts the organisation positively (Razmah et al., 2017). Meanwhile, Slack et al. (2013) justified that inspection, warranty, rework, scrap cost, and processing time are increased due to quality defects. This will affect a company's profitability due to quality defects. Lean accounting has also proven significant in eliminating waste as it influences the overall economic situation. Islam et al. (2013) conducted a study of Lean accounting implementation in the manufacturing industry in Bangladesh. The study found much waste such as transportation, excess inventory, over motion, defects, overproduction, non-productive time and waiting time. All the waste can be reduced by applying Lean concepts in the company. Thus, the authors attempt to segregate the productive and non-productive activities in the selected garments. Using the figures for non-productive activities, they calculated the average production loss in factories. They found that the selected garment factory was able to save costs up to $8,246,784.00 per year using Lean concepts (Islam et al., 2013).

In another case of reducing steps in the transaction process, Antony and Cudney (2016) conducted a study of LSS implementation in an academic unit in the UK. They concluded that rationalising scanning services achieved quality efficiency and reduced time. Based on this project, the organisation could reduce 28 process steps to 18. Before LSS, four departments were involved in the scanning process; after LSS implementation, only one department was involved. From this project, the cost savings were approximately 10,000 Pound Sterling (Antony & Cudney, 2016).

Customer-Oriented Service and Satisfaction

Many institutions have had success using the LSS system, such as improvements in the channelling of orders, operating hours, a fault reporting centre, response time and restoration time gained in an organisation if the organisation intends to boost customer loyalty (Khatibi et al., 2002).

The effective implementation of LSS in a utility company can be found in Byrne et al. (2007). Before implementing LSS, if the customer wanted to cancel the service, the customer service representatives followed the customer's instructions without asking whether the customer needed assistance. Once implementing LSS, the customer service adviser offered services to customers and offered financial incentives. Byrne et al. (2007) found that this approach led the organisation to provide services for customers rather than lose a customer. With the implementation of LSS, the organisation could redesign the flow of a process that relied on customer relationships rather than marketing approaches. At the same time, the projects increased the use of direct debit payments by 14%, a simplified registration process for business customers that led to an increase in acquisitions by 20%, new metre readings with lower costs and higher accuracy of metre readings (Byrne et al., 2007).

LSS implementation influences customer services for financial service providers (Delgado et al., 2010). The company implemented LSS because of customer focus. The company offers several financial services such as personal loans, leases, mortgages, debt consolidation, real estate, homeowner services and auto loans. Thus, one of the projects was to focus on decreasing operational costs by improving the process and giving good service to a customer that is easier to use and less time-consuming such as simplifying the application form, decreasing the processing time for auto loans and the company expanding the revenue by increasing customer satisfaction (Delgado et al., 2010).

The LSS system is consumer-oriented. Thus, the processes in the organisation are aimed at increasing the company's overall performance through quality production, which makes it possible for an organisation to effectively manage operations of the business to achieve ISO-certified products and services for an increased market share (Kennedy & Widener, 2008). Edvardsson et al. (2000) summarised that a company became profitable based on customer satisfaction and not on customer loyalty because loyalty is a behavioural intention and shows an indicator of how people will react in the future. Customer satisfaction is based on the customer's service or product quality assurance.

Most large companies comprehend that LSS mainly reduces waste and defects, cost improves cycle time, make organisations more customer service oriented and increases user satisfaction, and contribute to the organisation in term of cost savings benefits. According to Rothaermel (2015), staff engagement in coming up with decisions improves the organisational culture to work towards the achievement of set production goals. It helps improve the organisation as a whole. Thus, to understand the benefits of the LSS system in an organisation clearly, it is important to identify the strategies that make this approach different from the traditional management system used in the past.

METHODOLOGY

The method chosen for gathering and analysing data might be referred to as the research approach. Based on the research choice and the research type, it is either a qualitative or quantitative approach (Tobi & Amaratunga, 2010). Qualitative or quantitative data can be supported through a case study. This study is based on a single case study that examines a single division of an MNC. Non-numeric data can be measured as qualitative data while numeric data can be measured as quantitative data (Yin, 2004).

Research Site Adoption

The current research is conducted at Palma. Palma was used as the sample plantation MNC because few studies have been done on the benefits of implementing LSS in the plantation sector. Raja Sreedharan and Raju (2016) explained that LSS had been implemented in manufacturing services to service sectors, labour-intensive industries to technology-intensive industries, medical healthcare to communication, construction to assembly, and mass production wide variety and small volume production, and logistics industry to defence industries. Thus, this study examines LSS in plantation MNCs of developing countries to contribute to the benefits of implementation of LSS, particularly in plantation MNCs in developing countries.

Palma also accounted for around 4% of the world's total production of crude palm oil in 2016, making it the largest oil palm plantation by planted area. It represents a significant Malaysia-based MNC with various sectors that have developed the LSS system. In terms of contribution to profit, Palma is the top division. Palma had the highest profit contribution percentage compared to other divisions in 2017, with a profit before impairment of 116%. Four divisions make up Palma, each responsible for carrying out its obligations. The primary tasks and responsibilities are based on the upstream and downstream divisions. The upstream division often has a large profit compared to the downstream division. This study does not concentrate on upstream divisions with the data gathering starting in Palma's corporate headquarters.

Data Collection Method

This present study uses primary sources to investigate the benefits of implementing LSS at Palma.

Semi-Structured Interview

This study focuses on the individuals interviewed to provide a thorough insight into the benefits of implementing LSS in Palma. The data is primarily collected based on semi-structured interviews. This mechanism is advantageous to collect information and included interviews with LSS practitioners, namely Master Black Belt (MBB), Black Belt (BB), and Green Belt (GB) holders.

Thus, 13 participants, consisting of executives and non-executives, were chosen as respondents from among LSS practitioners because they represent the majority of performers and are actively engaged in the LSS implementation process. Based on Bunce and Johnson (2006), the first 12 interviews result in data saturation, and very few novel phenomena are expected to emerge beyond that. As a result, 13 LSS practitioners were interviewed in this study.

Dong-Suk (2010) indicates that belts practitioners who consist of Champions, MBB, BB and GB drive SS activities in an organisation. The study participants are LSS practitioners who conduct and perform LSS projects to achieve successful LSS implementation in the organisation.

Data Analysis

The semi-structured interviews were recorded using a digital recorder. The data were then transcribed and coded into themes. According to Ryan and Bernard (2003), the most fundamental task of qualitative research is to identify the theme. The process of identifying themes is based on word repetition.

The data were transcribed manually into Microsoft Excel. Then, part of the recorded data was translated into English (as some interviewees answered in Bahasa Melayu). Furthermore, from the transcription, the information was categorised into several themes and coded based on word repetition.

Example of themes includes cost savings, eliminating wastage and defects, improving quality and unintended benefits of LSS. The information was interpreted based on the themes and codes. The findings were then compared with previous studies, and conclusions were drawn.

RESULTS AND DISCUSSIONS

The literature outlines various factors that comprise the benefits of LSS implementation. This study found several aligned benefits. For instance, implementing LSS in production minimises waste during the processes while maximising profits from production (Anandarajan & Sylla, 2000). Second, an organisation can utilise LSS to focus on eliminating waste by supporting Six Sigma qualities (Powell, 2016). Subsequently, two processes enable LSS to concentrate on minimising lead time through the reduction of waste and added steps that are of no value. This is because Six Sigma focuses on reducing defects and variability by establishing and controlling its causes. When these processes are applied, an organisation can improve capability and speed and enhance customer satisfaction (Davila & Wouters, 2004). Baggaley and Maskell (2003), the Lean and Six Sigma approaches to enable an organisation to create streamlined processes to bring about high quality.

Studies have revealed that LSS enables the employee to be closely involved with activities that result in minimised wastage and enhanced performance. This is where employees are involved in developing a team that will work towards achieving set long-term goals of business production (Kennedy & Brewer, 2006). The management encourages employees to participate in decision-making to identify the production processes required to be changed for a smooth production process flow and motivate the employees. Thus, this research revealed the benefits of the implementation of LSS. During this study, four main categories of benefits were discovered. The benefits are cost savings, eliminating wastage and defects and improving quality.

Benefits Of LSS Implementation

Cost Savings

Since the full implementation of the LSS in 2012, according to the annual report of the 2016/2017 financial year, the firm had recorded savings worth RM 967 million in commercial operations. The company procurement-related expansions had reliably delivered over 52% consisting of RM 188 million in savings compared with the non-procurement of the firm's LSS benefits since the adoption of the system. The LSS projects savings include coalescing sourcing of common products such as fertilisers for plantations and cement for construction projects. Other areas included cost-cutting from multiple suppliers of services and goods and project administration preceding final accounts closure. As Executive 5 responded:

> It is significant to improve in terms of benefits of cost savings. So far, we are already set our target and…into procurement department which are they handling and the way how the negotiate prices with the vendors because sometimes even though the product is same but the price, we are paying to the vendors are different from one-unit business with another unit of business.

Towards the end of 2015 and 2016, the firm kick-started the War on Waste (WOW) campaign which targeted waste elimination that influences the bottom line using simple Kaizen approaches. The campaign was centred on swift actions and education by personnel towards decreasing eight common categories of waste namely overproduction, defects, non-utilised talent, delays, transportation, motion and extra-processing and inventory. In this period, 258 operating units had instigated over 2,200 enhancement projects that amounted to a possible total of RM190 million worth of savings and approximately 3.7 million hours in one year. Moreover, the MNC saved approximately RM142 million from these sourcing-related refining initiatives in 2016. As Executive 6 responded:

> We did War on Waste, or we call it as WOW campaign. Kaizen waste elimination challenges are generally like we expose the knowledge of LSS.
>
> Oh yeah, and because of this workshop, we train most of the executives as Green Belt and non-executives as White Belt and most of it, the savings we receive from the Palma division in Malaysia.

Executive 8 pointed out about WOW:

> But for the Kaizen elimination challenge, we open to all division to challenge about waste. What we did, we give them small plan like 5S to do a project based on the elimination of wastage. They need to identify the wastage. We did as competition, between departments to reduce whichever waste in their department. As an example, like paper, we already prepare to recycle paper box, but they did not implement it. So, what we did is, we invite them through email and ask them what waste that you have in your working space, then they will fill up the charter and inform us. Then each department will send the proposal what they want to do to reduce waste.

This study aligned with the findings by Green (2000) where the industrial control team was able to generate 500% growth in revenue, increasing operating profits by several million dollars.

Eliminate Wastage and Defects

The LSS improved the production process by focusing on eliminating waste. Eradicating errors by decreasing process variance made this an influential tool for generating continuous process improvement. Palma was able to eradicate waste and reduce inconsistency in its supply chain. Executive 6 pointed out:

> Project Chaah. We want to reduce cost per tonne of metric FFB, but indirectly we can save fuel or diesel, save the environment, save the fertiliser and man per hour as well. First process is, we receive palm oil (FFB), which is we call as fruit loose bunch, then once it's on the process of threshing, it means, removal the fruits from the bunches one by one, so our project in Chaah is to cleaning the fruits of the loose fruits. If we did not clean the loose fruits, then it will have a lot of other unexpected things like cigar, sand and so on.
>
> We did it by our own self which is, you know washing machine, they have the metal inside right, so that metal we use similar to make the fruits loose from the bunches. So, from that on, it become reduce of time, before the project, we have to wait around 7 hours to clean the fruit bunch, but now only 2 hours we can clean the fruit bunch. So, all the metal we use is actually from the mills which, the mills will have the scrap item which is not used. Indirect impact, reduce the waiting time in the mill, reducing time of consumption, reduce wear and tear time in the mill, it was quite of surprise about LSS because it able to reduce all of it based on this project.

LSS was used to evaluate the divisions' systems and helped LSS project teams to identify areas with high levels of waste and variance. After identification, ineffectiveness could be rectified through reduced paperwork, reduced time, automated shipping and picking planning, and automated verification of shipment. Executive 1 pointed out:

> Obviously, it's very clear how we can save from this LSS and the staff now that has been exposed to LSS is continuously looking what they can do, what they can improve

> and what they can do next. This is how they improve and they start to tackle rather than those days they were just fine for anything now, they are more productive.

Moreover, LSS eliminated actions that did not add value to the buyers. These can be translated as waste and helped the supply chains to function more efficiently. Great sources of waste were targeted, such as overproduction, transportation and non-adding value process. Proficient supply chains eventually offered Palma a sustainable competitive advantage and increased revenue.

This study is in line with Swarnakar et al. (2021), who found that the three most major benefits are reduced overall defects in the product: inventory reduction, reduction in the cycle time of the product, and having a relative importance index which are 84.75%, 83.50%, and 77.75%, respectively. Furthermore, implementing an LSS strategy in a manufacturing organisation provides numerous benefits such as reduced cycle time, lead time, workforce, inventory, and defects, as well as improvements in key metrics such as overall equipment effectiveness (OEE), first-time yield (FTY), and customer satisfaction. The study also reveals that successful LSS implementation will result in cultural changes in industrial organisations (Swarnakar et al., 2021).

Improving Quality

Besides cost reduction and increased savings, LSS aided in improving the quality of goods and services offered by the MNC. One Lean tool is to improve quality. This was realised by reducing the flaws and inaccuracies in product development processes. At the same time, the satisfaction of the customers was improved through better products and improved services. “We gain trust from our customer because once we produced the good quality products and standardised. Customer trust our products” (Executive 8). All that was required was a basic identification of the areas in each division where LSS quality improvement principles and approaches could be applied. In this case, LSS is a systematic methodology that addresses the flaws that play an important role in improving profitability and business performance. As Executive 8 responded:

> There is certain customer requirement, for instance, customer wants A quality of palm oil and certain specs of palm oil, but then we cannot produce the quality because of the nature of the environment. Then, we use LSS tools in the way of collecting the data and Minitab will produce the reports and we can present the evidence we have to the customer, so then we get trusted from customer.

It did not matter whether the MNC was a network of many businesses, considering the many diverse division. LSS aided each sector in striving hard to accomplish quality improvement goals. Over the many decades before the adoption of LSS at the MNC in 2013, the businesses had espoused various methods that were meant to refine, manage and control the quality of their goods and services, but none could be compared to the quality management realised through LSS. This was reiterated by one black belt holder just a few weeks before the researcher left the field of study;

> LSS has helped the entire process, since it does the required things faster and better, that too at a much-reduced cost. In term of statistically proven that findings from LSS technique are true and it also configures the performance of the idea and ease to us... (Executive 3).

The study is aligned with the study conducted by Green (2000) of an aerospace company that integrated Lean manufacturing and SS to repair auxiliary power unit’s propulsion engines and components that provide air conditioning and other power-related features for aircrafts. His study identified that, with LSS tools, this division decreased the repair time of components by 43%, which impressed the customers. From this, the organisation was able to gain USD 47 million in revenue, and part of it, USD 900,000 was derived from productivity improvement.

This study found several benefits of LSS implementation based on the literature. The literature revealed that most large companies gained cost savings, improved cycle time, reduced waste and defects, and customer-oriented services and satisfaction from LSS implementation. Meanwhile, the MNC benefits from LSS implementation manifested in cost savings, reduced waste and defects and improved quality.

CONCLUSION

The analysis of the benefits of implementing LSS reveals that participants agree with the advantages of the LSS systems. The major benefits listed are cost reduction, improving quality and savings obtained by the organisation. Moreover, the participants agree that it improved the quality of goods and services offered by the MNC, eliminating types of waste in the organisation and fostering a high level of motivation among employees.

This is in line with Bridge (2016), who found that principles of LSS aim to improve the quality and efficiency of organisational processes by integrating Lean and Six Sigma strategies. This is because the organisation uses this methodology to tackle factors associated with wastage of crucial resources, thus leading to reduced time, cost and negative environmental impacts.

Contribution Of the Study

This research makes numerous contributions to the benefits of implementing the LSS system in MNCs in the plantation industry. Furthermore, the data demonstrate that combining Lean and SS techniques in an MNC increases competency through cost savings and enhanced revenue.

Limitation Of the Study

The current research has several limitations. Firstly, the findings cannot be generalised because this study was limited to a single plantation division. Other MNCs may have different results. Further study could be extended to other MNCs in Malaysia.

Moreover, this study is based on the benefits of implementing LSS by the MNC. Future research is needed to gather information on the benefits of implementing LSS in Malaysia's public sector.

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AUTHORS' CONTRIBUTION

Siti Salimah Jalal carried out the research and data preparation, contributed to the interpretation of the results and took the lead in writing the manuscript. Suaniza Mamat and Zamzulaila Zakaria conceived, planned the research and provided feedback. Mohamad Hafiz Rosli involves in the publication and provided feedback.

CONFLICT OF INTEREST DECLARATION

We certify that the article is the Authors' and Co-Authors' original work. The article has not received prior publication and is not under consideration for publication elsewhere. This research/manuscript has

not been submitted for publication nor has it been published in whole or in part elsewhere. We testify to the fact that all Authors have contributed significantly to the work, validity and legitimacy of the data and its interpretation for submission to Jurnal Intelek.

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