



Lean Six Sigma Implementation and its Challenges in Malaysian Plantation Company

Siti Salimah Jalal*¹ and Mohamad Hafiz Rosli²

¹Universiti Teknologi MARA (UiTM) Cawangan Johor, Kampus Segamat, Johor, Malaysia

²Faculty of Management and Economics, Sultan Idris Education University, 35900 Tanjong Malim, Perak, Malaysia

salimahjalal@uitm.edu.my

Abstract. Lean Six Sigma (LSS) combines the two approaches to increase production, customer satisfaction and cost-effectiveness. LSS increasingly being used by multinational corporations (MNCs) around the world to increase performance and optimize value-added time. The implementation of LSS presents challenges, despite the benefits it provides. The objective of this research is to examine the challenges that are associated with the implementation of LSS in a Malaysian plantation company. Data was gathered using a qualitative case study approach. To understand the challenges of implementing LSS, thematic analysis was used. The findings underscore critical themes related to the challenges, including employee resistance to change, securing buy-in from high level of management and employees, unsuccessful projects, measurement difficulties and higher costs related to training. The resolution of these challenges is necessary to ensure that the LSS will be implemented successfully. This study's findings contribute to the existing literature on the challenges of LSS implementation in Malaysian plantation companies and offer insights to policymakers and organisations, particularly within the plantation industry, about LSS implementation.

Keywords: Challenges On Implementation, Lean Six Sigma, Multinational Corporation, Plantation..

1 Introduction

In Japan, an innovative approach termed The Toyota Production System [23], subsequently recognized as Lean Manufacturing, was established to improve proses efficiency. Known as the continuous improvement approach, Lean seeks to reduce waste and variability; [32], propose optimising “value-added time” as an element of the total lead time. Determining whether a process is a form of value-added to the product can be done by evaluating whether the customer may be willing to pay for these processes [13].

The primary goal of the Lean methodology is to accelerate business processes, and the method is predicated on the idea that cutting down on waste in the business process and removing bottlenecks will shorten the time needed to transition between various tasks, events, and cycles [13]. Various forms of waste may occur in a corporate process, including excessive waiting time, overproduction, defects, inefficient transportation, underutilised talent, excessive information processing, and inadequate utilisation of skills and knowledge [13].

Concurrently, the Six Sigma (SS) methodology is implemented through strategic project selection process, structured methodologies, and the assistance of improvement specialist and engage leaders. This methodology employs a vast array of tools,

including sophisticated statistical instruments, to enhance quality [30]. Studies confirm that the SS approach improved employee productivity and financial performance ([31]; [34]).

According to [33], the primary focus of Six Sigma concerned with the process improvement, whereas the primary focus of Lean is on improving the flow between processes. [7] describes LSS as a method of problem solving that works to achieve the highest possible level of efficiency. LSS is an approach that strives to maximise shareholder value by rapidly enhancing speed, customer satisfaction and quality while simultaneously reducing cost and invested capital [1]. In addition, LSS is an approach that maximises shareholder values. Another advantage of LSS is that it helps in reducing operational expenses. This is accomplished by lowering the amount of waste that is produced during the production process. Additionally, the costs that are incurred to make products are also decreased [13].

Despite that fact that LSS has brought forth a great deal of benefits, an effective implementation is difficult to accomplish. Based on [21], the economy of Malaysia is largely dependent on agriculture and the size of this industry workforce is indicative of its gross domestic product (GDP) contribution. In year 2019, Malaysia planted 5.9 million hectares of oil palm, yielding 19.86 million tonnes of crude palm oil (CPO), the world most abundant edible oil [21]. In addition, CPO contributed 37.9 percent of agricultural GDP in 2018, whereas plantation contributed 6.9 percent whereas, Malaysia exports palm oil products worldwide [21].

In the plantation sector, LSS is most effective when it has the support of upper management, the participation of workers, the availability of resources and alignment with the organizations overall strategy [27]. On top of that, employee buy-in is crucial to the success of LSS which then employees develop a sense of ownership and dedications to the process when this happens [27].

Nevertheless, it has been established that the challenging factors associated with the implementation of LSS are limited and warrant further investigation, particularly within the Malaysian plantation company. Multiple research databases, such as Scopus, Science Direct and Web of Science were analysed, yet it is very limited. This study uniquely identifies and ranks the barriers to recognize the challenges of LSS implementation, particularly within plantation company. Hence, research on the challenges of implementation LSS in developing countries and the plantation industry is lacking.

Therefore, the challenges encountered by Malaysian plantation company while implementing LSS are the focus of this study. This research aims to shed light on the challenges encountered by the Malaysia plantation company throughout the implementation of LSS. To achieve the research purpose, the research question has been formulated as follows: What are the challenges associated with the implementation of LSS in Malaysian plantation company? Thus, this study investigates the challenges associated with the implementation of LSS, with data collected from practitioners at a Malaysian plantation company. A comprehensive understanding of the key challenges will enable management to make qualified judgements regarding quality improvement activities.

2 Literature review

The integration of Lean and Six Sigma can yield superior outcomes compared to the efficacy of each methodology as standalone and the integrated LSS strategy encompasses human elements (including leadership, customer orientation, and cultural transformation) and process components such as process capability, management and statistical reasoning for ongoing enhancement [2]. Lean alone cannot provide statistical control over a process, and Six Sigma, alone cannot significantly enhance process speed

or decrease capital investments, thus a combined methodology yield superiors outcome [15]. This guarantees enduring outcomes by optimising shareholder value and enhancing the rate of advancement in customer satisfaction, cost, quality, process velocity and invested capital [16]. [22]and [6], asserted that a small number of organizations are not successful in the implementation of LSS, despite the significant benefits that effective LSS implementation has provided to organization worldwide. Therefore, the success or failure of the LSS implementation within the organization is contingent upon the presence of the key factors listed below.

2.1 Employees' resistance to the change

Resistance was identified as a challenge to the implementation of LSS by one of the successful large firms in Korea [9]. The Research and Development (R&D) department, which is comprised of highly knowledgeable specialist, resist collaborating with the manufacturing teams. Consequently, the organization fosters collaboration among its employees by establishing a distinct vision that outlines the organization objectives, and it implements team building activities to reduce resistance [9].

Change is considered as adopting a new environment and usually, the resistance to change is reflected in fear and lack of understanding of new systems or programs [24]. In the organization, all levels of employees are resistant to change and mostly it comes from the employees who deal directly with the changes if the change leader wants to implement a change, the end users must accept it, if not, the end users will not adopt it nor the change will become stabilize [24].

One of the challenges that affect numerous organizations is teamwork among different departments [5]. Studies have shown that different departments in the same organization may fail to cooperate especially when there is a feeling that some individuals are being favoured or certain departments are being lazy, and this is a major obstacle to the successful implementation of LSS [5].

The organization faces employees who used to say that the organization does not need an LSS system, it has done previously, and it is not going to work [16]. By then, the top management observed the process, got the data, and surprisingly found many opportunities to improve the cost, quality, and speed [16].

In addition, when the organization is unable to align the needs of the employees to the requirements of the new system, there is a very low chance of the new system being successfully implemented and studies have revealed that resistance is one of the leading challenges that affect successful implementation [19].

2.2 Lack of senior management commitment

Similar evidence was discovered in [3] study, which indicates that senior executive teams lack support and commitment when implementing LSS. The LSS vision is not well understood by a significant number of seniors executive teams, which results in inadequate communication between departments and faculties and a lack of comprehension of LSS [3].

Based on [4], one of the challenges faced by an organization when implementing LSS is, that the shareholders and stakeholders of an organization are required to assist the management in identifying the LSS system that is highly effective for the company. Leaders should demonstrate support for the continuous improvement program to make a change in the organization and a lack of adequate support will tend to the failure of a change in the organization [20].

The study conducted by [12] with one of the large companies in the United States of America (USA) identified the difficulties faced by the organization are, to develop the managers to give the best to lead the employees on LSS, make sure the projects implemented are aligned with the large companies goals, understanding the gaps, and

opportunities on the project which has been selected and to break projects into small and successful projects.

Based on [16], studies found that there are high expectations of the large firms towards the program managers to comprehend LSS knowledge, and the program managers were instructed to deliver the best to the customer to meet the expectations and foremost, the program managers must be capable and knowledgeable on LSS. In addition, some senior managers may fail to fully implement some aspects of LSS when they feel that the system may affect some of their duties [19].

2.3 Lack of adequate knowledge of LSS

The most difficulty faced upon implementation of LSS in the education sector in the United Kingdom (UK) was analysed by [3], which was the difficulty in understanding LSS terminology, which is mostly used in the manufacturing sector, not in the education sector. The second challenge is the culture of the education sector itself such as ingenuousness, belief, and acceptance in implementing LSS.

LSS systems in accounting are highly complex, which may confuse the part of the employees [35]. The system is complex as all the departments require to be monitored to identify the need to change to the LSS system for quality improvement in the company and there is a lack of adequate knowledge of the employees to implement the system [35].

The continuous change in technology in the business environment has made it difficult for an organization to implement the LSS system and this is where an organization risks losing capital when there is a change of technology requiring the managers to perform a continuous analysis of the most appropriate system that will survive the dynamic external environment [14]. [11] people are the most valuable resource which if they are continuously trained with sufficient knowledge and educated, will result in a great long-term investment for an organization.

2.4 Higher cost of implementing LSS

The management may find it challenging to accept the high cost of implementing the LSS system in production considering their benefits at the time. The LSS system is highly profitable in the long run, thus making the management reluctant to acquire the LSS system to control the production process [17]. The management mainly focuses on a system that will instantly impact the performance of an organization rather than investing in a system that will provide benefits after a long period [17].

New systems require the financial abilities of the organization before they can be successfully implemented. [5] also say that the cost of implementing LSS and supporting the performance of the system requires financial commitment which may be too costly for the organization, and it is important to note that cost acts as one of the major barriers that affect the implementation of new systems in an organization. LSS has already proven to be beneficial in enabling organizations to reduce wastage and the cost of production but then, financial aspects of the LSS may lead to difficulties in implementation [5].

Studies have revealed that organizational changes are some of the most difficult issues that can be achieved in numerous organizations [19], and not only is the process exposed to resistance from employees, but the entire process is usually costly and may require additional investment.

Therefore, to gain a comprehensive understanding of the LSS within an organization, it is crucial to identify the challenges that may arise during the implementation of the LSS. Most of the challenges of implementing of LSS from the previous studies shows that, employee resistance towards change, lack of senior management commitment, lack of adequate knowledge of LSS, and higher cost of implementing LSS.

3 Methodology

The objective of qualitative research is to comprehend the significance, and the qualitative researchers are intrigued by the way in which individuals interpret and experience various events and make sense of their surroundings [18]. A case study or field-work is one type of qualitative research approach [8]. This qualitative case study is a research method that allows for the analysis of a phenomenon within its environment using a diverse set of data sources and this guarantees that the subject is examined through a range of lenses, allowing numerous aspects of the phenomenon to be shown and comprehended [8].

To understand individuals or societies and the social events that happen, the effective approach is the case study method to answer a descriptive question such as 'What happened?' or an explanatory question such as 'How or why something happened?' [36]. A case study can be completed by a single case study or multiple case studies for the expansion of management accounting [29].

Case study research entails a comprehensive examination, frequently incorporating empirical data gathered over an extended duration from a clearly defined case, to analyse the context and processes associated with the phenomenon [25]. The phenomenon is not detached from its context, as in positivist research instead, it is significantly precisely due to its relationship with the context [25]. Thus, this study took a qualitative approach and focused on a single case study, which is known as *Palma* (pseudonym) in one of the Malaysian plantation companies for the purpose of a deeper understanding of the challenges of implementing LSS.

3.1 Data Collection

Qualitative data sources are abundant and varied, with three main categories: spoken (interviews), visual (observations), and written (documents). The sampling method for each research endeavour must be justified based on the sample's relevance to the intellectual subject [18]. Sampling is a critical component in defining qualitative methodology and non-probability samples are frequently utilized in qualitative work, whereas quantitative techniques use probability sampling to test (or falsify) a pre-existing theory [28]. As a result, this research utilised primary sources as a method for collecting data, with a particular emphasis on individuals who were interviewed through semi-structured interviews to acquire a comprehensive understanding of the difficulties associated with the implementation of LSS. Additionally, non-probability sampling was utilised to collect data from thirteen LSS practitioners. The interview begins with an interview session with the leader of the department. At first, this interview was conducted with the purpose of obtaining guidance on how to choose appropriate participants for this case study. Then, the researcher conducted interviews with seven LSS practitioners (1 non-executive and 6 executives) and additionally, the case study performed the interviews session with five different individuals (executives) who were all the practitioners of LSS, specifically Master Black Belt (MBB), Black Belt (BB), and Green Belt (GB) holders, who were directly involved in the LSS process. Consequently, the present research selected participant comprising both executives and non-executives, as they constitute the primary group actively engaged in the implementation of LSS.

3.2 Data Analysis

The semi-structured interviews were documented using an electronic device. In addition, by applying [10], four level analysis, the qualitative interview data from this study were analysed. These levels ranged from level 1 to level 4, and included activities such as transcription and note-taking, writing up case study narratives and within case analysis, determining findings through cross-case analysis, and interpreting and

enfolded finds in the literature [10]. Then, the collected data was subsequently transcribed and categorised into themes. [26], assert that the paramount element of qualitative research is the identification of the theme. The technique for identifying themes is based on the quantity of word occurrence. The data was manually entered into Microsoft Excel. Subsequently, it was translated into English, as numerous participants replied in Bahasa Melayu. Additionally, the transcriptions were segmented into themes and classified based on word occurrence. Themes comprise challenges, employees and senior manager resistance to change, high level management and employee buy-in, unsuccessful projects, measurement difficulties and higher training cost. The material was analysed based on the themes and codes. The data were subsequently compared to prior research, leading to conclusions.

4 Challenges of LSS Implementation

The Malaysian plantation company faced several challenges when attempting to implement LSS, as this research demonstrated. It was discovered that there are five primary challenges that occurred during the phase of this research. The challenges are resistance to change, buy-in, failed projects, measurement issues, and the higher cost of training employees.

4.1 Resistance towards change

The data that was gathered for this case study documents the resistance that was encountered because of the early phase of implementation of LSS within one of the plantation divisions within the organization. In the beginning, LSS was a distraction. Over the span of the study's duration, the early resistance was significantly reduced. A non-executive emphasized:

“The biggest challenge is resistance to change because it's difficult to change someone's perspective about the current process. At the very least, we need to offer them a better opportunity and attempt to influence and convince them to invest some money to improve future benefits”.

Later, this LSS methodology resulted in improvements to processes, goods and services. The capacity to remove errors has been of great assistance to divisions in increasing their profitability, production, and overall satisfaction with their customers. On the other hand, the challenges that must be overcome in order to successfully implement the LSS.

4.2 Resistance towards change from senior

Then, there were more success stories from the LSS projects, and employees were supportive of change, despite that some of the employees and senior level employees were pessimistic about the effect of those changes. Concern was levelled at the perceived changes and a lot of improvement in the working environment. Executive 3 pointed out:

“Especially the seniors, they have experience of doing their work. So, this is a new thing and new LSS tools so, they are reluctant to change. Currently, the challenge is the people because you are talking about the higher-level employee and we know that once they know better, they do not like to change, and that is the mentality of it...”

Another Executive 8 who responded to it:

"Major challenge I would like to say the seniority of thinking. The senior staff resist changing. By force, we must keep telling them about the benefits and what would affect their daily jobs".

The initial challenges related to LSS implementation are centred on resistance to change, which can come from both employees and senior employees.

4.3 Buy-in from top management and employees

Subsequently, the employee's adoption of the LSS process presents a challenge in its implementation. Consequently, the buy-in process engaged all levels of management, from top to bottom. The senior management encounters opposition from other employees in the finance department, as they perceive it not as their initiative but as the organization initiative. This is apparent from Executive 1 who stated:

"The buy-in from anyone is a significant challenge to overcome. It is not unusual for people to be resistive to change. Sometimes, before they are willing to put in the work, they need to first see the result that have been demonstrated to be successful. Since to complete an LSS project, you need to have a joint effort from the organization, there has always been a challenge...Because of this, we require a proven financial record considering this is the way that it assists in the implementation of LSS as well. From that point on, when you become aware of the overall savings, the buy-in will be much simpler".

Another Executive 8 who respond to it:

"It is based on top management to the lower-level management. We must understand that and work for it. We cannot simply implement LSS without getting buy-in from the top management. In terms of, if top management does not approve LSS that means it cannot be done to other parts or departments".

The following challenges for LSS implementation revolve around gaining buy-in from top management and employees. It is based on the LSS project, and if it is successful, it will lead to employees and top management a better understanding of LSS.

4.4 Failed Project

Another challenge is inaccurate data or a selected project that has failed. Numerous LSS projects has problems, however in most instances the project team effectively utilised the SS tools known as Define, Measure, Analyse, Improve and Control (DMAIC) to achieve the project objectives. However, in some scenarios, DMAIC proved to be the wrong tactic for the project problem, and those projects ended up making the problem worse or failed to achieve proper solutions. In some cases, they were unable to state the issues their projects were chartered to solve and sometimes there was no way to find sufficient project data to assess the performance of the process and gauge customer satisfaction. Executive 8 emphasised:

"Let's visualise that we already have sufficient project data, but when we check it using the SS system and Minitab Software, the bell curve reveals that the project data is invalid. In this case, the best course of action would be to collect all the project data once more. On occasion, the bell curve will have additional causes that we are unable to handle within the projects data, such as an example of a problem with Mother Nature or a human being...If this data turns out to be invalid, then we will have to cancel the

projects, and then we will have to begin the process all over again, and we will gather new data and begin working on the new projects...".

The subsequent LSS implementation challenges are based on unsuccessful LSS initiatives. It could be the result of a poor strategy or an unforeseen event

4.5 Measurement Issues

The priority of traditional shift responses grounded in logic and experience diminished as resources were reallocated to data collecting through the LSS methodology. Employees discovered a reduction in time spent on data collection and the application of suitable measures to enhance the workplace environment. Additionally Executive 6 who respond to it:

"At the final stage of the process in the mills, we remain with the palm oil fruits in the site of assembly; however, senior employees will estimate the number of tonnes based on their knowledge of the present situation. They only have estimations based on their previous experiences, hence they do not have any measurement instruments".

Another major challenge faced in implementing the LSS approach was realizing the full traceability of the measurement scale. It became extremely difficult to trace the fresh fruit bunches (FFB) up to the estate. This is because the fruits are regularly mixed up at the assembling points before being conveyed to the palm oil mill. The intricacy further escalated in upstream processes. As Executive 6 responded:

"From the estate, they bring the FFB in the 20kg lorry tonnes till the mill then they will start to measure or weigh scale and then they will go to wrap... the fruits in the place of assemble...So they don't have the measurement items, only the estimation figures are available to them...".

The ensuing LSS implementation challenges are centred on measurement issues, which continue to be addressed using traditional methods such as estimation based on experience.

4.6 Higher cost of training employees

Another challenge is the cost of training for LSS. Another participant pointed out the training cost:

"...the headcount is nearly RM6,000.00 per person to be trained as Belt Holder proficiency in LSS" (Executive 3).

As one of the participants pointed out:

"Even though there is the cost of training, there is also the savings from the cost. LSS system either reduces cost or increases revenue" (Executive 7).

The LSS approach has proved to be a game changer for Malaysian plantation company. The major impact had been facilitating cost reduction in the manufacturing process, which allowed the organization to overcome business-related challenges, stay competitive, and survive in the long term.

LSS has been used to eliminate waste in processes at Malaysian plantation company. The wastage has included excess production; long work hours between stages; raw material loading and unloading for finished products; needless movement of staff;

non-value-added processes to satisfy customer needs; holding unnecessary inventories and capacities; and sub-standard products. The implementation of LSS reduced stress, paperwork, and operating costs.

LSS has been utilised to improve productivity, workflow, customer satisfaction, and teamwork both externally and internally. Executive 4 agreed:

“There is an improvement in terms of the cost savings. It increases the profit margin clearly, but the major improvement comes from the culture, so people start to look at different points of view means that they tried to solve the problems by themselves”

Therefore, this study found some similarities in the challenges of LSS implementation based on the literature review.

5 Analysis and Discussion

Table 1 summarises the issues identified through the literature review and the challenges of LSS in the Malaysian plantation company. The challenges of implementing LSS in the Malaysian plantation company are not only like those identified in the literature review but also provide further insight.

Based on the findings, the challenges of implementing LSS in the Malaysian plantation company were primarily due to the resistance to change from employees and senior management, buy-in from top management and employees, failed projects, measurement issues, and higher cost of training.

Table 1. Summary of the challenges of implementation of LSS

Challenges of LSS	Challenges of implementation of LSS from the literature review	Challenges of implementation of LSS from the Malaysian Plantation company
1. Employees resistance towards the change	<ul style="list-style-type: none"> • [9]-Resistance as a challenge towards implementing LSS. • [24]-The resistance to change reflected of fear and lack of understanding of new systems or programs. • [5]-Different departments in the same organization may fail to cooperate. • [16]-The organization does not need an LSS system, it has been done previously, and it is not going to work. • [19]-When the organization is unable to align the needs of the employees to the requirements of the new system, there is a very low chance of the new system being successfully implemented. 	<ul style="list-style-type: none"> • LSS was initially seen as a distraction (non-executive). • The seniors are resistant to change because they have experience in conducting their work (Executive 3 and 8).
3. Lack of senior management commitment	<ul style="list-style-type: none"> • [3]-Many senior executive teams are not clear with the LSS vision. • [4]-The shareholders and stakeholders are required to assist the management in identifying the LSS system. • [20]-Lack of adequate support. 	

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| 4. Lack of adequate knowledge of LSS | <ul style="list-style-type: none"> • [12]-To develop the managers to give the best to lead the employees on LSS. • [16]-The program managers to comprehend LSS knowledge. • [19]-Some senior managers may fail to fully implement some aspects of LSS when they feel that the system may affect some of their duties • [3]-The difficulty in understanding of LSS terminology. • [35]-There is a lack of adequate knowledge of the employees to implement the LSS system. • [14]-The continuous change in technology in the business environment. | • |
| 5. Higher cost of implementing LSS | <ul style="list-style-type: none"> • [17]-The high cost of implementing the LSS system in production. • [5]-The cost of implementing LSS and supporting the performance of the system requires financial commitment which may be too costly for the organization. • [19]-The entire process is usually costly and may require additional investment. | <ul style="list-style-type: none"> • Higher cost of training the employees to gain the LSS expertise and certificate (Executive 3 and 7). |
| 6. Buy-in from top management and employees | • | <ul style="list-style-type: none"> • It revolves around gaining buy-in from top management and employees. It is based on the LSS project, and if it is successful, it will lead to employees and top management a better understanding of LSS (Executive 1 and 8). |
| 7. Failed project | • | <ul style="list-style-type: none"> • Unsuccessful LSS initiatives and it could be the result of a poor strategy or an unforeseen event (Executive 8). |
| 8. Measurement issues | • | <ul style="list-style-type: none"> • It centered on measurement issues, which continue to be addressed using traditional methods such as estimation based on experience (Executive 6). |
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6 Conclusion

This extensive study elucidates the challenges associated with the implementation of LSS in Malaysian plantation company. This research finding consistent with the literature review in terms of employee's resistance to change and the higher cost of implementing LSS. Additionally, this study presents further data such as buy-in from top management and employees, failed projects and measurement issues. Mostly, the getting buy in from all the stakeholders and people sometimes objecting to change is major challenge. Before investing time on it, they usually need proof of successful outcomes. Implementing an LSS project regularly presents challenges since it requires coordinated involvement of the organization. Therefore, a confirmed financial record is necessary since it helps LSS to be implemented. Nevertheless, there were cases some of the projects failed due to the incorrect strategy for the project issues, leading the projects that either made the things worse or didn't get the task done. Sometimes, they were unable to describe the issues, other times there was no way to find adequate project data to evaluate the performance of the projects. It could be the outcome of a poor strategy or an unexpected occurrence. Another challenge found on the study is about the measurement issues. They lack the necessary measurement instruments and rely on estimations derived from their experience.

Overall, the challenges associated with the implementation of LSS significantly impact any organization that values cost-effectiveness and operational efficiency. This research complements the present literature on the challenges of the implementation of LSS in Malaysian plantation company and provides some insight to policymakers and organizations notably plantation companies. This study has a few drawbacks. This study reliance on interviewers for data gathering, limits its ability to generalize findings. Future studies may investigate different forms of data collection. Secondly, this study only evaluated from the LSS practitioners' views, therefore future research may consider other portfolios in determining the LSS challenges. In addition, the discussion is based on one of the Malaysian plantation companies, therefore future research may compare the LSS implementation challenges within Southeast Asia countries.

Paper Contribution to Related Field of Study

The research provides insight into the challenges of implementation of LSS in the Malaysian plantation company

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