MJBE Malaysian Journal of Business and Economics

A CASE STUDY ON THE IMPLEMENTATION OF LEAN SIX SIGMA IN MALAYSIA PLANTATION COMPANY

Siti Salimah Jalal*[1], Suaniza Mamat[2], Zamzulalila Zakaria[2] and Mohamad Hafiz Rosli[1]

[1]Faculty of Accountancy, Universiti Teknologi MARA (UiTM) Cawangan Johor, 85000 Kampus Segamat, Johor, Malaysia

[2]Kuliyyah of Economics and Management Sciences, 53100 International Islamic Universiti Malaysia

*** Corresponding author's email:**
*salimahjalal@uitm.edu.my

Received: 27 February 2022

Accepted: 15 April 2022

Revised: 15 May 2022

Published: 30 June 2022

DOI: https://doi.org/10.51200/mjbe.vi.3791

Keywords: *Lean Six Sigma (LSS), management accounting, multinational corporation (MNC), Actor-Network Theory (ANT), plantation, process*

ABSTRACT

Lean Six Sigma (LSS) is a method focused on continuous improvement of quality, elimination of waste and minimization of defects in an organization and has been widely applied in Multinational corporations (MNC) in western countries. However, few studies have been found in developing countries, particularly in the plantation industries. Underpinning with Actor-Network Theory (ANT), this study aims to explore the process of implementation of LSS in one of the Malaysia Plantation Companies. In this study, the data was collected through face-to-face interviews with 13 executives and non-executives, document reviews, and direct observations. The finding indicates that the LSS implementation improves the cost-saving of RM967 million in business operations in the 2016/ 2017 financial year and trained 16 Black Belt practitioners and 184 Green Belt practitioners within five years. In addition, the implementation of LSS also increases revenue contribution and brings the focus of the company towards sustainability. Overall, this study offers some insight to the company especially the board of directors and Plantation Sustainability Quality Management committee into the implementation of LSS particularly the plantation company that can strategies the LSS in their business operation.

INTRODUCTION

In today's business environment, it is essential to have quality products. Quality management is one of the general indications of a quality product. The activities that assure quality management in companies comprise three processes such as quality planning, quality control and quality improvement (Juran, 1989). Quality planning encompasses the determination of customer needs and the development of products and processes. Meanwhile, the focus on the reaction to irregularities or regularities in the production process is based on quality control. On the other hand, quality improvement consists of systematic and proactive activity, which improves the opportunities in production processes to increase quality levels. The third process, quality improvement is best reached by working on projects (Juran, 1989).

The quality improvement of the Six Sigma (SS) approach that emerged in the 1980s is regarded as an operationalisation of this vision. Walter Shewhart played a crucial role in the development of the SS when he demonstrated how three Sigma deviations from the mean needed a correction process. He developed the Process Control Chart which was largely viewed as the basis for quality management. Further, he helped in the improvement of the quality of the manufacturing process of the Western Electric Company in the year 1924 (Theodore et al., 2011).

A few decades later, a new approach emerged in Japan focusing on the improvement of process performance named The Toyota Production System, Ohno (1988), which evolved as Lean manufacturing. Lean seeks to eliminate waste and reduce variability, also known as the continuous improvement approach, Shah and Ward (2007) optimise the so-called 'value-added time' as part of the total lead time. The Lean approach is mainly focused on improving the speed of the business process. The approach is based on the belief that reducing waste in the business process and also eliminating the bottlenecks can help reduce the time taken between different activities, events and cycles (Gardner, 2013).

Since the year 2001, there have been suggestions to merge Lean and SS into Lean Six Sigma (LSS) (George, 2002). Based on Snee and Hoerl (2007), the main focus of SS is on improving the process. Meanwhile, Lean is improving the flow between processes. An integrated LSS approach should encompass both projects and Lean Kaizen projects on the one hand and SS projects taking several months on the other. The LSS is defined by Basu (2009) as a method of solving problems efficiently. Gardner (2013) indicated that LSS is adopted by organisations that are experiencing rising costs in the production process and those facing increased competition. The application of LSS has enabled the streamlining of the production process resulting in a fast production process at a reduced cost while also ensuring quality products (Gardner, 2013).

PROBLEM STATEMENT

MNCs are key drivers of globalisation and promote economic activity interdependence among national markets (Rugman & Verbeke, 2004). MNC is a single industry with many firms that have been acquired either through takeovers or mergers and supply various services or goods (Franzoni & Giannetti, 2017). Being an MNC involves diversification into an industry that has no relationship with the current firm. MNCs aim to maximise shareholder value. When a company becomes an MNC, risks are spread across more industries, and hence the company reduces fluctuations regarding profits and sales that may arise due to cyclical or seasonal risks (Franzoni & Giannetti, 2017).

Particularly in developing countries where the industrialisation procedure has its foundation in MNC, energetic globalisation implies a great change in the method of operation management (Fleury, 1999). In other words, investing in new markets will also

involve rethinking management practices, using better ways of transferring knowledge and implementing Continuous Improvement (CI) methodologies such as LSS across units.

The Palma division is one of the largest revenue contributions to Malaysian MNC companies and focuses on the production of a wide range of plantations such as oil and fat products as well as rubber production (Ahmad & Kitchen, 2008). The Palma produces vegetable oil-based ingredients that are applied to foods, non-foods and other consumer products. It is a pioneer and leader of many sustainable practices for the palm oil industry and is currently the world's largest producer of Roundtable on Sustainable Palm Oil (RSPO) with a market share of 20 per cent of the global production by capacity (Jacques & Kepos, 2012).

The RSPO framework provides several set principles and criteria for sustainable practice. If the organisation meets the standard of criteria and principles based on planting, milling and waste management, the organisation will be certified as RSPO oil palm (Padfield et al., 2014). The Palma division was the first division that implemented the LSS system. The development of the LSS system started in the financial year 2010/2011 mainly in one of the Palma divisions, refer as downstream. By the 2012/2013 financial year, all divisions had implemented the LSS system based on the removal of wastage, defects and errors by a combination of different tools in LSS under various sustainability department guidance. Therefore, this case study explores the process of LSS implementation in detail at the Palma division.

RESEARCH OBJECTIVE AND QUESTION

The present research concentrates on investigating the process of implementing LSS in Palma. Thus, the objective and the research question are:

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

RQ1: How has the implementation process of the LSS system occurred in a multinational corporation in Malaysia?

Therefore, this case study explores the process of LSS implementation in detail at the Palma division. The exploration of implementing LSS in this particular MNC is based on the actor-network theory (ANT), which proposes that LSS implementation helps decrease costs and increase revenue.

LITERATURE REVIEW

The Evolution of Lean Six Sigma

The origin of Lean thinking is located in Japan as pioneered by Taiichi Ohno and associates based on the Toyota Production Systems to reduce cost by eliminating waste, where elements of Lean manufacturing were applied from around 1950 (Womack & Jones, 2003). The main concept of Lean thinking by Mr Ohno was to eliminate waste (Dahlgaard & Dahlgaard-Park, 2006). Seven forms of waste were identified, namely overproduction, defects, unnecessary inventory, inappropriate processing, excessive transportation, waiting and unnecessary motion. Lean is a principle-based management philosophy that focuses on the strategic elimination of waste, increasing customer value and continuous enhancement of cycle time and productivity. Vinod, Devadasan, Sunil and Thilak (2014), the methodologies and tools most frequently used to eliminate waste through Lean manufacturing are 5s, Kaizen, Kanban, mistake proofing, cellular manufacturing, pull production, value stream mapping, total productive maintenance, Takt time, visual management and set up time reduction.

SS, on the other hand, started at Motorola in the USA in the mid-1960s. Based on Gutierrez, Llorens-Montes and Sanchez (2009), the SS's denomination, 6s symbolises a specific number of 3.4 defects per million opportunities (DPMO), where the "opportunity" is known as any possible source of error in

products, processes or services. Moreover, SS is considered a management philosophy that focuses on the reduction of defects and variations in specific processes (Smith, 1993). SS basic methodologies are known as Define, Measure, Analyse, Improve and Control (DMAIC) which focuses on teamwork to achieve the goals of an organisation (George, 2002). The problem-solving algorithm of DMAIC is always used, and projects are monitored after each phase is completed. The method includes the following: Define (D) the problem as indicated such as what is to be accomplished by the project. Next, Measure (M) of the process or the project by combining experience and collecting data with knowledge. Furthermore, analyse (A) the available data to identify problems such as poor quality, waste, and delays in the process or projects. Fourth is Improving (I) the production process or projects that eliminate costs, waste, and defects to achieve the set goals. Lastly, is Control (C) of the improved processes or projects by preserved and documented procedures (George, 2002).

Lean and Six Sigma are needed to solve the problems encountered by organisations, and the question is how to use the integrated approach. Snee (2010) argues that discussions on which approach should be used when there is a lack of productivity in an organisation. The objective of LSS is to ensure that goods and services are produced at the level of SS. Therefore, an organisation tends to focus on moving towards the achievement of quality at the level SS which manages complexity, while Lean can achieve simplicity. Cutcher-Gershenfeld (2004) says that for this to be achieved, the management team must emphasise the elimination of defects, reduce inventory levels and cycle times, minimise the cost of development and production, and increase customer satisfaction and profit margin. LSS is an essential tool that involves cost calculation, determination of efficiency and profitability of manufactured goods, cost controls and the efficiency of business activities.

The Phases of LSS Development and Implementation

LSS is mostly implemented in Western countries ensuring that organisations can reduce costs. Therefore, this study will elaborate on the phases of LSS development and implementation in organisations particularly in large companies.

The effective implementation of LSS in an electrical company in the UK was analysed by (Byrne et al., 2007). The electrical monopoly company found itself losing market shares in deregulated UK retail energy. Therefore, it decided to use LSS approaches to drive innovation in its service-based business. It started by training hundreds of its employees and establishing business transformation. In the initial phase, the company implemented 130 LSS projects. As a result, it expanded the number of customers from 3.2 million to 5.1 million within four years and gained around an average of 40,000 new customers per month. To date, the company realised revenue and cost savings of USD 170 million (Byrne et al., 2007).

In the year 1955, a large organisation was established after the merger of two companies in the USA with business interests in aeronautical systems, space systems, systems integration and technology services (George, 2003). The organisation started to implement LSS with a few strategies. First, top management involvement and support. The organisation's top management extended substantial commitment and support towards LSS. Next, top management was trained in LSS concepts and applications. The organisation provided training to all the executive committee for around four-and-a-half days, and then the executive committee will train the other employees. This continues leadership commitment. In the third phase, the basic training reached all levels of management. Around 5000 managers were sent for training (George, 2003).

Next phase, the organisation developed a strong infrastructure through the participation of all employees in improvement projects under Black Belts, Green Belts, Sponsors and subject matter experts. Then, the organisation integrated Lean and SS methods via training that combined Lean and SS tools and principles such as the DMAIC process (SS tools), identifying seven forms of waste (Lean concept), working towards shorter cycle times and so on. Finally, the organisation reached out to the supplier by coaching their employees on LSS. As a result of this, the organisation achieved USD 4 billion of documented savings and recorded 5000 successful projects (George, 2003).

In another case, a large company that provides services globally such as print and digital documentation solutions and document technology products decided to combine Lean and SS tools to be implemented in the organisation (Fornari & Maszle, 2004). It implements LSS by approaching projects that aligned with its strategic goals, a bottom-line focus, dedicated resources and a standard set of methods and processes. This implementation was gradual. First, the projects were selected based on value creation such as giving financial benefits and economic profit for the corporation. Then, the bottom line was addressed by engaging and training the employees as Black Belt, Green Belts and managers to enhance their expertise to handle LSS projects. The projects used tools such as DMAIC or one of the LSS tools to run the projects (Fornari & Maszle, 2004).

In addition, the organisation dedicated resources by using the intranet to reach the employees by providing reference information, deployment details, project success and answers to frequently asked questions (Fornari & Maszle, 2004). To achieve a standard method and process, the organisation implemented an online YB awareness programme known as Yellow Belt awareness in 2003 to provide a basic understanding of core processes, tools and expectations about LSS for all the employees. As a result, the organisation achieved millions of dollars in savings, 400 Black Belts were trained, 700 projects which is high benefits to the organisation were executed, 2500 employees had Green Belt certification, and around 10,000 employees received Yellow Belt awareness training (Fornari & Maszle, 2004).

LSS is essential not only in technology industries but also in one of the world's largest construction manufacturer businesses which include designs, engineering, manufacturing, development, marketing and selling engines, machinery, insurance and financial products globally. In the study conducted by Byrne et al. (2007), the organisation had flat revenues within four years by the year 2000. In 2001, the organisation implemented LSS to CI and innovation for customer driven. LSS was implemented through training for nine months of 4200 employees. Employees were from various backgrounds and job scopes from finance to engineers. Once they completed the training, they will lead the projects and become mentors in the organisation (Byrne et al., 2007). This phase was developed and implemented throughout the organisation from top to down. The main reason for the success of LSS implementation in the organisation is strong leadership and strong participation from the employees. As a result, the organisation's revenue grew 80 per cent in the year 2005 (Byrne et al., 2007).

Numerous reports have already proved that well-executed LSS has numerous benefits for different organisations especially when the management team gives the employees full support (Reijns, 2010). Based on the previous studies, several factors like awareness and training, LSS project selection, effective communication, organisation culture, senior management commitment, involvement and support were found to play a more vital role in the success of the implementation of LSS in large companies. As a result, LSS methodologies have been proven in large companies in savings with increasing revenue growth and reducing cost by various aspects

such as delivery times, time spent on budget planning, inventory turnover, decision-making process, reduce defects and so on. Therefore, most large companies in the US, UK and Asia implement LSS and achieve cost savings.

According to Raja Sreedharan and Raju (2016), LSS has been implemented in manufacturing services to service sectors, labour-intensive industries to technology-intensive industries, medical healthcare to communication industries, construction industry to assembly industries, mass production to high variety and small volume production, and logistics industry to defence industries. Thus, there are limited studies on LSS implementation in MNCs in Malaysia, particularly in the plantation sector. Consequently, this study will focus on LSS implementation in Malaysian MNCs with a focus on the plantations division.

METHODOLOGY

Mohd Tobi and Amaratunga (2010) explained that the strategy chosen for data collection and analysis could be described as the research approach. It is either a qualitative or quantitative approach and is based on the selection of the research and the nature of the research. One of the approaches of qualitative study is a case study or fieldwork (Baxter & Jack, 2008). Case studies offer a better understanding of the nature of management accounting practice through the procedure, techniques and systems in the organisation (Scapens, 1990). This present study is based on a single case study which examines one division of MNC.

Research Site Adoption

The present study is conducted at Palma. Palma was chosen as the sample plantation MNC because few studies have been done on the implementation of LSS in the plantation sector. Thus, this study examines LSS in plantation MNCs of the developing country to contribute to the success of the implementation of LSS particularly in plantation MNCs in developing countries. Palma was also selected because it is the world's largest oil palm plantation by planted area, accounting for some 4 per cent of the total global production of crude palm oil in 2016 which represents a major Malaysia-based MNC with diverse industries which have implemented the LSS system.

Palma is the leading division in terms of profit contribution. In the year 2017, Palma achieved 116 per cent of profit before impairment and the highest percentage of profit contribution compared to other divisions. Palma consists of four divisions which carry its duties and responsibilities. The main functions and duties performed are based on upstream and downstream divisions. Based on both division processes, the upstream division usually has a high-profit margin. Thus this study does not focus on this division. The data collection process commenced in Palma's headquarters.

Semi-structured Interview

This present study was conducted using semi-structured interviews to collect data about the process of implementation of LSS in Palma. Qu and Dumay (2011) elaborate that the most significant mechanism used in collecting data for a qualitative studies such as field studies and ethnographic studies is the interview. Interviews are divided into individual interviews and focus group interviews. This study focuses on individuals interviewed for an in-depth understanding of the implementation of LSS in Palma. Guest, Bunce and Johnson (2006), the first 12 interviews lead to data saturation, and very few new phenomena are likely to appear after that. Therefore, this study interviews 13 LSS practitioners. The study was conducted in three phases. The semi-structured interviews were conducted face-to-face and recorded.

Reliability and Validity of Qualitative Data

Scapens (1990) explained that triangulation is a method of collecting data from multiple sources. Triangulation is "a validity procedure where researchers look for convergence among multiple and different sources of information to form themes or categories in a study" (Creswell & Miller, 2000). It is used to increase research accuracy and serves as a validity measure (Golafshani, 2003). Thus, this research has gathered information from multiple sources using semi-structured interviews, direct observation and document review. It adopted the triangulation method to reach its conclusions and enhance its validity.

FINDINGS

Participants Background

This study started by interviewing the Head of Quality and LSS Mr Mohamed (pseudonym) in early 2014 as a pilot study at the Head Office. This interview was intended to get an overview of the early implementation phase and a guide on how to select suitable participants for this case study. As a result of the interview, the researcher was able to capture the process of LSS implemented in Palma.

Following the initial interview, seven LSS practitioners of White Belt (WB) Holder, Green Belt (GB) Holders and Black Belt (BB) Holders were interviewed by the researcher in 2014 at Palma. During the second phase of the interview, the organisation was in the initial phase of implementing LSS.

The third phase of semi-structured interviews including themes was conducted from 2015 to 2016 and involved five individuals LSS practitioners of Green Belt (GB) Holder, Black Belt (BB) Holders and Master Black Belt (MBB) holders. During the third phase, the organisation was implementing the standardisation phase.

The selection of the LSS practitioners as the respondents consists of executives and non-executives because they are the main group of actors actively involved in the process of LSS implementation. The top management is excluded because the top management does not play any significant roles. Hoerl (2001) explained that the ranking of expertise is identified through the Belt systems which are classified as Master, Black, Green and Yellow belt. These four different belt levels ensure the execution and formation of SS projects in the organisation are done efficiently. Kwak and Anbari (2006) found that the selection of knowledgeable and well-respected employees for BB projects was a critical success factor for SS projects in any organisation. Thus, following the above studies, the current study selected the respondents consisting of executives and non-executives because they are the main group actively involved in the implementation of LSS in the Palma.

This mechanism and the different belt levels have been used to gather in-depth information regarding the process of implementation of LSS.

Early Implementation of LSS at Downstream, Palma

The Downstream division obtained a low-profit margin and was looking for a change to increase its profit margin and cost reduction simultaneously. To achieve cost savings, the CI project was developed early in 2010/2011. The focus on the CI projects had been initiated through the LSS methods. As a result, the Plantation Sustainability Quality Management (PSQM) division was established at Palma in the 2010/2011 financial year to instil a performance culture and assist the Group Management Sustainability Committee. Executive 7 explained, "Oh yeah, PSQM is responsible for monitoring the continuous improvement and will make sure the target to be achieved".

At the time of the study, Mr Mohamed was appointed the head of the plantation of sustainable quality management. The PSQM was committed to different types of quality programmes and one of which is LSS. In the early implementation phase, the process of implementing LSS at the Downstream division at Palma was managed by Mr Mohamed and Plantation Sustainable Committee (PSC) team members. The PSC members collected information from departments to see what problems they faced. One respondent claimed:

> … Mr Mohamed and PSC team members have a lot of expertise and knowledge in LSS. The team started to walk through the one-by-one departments to listen and to identify the problem that occurs and the cause of the problem occurs to improve the organisation. Moreover, Mr Mohamed and the team begin to share their expertise and knowledge with other departments about the LSS system and how the LSS system can ensure improvement in the department (Executive 7).

These processes collect a lot of information to identify the root of the problem and the methods to improve it. This is important because each department will have different problems. As Executive 7 explained on the Downstream process:

> Fresh Fruit Bunches (FFB) of palm oil are from the estate and deliver to the mill. Mill will process it as palm oil based on RSPO P&C, then send it to Downstream. Estate and mill more to produce oil (Upstream). Upstream revenue is high. Meanwhile, downstream develop palm oil to get an innovative oil to refineries. This stage will base on RSPO SCCS. Refineries will then sell all the products to customers based on the innovative oil.

Thus, the whole process of Downstream operations follows the RSPO SCCS certification. Downstream margin obtains profit and loss based on refineries sales volume, customer demand, overhead expenses and storage cost. Thus, the Downstream applied LSS methods to reduce cost and become a pioneer of LSS implementation in the organisation. After two (2) years of implementing LSS, Downstream, Palma was able to increase profit and able to achieve cost savings. In the financial year 2011/2012, Palma contributed about RM12.2 million, and PSQM introduced the Black Belt training programme and trained nine engineers (MNC Berhad, 2012).

Development and Implementation of LSS at Palma

Subsequently, after Mr Mohamed and PSC team members successfully developed LSS in Downstream in the 2012/2013 financial year, they came up with the blueprint for the LSS system. He presented the blueprint to top management including the President and Chief Executive Officer who authorised Mr Mohamed to implement the LSS system in the other divisions of the MNC. Executive 7 pointed out:

> Mr Mohamed presents the blueprint to the top management. So then, the President and Chief Executive Officer saw the presentation on the blueprint of LSS, and he said we could do it and implement it.

The blueprint has several phases of implementation from the 2012/2013 financial year up to 2016/2017 and later.

a. Phase 1

By late 2013, LSS had been launched in all divisions. As a result, Phase 1 is described as a fundamental phase where the MNC commences the LSS system. Phase 1 is presented for up to six months and is designated as the formation of LSS. In this phase, LSS has been targeted to achieve a total of RM775 million worth of savings within five years from the 2012/2013 financial year up to 2017/2018. The cost savings target was

developed to increase revenue, cost reduction and avoidance. The aim of RM775 million is based on a calculation of 1 per cent of the total profit made by the MNC in the financial year 2012. The percentage of 1 per cent is disseminated across years which equals 0.02 per cent for each financial year. As one of the respondents agreed:

> First is a fundamental phase. The fundamental phase is to create a target for every year. The targeted cumulative savings total of up to 1 per cent of total profit in the year 2011/2012. So, the targeted cumulative savings of the first year is 0.02 per cent, the second year 0.04 per cent and the percentage of savings will be up to 1 per cent at the end of the 2016/2017 financial year. The project's target cumulative savings is RM775 million in the cumulative of 5 years. Furthermore, materials such as documentation are designed for training to use for Green Belt, Black Belt and White Belt (Executive 7, Black Belt Holder).

Each of the divisions was tasked with setting a goal for improved outcomes. The LSS actions characteristically started with key capacities for development, which were followed by the necessary initiatives and then the process of implementation.

a. Phase 2

After six months of phase 1, MNC introduced phase 2. This research was conducted in the second phase. Phase 2 is the implementation phase. It aimed to strengthen the LSS system through the Belt Holders' proficiency. In this phase, the MNC aimed to develop the expertise of LSS knowledge. Therefore, the implementation phase established LSS capacity and capability through project coaching, centralised or localised workshop and training for the employees. In addition, to establish a Belt workshop, the LSS project selection will be assigned based on a focus group.

Palma strategized three approaches using LSS tools to implement at the focus groups (also known as employees in Palma). Focus groups of each approach are divided across the non-executive level, executive level and manager's level. The three approaches are Kaizen, Lean and Six Sigma tools and are divided across the focus group. The three approaches are classified for all the employees in the organisation. Executive 7 pointed out:

> It is three approaches which are Lean, Six Sigma and Kaizen. Kaizen tools, based on which they can improve in daily activities. That means they might improve small things. Thus, they will close small loops while the big boss will close big loops. So, Six Sigma and Lean tools practise by executives and bosses. They will do big projects in which they will improve big things. In the end, the whole organisation will be improved.

The first approach implemented by Palma is Kaizen. Kaizen is about Waste Elimination which is one of the Lean tools. Kaizen was implemented for all the employees in Palma, especially the non-executive level. It is an individual-based improvement with logic and common sense of waste elimination with minimal conceptual tools and training as a White Belt. One of the respondents claimed:

> …Kaizen method is a more simple tool. The Kaizen project is based on rationale and experience only and not too many details, but then the LSS project charter, stress more data (Executive 6, Black Belt Holder).

The second approach implemented by Palma is Lean tools. Lean is concerned with Cycle Time and Efficiency Improvement. Lean was implemented among employees in Palma, especially at the executive level. Lean concerns improving the organisation in terms of better quality, faster and cheaper by conceptual tools such as 5S, Kanban, Visual Stream Mapping and Spaghetti Diagram.

One lean tool widely use in Palma is 5S. Gapp, Fisher and Kobayashi (2008) explained that 5S is based on the Japanese acronyms of Seiri (organisation), Seiton (neatness), Seiso (cleaning), Seiketsu (standardisation) and Shitsuke (discipline). The implementation of 5S into an organisation can discover the hidden problem that may have remained hidden. Becker (2001) defines 5S in the West, known as "housekeeping". Based on Gap et al., (2008), 5S is used as a problem-solving method within Lean management philosophies at the process level. Meanwhile, Executive 8 elaborates on one of the 5S projects:

> We use 5S for efficiency in the workplace. As an example, all the documents need to be in a file and the files need to label under the 5S approach. Whenever someone from outside or internally wants to find any important documents, they still can find the documents because the file is labelled and it's produced work efficiently and less time-consuming.

The third approach implemented by Palma is Six Sigma (SS). SS aims to eliminate defects. SS is implemented among employees especially managers, executives and engineers. It is to avoid complicated problems occurring in the organisation. SS is more to the data-driven continuous program by statistical and conceptual tools such as DMAIC and Design for Six Sigma (DFSS). Data-driven means based on the collection of data (regarding figures, and records) for the project. In addition, Sokovic et al. (2010) explained DFSS as an approach focusing on problem prevention. DFSS is based on the objective of meeting or exceeding all the needs of the customer demand. It also helps meet all the criteria needed by the customer and good quality products are produced from the very beginning. The major objective of DFSS is to design things right the first time. As Executive 8 elaborated:

> Six Sigma has a few phases like DMAIC which stands for Define, Measure, Analyse, Improve and Control. An example started with the define phase, the customer wants oil for 3 per cent, free fatty acid (FFA), then, Measure phase, we see the capability. Next, analyse phase, we analyse the data whether we can meet the 3 per cent or not after we collect all the data. To analyse the data, we use the Minitab software whether we can get 3 per cent or not. Six Sigma is used to measure whether the project can be successful or not.

Thus, to strengthen the focus group with the LSS tools, in the second phase, Palma executed LSS workshops and training divided into four stages.

LSS Workshop and Training

The PSC team members headed by Mr Mohamed under the numerous sustainability subdivisions offered appropriate training centred on the complexity and necessities of the intended projects. Therefore, it was significant to ensure training was offered regularly to all staff. There are mainly three major levels of LSS training, which White Belt, Green Belt and Black Belt. The training emphasises performance and competence in using LSS techniques and tools. Each employee was exposed to LSS strategies and tools to guarantee operational solutions pursued the best outcomes.

Foremost, the White Belt training program was executed. In this training, the employees are exposed to a simple and basic tool that proved to be appropriate for simple LSS tasks. It is all about improving the organisation in terms of better quality, faster and cheaper by conceptual tools such as 5S, Kanban, Visual Stream Mapping and Spaghetti Diagram while at the same time using Kaizen. Meanwhile, Executive 7 stressed:

> Like Kaizen for staff and workers, we want to equip them at least with White Belt which they can do simple things and can solve a simple problem for at least 3 months before they can finish training.

The Green Belt training programme was consistently executed. In this training, the employees are exposed to the Green Belt programs which concentrated on theoretical and practical LSS, simple tools for statistical problem-solving and decision-making. This strategy was best executed on LSS projects with a superior range of developments. As Executive 5 pointed out:

> Green Belts is for the executive level which has 4 modules, this module is applicable for Palma to go through up to completion, training, project and last but not least the certification of completion.

The Black Belt training programme was also systematically executed. In this training, the employees are exposed to Black Belt programmes which were applied to the most complex tasks, and which required innovative statistical tools and multi-divisionally action. The personnel nominated in executing the LSS projects underwent appropriate training and were allowed to apply the acquired knowledge in refining their daily actions. The outcomes from the LSS projects were reported on a trimester basis to the MNC senior management and eventually to the Main Board. At the same time, these LSS results were made publicly available through the web database of the company, while annual reports were assured autonomously by both external and internal auditors. Executive 5 responded:

Moreover, Black Belts (BB) are based on the executive level as well which comprises the combination and more expertise level doing statistics, analysis, and projects within 6 months, after completion, they will sit on the exam and if they pass will get certified as Black Belt. While for Master Black Belts also known as Champions will be the same as black belts but they will have a duration programmed for 2 years to complete. They will have to sit for the exams for internal and external exams so after completion they will be certified as Master Black Belts. The importance to train people is because they will contribute to the organisation in terms of profitability and efficiency.

Deliberately, decisions on the implementation of LSS were made by the MNC senior management and were instigated by an LSS Working Group that comprised LSS Managers from each key division. The LSS Managers performed vital roles in establishing precise division roadmaps for LSS application, which included goals, building capacities, managing projects and monitoring.

a. Phase 3

Phase 3 is the standardise phase. The duration of this plan is around two to five years of the 2013/2014 financial year up to 2016/2017. The general objective of MNC was to expand the number of LSS specialists regarding Belt Holders across the corporation through LSS training and projects, while at the same time ensuring their LSS strategy was aligned with global standard practices. In terms of the standardise phase, the LSS system offers rewards for successful projects in the organisation.

This phase was planned to acknowledge the Belt Holders' effort in terms of rewarding them with all the achievements of LSS projects and promoting the LSS across the organisation. Awards and credits were more than occasionally given to personnel for their work efforts in establishing value through CI. This recognition was critical in motivating staff to establish more cost savings projects and generate healthy rivalry among staff. As Executive 1 pointed out:

Our top management explains why we shall have this LSS training. Moreover, the Sustainability group, what they did is, they

communicate with people about the activities, the existence of the LSS and in what way it impacts them financially. The most important thing we are not just training people but this has proven its impact financially and people love it when they get rewarded when they achieve savings on projects.

Moreover, the LSS Champion Award was created to acknowledge the capabilities exerted by exceptional leaders who proactively generated a performance culture within their capacity of responsibility. The MNC continued to hold an annual competition on Group-wide LSS projects, to afford their personnel to showcase noteworthy and inventive LSS projects, and to identify their efforts and ideas in getting value from the development the creativity of the LSS projects. As a result, standardise phase utilised the successful projects through the replication of relevant projects across divisions. Executive 8 pointed out:

One of the LSS projects has implemented and created one new machine which can separate the fruits from the sand. The coach that implements it at least makes a savings of half a million. So, from there on, what did the management do is, they start to replicate the items to all the estates in the plantation MNC and thus the management started to think that LSS methods are good.

As a form of acknowledgement and inspiration, MNC would then send the successful team to international and national competitions. This was witnessed when MNC made an extraordinary achievement by winning the Silver Equity Corporation Innovation and Quality Award Champions award for the sixth successive year in 2016. This form of connection not only exposed the personnel to top standards of working quality but at the time positioned MNCs among the front-runners in the field. As Executive 6 pointed out:

> For Silver Equity Corporation awards, almost 5 years we win…Palma division. Even the project is going to the United States of America because Palma wins the LSS projects...

This team represented Malaysia at the 2016 World Conference on Quality and Improvement International Team Excellence Award that was held in Wisconsin, USA. The team was subsequently recognised for having the Best Project in Organisational Impact. As of the 2016/2017 financial year, after five years of initial implementation, the MNC achieved RM 967 million in cumulative LSS benefits and trained 16 Black Belt practitioners and 184 Green Belt practitioners[1].

This research ended in the year 2017 when MNC implemented the standardise phase.

a. Phase 4

The sustainability phase aimed at sustaining the LSS system in the organisation after the five years initial plan. It started in the 2017/2018 financial year and continued today. This phase was designated to sustain the LSS in the MNC and the next plan is to ensure all the MNC divisions are aware of LSS. Table 1 is the summary of the study based on the LSS phases.

1 Source: MNC Annual Report 2017

Table 1 Summary of LSS phases

Phase 1	Phase 2	Phase 3	Phase 4
Fundamental phase • Formation of LSS	Implementation phase • LSS workshop and training	Standardize phase •Awards and recognition	Sustainability phase
FY 12/13 up to 6 months	FY 12/13-FY 16/17-6 months to 5 years	FY 13/14-FY 16/17-Mid-term to 2.5 years	FY 17/18 till further

LSS as Non-Human Actors

An LSS is an object that is inscribed by management accounting tools. In other words, LSS is a product of management accounting tools. From the perspective of Actor-Network Theory (ANT), LSS becomes an actor creating an actor network by which individual interests are aligned with the organisational objectives. The LSS tools engage the actor-network to cooperate. The LSS itself becomes uncomplicated and indisputable. At this point, the actor-network is stable and permanent. The LSS cannot exist itself. It necessitates actors to carry out work deliberately.

In addition, the LSS is a discourse to establish alliances with human actors. According to Busco (2009), the actor network established from organisational induction is a complex set of heterogeneous actors with differing but aligned interests such as people, businesses and organisational standards. The actor-network thus established is often expected to grow further and become stronger as interactions between people intensify. New networks are established as more actors come on board. They are developed because of a need, where two or more people come together to actualise it. Within the concrete actor network, is a set of non-human actors that are often necessary for the network to be realised. These non-human actors include; objects, policies and technologies (Coad & Herbert, 2009). With the help of these non-human actors, organisations end up developing network relationships that last longer. It is the human actors that present these non-human concepts and ensure they are actualised.

Therefore, Figure 1 represents the model of the actor-network analysis based upon the interdependence of the management accounting tools and the dependence of human actors on the LSS.

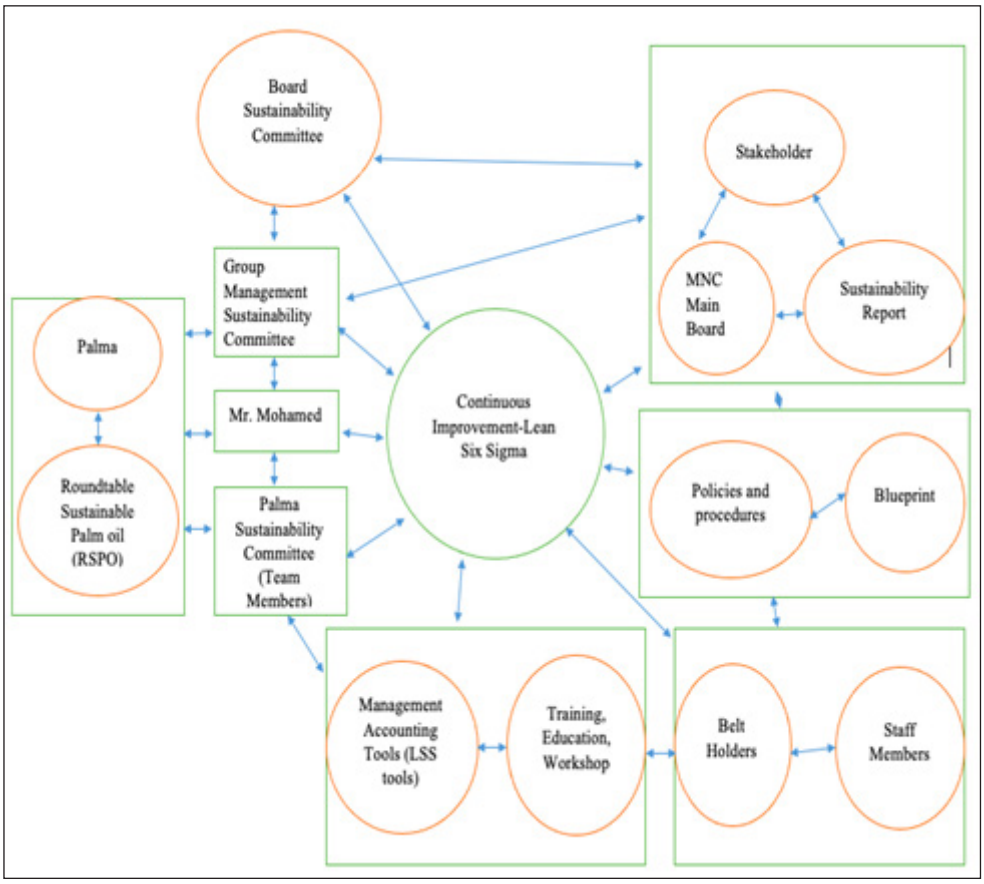

Figure 1 Model Actor-Network in MNC

Figure 1 describes the actors including the stakeholders which provide direction for the sustainability report and govern the MNC Main Board, the Board of Sustainability Committee governs the Group Sustainability Quality Management (GSQM) Committee, the Roundtable of Sustainable of Palm Oil (RSPO) assists Palma with a framework for certified palm oil. Mr Mohamed manages the Palma Sustainability Quality Management (PSQM) and the team members who are known as Palma Sustainability Committee (PSC) who assist Mr Mohamed, the PSC team members who train and educate the Belt Holders with LSS tools. Belt Holders then assist the PSC team members by spreading the LSS knowledge and tools to other staff members, the tools used for standardisation of LSS development and policies and procedures as well as a blueprint guide the LSS implementation. As soon as the blueprint of LSS has been constructed and approved by the Board, it is a compliant guideline that all the staff members have to follow. The LSS, which gathers the guideline, influences all staff members in Palma to implement the process. The LSS started with a form of alliance where Mr Mohamed was able to present convincing facts about the LSS system. In some situations, the human actors drew attention to aspects of non-human actors such as blueprints and figures of savings.

Top management came out with a proof strategy about CI as LSS, so top management has taken a big step to policy it, in all divisions and enforce employees on the LSS blueprint (Executive 2, Belt Holder)

The sustainability report and the communication of policies and procedures with a blueprint were examples of non-human representatives within the LSS systems. It could be said that the LSS itself is implanted in a heterogeneous actor-network, it needs the actors in the network, which includes the management accounting tools and the

users, the stakeholders' guidelines to create sustainability, RSPO with guiding the Palma, the policies and procedures with the blueprint and sustainability reports to the implementation of LSS. Thus, the combination of the significance of the LSS and the interest people show in it creates an association of actors who bring the LSS tools to life. Representing their interest in the LSS implementation, the actors join together to form associations and therefore actor networks. LSS is a heterogeneous actor-network of associated interest.

The other way around, the level of alliances of interest was the extent of a combination of the actor-network in which diverse actors have been allied and networks include Mr Mohamed, the enrolled actors (PSC team members, Belt Holders, staff members), the management accounting tools (LSS), blueprint, policies and procedures and sustainability report which brought in the implementation and support of LSS in Palma and the MNC as a whole. This research is aligned with the studies of Alcouffe, Berland and Levant (2008) found out, the allies and networks brought in the support and the implementation of the ABC system which has made the George Perrin method has failed.

CONCLUSION

This research is exploring the process of implementing the LSS system in one of the MNC Malaysian Plantation companies. Subsequently, the CI distinguishes LSS as one of the CI projects to decrease cost and increase revenue in the MNC.

This present study used the ANT theory to explain how LSS has been implemented. As proposed by ANT, LSS becomes an actor creating an actor network aligned with the organisational objectives. The LSS tools engage the actor-network to cooperate. Therefore, the LSS implementation in the MNC has been established by the alignment of interest of the actor-network until the LSS has been launched.

The LSS implementation is beneficial for the MNC. LSS helped the firm make record savings worth about RM 967 million in business operations by the 2016/2017 financial year and has trained 16 Black Belt practitioners and 184 Green Belt practitioners within five years.

REFERENCES

Ahmad, S. Z., & Kitchen, P. J. (2008). Transnational corporations from Asian developing countries: The internationalisation characteristics and business strategies of Sime Darby Berhad. *International Journal of Business Science and Applied Management*, *3* (2), 21 – 36.

Alcouffe, S., Berland, N., & Levant, Y. (2008). Actor-networks and the diffusion of management accounting innovations: A comparative study. *Management Accounting Research*, *19* (1), 1 – 17. https://doi.org/10.1016/j.mar.2007.04.001

Basu, R. (2009). *Implementing Six Sigma and Lean: A practical guide to tools and techniques*. Routledge. https://doi.org/10.4324/9780080949604

Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report*, *13* (4), 544 – 559. http://www.nova.edu/ssss/QR/QR13-4/baxter.pdf

Becker, J. (2001). Implementing 5S: To promote safety and housekeeping. *Professional Safety*, *46* (8), 29 – 34.

Busco, C. (2009). Giddens' structuration theory and its implications for management accounting research. *Journal of Management and Governance*, 13 (3), 249 – 260. https://doi.org/10.1007/s10997-008-9081-6

Byrne, G., Lubowe, D., & Blitz, A. (2007). Using a Lean Six Sigma approach to drive innovation. *Strategy and Leadership*, *35*, 5 – 10. https://doi.org/10.1108/10878570710734480

Coad, A. F., & Herbert, I. P. (2009). Back to the future: new potential for structuration theory in management accounting research? *Management Accounting Research*, *20* (3), 177 – 192. https://doi.org/10.1016/j.mar.2009.02.001

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory into Practice*, *39* (3), 124 – 131. https://doi.org/10.1207/s15430421tip3903_2

Cutcher-Gershenfeld, J. (2004). *Six sigma systems principles module 2.1*. Retrieved from https://ocw.mit.edu/courses/engineering-systems-division/esd-60-lean-six-sigma-processes-summer-2004/lecture-notes/6_1standard_work.pdf.

Dahlgaard, J., & Dahlgaard-Park, S. (2006). Lean production, six sigma quality, TQM and company culture. *The TQM Magazine*, *18* (3), 263 – 281. https://doi.org/10.1108/09544780610659998

Fleury, A. (1999). The changing pattern of operations management in developing countries: The case of Brazil. *International Journal of Operations and Production Management*, *19* (5), 552 – 564. https://doi.org/10.1108/01443579910260874

Fornari, A., & Maszle, G. (2004). Lean Six Sigma Leads Xerox. *ASQ Six Sigma Forum Magazine*, *3* (4), 11 – 16.

Franzoni, F., & Giannetti, M. (2017). Costs and benefits of financial conglomerate affiliation: Evidence from Hedge Funds.

Gapp, R., Fisher. R., & Kobayashi, K. (2008). Implementing 5S within Japanese context: An integrated management system. *Management Decision*, *46*(4),565–579.https://doi.org/10.1108/00251740810865067

Gardner, K. (2013). *How to successfully implement lean six sigma: The lean six sigma deployment roadmap*. Pinnacle Press.

George, M. L. (2002). *Lean Six Sigma – Combining Six Sigma quality with lean speed*. McGraw-Hill.

George, M. L. (2003). *Lean Six Sigma for services*. McGraw-Hill.

Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The Qualitative Report*, *8* (4), 597 – 606. http://www.nova.edu/ssss/QR/QR8 4/golafshani.pdf

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods*, *18* (1), 59 – 82. https://doi.org/10.1177/1525822X05279903

Gutierrez, L. J., Llorens-Montes, F. J., & Bustinza, O. F. (2009). Six Sigma: From a goal-theoretic perspective to shared-vision development. *International Journal of Operations and Production Management*, *29* (2), 151 – 169. https://doi.org/10.1108/01443570910932039

Hoerl, R. (2001). Six Sigma Black Belts: what do they need to know? *Journal of Quality Management*, *33* (4), 391 – 406. https://doi.org/10.1080/00224065.2001.11980094

Jacques, D., & Kepos, P. (2012). International directory of company histories. *Vol. 136*. Detroit, Mich: St. James Press.

Juran, J. M. (1989). *Leadership for quality: An executive handbook*. The Free Press.

Kwak, Y. H., & Anbari, F. T. (2006). Benefits, obstacles, and future of Six Sigma approach. *Technovation*, *26* (5), 708 – 715. https://doi.org/10.1016/j.technovation.2004.10.003

MNC Berhad. (2012). *Annual report 2012*. Retrieved from http://disclosure.bursamalaysia.com/FileAccess/apbursaweb/download/?name=EA_DS_ATTACHMENTS&id=159577 on 20 November 2018.

Mohd Tobi, S. U., & Amaratunga, D. (2010). Social enterprise applications in an urban facilities management setting. In C. Egbu (Ed.), *Procs 26th Annual ARCOM Conference* (pp. 1351 – 1360). Association of Researchers in Construction Management.

Padfield, R., Richards, C., Yusop, Z., Parkey, J., Harrison, O., & Preece, C. (2014). Tackling wicked problems in the Malaysian water industry: A framework for university industry research partnership. *Journal of Governance and Development*, *10*, 99 – 119.

Qu, S., & Dumay, J. (2011). The qualitative research interviews. *Qualitative Research in Accounting and Management*, *8* (3), 238 – 264. https://doi.org/10.1108/11766091111162070

Raja Sreedharan, V., & Raju, R. (2016). A systematic literature review of Lean Six Sigma in different industries. *International Journal of Lean Six Sigma*, *7* (4), 430 – 466. https://doi.org/10.1108/IJLSS-12-2015-0050

Reijns, T. J. F. (2010). The advantages and limitations of Lean Six Sigma in process (re)design. *Logistics and Operations Management*, 1 – 32.

Rugman, A. M., & Verbeke, A. (2004). A perspective on regional and global strategies of multinational enterprise. *Journal of International Business Studies*, *35*, 3 – 18. https://doi.org/10.1057/palgrave.jibs.8400073

Scapens, R. W. (1990). Researching management accounting practice: The role of case study methods. *British Accounting Review*, *22*, 259 – 281. https://doi.org/10.1016/0890-8389(90)90008-6

Shah, R., & Ward, P. T. (2007). Defining and developing measures of lean production. *Journal of Operations Management*, *25* (4), 785 – 805. https://doi.org/10.1016/j.jom.2007.01.019

Smith, G. (1993). *Benchmarking success at Motorola*. Society of Management Accountant of Canada.

Snee, R. D. (2010). Lean Six Sigma-getting better all time. *International Journal of Lean Six Sigma*, *1* (1), 9 – 29. https://doi.org/10.1108/20401461011033130

Snee, R. D., & Hoerl, R. W. (2007). Integrating lean and Six Sigma – a holistic approach. *Six Sigma Forum Magazine*, *6* (3), 15 – 21.

Sokovic, M., Pavletic, D., & Kern, P. K. (2010). Quality improvement methodologies, PDCA cycle, RADAR matrix, DMAIC and DFSS. *Journal Achievements in Materials and Manufacturing Engineering*, *43* (1), 476 – 483.

Theodore, T. A., James, E. B., & Jason, S. (2011). *Analysing portfolios of Lean Six Sigma Projects*. INTECH Open Access Publisher.

Vinod, M., Devadasan, S. R., Sunil, D. T., & Thilak, V. M. M. (2014). Six Sigma through Poka-Yoke: A navigation through literature arena. *International Journal Advance Manufacturing Technology*, *81*, 315 – 327. https://doi.org/10.1007/s00170-015-7217-9

Womack, J. P., & Jones, D. T. (2003). *Lean Thinking – Banish waste and create wealth in your corporation*. Free Press.