CRANFIELD UNIVERSITY

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Developing a Framework of Leadership Behaviours to Facilitate the Effective Use of Lean Six Sigma in Manufacturing: The Case of Jordan

School of Aerospace, Transport and Manufacturing

Doctor of Philosophy (PhD)

Academic Year: 2019 - 2022

Supervisors: Dr Patrick McLaughlin
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Abstract

This study aims to explore the leadership behaviours that facilitate the effective use of Lean Six Sigma, whereby organisations and leaders can realise the required behaviours to use the Lean Six Sigma successfully. Leadership is identified as one of the vital factors for the successful implementation of Lean Six Sigma. Thus, this research studies leadership from a behavioural lens. It would be helpful for organisations to get the expected benefits of Lean Six Sigma.

An interpretive research philosophy is adopted; reality is constructed through social interaction in which people construct shared meanings and reality. A grounded theory methodology was used to collect and analyse the qualitative data. From that, identifying the required leadership behaviours was based and grounded on the themes that emerged from the data analysis. Twenty-seven interviews were conducted and, through analysing these interviews, thirty-six aspects of leadership behaviours emerged. The researcher made a constant comparison to let the aspects emerge during data analysis. These aspects were given to the participants in the focus group workshop to group them into core categories (themes). Then, ideal position descriptions for each theme were developed to describe what each theme looked like in the most effective and established organisations. The researcher adopted and relied on three sources to identify the possible leadership behaviours to develop the proposed framework. These sources are a focus group workshop, interviews analysis, and the literature. The framework is a series of leadership behaviours that target specific themes. The framework was validated through experts' judgment from industry. The experts' feedback was this framework is comprehensive and covers all topics. They believe that adopting these behaviours can lead to achieving the desired goal, which enhances operations efficiency.

This research has contributed to facilitating the effective use of Lean Six Sigma by identifying the leadership behaviours required for the successful use of the Lean Six Sigma. Furthermore, it is novel in explaining how the leadership behaviours can support Lean Six Sigma; the themes' descriptions explain how influence the use of Lean Six Sigma.

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List of abbreviations

Critical to quality characteristics (CTQs)

Defects per million opportunity (DPMO)

Human resource management (HRM)

Just-in-Time (JIT)

Key performance indicators (KPI's)

Lean Six Sigma (LSS)

Single-minute-exchange-of-die (SMED)

Total preventive maintenance (TPM)

Total productive maintenance (TPM)

Toyota Production System (TPS)

Total quality management (TQM)

List of publications

Journal paper

Alnadi, M. and McLaughlin, P. (2021) 'Critical success factors of Lean Six Sigma from leaders' perspective', *International Journal of Lean Six Sigma*, 12(5), pp. 1073–1088.

Conferene paper

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CHAPTER ONE
INTRODUCTION

1. CHAPTER ONE

1 Introduction

This chapter gives an overview of the research project; it describes and demonstrates the research background and problem statement that this study addresses. Then, it develops the aim of this research project and constructs the objectives that assist in reaching and accomplishing the study's aim. Next, this study tries to answer the main research question followed by sub-questions, which were developed to improve the knowledge in this topic and to discern what kind of research would be conducted, such as quantitative and/or qualitative study. Finally, the researcher of this thesis tried to ensure the sections and structure interrelated and flowed logically. Thereby, the thesis' structure, the last section in this chapter, highlights the chapters that form this thesis and shows the interconnection among the thesis sections.

1.1 Background

In recent years, Lean Six Sigma has been widely recognised as a business strategy for deploying Continuous Improvement in many sectors such as manufacturing, service, and public (Albliwi, Antony and Lim, 2015). Leadership is necessary for successful Lean Six Sigma deployment in companies and critical to sustaining enhancement (Achanga et al., 2006; Gamal Aboelmaged, 2010; Laureani and Antony, 2019; Snee, 2010). Snee (2010, p.10) explained the way Lean Six Sigma is an effective leadership development tool: "leaders enable an organisation to move from one paradigm to another; from one way of working to another way of working. Lean Six Sigma provides the concepts, methods and tools for changing processes."

Leadership is essential to the success of Lean Six Sigma, but there are also other factors. For instance, Laureani and Antony (2018) suggest that leadership, project management, selection of top talented employees, and financial accountability are critical factors for the successful implementation of Lean Six Sigma. According to Lande, Shrivastava, and Seth (2016), researchers should understand which critical success factors are very significant and emphasise the important factors in their studies. Thus, this study focuses specifically on leadership, one of the significant factors for the successful implementation of Lean Six Sigma, since leadership is one of the vital factors emphasised in many studies

(Albliwi et al., 2014; Alnadi and McLaughlin, 2020; Laureani and Antony, 2018; Seidel et al., 2019).

However, many companies struggle to implement Lean Six Sigma successfully because of failure factors (Albliwi et al., 2014). Albliwi and her colleagues explored 34 common failure factors of Lean Six Sigma; the most shared failure factors are a "lack of top management commitment and involvement, lack of communication, lack of training and education, limited resources and others" and researchers point out the lack of leadership skills as a failure factor, as mentioned in the literature.

Some organisations fail to get benefits and/or struggle to implement Lean Six Sigma successfully. In contrast, other organisations have successes in deploying Lean Six Sigma (Albliwi, Antony and Lim, 2015). However, there are concerns about implementation failures (Chakravorty, 2009) and various critical success factors (Achanga et al., 2006; Laureani and Antony, 2012; Näslund, 2013) are identified in the literature (Laureani and Antony, 2017). Therefore, there is a need to conduct more research to analyse the critical success factors of Lean Six Sigma related to process and organisational excellence (Sreedharan, Sunder and Raju, 2018). Furthermore, Laureani and Antony (2018) suggest doing additional research to identify the suitable leadership type for Lean Six Sigma deployment. This research project specifically focuses on leadership behaviours, identifying what leaders need to do to enable and facilitate the Lean Six Sigma process.

1.2 Problem statement

It is a common fact that companies are facing difficulties in implementing Lean Six Sigma effectively (Timans et al., 2012). Many researchers point out that many organisations fail to obtain benefits from continuous improvement programmes such as Lean and Six Sigma, as well as other organisations fail to achieve the necessary results from Lean Six Sigma; however, some organisations have successes in deploying Lean Six Sigma (Albliwi, Antony and Lim, 2015). The pandemic, Covid 19, has increased the pressure on organisations to improve productivity and reduce cost and optimal utilisations of resources through having effective Lean Six Sigma operations (Bhat et al., 2022). Although the literature shows a sufficient cases of successful implementations of the Lean Six Sigma, it is still that many organisations face obstacles for getting the benefits of Lean Six Sigma (Noronha et al., 2022).

As a result of lack of management commitment and lack of strong leaders, many organisations fail to implement Lean Six Sigma (Kumar, Antony and Tiwari, 2011). Timans and his colleagues (2012) suggest that the impeding factors are lack of leadership, internal resistance, the availability of resources, and altering business focus. Montgomery (2016) found that one of the main reasons for Lean Six Sigma failure is the lack of management support regarding the top management level and leadership at all levels. Also, lack of management commitment and lack of strong leaders to drive the initiative are the main failure factors (Rathi et al., 2022). Nevertheless, researchers have demonstrated that the weak management in some companies is a cause of failure because these companies do not focus on the soft side such as leadership, culture, and employee training (Kumar, Antony and Tiwari, 2011). Moreover, the lack of leadership during Lean Six Sigma implementation is a significant cause of Six Sigma failure, since they should play a role in influencing employees' behaviours (Marolla, Rosa and Giuliani, 2022). To avoid the Lean Six Sigma implementation obstacles and sustain the journey of this initiative, leaders availability at different phases is important (Yadav, Shankar and Singh, 2021). Leadership commitment and support are critical for making resources available, and implementing the ideas to solve problems and sustaining improvements (Bhat et al., 2022; Singh and Singh, 2020).

Furthermore, Byrne (2003) points out that failure happens when the leaders at the top-level push employees to conduct the Six Sigma quickly to get the results quickly. Thus, the leadership role is very significant to sustain and initiate the change to realise the effective use of Lean Six Sigma. Hence, this is a journey that needs strong leadership and high commitment from management at all managerial levels. Kumar and his colleagues (2011) confirm this view that leadership commitment and communication are significant for the successful implementation of Lean Six Sigma. Also, Gamal Aboelmaged (2010) points out leadership commitment and involvement as one of the success factors for Six Sigma implementation. Therefore, this research project studies one of the significant success factors for Lean Six Sigma from a leadership perspective. In other words, this thesis is presented from a lens of leadership behaviours as a vital factor to facilitate the effective use of Lean Six Sigma.

1.3 Aim

This research aims to enable the successful use of Lean Six Sigma operations by identifying certain leadership behaviours. Thereby organizations and leaders can realize the required behaviours to use Lean Six Sigma successfully. furthermore, this aim can foster elevated levels of Lean Six Sigma performance in the workplace through having useful framework.

1.4 Objectives

To achieve the study aim; the following research objectives should be accomplished:

1. To perform a critical review of the literature that is relevant to the study domain and research questions in order to determine research gaps and identify leadership behaviours that facilitate Lean Six Sigma.
2. To adopting grounded theory methodology enables identifying the appropriate leadership behaviours based on the themes that emerged from the data analysis.
3. To collect data from the manufacturing sector in Jordan to identify leadership behaviours that facilitate Lean Six Sigma operation.
4. To construct a framework of leadership behaviours based on ideal position descriptions for themes. This objective will be accomplished by combining literature and empirical data.
5. To validate the developed framework through experts' judgment from the industry.

1.5 Research questions

How can leadership behaviours play a vital role in bring the successful use of Lean Six Sigma operations?

This question led the researcher to sub-questions:

What are the leadership behaviours that can improve the use of Lean Six Sigma?

What are the themes that influence the effective use of Lean Six Sigma in the manufacturing sector in Jordan?

1.6 Thesis structure

This thesis consists of nine chapters that start with an introduction and then review the relevant literature. The thesis then demonstrates the research methodology, data collection and analysis, develops the framework, and constructs the proposed framework.

A discussion follows on the study's key findings, limitations, and further work. Finally, the conclusion is provided on the whole study. The chapters of the thesis are outlined below with brief descriptions:

- *Chapter one (Introduction):* this chapter provides an overview of the research background and problem statement. Also, in this chapter, the researcher develops the study's aim, objectives, and research questions.
- *Chapter two (literature review):* this chapter starts with descriptions and identifications for the main study concepts such as leadership, behaviours, Lean manufacturing, Six Sigma, and Lean Six Sigma. Following that, it highlights the success factors, benefits, limitations, and barriers for Lean Six Sigma. Then thematic analysis is conducted to identify leadership behaviours that facilitate the use of Lean Six Sigma. It also provides a description of Jordan as a case study and demonstrates the levels of implementing Lean Six Sigma in Jordan. This chapter concludes the literature review by demonstrating the knowledge gaps identified to be fulfilled by the current study.
- *Chapter three (research methodology):* the philosophical position of the researcher is demonstrated in this chapter for which ontology is constructivism and epistemology is interpretivism. Then, the researcher's perspective of the research design shows that the appropriate approach for this study is grounded theory. This chapter provides detailed justifications for the selected methodology and tools for this study. Also, this chapter establishes the procedures used to ensure research reliability and rigour.
- *Chapter four (data collection and analysis):* this chapter presents the participants' characteristics. It shows the results that emerged from the first phase of data collection and analysis, which are aspects of the leadership behaviours. Also, this chapter presents the second phase, which reveals the themes that influence Lean Six Sigma.
- *Chapter five (framework development):* the previous chapter develops the areas of focus (the themes). This chapter starts developing the framework by creating descriptions for the ideal position for the themes. Then, based on the descriptions for the ideal position, the required leadership behaviours to create that position are identified. In other words, the leadership behaviours are synthesised with the targeted themes. The chapter concludes by integrating the identified leadership behaviours that came from the literature, data analysis, and the focus group to overcome the overlap among these three sources.

- *Chapter six (constructing the framework):* this chapter constructs the framework by showing a series of leadership behaviours that target specific themes. It shows that the framework consists of two main components: leadership behaviours and themes. Moreover, it considers the experts' judgment on the framework to validate it.
- *Chapter seven (discussion, recommendations, and conclusion):* presents the main findings of the study with some comments and interpretations. This chapter also reveals the researcher's thoughts on some areas of this study. Also, it describes the study implications and contribution to the knowledge. Moreover, it demonstrates the limitations that challenge this research project and proposes some future work to address these limitations, and suggests the future direction for research in this area.

CHAPTER TWO
LITERATURE REVIEW

2. CHAPTER TWO

2 Literature review

This chapter reviews the published work about Lean Six Sigma and leadership. It starts with mentioning the different approaches to achieve improvements. Also, it compares radical improvement and continuous incremental improvement, where Lean Six Sigma enables continuous improvement. The literature shows that productivity is one of the most important measures for improvement. Lean Six Sigma is also described as one of the main factors for increasing productivity and realising improvements. Also, the literature demonstrates that leadership plays a vital role in increasing productivity. Moreover, leadership is one of the key success factors for facilitating Lean Six Sigma. Therefore, this chapter starts with an illustration about Lean, Six Sigma, and Lean Six Sigma and then demonstrates leadership definitions, sources, and approaches.

This chapter continues by focussing on the core area of this study: leadership and Lean Six Sigma. Identifying leadership styles and behaviours that facilitate Lean Six Sigma is vital for this study. In addition, leadership behaviours from the literature are an input to building the framework. Furthermore, this chapter identifies the knowledge gaps in this area and shows that this research project responds by fulfilling these gaps. Finally, since Jordan was chosen as a case study for this work, this chapter reviews the studies conducted in Jordan that are related to Lean Six Sigma and shows some information about Jordan.

2.1 Improvement

It is vital to organisations to improve processes quality and sustain the necessary quality level (Gershon, 2010). The importance of increasing profit and reducing turnover is equal to achieving improvements in processes (Fryer, Antony and Douglas, 2007). According to Gershon (2010), organisations can use many approaches for processes improvement to improve their processes performance. These approaches are total quality management (TQM), Kaizen, Poka-Yoka, agile management, Lean philosophy, Six Sigma, Lean Six Sigma, process excellence, Just-In-Time (JIT), and theory of constraints (TOC). Gershon points out that these improvement methodologies share common characteristics such as philosophy of

improvement; the key to improving processes are measurement and statistics and employee power to improve the processes.

According to Gåsvaer and von Axelson (2012), both Kaikaku (radical improvement) and Kaizen (continuous incremental improvement) are complete each other to achieve the competitive advantage, which in turn make the business gain more profit. Harrington (1995) suggested this synergy between Kaikaku and Kaizen is significant because Kaikaku does a jump in improvement quickly, whereas Kaizen sustains this level of improvement in the long term. To some extent, radical improvement and continuous incremental improvement are similar; for instance, both methodologies depend on units of analysis and rigorous measures and the need for change in organization and behaviours to get the desired benefits (Hedman, Larsson and Rönnbäck, 2021). The balancing in using innovation improvement and continuous improvement is necessary for sustaining the business efficiency (Forés and Camisón, 2016).

However, there are some differences between radical improvement (top-down strategy) and continuous improvement (bottom-up strategy). Continuous improvement method usually used to improve productivity and customer satisfaction, but radical improvement is more suitable to increasing technological competitiveness (Kobarg, Stumpf-Wollersheim and Welpe, 2019). Gåsvaer and von Axelson (2012) report there are differences in culture implementation between Kaikaku and Kaizen; these differences in adopting culture can be observed in Kaikaku depending on flexible culture quick response, taking risks, encourage innovation and flexible structure. While Kaizen depends on fixed structure and policy, trying to achieve more profit and reducing cost. McLaughlin, Bessant and Smart (2008) suggest that the organization's innovation culture can facilitate implementing continuous improvement and radical change, which may be the aim of organizations that upholds the continuous improvement philosophy.

Continuous improvement depends on Lean, Six Sigma, Lean Six Sigma, and other methodologies. Thus, Lean Six Sigma consider a facilitator and supporter for continuous improvement (Farrington, Antony and O'Gorman, 2018; Gershon, 2010). Nevertheless, some researchers argue that Lean Six Sigma is considered an inhibitor

and obstacle for radical innovation because Lean Six Sigma focuses on low risk and systematic structure (Chen and Taylor, 2012).

2.1.1 Productivity

There is an issue for improving productivity to gain more output using less input, in that pressure emerged on organisations to improve their productivity (Jarkas, 2015). According to Krajewski, Malhotra and Ritzman (2015), *productivity* is "the value of outputs (services and products) produced divided by the values of input resources (wages, costs of equipment)". Vadivel, Manoj and Meenakshi (2014) defined *productivity* as "a total output per one unit of a total input". Organisations could use productivity to measure performance (Krajewski, Malhotra and Ritzman, 2015), and know the efficiency of production (Vadivel, Manoj and Meenakshi, 2014). According to Drohomeretski et al. (2014), productivity is achieved due to applying Lean in organisations. One of the significant trends in operations management is productivity improvement; organisations face competition with their local and international competitors; therefore, organisations seek to improve their supply chain and process performance (Krajewski, Malhotra and Ritzman, 2015). Many measures exist for productivity, such as the value of output, which can be determined by the number of customers served or the number of finished items, or what customers pay. The value of input can be measured by the number of working hours or their cost (Krajewski, Malhotra and Ritzman, 2015).

2.1.2 Factors that increase productivity

Boyd and Gupta (2004) point out, Lean and Six Sigma are considered the most effective tools for improvement. Lean Six Sigma has a clear influence on organizations' performance (Alkunsol et al., 2019). Six Sigma reduces variation, which improves productivity; Lean focuses on eliminating waste and process design, which improves productivity (Gleeson et al., 2019).

However, a wide variety of factors are influencing productivity; these factors are interrelated and interconnected. These factors are related to management factors, technological advancement (Vjesnik, 2016), wage (Bukit et al., 2018), working conditions (Karthik and Kameswara Rao, 2019), leadership and innovation (Naoum, 2016), emotional intelligence (Brooks and Muyia Nafukho, 2006; Sahdat et al., 2011), and labour competences and skills (Jarkas, 2015). Nurhendi, Khoiry and Hamzah

(2019) did a critical review and taxonomy of these factors; they found 175 factors that affect productivity. Moreover, Karthik and Kameswara Rao (2019) identified 38 factors that affect productivity: leadership, human resources, surrounded environment, and working tools. However, Bukit et al., (2018) have suggested that labour productivity is affected by salary rather than influenced by years of experience. Another factor is emotional intelligence; Sahdat et al., (2011) find that emotional intelligence affects productivity positively. Emotional intelligence could be seen in three different levels; employees recognize their feelings and emotions, deal with colleagues emotionally and respect others, and relation between subordinates and leadership.

Moreover, management and leadership play a vital role in increasing productivity; the team leader style and behaviour significantly affect subordinates' productivity, whereas leadership style inspires and stimulates subordinates to achieve the needed performance (Naoum, 2016). Also, Naoum points out the motivational factors that play a role in changing employee behaviour and increase job satisfaction, which in turn increase output. Hiyassat, Hiyari and Sweis (2016) showed that financial incentives, trust and communication between employees and management are the main factors that increase productivity.

Many organizations invest in information technology to increase business performance. The information technology role can be seen in improving decentralized decision-making and business processes, which facilitate productivity improvement (Faryabi and Tajvidi, 2012). Taking advantage of new technology and focusing on innovation is necessary to gain productivity (Naoum, 2016).

However, the first part of this chapter provided an overview of the importance of improvement for organisations. That Lean Six Sigma is one of the main approaches for realising improvements. Overall, productivity is a vital indicator for improvement in processes. This section also showed that Lean Six Sigma and leadership play a vital role in increasing productivity.

2.2 Lean manufacturing overview

After the Second World War, Japanese manufacturing was facing a crisis with a high unemployment rate and the market was broken (Drohomeretski et al., 2014). Therefore, the Toyota Production System (TPS) emerged to solve this issue by

increasing productivity and decreasing cost, which was achieved through eliminating non-value-added activities (Monden, 1994). Figure 2-1 shows the TPS' House. In his book, Monden points out that the TPS came after the Taylor System (scientific management) and the Ford System (mass-assembly line). The TPS evolved overtime to become Lean manufacturing in order to achieve efficiency within a manufacturing process (Alsmadi, Almani and Jerisat, 2012; Reichhart and Holweg, 2007). Womack, Jones and Roos (1990) described the Japanese approach to production as "Lean production". Toyota's principles have been categorised into four categories (4 Ps), namely Philosophy, Process, People/Partner, and Problem solving (Liker, 2004).

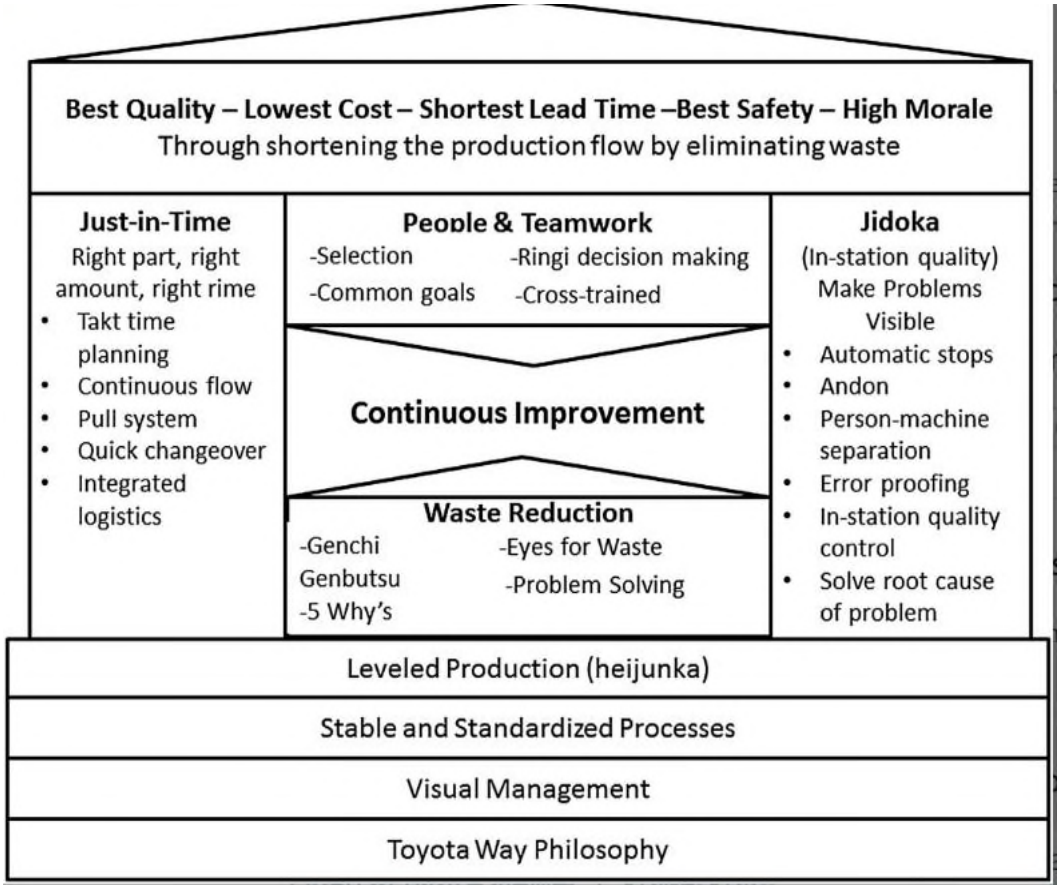


Figure 2-1 Classical TPS house diagram Source (Kehr and Proctor, 2017)

Many researchers are trying to define Lean manufacturing, and they see Lean from different points of view. Therefore, there is a lack of a clear definition of Lean (Bayou and de Korvin, 2008). However, Sohal (1996, p.91) defined Lean production as "a system that seeks to eliminate unnecessary processes, to align processes in a continuous flow and to use resources in order to solve problems in a never ending

process." Lean has four bundles that are important for Lean practices, namely Just-in-Time (JIT), total quality management (TQM), total preventive maintenance (TPM), and Human resource management (HRM) (Sahoo and Yadav, 2018). These bundles are inter-related practices that form the essence of Lean manufacturing, which can facilitate the effective use of Lean tools, and these bundles can influence operation performance (Sahoo and Yadav, 2018). *JIT* an inventory system management that seeks to reduce flow times and response time along the value stream, meeting customer demand at the right time and in right quality and quantity which increase efficiency and decrease waste (Pinto et al., 2018). In other words, JIT is having just what is needed when it is needed without any waste. *TQM* improves and sustains the quality of the processes, goods, and services to meet or exceed customer expectations (Cua, McKone and Schroeder, 2001). *TPM* refers to the process of improving machine reliability and capacity through periodic maintenance systems (Jabbour et al., 2013; Pettersen, 2009). Finally, Lean *HRM* depends on employees' commitment and involvement (Furlan, Vinelli and Pont, 2011).

2.2.1 Lean viewed as a philosophy

Lean manufacturing is known as a philosophy that aims to eliminate waste for operations' processes and facilitates production flow in an efficient and effective way (Alsmadi, Almani and Jerisat, 2012; Papadopoulou and Özbayrak, 2005; Reichhart and Holweg, 2007). These **wastes** are defects, overproduction, waiting, transportation, inventory, over-processing, and unnecessary motions (Jastia and Kodali, 2015). More details about these wastes are shown in section 2.2.3. When the organisation adopts and implements this philosophy carefully, it can be the starting point to reach manufacturing excellence (Papadopoulou and Özbayrak, 2005). Thus, using Lean techniques helps organisations to achieve productivity and decrease the inventory level and process cycle (Alsmadi, Almani and Jerisat, 2012). Moreover, the successful implementation of Lean makes organisations more profitable (Bhasin, 2013).

The TPS provides many techniques and tools such as 5S, Kanban, value stream mapping, single-minute-exchange-of-die (SMED), and total productive maintenance (TPM) (Chiarini, 2011; Holweg, 2007; Monden, 2011). According to Chiarini, Baccarani and Mascherpa (2018), Lean-TPS depended on tools and techniques in the early stage and, therefore, it was considered as a precise and mechanical management

method. However, new dimensions have since appeared due to several attempts with Lean-TPS implementation, which take care of managerial and cultural aspects (Frahm, 2016). Since then, in Western countries, the TPS has evolved from implementing only Lean tools and techniques to an integrated culture and philosophy (Bhasin and Burcher, 2006; Jørgensen et al., 2007).

According to Bhasin and Burcher (2006), organisations usually look for Lean as tools and processes, and also change the way they observe Lean and adopt it as a philosophy. Furthermore, they point out that once organisations observe Lean as a philosophy, it becomes a method of thinking in the organisation, whereby the Lean tools are considered as mechanisms to implement organisations' thoughts (Bhasin and Burcher, 2006). Liker (1996, p. 481) described Lean as: "a philosophy that when implemented reduces the time from customer order to delivery by eliminating sources of waste in the production flow".

Lean activities rely on a set of management practices, tools, or techniques that specifically aim to improve production activities (Rotter et al., 2019). *Lean management* is the necessary activity to sustain and facilitate Lean manufacturing implementation (Mann, 2009). Leaders that follow Lean practices through standard work provide the mechanism to sustain the change. Visuals, accountability, task assignments, and leader stander work are managerial elements that make a closed-loop system that creates a process focus and results in process improvement (Mann, 2005).

Although Lean manufacturing has achieved success in a range of instances, it is criticised on different accounts, such as a lack of human integration or it is hard to apply if the manufacturing environment is not repetitive (Hines, Holwe and Rich, 2004). Moreover, Lean manufacturing focuses on value-added activities, but the value-added activities do not consider product size, complexity, or ability to manufacture (Pepper and Spedding, 2010).

2.2.2 Lean principles

Womack and Jones (1996) summarised five principles of Lean thinking. These principles are: specify a value for a particular product, identify the value stream from supplier to end customer for each product, improve value flow by removing

interruptions, and keep track of perfection. Womack and Jones argue that when managers understand these principles and link them together, they can fully use lean techniques. See Figure 2-2 that shows the five Lean principles.

2.2.2.1 Specify value

The first and most important step in Lean thinking is to understand what value is and the required processes to create the value, which would eliminate waste . The organisation should identify the ultimate customer value precisely by ensuring dialogue with the customer. The organisation then should try to accomplish the customer's needs and requirements by providing a product at a specific price and at a specific time (Poppendieck, 2011).

2.2.2.2 Identify the value stream

Value stream mapping represents all the specific processes and steps required for a specific product from the supplier to the customer. It is the connection between all processes and steps with the purpose of adding value for the end customer. Identifying these processes and steps is undertaken through the three critical management tasks: problem-solving task, information management task, and physical transformation task. By assessing the organisation's current performance, it can identify and eliminate the non-value-added activity for the customer (Solaimani et al., 2019).

2.2.2.3 Flow of production

It is about removing barriers to make the processes flow smoothly and eliminating delays and waste. It also focuses on the product activities needed to design, order, and provide the product (goods or service) in a continuous flow. This step deals with the entire process of value flow to reach the end customer (Poppendieck, 2011).

2.2.2.4 Pull techniques

This principle aims to prevent the process variation. Rather than using the traditional sales forecasting method, the producer designs what the customer needs and provides the product when the customer requests it (order). Essentially, let the customer pull the product; thus, the organisation does not produce an unwanted product or push it on to customers (Solaimani et al., 2019).

2.2.2.5 Seek for perfection

These principles of identify value, value stream analysis, the flow of production, and pull form a virtuous circle of perfection. Furthermore, the interaction with customers

gives new methods of specifying a value and developing the flow and pull in a better way. It is ongoing assessment to continually eliminate waste. Therefore, perfection is a continuous improvement for all Lean principles. In other words, it is an infinite journey for improvement (Solaimani et al., 2019).

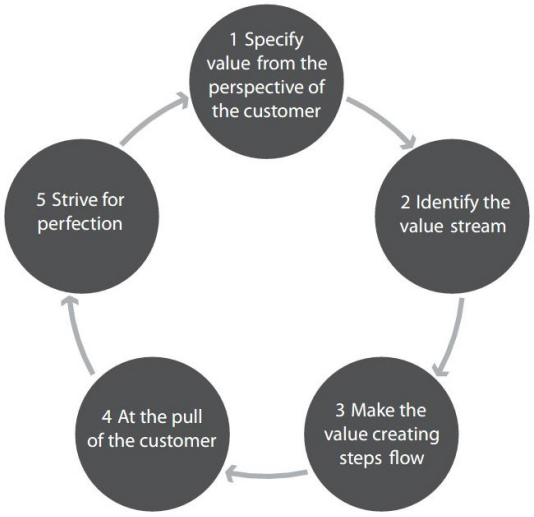


Figure 2-2 The five Lean principles Source (Hines et al., 2010)

2.2.3 Value vs waste

Identifying value and eliminating wastes are the most important aspects of Lean implementation. On the one hand, starting with *value* that a consumer's overall assessment of the utility of goods or services based on what is received and what is given (Peralta et al., 2020). Nevertheless, a value can vary from customer to customer as follows: 1) Some customers perceive the value as low price. 2) Other customers focus on the benefits of products or services. 3) The value can be about the quality customers get for what they pay. 4) Value is what customers get for what they give all benefits against all sacrifices, not only money. Overall, the value can refer to getting the specific product that customers want, in the right quantity, at the suitable time, with the expected quality, and at the right price (Bicheno, 2008).

On the other hand, waste can be clarified as any activities or steps in a process for which the customer is unwilling to pay. These unnecessary steps increase the time and cost of the process. While value-added activities are those steps that add a feature or

trait for the product, in turn, customers are willing to pay for it (Womack and Jones, 1996).

To creating value for customers and eliminating waste, Lean Leader address Muda (waste), Mura (unevenness or variability), and Muri (overburden) (Hines et al., 2010). Muda, Mura, and Muri cause each other; they are interrelated. Lean seeks to eliminate seven types of waste (*Muda*) TIMWOOD transport, inventory, motion, waiting, overproduction, over-processing, and defects:

- The waste of *transport* refers to materials' movement, having too many transports for a certain material or work in progress transportation.
- The waste of *inventory* refers to excessive storage and delay of information or product. The unnecessary inventory increase lead time and cost; there are three types of inventory: raw materials, work in process, and finished product (Bicheno, 2008).
- *Motions* waste refers to the unnecessary movement of employees, raw material, or machines from one place to another.
- *Waiting* refers to items or individuals being inactive between operations, which causes reduced flow and long lead times.
- *Overproduction* refers to producing too much or too soon, resulting in a poor flow of products and high inventory levels.
- *Over-processing* refers to trying to add more value for products than the customer wants to pay for it. This consuming resources and increases production time.
- A *defect* is a frequent error in product quality or poor delivery performance.

2.3 Six Sigma

Motorola introduced Six Sigma in the1980s in the USA (Arnheiter and Maleyeff, 2005). Six Sigma refers to the Greek symbol sigma (**σ**), which expresses the number of standard deviations and variations in the process; a higher Sigma level indicates less defects (Singh and Rathi, 2019). There are two aims for Six Sigma. Firstly, the reason for using Six Sigma is to enhance the quality of the products by reducing the number of defective products (Widodo and Soediantono, 2022). Applying Six Sigma improves the quality of a company through the objective of reaching less than 3.4 defects per million opportunity (DPMO) (Zare Mehrjerdi, 2011). Secondly, according to Su and Chou (2008), Six Sigma is a methodology of recognising where the variation

in the process happened and removing this variation in order to create value for customers and, in turn, increase customer satisfaction. Six Sigma's objective helps in achieving three goals: raise profitability, raise customer satisfaction, and improve productivity (Lo, Tsai and Hsieh, 2009). For example, due to using Six Sigma, Motorola won an award for quality between the 1980s and 1990s, and realised gains of 2.2 billion dollars (Drohomeretski et al., 2014).

Six Sigma is defined as a tool to reduce variation in the process by depending on improvement specialists and an organised method to achieve organisational goals and increase customer satisfaction (Schroeder et al., 2008). Furthermore, Deshmukh and Chavan (2012) defined *Six Sigma* as a quality improvement initiative aiming to reduce process variation in order to increase quality in operations and decrease process costs. Snee (1999, p. 100) defined *Six Sigma* as: "a business improvement approach that seeks to find and eliminate causes of mistakes or defects in business processes by focusing on outputs that are of critical importance to customers."

According to Hadian and Rahimifard (2019), Six Sigma is classified in both business and statistical sides. On the statistical side, Six Sigma refers to having less than 3.4 defects per million opportunities. On the business side, Six Sigma represents a business strategy to reduce waste, reduce quality costs, improve profitability, and improve all processes to satisfy or exceed the customer's needs (Hadian and Rahimifard, 2019). Despite looking at Six Sigma as a technical approach to process control, the wider philosophy behind the technical and statistical side of Six Sigma should be considered; thus, organisations should take care to manage people properly or train employees (Pepper and Spedding, 2010).

2.3.1 Six Sigma methodology

Six Sigma includes two methodologies: DMAIC (define, measure, analyse, improve, and control) and DMADV (define, measure, analyse, design, and verify). DMAIC methodology is used to improve the existing process, while DMADV is used for developing new processes and products (Andersson, Eriksson and Torstensson, 2006; Kumar and Sosnoski, 2009).

This section clarifies the DMAIC functions: The first phase: *Define* (D) determines the target customers and identifies their needs and priorities through feedback. In this

phase, the project team defines the traits that are called critical to quality characteristics (CTQs) (Benbow and Kubia, 2010; Henderson and Evans, 2000; Widodo and Soediantono, 2022). The second phase: *Measure* (M) in this phase should determine the process performance indicators and how the process is measured and how is it performing (Widodo and Soediantono, 2022). This can be done by mapping the process, data collection, and capability analysis of CTQs, which shows progress towards the goals defined in the previous step (Benbow and Kubia, 2010). The third phase: *Analyse* (A), the team identify the core problems that they try to address then they can be able identify the main reasons for the problem; the team discovers the causes of defects through being aware of the variables that cause process variation (Widodo and Soediantono, 2022). The team can make this analysis through the following tools and techniques: Pareto analysis, brainstorming, cause and effect diagram, and a control chart (Benbow and Kubia, 2010; Noone, Namasivayam and Spitler Tomlinson, 2010). The fourth phase: *Improve* (I), the team plan, test, and implement solution for the identified problem. In other words, they try to know the suitable method to remove the reasons for the defects and then attempts to identify the possible solutions (Ponsiglione et al., 2021). The final phase: *Control* (C), the team ensure that the effective solutions sustain the improvements, control measures and tools are applied to ensure the variables remain within the range limit over time (Ponsiglione et al., 2021).

2.4 Lean Six Sigma

The term Lean Six Sigma was first introduced in the literature around 2000 (Antony et al., 2012b; Snee, 2010). *Lean Six Sigma* (LSS) is "a continuous improvement methodology that aims to reduce the costs of poor quality, improve the bottom-line results and create value for both customers and shareholders" (Albliwi et al., 2014). Lean Six Sigma is a well-known strategy for organisations to improve quality and reduce cost and time by focusing on improving processes (Kumar et al., 2006a). Lean Six Sigma evolved through Lean manufacturing production system integration with the Six Sigma improvement approach (Drohomeretski et al., 2014). This integration between Lean manufacturing and Six Sigma emerged to ensure high quality, speed, to decrease cost and achieve zero defects, which in turn increase customer satisfaction (Alsmadi, Almani and Jerisat, 2012; Pamfilie, (Draghici) and Draghici, 2012).

Moreover, these authors point out that this integration focuses on removing waste by applying Lean and identifying the production process variation through Six Sigma. According to Antony et al. (2012), this integration helps an organisation to achieve better performance than applying each method in isolation.

Lean Six Sigma has evolved over time to become the most popular strategy for deploying continuous improvement in organisations in different sectors, namely: manufacturing, service, and public sector (Albliwi, Antony and Lim, 2015). According to Assarlind, Gremyr and Bäckman, 2013 and Laureani and Antony (2019), organisations seeking to achieve operational excellence and quality aim to achieve continuous improvement, which facilitates reaching operational excellence. Lean and Six Sigma share some similarities and differences; the following Table 2-1 shows these commonalities and differences between Lean and Six Sigma.

Table 2-1 Commonalities and differences between Lean and Six Sigma Source: (Antony and Kumar, 2012)

Lean Six Sigma similarities	Lean	Six Sigma
• Both are methodologies that aim to achieve continuous improvement.	• Lean is primarily useful for a quick and initial round of improvements.	• Six Sigma is suitable for long-term and complex problems where the solutions are either unknown or vaguely known.
• Customer need is the main focus of the business.	• Lean requires low investment due to the nature of the training and the skills to be developed due to this training.	• Six Sigma demands high investment and is not suitable for fixing common sense problems in the business.
• Practical methods operate in many companies.	• Lean has less focus on statistical tools.	• Six Sigma demands using of statistical methods for decreasing variation in processes.
• Both have comprehensive tools for solving issues related to processes.	• Lean implementation and deployment do not require formal organizational infrastructure.	• Six Sigma has a wide range of organizational infrastructures such as yellow belts, green belts, black belts, and master (black belts).

	• Lean looks into mapping processes from suppliers to customers and uses value stream exercises to understand processes' interactions.	• Six Sigma does not consider system interaction between processes in a typical problem-solving.

While other researchers (e.g. Caine, Escamilla and Antony, 2003; Pepper and Spedding, 2010; Salah, Rahim and Carretero, 2010) focus on the tools and techniques to make a comparison between Lean and Six Sigma. The differences and similarities between Lean and Six Sigma tools are presented in figure 2-3.

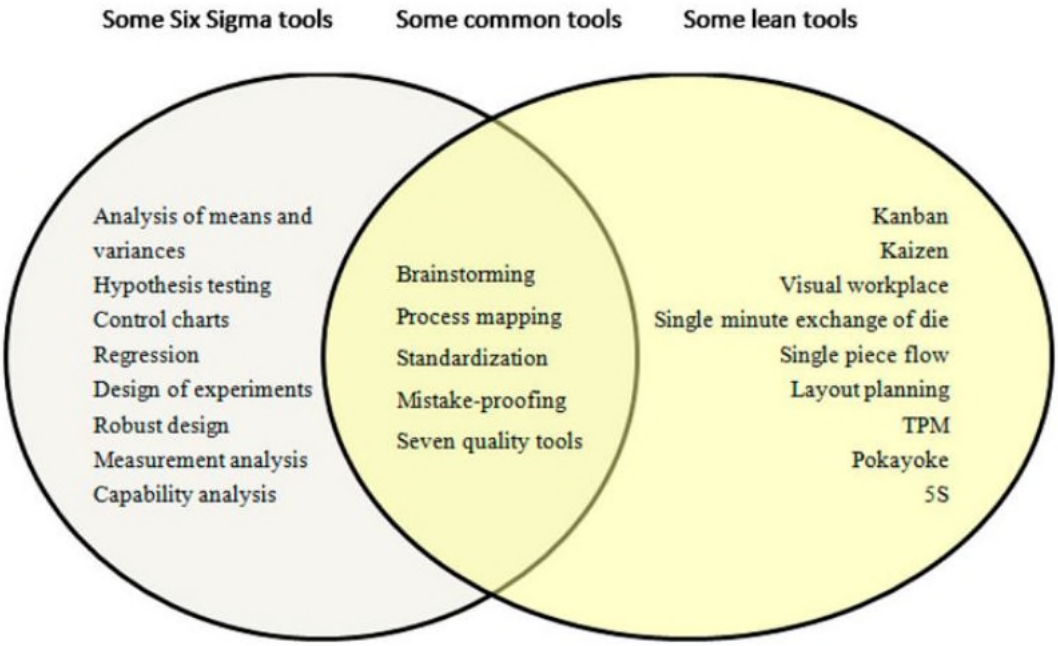


Figure 2-3 The differences and similarities between Lean and Six Sigma tools Source: (Drohomeretski et al., 2014)

Furthermore, some researchers focus on improvement objectives and organizations' needs in comparing Lean and Six Sigma (Snee, 2010), this can be seen in the following figure 2-4, which comprises both Lean and Six Sigma's main objectives.

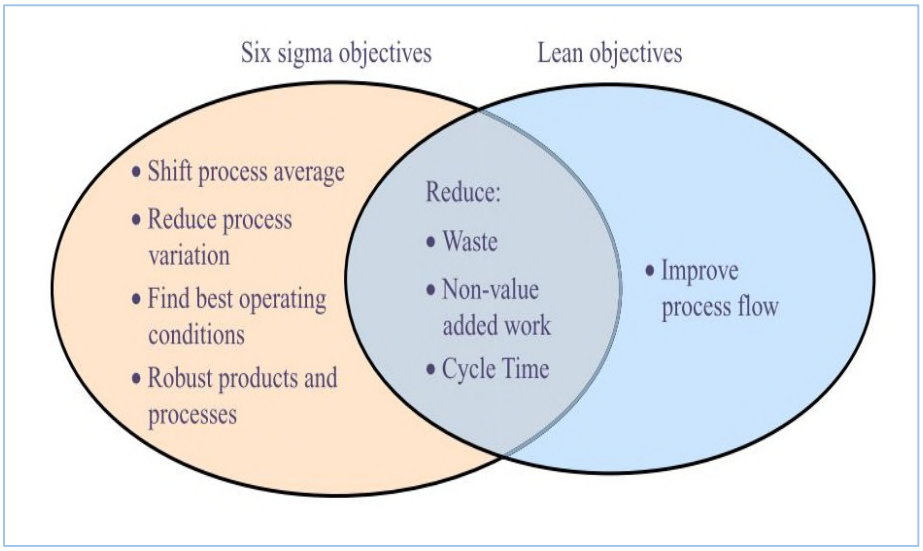


Figure 2- 4 Lean and Six Sigma's main objectives Source: (Snee, 2010)

2.4.1 Success factors for Lean Six Sigma implementation

Critical success factors can be defined as essential elements and factors that are important to implement any project successfully (Jeyaraman and Kee Teo, 2010). When organizations determine the critical success factors for Lean Six Sigma, they

can emphasise their activities on these factors to achieve the desired success; therefore, identifying these factors is important to achieve success (Laureani and Antony, 2012, 2018). Moreover, Lande, Shrivastava and Seth, (2016) point out the importance of understanding and using these factors to speed up the implementation of Lean Six Sigma. Implementing Lean Six Sigma is need many factors to do it effectively. According to Papadopoulou and Özbayrak (2005), many researchers showed that to transform the existing process to Lean Six Sigma, a lot of contribution is necessary in all organizational levels and new values in organization structure and culture. According to Achanga et al. (2006), leadership, management finance, organisational culture, and skills and expertise are critical success factors for Lean Six Sigma implementation. Equally, Laureani and Antony (2018) fund that the outcomes recommend that the most important factors for implementing Lean Six Sigma are leadership, project management, financial accountability, and highly talented employees. Similarly, Laureani and Antony (2012) did a study to recognize the significant success factors for Lean Six Sigma, which are: leadership styles, management commitment, and relating Lean Six Sigma to organization strategy and cultural change.

However, the lack of money consider as an obstacle because organizations need to hire consultants and provide training for their employees; thus, financial capability is a critical success factor (Achanga et al., 2006). Furthermore, some Lean tools and techniques require skills and expertise, but most SMEs employ less skilful employees, which hinders Lean implementation. Moreover, culture plays an important role in Lean implementation; organizations that have high performance have a culture to sustain improvement (Achanga et al., 2006).

The researcher grouped these critical success factors by reviewing several studies. The following table (2-2) summarises the critical success factors mentioned in the literature for Lean Six Sigma.

Table 2- 2 Critical Success factors of Lean Six Sigma

Critical Success Factors	*Supporting literature*

Top management involvement and support	(Ponsiglione et al., 2021), (Snee, 2010), (Antony et al., 2012d), (Hilton and Sohal, 2012), (Assarlind, Gremyr and Bäckman, 2013), (Jayaraman, Kee and Soh, 2012), (Sreedharan, Sunder and Raju, 2018b), (Mustapha, Abu Hasan and Muda, 2019).
Leadership	(Antony et al., 2012a), (Laureani and Antony, 2012), (Habidin and Yusof, 2013), (Hilton and Sohal, 2012)
Organizational culture	(Mustapha, Abu Hasan and Muda, 2019), (Sreedharan, Sunder and Raju, 2018), (Laureani and Antony, 2012), (Antony et al., 2012c), (Assarlind, Gremyr and Bäckman, 2013), (Cappelletti, 2022)
Employees training	(Snee, 2010), (Ponsiglione et al., 2021), (Antony et al., 2012d), (Assarlind, Gremyr and Bäckman, 2013), (Näslund, 2013), (Mustapha, Abu Hasan and Muda, 2019), (Sreedharan, Sunder and Raju, 2018)
Rewards and recognition	(Assarlind, Gremyr and Bäckman, 2013), (Jayaraman, Kee and Soh, 2012), (Mustapha, Abu Hasan and Muda, 2019),
Organizational infrastructure	(Swarnakar, Bagherian and Singh, 2022), (Snee, 2010), (Antony et al., 2012a), (Sreedharan, Sunder and Raju, 2018)
Effective communication	(Assarlind, Gremyr and Bäckman, 2013), (Antony et al., 2012a), (Jayaraman, Kee and Soh, 2012), (Sreedharan, Sunder and Raju, 2018), (Mustapha, Abu Hasan and Muda, 2019)

Understanding Lean Six Sigma tools and techniques	(Antony et al., 2012d), (Sreedharan, Sunder and Raju, 2018)
Linking Lean Six Sigma to organization strategy	(Laureani and Antony, 2012), (Näslund, 2013), (Antony et al., 2012a), (Assarlind, Gremyr and Bäckman, 2013), (Hilton and Sohal, 2012)

However, organisations should focus on vital factors without neglect the less important factors (Jeyaraman and Kee Teo, 2010). According to Lande, Shrivastava and Seth (2016), the researchers should understand which critical success factors are very significant and emphasis on important factors in their future studies. Lande and his colleagues found the most vital critical success factors are training, management involvement and commitment, customer satisfaction, and leadership. While, the highest frequency for critical success factors which mentioned in 137 studies are: "the role of management leadership and quality policy, supplier quality management, process management, customer focus and training" (Lande, Shrivastava and Seth, 2016). Furthermore, a study conducted by Ahmad et al. (2019) found the most important factors for Lean Six Sigma implementation are management engagement and leadership. Actually, many critical success factors appeared in the literature. These factors determine success in implementing Lean Six Sigma, and those factors are interrelated to each other (Jeyaraman and Kee Teo, 2010). However, this research project focuses particularly on leadership as one of the key critical success factors. In that, leadership behaviours that facilitate the effective use of Lean Six Sigma are identified. The following section presents leadership as a success factor for Lean Six Sigma. Further information about leadership is provided in section 2.5.

2.4.1.1 Leadership as a success factor for Lean Six Sigma

There was a great attention from researchers studying the critical success factors for Lean Six Sigma, but few studies focused on the leadership behaviours which plays a vital role in the successful implementation of Lean Six Sigma (Bijl et al., 2019). Companies must have the right leader to encourage and motivate employees and create a suitable continuous improvement culture to benefit from Lean Six Sigma implementation (Laureani and Antony, 2018). According to Achanga et al. (2006),

the most significant factor for successfully implementing Lean practices is leadership and management commitment in SMEs. Researchers highlight the link between leadership and commitment to success in quality improvement programs (Gamal Aboelmaged, 2010; Martínez-Jurado and Moyano-Fuentes, 2014; Waldman et al., 1998). Strong leadership traits and a supportive management style are necessary to Lean success (Achanga et al., 2006). Effective leadership seeks to stimulate employee skills and knowledge. Lean management includes a set of technical aspects; these aspects are not fully adopted unless the socio-cultural aspects (organisational culture and behaviours) are addressed during Lean implementation (Tortorella et al., 2018). Therefore, leaders are vital to demonstrating the expected behaviours to handle socio-cultural issues that may inhibit Lean management implementation (Liker and Convis, 2011; Mann, 2009). Laureani and Antony (2018) instigated a question about different leadership styles and traits that could impact Lean Six Sigma deployment successfully. However, leadership styles and Lean Six Sigma are presented in detail in section 2.6. Also, leadership behaviours that enable effective Lean Six Sigma are identified in section 2.7.

2.4.2 Benefits of successful Lean Six Sigma implementation

Lean Six Sigma integration is possible and beneficial; applying Lean and Six Sigma brings many benefits for organisations and they complete each other (Salah, Rahim and Carretero, 2010). The main focus of Lean Six Sigma is to enhance the quality and productivity of business (Singh and Rathi, 2019). According to Albliwi, Antony and Lim (2015), the top-cited benefits of implementing Lean Six Sigma are: increasing customer satisfaction, profits and incomes, quality and production capacity, reducing time, reducing cost, reducing defects, reducing inventory, and improving vital performance metrics. However, Lean Six Sigma is not widely implemented in the manufacturing sector like the service sector (Singh and Rathi, 2019). Despite of that, they identified the main benefits of implementing Lean Six Sigma in the manufacturing sector by reviewing 216 papers; these benefits are: 1) reducing defects in processes, 2) reduce inventory, 3) costs of low quality, 4) improving productivity, 5) increase customer satisfaction, 6) decreasing cycle time and lead time (Singh and Rathi, 2019). Moreover, Alexander, Antony and Rodgers (2019) identified the most important benefits of implementing Lean Six Sigma: 1) reducing downtime; 2)

operational costs; 3) improving quality; 4) increased efficiency and production flow. Furthermore, they did a review for 15 papers that identified in the SME manufacturing area.

Furthermore, there are soft benefits of applying Lean Six Sigma like improving workers' morale to do creative thinking, identifying different types of non-added-value activities, and decreasing workplace accidents (Albliwi, Antony and Lim, 2015). The following table (2-3) shows benefits of successfully implementing Lean Six Sigma in the manufacturing sector by reviewing published papers.

Table 2- 3 Main benefits of implementing Lean Six Sigma

Benefits of Lean Six Sigma	*Supporting literature*
Reduction in variation and waste	(Chakravorty and Shah, 2012), (Bailey, Motwani and Smedley, 2012), (Johan and Soediantono, 2022), (Swarnakar, Tiwari and Singh, 2021),
Increasing customer satisfaction	(Bailey, Motwani and Smedley, 2012), (Thomas, Barton and Chuke-Okafor, 2008), (Chen and Lyu, 2009), (Johan and Soediantono, 2022),(Vinodh, Gautham and Ramiya R., 2011)
Increasing productivity	(Swarnakar, Tiwari and Singh, 2021), (Bailey, Motwani and Smedley, 2012), (Pickrell, Lyons and Shaver, 2005), (Thomas, Barton and Chuke-Okafor, 2008), (Lee and Wei, 2009)
Cost reduction	(Chakravorty and Shah, 2012), (Bailey, Motwani and Smedley, 2012), (Johan and Soediantono, 2022), (Kumar et al., 2006b)
Time reduction	(Bailey, Motwani and Smedley, 2012), (Chakravorty and Shah, 2012), (Johan and Soediantono, 2022), (Lee and Wei, 2009),

Reduction in defects	(Widodo and Soediantono, 2022), (Vinodh, Gautham and Ramiya R., 2011), (Swarnakar, Tiwari and Singh, 2021), (Roth and Franchetti, 2010), (Hardeman and Goethals, 2011)
Improvement in products quality	(Roth and Franchetti, 2010), (Bailey, Motwani and Smedley, 2012), (Widodo and Soediantono, 2022)
Increasing in profit	(Vinodh, Gautham and Ramiya R., 2011), (Johan and Soediantono, 2022)

This section presented the benefits of using Lean Six Sigma in the manufacturing sector. However, the following sections present the limitations of Lean Six Sigma methodology and barriers inhibiting the effective implementation of Lean Six Sigma; see sections 2.4.3 and 2.4.4.

2.4.3 Limitations of Lean Six Sigma

Many researchers point out there are limitations in Lean Six Sigma methodology (Albliwi, Antony and Lim, 2015). Further, Albliwi and her colleagues point out to highly cited limitations of Lean Six Sigma. These limitations are: ambiguity to implement Lean Six Sigma in early stages because of no clear guidelines to do it; no standard method to implement Lean Six Sigma; Lack understands about using Lean Six Sigma tools and techniques; unclear understanding of which strategy should be applied first; absence of a standard framework to implementing Lean Six Sigma. However, other researchers point out to some limitations of Lean Six Sigma, this can be clearly seen in the following table (2-4).

Table 2- 4 Main limitations for implementing Lean Six Sigma

Limitations	**Supporting literature**
Absence of globally accepted standers for certification	(Laureani and Antony, 2011), (Guerrero et al., 2017), (Rafique et al., 2019)

Absence of standard framework to implementing Lean Six Sigma	(Kumar et al., 2006a), (Pepper and Spedding, 2010)
Lack understanding about using LSS tools and techniques	(Kumar et al., 2006a), (Pepper and Spedding, 2010), (Albliwi, Antony and Lim, 2015), (Guerrero et al., 2017), (Rafique et al., 2019), (Mahmutaj et al., 2015)
Ambiguity to select the suitable strategy in early period of implementing Lean Six Sigma.	(Kumar et al., 2006a), (Vinodh, Gautham and Ramiya R., 2011), (Pepper and Spedding, 2010)
Difficulties to sustain Lean Six Sigma	(Snee, 2010)
Lack of a maturity model to measure LSS implementation level	(Albliwi et al., 2014), (Chakravorty and Shah, 2012)
Lack of innovations in Lean Six Sigma projects	(Thomas, Barton and Chuke-Okafor, 2008)

2.4.4 Barriers (failure factors) to implement Lean Six Sigma

Practitioners and organisations implementing Lean Six Sigma face inhibiting and impeding factors. For example, Timans et al. (2012) found the main impeding factors: internal resistance, availability of resources, changing business focus, and lack of leadership. In addition, some researchers (e.g. Pepper and Spedding, 2010; Richard, 2008) pointed out that Lean Six Sigma implementation in organisations usually takes a long time; this is a challenge that faces top management in organisations. After reviewing the related literature, the following table (2-5) summarises the impeding factors and challenges for Lean Six Sigma implementation.

Table 2- 5 Impeding factors for Lean Six Sigma implementation Adopted: (Albliwi, Antony and Lim, 2015)

Impeding factors	***Supporting literature***
Lack of resources	(Singh and Rathi, 2021), (Thomas, Barton and Chuke-Okafor, 2008), (Timans et al., 2012), (Marolla, Rosa and Giuliani, 2022)

Lack of visionary leadership	(Timans et al., 2012), (Antony, 2015), (Marolla, Rosa and Giuliani, 2022)
Lack of training and coaching	(Breyfogle, 2008), (Thomas, Barton and Chuke-Okafor, 2008), (Timans et al., 2012), (Rathi et al., 2022)
Lack of awareness about Lean Six Sigma benefits	(Singh and Rathi, 2021), (Snee, 2010), (Thomas, Barton and Chuke-Okafor, 2008)
Lack of skills especially managerial, technical, and statistical	(Franchetti and Yanik, 2011), (Thomas, Barton and Chuke-Okafor, 2008), (Rathi et al., 2022)
Employee attitude towards a new business strategy	(Kumar et al., 2006), (Vinodh, Gautham and Ramiya R., 2011), (Singh and Rathi, 2021)
Time-consuming	(Pepper and Spedding, 2010), (Richard, 2008), (Marolla, Rosa and Giuliani, 2022)

The top five impeding factors are unavailability of resources, time-consuming, internal resistance, Lack of training or coaching, and unmanaged expectation (Albliwi, Antony and Lim, 2015). The organisations should be aware of these impeding factors to tackle them and implement Lean Six Sigma successfully.

However, the second part of this chapter covered: Lean manufacturing, Six Sigma, Lean Six Sigma, success factors for Lean Six Sigma implementation, benefits of successful Lean Six Sigma implementation, limitations of Lean Six Sigma, impeding factors for Lean Six Sigma implementation. The third part of this chapter covers the leadership since leadership is the main foucs of this study.

2.5 Leadership

The leadership concept has evolved through several significant historical periods (Day and Antonakik, 2012; King, 1990). Leadership has emerged early in history in the ancient nations the 6th century BC in writings by Confucius Analects (Confucius and

Legge, 1971) and Sun Tzu (The Art of War) (Tzu and Clavell, 1981), then the western nations in the 4th century start being familiar with leadership (Ames, 1983).

However, the importance of leadership has been highly emphasised in releasing the effective implementation of Lean Six Sigma. This part focuses on leadership to get a general understanding of the leadership area (topic) and then identify the leadership styles and behaviours established in the literature.

2.5.1 Leadership definitions

There is no universal definition that exists for leadership (Northouse, 2016). The number of definitions of leadership is greater than the number of persons who have tried to define it (Stogdill, 1974). For more than a century, the leadership became an academic topic and discussed in the literature; since that time, leadership definitions have emerged. Many political factors and events form the researchers' views about leadership during that period (Northouse, 2016).

In the 1920s, the definitions of leadership focused on a leader power and control (Northouse, 2016); *leadership* was defined as "the ability to impress the will of the leader on those led and induce obedience, respect, loyalty, and cooperation" (Moore, 1927, p.124). During 1940s, *leadership* was defined as a person's behaviour involved in leading group activities (Hemphill, 1949). According to Hemphill and Coons (1957, p.7), *leadership* is "the behaviour of an individual … directing the activities of a group toward a shared goal". Furthermore, Seeman (1960) described *leadership* as behaviour that stimulates employees to accomplish their tasks to achieve a common goal. In the 1980s, several themes of leadership definitions have evolved such as: do as a leader wish (the definitions show that subordinates doing as leaders want), influence (this theme is the most popular one in 1980s, researchers focus on idea that is non-forcible influence (Northouse, 2016). Rauch and Behling (1984, p.46) defined *leadership* as "the process of influencing the activities of an organised group toward goal achievement". Furthermore, *leadership* is "the process of making sense of what people are doing together so that people will understand and be committed" (Drath and Palus, 1994, p.4).

In this century, 21th, some studies emerge underline leadership, perspectives which are: spiritual leadership, authentic leadership, servant leadership, and adaptive

leadership (Northouse, 2016). Northouse's (2019) and Yukl's (2013) definitions are affected by the 21st century perspective of leadership, which considers leadership a process that affects individuals to accomplish a common goal. *Leadership* is defined as "the ability of an individual to influence, motivate and enable others to contribute toward the effectiveness and success of the organisations of which they are members" (House, Javidan and Dorfman, 2003, p.494). Yukl (2013, p.23) defines *leadership* as "the process of influencing others to understand and agree about what needs to be done and how to do it, and the process of facilitating individual and collective efforts to accomplish shared objectives." Yukl, in his definition, focuses on how members of a team or company consider several things to ensure tasks will be accomplished successfully. Northouse (2019, p.5) defines *leadership* in his book as "a process whereby an individual influences a group of individuals to achieve a common goal".

It can be concluded that the common themes of leadership definitions from the early period began with leader power (Moore, 1927) then behaviour and characteristics (Seeman, 1960). These definitions also consider the interaction between leader and follower to achieve a common goal (Peters and Waterman, 1982). Finally, leadership is a collection of processes that includes what is mentioned previously (House, Javidan and Dorfman, 2003; Northouse, 2016; Yukl, 2013).

2.5.2 Sources of leadership

Some researchers, such as (Benne, 1948; Fischer, 2016), argue that leaders are born, not made, which assumes leaders are born with some specific characteristics and qualities that made them leaders and distinguish them from non-leaders (Li and Hu, 2022). In contrast, others such as (Avolio, 2004) suggest that leaders, especially transformational leaders, are made through developing them. An organisation can develop leaders through training and education, which increase leaders' competencies and skills (Fischer, 2016). Marques (2010) explains that a leader may be born with certain skills and traits that give him or her a chance to become a leader, while other leaders may be made by learning new experiences.

However, Northouse (2016) suggests that some leaders are assigned while others are emergent. The assigned leaders have a formal position and depend on authority that they obtained it from their title or position. This type of leader, in some situations,

does not express the actual role of leadership. On the other hand, emergent leaders do not depend on title and authority, while they have a significant impact on subordinates (Northouse, 2016). Fisher and Ellis (1993) suggest these leaders are not assigned by position; they emerge through time and by making communication with others. Further, Fisher and Ellis (1993) add the emergent leader depends on some positive communication behaviours such as introducing new ideas, listening for a different opinion, being informed, being firm but not rigid, and trying to be involved. Several variables determine emergent leadership, such as a leader's personality (Smith and Foti, 1998), gender (Watson and Hoffman, 2004), social identity (person character suitable with the group identity) (Hogg, 2001).

2.5.3 Leadership versus management

It is benefit to distinguish between management and leadership since some researchers and people use these words interchangeably and as synonyms (Vasilescu, 2018), making it confused to accurately researching them (Gordon and Yukl, 2004). Moreover, this interchangeable use for management and leadership causes confusion to measuring, evaluating, and promoting them (Kotter, 2006; Toor and Ofori, 2008). In contrast, others argue that these concepts do not have the same scope and meaning (Kumle and Kelly, 1999; Marturano, 2007). For example, Bârgău (2015) conducted a study to distinguish between management and leadership, and he points out that leadership and management are different in roles, tasks, and skills. Bârgău argues leadership is to motivate subordinates through set directions and vision; also, leaders' soul and creativity play an important role in influencing others. While management plans, assign tasks, and use the authority to ensure the routine work is done (Bârgău, 2015). Furthermore, Kotter (1999), in his book, differentiates between leadership and management. He argued that management dealing mainly with complexity by problem-solving, planning, budgeting, organizing, controlling. Whereas leadership deals mainly with change, setting vision and direction, aligning people, and inspiring and stimulating individuals.

However, Kotter (1990) suggests that leadership and management are an integrated process that completes each other; thus, having leaders with strong management skills is the way to the organization's success. Some researchers such as (Kotter, 2006; Northouse, 2016; Zaleznik, 1998) concluded that there is an intersection between

leadership and management despite the differences between them. Clarifying that, when a manager is trying to influence subordinates to achieve organization goal, this mean manager is involved in leadership. On the other hand, when leaders do tasks such as controlling, planning, and organizing, this means leaders are involved in management (Northouse, 2016).

To conclude, some researchers consider management and leadership interrelated (Conger and Kanungo, 1992; Hay and Hodgkinson, 2006; Yukl, 1999), while others argue there are things differentiation between them (Kotter, 2006; Maccoby, 2000; Zaccaro and Horn, 2003). However, it is better to consider these interactions in some themes and these differences in order to understand leadership context efficiently (Toor and Ofori, 2008).

2.5.4 Leadership approach

Researchers have developed several leadership theories to address different aspects of leadership and explain these aspects from different perspectives (lenses) in different periods (Middlehurst, 1993). The intensive studies for leadership contribute to developing different perspectives of leadership. Different researchers have different conceptualisations about leadership. Some researchers observe or conceptualise leadership as traits or behaviours, whereas others observe leadership from an information-processing viewpoint or relational perspective (Northouse, 2019). Northouse (2010) highlights leadership aspects and points out the number of theoretical approaches that show the complexities of the leadership process and how theory can inform leadership practice. Therefore, leadership approaches are traits, skills, behavioural, and situational approaches (Northouse, 2016). The following sections present these leadership approaches briefly. Then the study is focused on the behavioural approach since this research project is mainly about identifying leadership behaviours.

2.5.4.1 Traits approach

The traits approach evolved from the Great Man theory, which emerged in the 19th century; the Great man theory argued that leaders are born, not made and are gifted with characteristics such as charisma (Carlyle, 1841). In the 20th century, researchers studied the traits aspect of leadership (Northouse, 2016). This theory concerns

determining the qualities and characteristics that leaders should have to be in a position to lead others (Stogdill, 1948). Therefore, these traits distinguish leaders from non-leaders and try to get a better understanding of what are the characteristics that are common among leaders (Day and Antonakik, 2012). Some of these traits are integrity, sociability, intelligence, self-confidence, and determination (Northouse, 2016). According to Stogdill (1948), there are various traits regarding the situations; thus, different situations require different traits. Some researchers have tried to identify these traits; they found some similarities and differences in their studies of leadership traits (Kirkpatick and Locke, 1991; Mann, 1959; Zaccaro, Samantha and Marylo, 2004).

2.5.4.2 Skills approach

Consider the skills aspect of leadership, which mainly focuses on the ability and knowledge that leaders should have, which can be developed through learning and training (Northouse, 2016). These skills help leaders accomplish their works using their knowledge and competencies (Northouse, 2016). These skills also are necessary for effective leadership regardless of managerial levels. The skills perspective is supporting the view which argues the leader is made (Avolio, 2004). According to Katz (1955), leadership needs three essential skills: technical, human, and conceptual skills. The importance and intensity of these three skills are vary depending on the managerial levels; thus, in top management, the human and conceptual skills are the most significant, while at the operational level (supervisory management) the technical and human skills are the most important (Katz, 1955). However, Mumford et al. (2000) suggested that leadership behaviour depends on leadership skills, which are problem-solving skills, social judgment skills, and knowledge.

2.5.4.3 Situational approach

Some theories assume one behaviour is suitable for all situations. This assumption causes unsatisfied results when leaders adopt one style. Due to the unsatisfied results about some leadership theories, the situational approach has evolved to tackle that issue (House, 1971). This theory suggests that there is not one suitable leadership style for all emergent situations; thus, leader aspects (e.g. traits and behaviours) and leadership outcomes rely on that situation that leaders may face. In other words, different situations demand different types of leadership (Day and Antonakik, 2012).

The contingency approach consists of directive and supportive dimensions; these dimensions should be applied suitably according to the current situation (Northouse, 2016).

2.5.4.4 Behavioural approach

The behavioural perspective emerged after the traits theory; in the 1950s, researchers began emphasising leadership behaviours: what leaders do and how these behaviours influence followers and predict effectiveness (Stogdill and Coons, 1957). Thus, leadership behaviour is what leaders do and how they act (Northouse, 2016). As Yukl (2012) reported, over the half past century (20th), thousands of studies have been conducted on leadership behaviour; a wide variety of results in these studies make it hard to compare and integrate the results.

According to Yukl (2013) and McCauley (2010), researchers can analyse leadership based on three common constructs to general leadership theories, these constructs are 1) leadership personal attributes, 2) influence process, and 3) context. Blickle et al. (2013) explain leaders' characteristics as "who leaders are", leaders' behaviours as "what leaders do", and the context where leaders are embedded in as "what their situation is like". Leadership has been observed as an influence process between leader and followers (McCauley, 2010). This influencing on process happens mainly through the leadership behaviours (Derue et al., 2011), which are an observable activity of the individual that can be objectively described (Bruvold, 1972). Leaders usually might use some tools and tactics to utilise (exert) their influence (Bass and Bass, 2009). However, in order to get a clear picture of the implications and underpinnings of the behavioural approach, the following sections are looking more closely at leadership behaviours.

2.5.4.4.1 Leadership behaviour taxonomies

Researchers had started to identify and categorise effective leadership behaviours in their study early to study the behavioural aspect of leadership. According to Yukl, Gordon, and Taber (2002); and Fleishman et al. (1991), different taxonomies for leadership behaviour have been identified from many studies. Between 1940 and 1986, Fleishman et al. (1991) found 65 studies identifying different leadership behaviour classifications. However, there is a lack of agreement about which

taxonomies are meaningful and relevant; thus, it is hard to unify and compare the findings from different studies that depend on various categories for leadership behaviour (Yukl, Gordon and Taber, 2002).

However, many researchers (Blake and Mouton, 1964; Bowers and Seashore, 1966; Stogdill and Coons, 1957) have tried to describing leadership behaviours early. One of the key issues in identifying comprehensive taxonomy for leaders' behaviour is the wide range of results that has appeared from one study to another. This wide range of taxonomies has happened for many reasons (Fleishman et al., 1991; Yukl, 1989). According to Yukl (2013), the first reason, taxonomies that differ in purpose can be predicted to have slightly different classifications. The second reason is that behaviour construct can be formulated at different levels of generality or abstraction. Also, the method used to develop behaviour taxonomy is the third reason. However, the next two sections provide the early attempts for developing a taxonomy for leadership behaviour. Ohio state leadership studies and Michigan leadership studies are one of the central attempts to categorise leadership behaviours.

In the 1950s–1960s, Stogdill and Coons (1957) suggest that effective leadership behaviour is related to two dimensions: Initiating Structure and Consideration. Initiating Structure refers to giving structure and organising the work environment and identify team members' responsibilities and roles. In contrast, consideration emphasises relationship behaviours through mutual respect and trust between leaders and subordinates. Therefore, these studies, Ohio state leadership studies, made increased attention to the leadership behaviour perspective. In other words, rather than only focusing on leadership traits, the researcher took more consideration into how leaders act with subordinates. According to Judge, Piccolo and Ilies (2004), these two dimensions were widely researched for an extended period.

The researchers in *Ohio State studies* considered these two dimensions of leader behaviour (Consideration and Initiating Structure) are independent. However, according to Northouse (2016), many researchers have tried to determine the most suitable leadership behaviour; some researchers argue that the high consideration dimension is the most effective in some situations. In comparison, others argue that

the high initiating structure is the most effective in another context. Nonetheless, some researchers point out that applying both dimensions in a high scale is better.

The second key studies on leadership behaviour were in the *University of Michigan studies* (Katz et al., 1952; Katz, Maccoby and Morse, 1950; Mann and Dent, 1954), which have been conducted around the same period of the Ohio State studies (Yukl, 1981). Michigan studies aimed to identify the most effective pattern of leaders' behaviour on group performance. These studies have been done by focusing on leader behaviour, group process, and group performance measures (Yukl, 1981). In addition, researchers used group productivity measures to determine effective behaviour. These studies have identified leadership behaviour styles: production orientation and employee orientation (Likert, 1961). Employee orientation is a behaviour that leaders highly focus on human relations to deal with followers, emphasizing personal needs and considering employees as human beings (Bowers and Seashore, 1966). On the other hand, production orientation is a behaviour emphasizing process and technical aspects of production; thus, members are considered as a tool for accomplishing organization and team goals (Bowers and Seashore, 1966).

These behaviours are similar to consideration and initiating structure behaviours which were identified in the Ohio State studies. According to, Yukl (1981) the main findings of these studies indicate that effective leaders focus on supervisory functions such as organizing and planning. Effective leaders also support and help followers, adopt general supervision methodology, and give followers some autonomy. It can be clearly seen that the dimensions of both Ohio State studies and Michigan studies are similar; both of them classifying the leader behaviour into two dimensions. However, the results of those studies were contradicted and vague (Yukl, 1994). Michigan researchers considered production and employee orientation as contrasting ends of a single continuum. Thus, leaders who are oriented toward employees are less oriented toward production and Vis versus. However, this perspective has changed; researchers reconceptualised the production and employee orientation as two independent leadership orientations (Kahn, 1956).

Beyond early leadership behaviour studies, Yukl (2012) suggests *comprehensive taxonomies* of effective leadership behaviours (see table 2-6). Early studies of

leadership behaviours defining two main taxonomies: task-oriented and relations-oriented behaviour (Likert, 1961; Stogdill and Coons, 1957). Moreover, leadership behaviour has been classified into three taxonomies task-oriented, relations-oriented behaviour and change-oriented component were added (Yukl, Gordon and Taber, 2002). Yukl (2012) has added new taxonomies of leadership behaviours to the previous one, which forms comprehensive taxonomies, the four taxonomies, which can be seen in the following table (2-6).

Table 2- 6 Hierarchical Taxonomy of Leadership Behaviours Source: (Yukl, 2012)

Task-oriented	Clarifying Planning Problem solving Monitoring operations
Relations-oriented	Supporting Empowering Developing Recognizing
Change-oriented	Envisioning change Encouraging innovation Advocating change Facilitating collective learning
External	Networking External monitoring Representing

Task-oriented behaviour and relation-oriented behaviour have different labels (Yukl, 2012), namely: Initiating Structure and Consideration dimensions (Stogdill, 1963; Yukl, 1981), production orientation, and employee orientation (Likert, 1961). Moreover, early leadership theories such as managerial grid (Blake and Mouton, 1964), path-goal theory (House, 1971), situational leadership theory (Hersey and Blanchard, 1977), and leadership substitutes theory (Kerr and Jermier, 1978) focused on broadly defined taxonomies task-oriented and relation-oriented behaviour.

Yukl (2012) has developed four main taxonomies of leadership behaviour, see table 2-6. These taxonomies have 15 specific behaviours. This section is explaining each taxonomy. First taxonomy, task-oriented behaviour: leaders focus accomplishes the important goals of a group or organization through using employees, equipment, and other resources efficiently (Yukl, 2012). Task-oriented behaviour comprises planning, clarifying, monitoring, and problem-solving.

The second taxonomy is relation-oriented behaviour that focuses on the group relations and the quality of human resources, which in turn let subordinates feel comfortable (Northouse, 2016; Yukl, 1971). Leaders use this behaviour to improve employee skills, commitment to the objectives, and member-leader relations. Relation-oriented behaviour comprises supporting, empowering, developing, and recognizing.

The third taxonomy of leadership behaviour is change-oriented behaviour that is mainly focusing on adopting and implementing important changes in strategies, products or processes (Yukl, Gordon and Taber, 2002; Yukl, 2006). Change-oriented behaviour comprises advocating change, envisioning, encouraging innovation, and facilitate collective learning.

Yukl (2012) has suggested the fourth taxonomy of leadership behaviour: external leadership behaviour. Leaders in external leadership seek to get necessary resources and information for their team, defend about team's interest, and promote the team or organization's reputation. Few studies focused on external leadership behaviour because most of the studies had depended on subordinates to get information about leaders' behaviour (Kaplan, 1984). Those subordinates have little opportunity to observe leader behaviour when they are interacting with people outside department. External leadership behavior comprises networking, external monitoring, and representing. Some studies showed that maintaining networking is related to effective leadership behaviour (Kotter, 1982; Michael and Yukl, 1993).

However**,** Behrendt, Matz and Göritz (2017) point out that Yukl's taxonomy has three distinct points that make his taxonomy stronger than previous studies: it provides a detailed description for each component of behaviour; similar behaviours were integrated; facilitate developing an integrated model of leadership behaviour. Despite

that, Behrendt, Matz and Göritz (2017) criticise Yukl's taxonomy methodology because it relies on available research; therefore, he does not distinguish between behaviours and their perceptions. Furthermore, Behrendt, Matz and Göritz (2017) argue that Yukl did not provide clear guidance to explain the way specific behaviours are categorized.

2.6 Leadership styles that influnce Lean Six Sigma

Between the 1950s and 1960s, researchers began to focus on identifying the effective leader styles (Smith and Peterson, 1988) and the way that leaders' behaviour can influence the performance and satisfaction of subordinates (Northouse, 2016). Between 1960 to 1980, leadership taxonomies and theories were affected by task and relation behaviour, such as the Managerial Grid (Blake and Mouton, 1964) and path-goal theory (House, 1971). Different theories have emerged that studied leadership behaviour (Hersey and Blanchard, 1977; Kerr and Jermier, 1978). Despite that, Yukl (1993) points out, in the 1970s, most leadership theories focus on rational aspects of specific types of leadership behaviours such as positive rewards, supportive and participative behaviours. However, in the late 1970s, the transformational leadership theory was emerging and beginning taking researchers interest (Bass, 1985; Burns, 1978a; House, 1977). Since the 1980s, more researches in leadership behaviour have been based on transformational and charismatic theories (Avolio, Bass and Jung, 1999; Bass, 1985; House, 1977).

Leaders have different visions and values about managing their team to achieve organizational goals (Tortorella et al., 2018). Different perspectives have emerged on relationships between leaders and followers (Robbins and Judge, 2011). In order to give the reader a general understanding of the different leadership styles identified in relation to Lean Six Sigma, the researcher decided to clarify these styles.

However, the question is whether leadership styles have an impact on Lean Six Sigma operations and processes. Being aware of these leadership styles can help organisations in designing effective transformation to Lean Six Sigma (Tortorella et al., 2018). Thus, the following sections identify the leadership styles that influence Lean Six Sigma since the main focus of this study is to identify leadership behaviours. This identification for leadership styles can broaden the current understanding of the

suitable leadership styles for effective use of Lean Six Sigma. In that, organizations that are going to embrace Lean Six Sigma can stimulate suitable leadership behaviours as well as develop programs for leadership.

2.6.1 Situational leadership (task-oriented and relation-oriented behaviours) and Lean Six Sigma

This leadership style was clarified in this chapter see sections 2.5.4.3 and 2.5.4.4.1, which provide details about situational leadership (task-oriented and relation-oriented behaviours). Relation-oriented behaviour is about time spent in solving issues and communication, which referred to some studies as effective lean leaders behaviours (H. van Dun and Wilderom, 2016; Liker and Convis, 2011). Moreover, this relation-oriented behaviour helps in establishing a culture of continuous improvement (Bortolotti, Boscari and Danese, 2015; Womack and Jones, 2003). Nevertheless, Tortorella et al. (2018) found that relation-oriented behaviours are negatively associated with Lean bundles such as JIT, in contrast to task-oriented behaviours, which are associated positively with Lean.

Highly relation-oriented behaviour may not be effective, as leaders in this style tend to delegate and facilitate tasks, which is dependent on the maturity of their followers (Tortorella et al., 2018). Rother and Harris (2001) and Duggan (2012) pointed out that this behaviour should be the last to be applied in the Lean Management implementation journey. Some researchers supported this view that leaders should develop their relations-oriented behaviour, as long as the maturity of Lean implementation increased through stimulating, coaching, and developing subordinates (Poksinska, Swartling and Drotz, 2013; Tortorella, van Dun and Almeida, 2019). Then daily management activities can be passed gradually to subordinates to shift toward a self-managed team, achieved through empowering and involving employees in improvement activities (Poksinska, Swartling and Drotz, 2013).

Task-oriented behaviour has been discussed in the literature related to Lean. Tortorella et al. (2018) found that task-oriented behaviour is more helpful in achieving higher levels of implementing Lean Management than relation-oriented behaviours. This result is, to some extent, in line with previous indications (Spear, 2004). Tortorella et al. (2017) pointed out that the intensive use of task-oriented behaviour

and relation-oriented behaviour for implementing Lean varies according to hierarchical level.

In Lean manufacturing, the contextual relating to leaders' behavioral orientation does matter (Tortorella et al., 2017). Tortorella and his colleagues pointed out the number of followers as a contextual variable that senior chiefs and executives must observe. Another study conducted by Tortorella et al. (2018) focused on team size and leader's age showed that bigger teams and more ranking managers were negatively connected with Lean manufacturing implementation. Tortorella and Fogliatto (2017) developed a method that identified situational leadership style in terms of task-oriented behaviour or relation-oriented behaviour that most contribute to each implementation phase of the Lean management roadmap by taking into consideration the hierarchical position of the leaders. This model helps in identifying the relationships between multi-level leadership styles and the implementation phases of the Lean roadmap (Tortorella and Fogliatto, 2017). However, situational leadership can be more effective in enabling the successful use of Lean Six Sigma when organisations can understand their cultural environment, in that leaders can behave in a certain way according to their organisational culture (Tortorella et al., 2021).

In light of the perceived role of situational leadership style, it can be argued that the style of leadership, either task or relation oriented, rely on the level of competencies of the employees. In that, it is worth using task-oriented behaviours in the early stages of implementing Lean Six Sigma. Since this style focuses mainly on these behaviours: planning, clarifying, problem-solving, and monitoring employees that make leaders focus on accomplishing tasks effectively. Then, once the employees are competent with the passage of time for Lean Six Sigma implementation, leaders can change their leadership style to tend toward relations.

2.6.2 Transformational leadership

Burns (1978) and Bass (1985) considered transformational and transactional leadership as the opposite end of a continuum which reflects they are separate. However, Bass (1985) argued that transformational leadership is built on and exceed transactional leadership in subordinates' motivation and satisfaction. Whereas transactional leadership stimulates subordinates by appealing to their interest,

focusing on the exchanges between leaders and followers. *Transactional leadership* is leaders who set clear objectives for followers and use either rewards or punishments in order to stimulate followers to achieve these goals (Burns, 1978b). According to Bass (1996), the factors of transactional behaviours are a contingent reward, and management by expectation active and management by expectation passive. Transactional leadership focuses on a compilation of work, transactional leadership is a relationship that depends on interests between leaders and followers. However, Notgrass (2014) suggested that subordinates do not observe transactional leaders as a preferred style to achieving a beneficial leader-subordinate relationship. Thus, subordinates prefer transformational leadership behaviours, such as building trust and recognizing accomplishment (Notgrass, 2014).

Researchers are highly interested in transformational leadership; thus, transformational leadership has been widely studied (Lowe and Gardner, 2001). Transformational leadership was studied in traditional areas such as social psychology and management. In addition, researchers have studied transformational leadership in other areas such as industrial engineering, nursing, and education (Antonakis, 2012). Transformational leadership incorporates charismatic and visionary leadership (House, 1977; Northouse, 2019). House and Howell (1992) suggested that charismatic leaders have personalities and characteristics that distinguish them from non-charismatic leaders; by having power and traits, leaders are able to influence and motivate followers. Bass took Charismatic leadership work to a new level: rather than just focusing on leader traits to motivate followers, he suggested leaders focus on fulfilling the needs (Bass and Avolio, 1990). Charismatic leadership is necessary but not enough; thus, according to Bass, leaders should pay more attention to satisfying followers' needs in proportion to leaders own needs.

The transformational leadership concept was introduced by Burns (1978). He focused on ethics and the concept of transformational leadership, but he did not clarify the behaviours that are used by transformational leaders (Burns, 1978a; Sashkin, 2004). Bass (1985) expanded and refined the previous work of (Burns, 1978a) and (House, 1977). Bass suggested that transformational leadership behaviours consist of four primary factors for influencing followers: idealized influence (charismatic influence), inspirational motivation, intellectual stimulation, and individualized consideration

(Bass, 1996). Many reviews of transformational leadership behaviour have been conducted to evolve transformational leadership (Bass and Avolio, 1997, 1990; Bass, Avolio and Atwater, 1996; Waldman, Bass and Yammarino, 1990; Yammarino and Bass, 1990).

Transformational leadership describes a leader who influences followers to achieve an organisation's vision, initiates the change through inspiration, and conducts the change through team members' commitment (Yammarino and Bass, 1990). Transformational leadership is a process that changes and transforms subordinates by creating a connection that increases morality and motivation level (Bass, 1985). This increases followers' consciousness about what is fundamental about ethical issues and prioritises team interest rather than self-interest. One of the central features of transformational leadership is appealing to subordinates' values and emotions (Bass and Avolio, 1990). Also, it involves satisfying subordinates' needs and treating people as human beings. Bass (1985) pointed out that transformational leadership motivates and inspires employees to accomplish more than expected. This motivating and inspiring can be achieved by (1) increasing employee awareness about the importance of achieving specified goals, (2) persuading followers to transcend their own self-interest in order to achieve organizational goals, and (3) moving subordinates to address higher-level needs.

Bennis and Nanus (1985) and Kouzes and Posner (2002, 2017) their studies have increased researchers understanding of the nature of transformational leadership. Bennis and Nanus (2007) suggested four strategies used by leaders to transform organizations. These strategies are: (1) having a clear vision of the future situation, (2) being social architects which creates a form for common meaning employees maintained, (3) creating trust by making leaders' positions known clearly and then supporting these positions, (4) using the creative deployment of self through positive self-regards which influence on creating followers confident and expectations.

However, transformational leadership has several criticisms. There is a lack of conceptual clarity about transformational leadership, in that it is hard to define the parameter of transformational leadership precisely. Tracey and Hinkin (1998) pointed out there is an overlap between the transformational leadership factors (idealized

influence, inspirational motivation, intellectual stimulation, and individualized consideration), that shows dimensions are not specified. Researchers are not sure if these factors are the reasons for transformational leadership or if they simply help in explain the transformational leadership presence (Andersen, 2015; Tourish, 2013). Anderson et al. (2017) suggest that since millennials are becoming a part of organizations' staff by entering the labour market. Organizations are recognizing that they should modify the previous work of transformational leadership because millennials may not accept this style. Anderson and colleagues are assuming that millennials are different from previous generation baby boomers in their needs and willingness to cooperate with others to accomplish a shared goal. Furthermore, Conger (1999), and Howell and Avolio (1993) argued that transformational leadership might be abused since leaders can use their own charisma to influence followers to move to a new vision which maybe this new vision is not better (Christie, Barling and Turner, 2011). This can cause destructive results for organizations. Finkelstein (2003) corroborated with this view, stated pursues misguided strategies or unrealistic objectives may cause disaster, even if the organizations have motivated and loyal employees.

There is a lack of studies that established a causal relationship between transformational leadership and changes in organizations or followers (Antonakis, 2012; Arthur and Hardy, 2014). Yukl and Lepsinger (2004) and Beyer (1999) agreed with this view by stating that transformational leadership is an extinctions of motivation theory, and there is a need to get a better understanding of the way leaders are building groups or influence organisational performance. Another criticism for transformational leadership, Yukl (1999), pointed out that transformational leadership suffers from a "heroic leadership" bias. Although Bass and Avolio (1993) and Avolio (1999) argued transformational leadership is elitist and antidemocratic by giving the impression that leaders behave independently from subordinates, Bass and Avolio (1993) and Avolio (1999) disprove that they claimed transformational leader could be democratic and directive. It is necessary to have more explanation of situational variables that determine how effective transformational leadership will be (Beyer, 1999; Bryman, 1992).

2.6.2.1 Relationship between transformational leadership and Lean Six Sigma

Poksinska, Swartling and Drotz (2013) suggested that many of leadership practices and behaviours displayed by Lean leaders can be categorised as transformational leadership. Indeed, in the literature, there has been a connection made between transformational leadership style and Lean leadership (van Assen, 2018; McLachlin, 1997; Sosik and Dionne, 1997). For instance, as mentioned earlier, transformational leadership behaviours consist of four primary factors for influencing followers: idealised influence (charismatic influence), inspirational motivation, individualised consideration, and intellectual stimulation (Bass, 1996). For example, intellectual stimulation depends on some behaviours such as coaching, providing constructive feedback, and challenging followers. These behaviours are described in several reports of the Toyota Production System (Spear, 2004). Furthermore, transformational leadership characteristics emphasised stimulation, empowerment, communication, persuasion, and teaching (Gregory Stone, Russell and Patterson, 2004). These individual characteristics are connected to the use of Lean, whereas teaching workers about identifying and solving problems and empowering followers to implement their ideas is considered a supporter of Lean systems (Liker and Convis, 2011; Seidel et al., 2019). Whereas Reiner (2018) points out that transformational leadership support Lean implementation in organisations since this style creates more proactive employees. van Elp, Roemeling and Aij (2022) confirms this view that the transformational leadership style is closely linked to the successful Lean Six Sigma implementation.

Transformational leadership is also a supportive style since leaders show concern and recognition of individual needs (Rafferty and Griffin, 2004). As well as creating a vision for followers which can improve followers understanding of the significance and qualities related with desired results, transformational leadership increase followers performance expectations and raise their readiness to work towards a common goal (Jung, Chow and Wu, 2003). This style increase followers commitment and motivation to achieve long-term goals and leaders' visions (Pongpearchan, 2016). However, Considering these results, there is a high level of agreement in the literature that the transformational leadership style influences Lean Six Sigma positively. Furthermore, this agreement between the wide variety of studies emerged since this

style focuses on coaching, empowering, and increasing followers commitment and motivation, which are considered vital behaviours in realising successful Lean Six Sigma (Motiani and Kulkarni, 2021).

2.6.3 Servant leadership

The term servant leadership was first coined by Greenleaf (1970). Greenleaf has inspired by Hermann Hesse's novel, *The Journey to the East* (Hesse, 1956). Greenleaf's perspective was that; a person can be a leader and a servant at the same time (Greenleaf, 1970). Servant leaders see employees as equals rather than followers (Greenleaf, 1970). Servant leaders are concerned with prioritising followers' needs. Servant leaders are responsible for supporting and coaching employees (Greenleaf, 2002) in order to optimise their performance.

Tilghman-Havens (2018) proposed servant leaders have a social responsibility concerning the less privileged followers. In that, servant leaders try to remove social injustices and inequalities. Servant leaders consider that being moral and virtuous in their behaviour to develop followers potential rather than using power to dominate others (van Dierendonck, 2011; Greenleaf, 1970; Liden et al., 2008). Servant leaders' behaviours focus on putting followers interests ahead of their interests and support followers' personal development by listening and developing long term relations. This attention to followers enables leaders to understand followers needs and goals (Liden et al., 2008). However, Liden et al. (2008), the usefulness of the servant leadership style depends on followers' willingness and readiness to be guided, supported, and empowered. Spears (2002) identified servant leaders' characteristics, which are key to developing servant leadership, in Greenleaf's writings. These characteristics are listening, empathy, healing (to overcoming personal problems), awareness, persuasion, conceptualization, foresight (predicting the future), stewardship, commitment to the growth of people, building community. While, servant leadership behaviours are empowering, prioritising and developing followers, behaving ethically, emotional healing, and creating value for community (van Dierendonck and Nuijten, 2011; Laub, 1999; Liden et al., 2008, 2014). van Dierendonck (2011) suggests that researchers have subjected servant leadership to comparisons with other leadership styles. Hu and Liden (2011) suggest that servant leadership conceptually differs from other main leadership styles since servant leaders focus on ethics and

behavioural integrity. Lemoine, Hartnell and Leroy (2019) and Dinh et al. (2014) argue this view by stating servant leadership, authentic leadership, and ethical leadership are similar since these types of leadership reflect a morally based perspective on leadership. Van Dierendonck (2011) supported this view that both servant leadership and authentic leadership share similar characteristics such as honesty, integrity, and humility. Servant leaders and ethical leaders share similar characteristics: integrity, trustworthiness, and serving in the right way (van Dierendonck and Nuijten, 2011).

Groves (2016) pointed out that transformational leaders focus on influencing followers' values, behaviours, and beliefs to achieve organizational goals. In comparison, Banks et al. (2018) suggested servant leadership correlated with transformational leadership. Stone, Russell and Patterson (2004) confirm that both servant leadership and transformational leadership are related to each other, and they debate whether there are differences between these styles. However, other researchers see differences between servant and transformational leadership, whereas, servant leaders do not consider employees as followers (Liden et al., 2008); also, servant leaders focus on employees satisfaction by understanding employees' needs, desires, and goals (Toledo et al., 2019).

2.6.3.1 Relationship between servant leadership and Lean Six Sigma

The key idea of this leadership style is that servant leaders focus on responding to followers' needs. According to Seidel et al. (2019), servant leaders must provide resources for followers to facilitate their work to add-value to the end customers. This is important to Lean, which considers that the main adding-value activity is accomplished at the front-line (Womack and Jones, 2003). Indeed, Poksinska, Swartling and Drotz (2013) point out a positive connection between Lean leadership and servant leadership, but there is a lack of empirical evidence. Van Assen (2018) refutes this, highlighting a negative connection between servant leadership and the use of Lean tools, and arguing that servant leadership is not related to the occurrence of a continuous improvement culture.

Aij and Rapsaniotis (2017) reviewed the literature and found significant similarities and intersections between Lean leadership and servant leadership, while they observe

differences in origins, philosophy, characteristics and behaviours, and tools. This overlap between Lean and servant leadership can broaden leaders' understanding on how of inspire high performance and contribute to successful Lean operations (Aij and Rapsaniotis, 2017). However, there is a contradiction among the studies' results around the role of servant leadership in Lean Six Sigma. Some found a positive relationship (Poksinska, Swartling and Drotz, 2013; Seidel et al., 2019), while others revealed a negative relationship (van Assen, 2018). This contradiction implies the weakness of this leadership style in successful Lean Six Sigma since most of the studies that occurred were theoretical studies and have contradictions.

2.6.4 Authentic leadership

Luthans and Avolio (2003) published an early article on authentic leadership, which focused mainly on developing this style of leadership. *Authentic leadership* is a leadership style in which leaders are aware of their behaviours and thoughts; they are aware of their values and others' values (Tortorella et al., 2021), making followers perceive leaders as trustworthy and believable (Gardner et al., 2005; George and Sims, 2007). The leaders should learn to develop these behaviours and qualities and apply them in the context of working and serving others (Northouse, 2019). Authentic leaders are true to themselves and depend on internal values and standards rather than respond to external pressures (Swain, Cao and Gardner, 2018). George (2003) pointed out authentic leadership has five important features and characteristics, namely: leaders have a sense of purpose, they have strong values about how to act, they establish trusting relationships, they have self-discipline and act on their values, and they show empathy to the status of others.

Walumbwa et al. (2008) suggest four components that constitute authentic leadership, 1) self-awareness: to which extent leaders know how they make meaning of the world. That meaning influences how they observe themselves. 2) Internalized moral perspective: about the integrated form of staying true to one's values. 3) Relational transparency: reflects openness for sharing information and self-disclosure to express of true feelings and emotions to others, and 4) Balanced processing: refers to analysing information objectively before making a decision. The basis of authentic leadership depends on these factors. Along with these components, some factors influence this leadership style: firstly, positive psychological capacities, which consist of

confidence, optimism, hope, and resilience. Secondly, moral reasoning, and thirdly critical life events (Gardner et al., 2005; Luthans and Avolio, 2003; Northouse, 2019).

There are different conceptualisations regarding of authentic leadership based on diverse perspectives. Firstly, the interpersonal perspective focuses on the leader's knowledge, regulation, and concept (Chan, 2005). The second perspective is the internal process which considers a leader as relational; authenticity emerges from leaders and followers interactions (Eagly, 2005). Both leaders and followers affect each other mutually. Finally, a developmental perspective that suggests authentic leadership can be nurtured and developed in a leader. This can be developed in people over a lifetime and an affected by major life events such as a new career or illness (Gardner, Avolio and Walumbwa, 2005a, 2005b).

2.6.4.1 Relationship between authentic leadership and Lean Six Sigma

According to Seidel et al. (2019, p.1328), this authentic leadership style is relevant to Lean, "in particular, at the influence process dimension since lean involves changes in work practises that demand persistence and practical demonstration of know-how of the leader". Authentic leadership focusing on developing their behaviours to be trustworthy and believable, whereas leaders should learn to develop these behaviours and qualities (Gardner et al., 2005; George and Sims, 2007). This might intersect with Lean leadership that emphasises self-development, which has been mentioned as the first step to leadership development at Toyota (Liker and Convis, 2011).

Swain, Cao and Gardner (2018) conducted a study to understand the way authentic leaders and leaders with behavioural integrity can facilitate the Six Sigma processes. They pointed out that to get the best benefit of Six Sigma in organizations, both authentic leadership and behavioural integrity are required. Leaders should have a commitment to the values they adopt. Combining authentic leaders and behavioural integrity can support raised levels of Six Sigma performance in the work environment. Also, combining these qualities for Six Sigma can help organizations to gain a competitive advantage (Swain, Cao and Gardner, 2018). However, some of these studies were conducted theoretically to propose a connection between authentic leadership and Lean Six Sigma, e.g. (Seidel et al., 2019). Moreover, another study, e.g. (Swain, Cao and Gardner, 2018), used a survey as a tool to establish the connection between authentic leadership and Lean Six Sigma; it was worth relying on

interviews to explore and establish this area that already does not have enough literature to deduce hypotheses. In light of that, the strength of interconnection between authentic leadership and Lean Six Sigma is not apparent since there is a lack of empirical evidence.

2.6.5 Empowering leadership

Leadership power and behaviour approaches are linked mainly to participative leadership, delegation, and empowerment. Participative leadership and delegation stress the leader's perspective on power-sharing, while researches on empowerment stress the subordinate's perspective. *Empowerment* refers to those individuals who can define their work roles, achieve meaningful work, and affect significant events (Yukl, 2013). Empowering leadership can be observed from different perspectives. The first perspective is, power-sharing which refers to authority and responsibility that leaders award to followers. The second perspective is related to psychological issues that concern removing the feeling of helplessness and increasing employee motivation (Li et al., 2016). The participative leadership and delegation are not the only factors that make people feel empowered; there are other types that influence psychological empowerment (Forrester, 2000; Vecchio, Justin and Pearce, 2010). Not only does leader's behaviour with followers increase their empowerment, but also there are organizational programs that increase employee empowerment. These programs are self-managed teams, democratic structures and processes, and employee ownership of the company (Heller, 2000; Yukl and Lepsinger, 2004).

2.6.5.1 Relationship between empowering leadership and Lean Six Sigma

Sharing information and knowledge with subordinates enables empowerment, which allows employees to participate in decision-making and contribute to organizational performance (Ford and Fottler, 1995). Information sharing and teamwork are essential for the Lean process (Netland, Schloetzer and Ferdows, 2015). The empowerment behaviour of leadership is an essential behaviour for stimulating employees to use Lean tools (Jones, Latham and Betta, 2013).

One of the central aspects of the Toyota Production System TPS is workplace learning (Jönsson and Schölin, 2014). They found that empowering leadership facilitates learning in the TPS context. Van Assen (2018) pointed out that there is a positive

correlation between empowered leadership style and the use of Lean tools. Nogueira, Sousa and Moreira (2018) confirm this result by finding that an empowering leadership style positively influences Lean management implementation. These studies in line with Aij, Visse and Widdershoven (2015) prove the importance of employee empowerment for implementing Lean. However, the studies in the literature started theoretically trying to establish a theoretical relationship between empowering leadership style and Lean Six Sigma; they found a connection. Then, other studies prove this connection by finding a strong positive correlation between empowering leadership style and Lean Six Sigma. This indicates there is consensus among studies conducted either theoretically or empirically that empowering leadership style plays a vital role in Lean Six Sigma operations.

2.6.6 Distributed leadership

Previous literature on leadership showed that influential leaders empower others to understand events, solve problems, and make decisions (Heller and Yukl, 1969; Likert, 1961). Aspiring to the goal of fair and inclusive distributed leadership does not mean requiring that all equally share authority. Not all employees will or should be accorded equality in each form of authority (Woods, 2016). In order to have effective leadership, it is not necessary to be widely 'shared' or 'democratic'; whereas to be effective, there is a need to balance different 'hybrid configurations' of practice (Bolden, 2011). Furthermore, Mehra et al. (2006) point out that distributed leadership needs to be moderate and qualified; it can differ regarding critical structural characteristics. These differences can have important implications for team performance.

Distributed leadership involves multiple leaders with different but interrelated tasks, and both informal and formal may be involved (Yukl, 2013). Distributed leadership means more than one leader in the same team (Day, Gronn and Salas, 2004). Team leadership, or shared leadership, is "a dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of group or organizational goals or both. This influence process often involves peer, or lateral, and at other times involves upward or downward hierarchical influence" (Pearce and Conger, 2003, p.1). The most extreme form of distributed leadership happens when the leaders allow the employees to make all significant decisions, and

the leaders distribute the responsibility about daily operations with members and frequently rotated (Yukl, 2013). Leadership can be distributed across many members without focusing the leadership in a single leader (Mehra et al., 2006). Distributed leadership increases all the employees' power and spreads it among organisation members, rather than focusing on a single formal leader (Carson, Tesluk and Marrone, 2007; Pearce and Conger, 2003). The characteristic of distributed leadership is that it reduces the solo leader's power and enables members to take a leadership role (Lumby, 2019).

The distributed leadership has been conceptualised in different ways (Day, Gronn and Salas, 2004), but there appears to be broad agreement on two issues: (1) leadership is not just a top-down process between the formal leader and individuals; and (2) there can be multiple leaders in the same group (Mehra et al., 2006). Distributed leadership to be truly successful; focus on leadership as *a practice* rather than leadership as role or responsibility (Harris and DeFlaminis, 2016). Moreover, distributed leadership places emphasis on *interactions* rather than actions; in that leadership is not simply restricted to formal leadership roles, while influence and activity are shared across the team members (Harris, 2013). Many studies highlighted those different ways to share and distribute power and authority in organisations, but some are more successful than others, e.g. (Cox, Pearce and Perry, 2003; Day, Gronn and Salas, 2004). Despite distributed leadership popularity has attracted much critical comment, particularly on the relationship of distributed leadership and power (Lumby, 2019).

Several researchers have considered how shared or distributed leadership is related to the team or organizational effectiveness, e.g. (Carson, Tesluk and Marrone, 2007; Friedrich et al., 2009). Nevertheless, there is a need to conduct more research on the distribution of leadership responsibilities among the individuals in a team or organisation. In addition, some questions need further research; to what extent leadership authority and power can be shared or distributed effectively and the context that can facilitate the success of shared leadership. Also, the implication for the organisational design, all of these important questions need answers (Yukl, 2013).

2.6.6.1 Relationship between distributed leadership and Lean Six Sigma

This leadership style seems to promote employees participation and stimulating them to use their capabilities. In turn, this authorisation is critical for empowering shop floor employees in organisations that apply Lean management (Kim et al., 2006). Team leadership increase employees' involvement and enhance the bottom-up, which help in create a culture of identifying waste, suggesting improvements and applying solutions (van Rossum et al., 2016). In order to use Lean manufacturing effectively in organisations, all employees need to identify where improvements can be made, and they should take responsibility for implementing solutions (Grove et al., 2010). Leaders can increase employees' enthusiasm for identifying waste and suggesting improvements by engaging them in all the processes of the organization (Kim et al., 2006). Authorising and empowering employees is essential since they are more involved in the details of the work; they are more aware of what needs improvements (Jimmerson, Weber and Sobek, 2005; van Rossum et al., 2016).

The previous literature has established a link between distributed Leadership and Lean Six Sigma implementation (van Rossum et al., 2016; Seidel et al., 2019). Distributed leadership is relevant for lean leadership since distributed leadership can give a better understanding of how lean leadership occurs as an interaction between leaders and team members (Seidel et al., 2019). Moreover, van Rossum et al. (2016) conclude that distributed Leadership is one of the factors that enable the successful transition from the theoretical approach of implementing lean tools to the actual transformation to Lean management. However, the relationship between distribution leadership and Lean Six Sigma has been researched theoretically and empirically, see (van Rossum et al., 2016; Seidel et al., 2019). The literature confirms that distributed leadership style influences Lean Six Sigma positively. This implies the importance of this leadership style in realising the successful use of Lean Six Sigma.

However, after reviewing the literature, the researcher found six key leadership styles. These studies have tried to link leadership styles and Lean Six Sigma empirically and/or theoretically. The following table (2-7) shows the leadership styles that influence Lean Six Sigma implementation.

Table 2- 7 Leadership styles for successful implementation of Lean Six Sigma

Leadership styles for successful implementation of Lean Six Sigma	**Supporting literature**
Situational (task-oriented, relation-oriented behaviours)	(Tortorella et al., 2021), (Tortorella, van Dun and de Almeida, 2019), (Seidel et al., 2019), (Tortorella et al., 2018), (Camuffo and Gerli, 2018), (van Dun, Hicks and Wilderom, 2017), (Tortorella et al., 2017), (Tortorella and Fogliatto, 2017)
Transformational leadership	(Motiani and Kulkarni, 2021), (Seidel et al., 2019), (van Assen, 2018), (van Dun, Hicks and Wilderom, 2017), (Poksinska, Swartling and Drotz, 2013), (van Rossum et al., 2016), (Li et al., 2015), (van Elp, Roemeling and Aij, 2022)
Servant leadership	(Seidel et al., 2019), (van Assen, 2018), (Aij and Rapsaniotis, 2017), (Poksinska, Swartling and Drotz, 2013)
Authentic leadership	(Tortorella et al., 2021), (Seidel et al., 2019), (Swain, Cao and Gardner, 2018),
Empowering leadership	(Nogueira, Sousa and Moreira, 2018), (van Assen, 2018), (Jones, Latham and Betta, 2013), (Jönsson and Schölin, 2014), (Aij, Visse and Widdershoven, 2015)
Distributed leadership (Team leadership)	(Seidel et al., 2019), (van Rossum et al., 2016), (Kim et al., 2006), (Grove et al., 2010)

The results determined the leadership styles that can enable the use of Lean Six Sigma successfully. This review provides a better understanding for practitioners and researchers from existing literature on how leaders behaviours can enhance Lean Six Sigma implementation. First of all, relation-oriented behaviour helps in creating a

culture of continues improvement that use Lean Six Sigma as a tool to achieve continues improvement. Adopting task or relation behaviours vary according to Lean implementation phase and hierarchal levels. Furthermore, transformational leadership enable Lean Six Sigma implementation since this style creates more proactive employees. The individual characteristics for leaders in this style such as stimulating, empowerment, persuasion and teaching are related to Lean implementation, whereas teaching workers about identifying and solving problems, and empowering followers to implement their ideas; supporting Lean implementation. Servant leadership provides the necessary resources for employees to enable their work to add value to the end customers. Authentic leadership shows commitment to the values leaders adopted; this commitment is vital to Lean Six Sigma implementation. Distributed leadership relevant to Lean manufacturing, since leaders supposed to receive feedback from followers and those leaders should improve their performance continuously (Alnadi and McLaughlin, 2020). However, the link between leadership styles and Lean Six Sigma was established in this section, as well as there was evidence from studies that leadership styles are associated with and influence Lean Six Sigma implementation (Tortorella et al., 2021).

It is not clear which style is the most dominant and effective. There is a lack in interpreting how these leadership styles linked to Lean Six Sigma implementation. There is a lack of empirical evidence most of the studies depended on a theoretical base. Very few studies have focused on leadership styles and Six Sigma success. Also, there is scarcity in papers that addressed leadership styles that facilitate Lean Six Sigma implementation.

2.7 Leadership behaviours that enable Lean Six Sigma implementation

This section aims to provide a synthesis of the results of the previous literature on leadership behaviours that enable successful Lean Six Sigma implementation. A thematic analysis was conducted on the previous literature which helped in identifying the relevant aspects and associating the behaviours with specific aspects. Thematic analysis was used for many reasons. Thematic analysis can provide much greater detail that can be aggregated into discernible constructs (Hartman and Conklin, 2012).

Thematic analysis also helps in identifying, analysing and reporting themes within data (Braun and Clarke, 2006b, 2006a) as it focusses on searching for specific patterns across an entire data set (Braun and Clarke, 2006b, 2006a). In this paper, the data are the relevant articles. Moreover, thematic analysis was useful in summarizing the large body of data and helped in developing a thick description of the emerging themes. Through these descriptions, this study's researcher highlighted the similarities and differences between themes by defining specific behaviours for each theme.

The literature was subject to thematic analysis to identify the themes that influence the successful implementation of Lean Six Sigma and the associated behaviours for each theme. The thematic analysis provides flexibility without being tied to theory. After collecting the relevant texts, the researcher familiarised themselves with the data to identify the patterns. Then a thematic analysis was conducted to identify the key aspects of leadership behaviour to facilitate Lean Six Sigma implementation. The unit of analysis that has been adopted is content analysis, namely, words and phrases, sentences and paragraphs. The main added value of conducting content analysis is the classification of units into categories (Insch, Moore and Murphy, 1997), allowing the categories to emerge from the text (Insch, Moore and Murphy, 1997). After identifying the relevant articles and analysing the text, the researcher assigned the words, phrases, sentences and paragraphs into categories. The researcher categorised the leadership behaviours into different key aspects through an overview analysis of leadership behaviours. The leadership behaviours were then analysed by grouping them into aspects. However, the researcher grouped these behaviours into aspects only when clearly certain behaviours could be related to a specific aspect. Finally, the researcher checked samples of coding to ensure the classification and categorisation were applied correctly and to what extent the same text was coded in the same way several times.

After reviewing the literature, the researcher have identified the leadership behaviours that facilitate Lean Six Sigma process and provide understanding by analysing how leadership behaviours would support the Lean Six Sigma process. Seven key aspects of Leadership and Lean Six Sigma have been identified, and the associated behaviours are described as follows:

2.7.1 Communication

Most of the papers highlighted the significance of establishing effective communication for Lean Six Sigma implementation. Many studies (e.g. Aij and Teunissen, 2017; Laureani and Antony, 2017) indicate that effective Lean leaders spend considerable time in communicating and problem-solving. Aij and Teunissen (2017) point out that effective leaders both communicate information and listen carefully to subordinates, which helps in building trust and gaining more information. Establishing two-way effective communication that enhances information flow across the organisation's hierarchy is necessary to increase the work floor employees' understanding of the current goals and objectives (Loh, Mohd Yusof and Lau, 2019). Also, it is essential to involve and engage employees in improvement programmes (Laureani and Antony, 2017; Maijala et al., 2018; Poksinska, Swartling and Drotz, 2013). Managers communicate with top management and other team members as a part of management practices (Hwang, Hwang and Hong, 2014). However, implementing a Lean initiative would be challenging for leaders on the aspect of communication, for instance, how Lean manufacturing practices can be linked to suppliers to achieve high integration (Connor and Cormican, 2022). Verbal and visual communication systems are necessary since they are mutually supporting tools for delivering the message that help Lean Six Sigma deployment (Laureani and Antony, 2017), whereas visual tools help in clarifying goals and providing on-time feedback on process performance (Poksinska, Swartling and Drotz, 2013). Daily performance management uses whiteboards and dashboards to display information using simple charts (Hung et al., 2015; Poksinska, Swartling and Drotz, 2013). Visually displaying daily progress performance is known more formally in Lean terminology as the use of a "daily management" or "daily engagement" system (Maijala et al., 2018). Communicating make the information available for the work floor employees (Poksinska, Swartling and Drotz, 2013), and informs them about what is expected from them (Loh, Mohd Yusof and Lau, 2019). Leaders communicate with work floor employees through the Gemba Walk; the leaders walk along the shop floor with their employees supporting daily kaizen (Toledo et al., 2019). The Gemba Walk refers to visiting the work floor by leaders to help in identifying waste, solving problems, and supporting employees (Aij, Visse and Widdershoven, 2015; Mann, 2009).

2.7.2 Culture of continuous improvement

Leaders pay attention to activities that support continuous improvement (Poksinska, Swartling and Drotz, 2013). Management that practises continuous improvement focuses on finding a better way in all circumstances, and pursues an understanding of customers' need so that goods can be customised (Loh, Mohd Yusof and Lau, 2019). Lean implementation aims to create a culture of continuous improvement, where employees are empowered to drive improvements and to eliminate waste (Poksinska, Swartling and Drotz, 2013). Culture is perceived as a building block in organisations (Berg and Black, 2014); Lean leader must ensure that the culture is serving the organisation's objectives to achieve improvements (Aij and Teunissen, 2017). A suitable organisational culture is widely considered to be essential for Lean Six Sigma implementation (Antony and Banuelas, 2002; Cheng, 2007; Kwak and Anbari, 2006; Zu, Robbins and Fredendall, 2010). Leaders should support continuous improvement by allocating time and resources, and be open to ideas that help in achieving improvements (Poksinska, Swartling and Drotz, 2013). However, implementing the Lean initiative would be challenging for leaders on the aspect of the allocated support, such as time and money (Connor and Cormican, 2022).

Aij and Teunissen (2017) conducted a review of leadership attributes that leaders could use to support the culture of continuous improvement, namely: task identity, feedback, autonomy, belief in improvement, and honesty; while the main behaviours that have been discussed in the literature that supporting continuous improvement culture, namely: learning organisation culture, followers being challenged, basic performance evaluation, and managerial versatility (Aij and Teunissen, 2017). The leaders work on extended assignments, with in-depth processes and people knowledge; leaders' behaviours go beyond being just coordinators of resources, and frequently rotating on assignments, their behaviours change to emphasise the importance of providing managerial versatility (Camuffo and Gerli, 2018). Another behaviour of leadership is creating and supporting the development of a learning organisation culture (Aij, Visse and Widdershoven, 2015; Maijala et al., 2018). Leaders, in order to support Lean Six Sigma operations, create an environment in which mistakes are regarded as opportunities for learning; learning by seeing and doing, and being committed to lifelong learning (Aij et al., 2013; Aij, Visse and

Widdershoven, 2015; Goodridge et al., 2015; Steed, 2012). This learning environment can be effective in encouraging employees to submit new ideas, they know there will be no blame for any mistakes that occur; also leaders have the courage to acknowledge their own mistakes (Aij, Visse and Widdershoven, 2015; Loh, Mohd Yusof and Lau, 2019). Effective leaders help in building this culture in which all employees embrace the method of identifying errors in processes without being blamed (Aij and Teunissen, 2017; Toussaint and Berry, 2013).

Another behaviour associated with developing a culture of continuous improvement is challenging and stimulating the employees. Leaders challenge the employees to do their best that leads to stimulating them (Toledo et al., 2019). In turn, employees can achieve improvements that include decreasing the lead time, cost and waste, as well as increasing productivity and quality (Monden, 2011; Toledo et al., 2019). In order to be effective in challenging the employees, the leaders must be charismatic and supportive (Fujimoto, 1999; Monden, 2011). In advanced levels of implementing Lean Six Sigma, leaders evaluate performance processes that they are responsible for, with quick and regular feedback with other managerial levels (Camuffo and Gerli, 2018). Leaders should support and practise daily kaizen (Liker and Convis, 2011). There are two rules that leaders can use to support continuous improvement (kaizen) (Spear and Bowen, 1999; Toledo et al., 2019). The first means all work content, sequences, timing, and outcomes should be standardised, which makes problems easier to discover. The second rule specifies the connection among individuals for the implementation of the operations; the connection must be clear regarding sending requests and receiving a response (Spear and Bowen, 1999).

2.7.3 Coaching and developing employees

Training employees is essential to increase their awareness about Lean Six Sigma philosophy and tools (Assarlind, Gremyr and Bäckman, 2013; Henderson and Evans, 2000). Widespread training in organisations has been observed as an instrument for involving the employees in improvement initiatives (Laureani and Antony, 2017). Training can take two forms; outsourced or train-the-trainer. Train-the-trainer aims to make leaders competent and skilled in leading improvement; they then can train their units and followers (Assarlind, Gremyr and Bäckman, 2013; Snee, 2010). Despite different forms of training, most successful organisations believe that training is worth

the investment to achieve the effective use of Lean Six Sigma (Henderson and Evans, 2000). Training leaders for Lean manufacturing should be comprehensive in that it focuses on developing personal skills, interpersonal skills, and managerial practices that align with Lean thinking (Holmemo, Ingvaldsen and Powell, 2022).

To promote employees' self-development, the leaders begin to identify the competencies that employees need through conduct dialogue with the employees. The following competencies are assessed: teamwork, technical knowledge, business vision, Lean thinking, communication and results for the company (Toledo et al., 2019). Factors that are related to employees' development are empowerment and trust building (van Assen, 2018). Being coached means the leadership role is facilitating, supporting, and functioning. This role seems to be the dominant style for successful Lean Six Sigma implementation (Maijala et al., 2018). Leaders tend to be both coach and teacher who provide support for team members (Camuffo and Gerli, 2018). They also focus on individual employees' skills, experience, and ability and set challenges which enhance and encourage growth in the employee (Poksinska, Swartling and Drotz, 2013).

2.7.4 Creating vision and aligning goals

This aspect refers to Hoshin Kanri, which is a strategic planning system that is intended to be consistent with Lean (Goodridge et al., 2015), and through which leaders interpret and spread the organisation vision and goals to teams (Liker and Convis, 2011). Hoshin Kanri can be identified as a key strategy that aims to develop a particular coherent strategic plan (Goodridge et al., 2015). It is also a method of aligning goals with customer focus (Aij and Teunissen, 2017). This strategy trains the employees in strategical learning, planning and goal setting, also increasing employees' understanding of the links among practices, operational goals, and strategic goals (Toledo et al., 2019). Leaders from different units and departments ensure the alignment of priorities and actions horizontally and vertically (Goodridge et al., 2015; Tortorella, van Dun and de Almeida, 2019). The Lean leader's role is to develop long-term strategies and goals and organise the work of employees in different teams and units (Aij and Teunissen, 2017), also, ensuring the connection between the workgroup and other units of the organisation (Emiliani, 2008).

In order to create visionary and forward-thinking in organisations, leaders explain to employees the reasons for implementing Lean Six Sigma (Loh, Mohd Yusof and Lau, 2019). The leaders are responsible for aligning and implementing the vision on the organisation's priorities and goals to be achieved by the employees (Dombrowski and Mielke, 2013a; Inamizu et al., 2014; Toledo et al., 2019). Although each team has a different short-term goal, Hoshin Kanri provides a central direction for all teams to be able to align with the same strategic goal and achieve long-term goals (Aij and Teunissen, 2017).

2.7.5 Employee motivation

Leaders support Lean Six Sigma operations by giving recognition to employees who provide improvement ideas and actively participate in the realisation of processes enhancements (Poksinska, Swartling and Drotz, 2013). In some organisations, teams have to provide a certain number of ideas during a specific period (Poksinska, Swartling and Drotz, 2013). Laureani and Antony (2017) revealed that rewards systems play a vital role in Lean Six Sigma deployment; two sub-themes were identified, namely non-financial and financial rewards. The former relate to Lean Six Sigma deployment more than the latter (Laureani and Antony, 2017). During gemba walks effective Lean leaders demonstrate care and recognition by acknowledging the value of employees' work (Aij and Teunissen, 2017; Antony et al., 2007). Leaders show care for individuals by making regular visits, during which they can respond to employees' questions and put results on a visual metrics boards (Aij, Visse and Widdershoven, 2015). The leaders influence employees' attitudes and behaviours towards the Lean Six Sigma philosophy through recognition and positive reinforcement (Poksinska, Swartling and Drotz, 2013); that recognition can have many forms and attributes such as encouragement, emotional rewards, and attention and acknowledgement (Aij and Teunissen, 2017). These practices of rewards and recognition aim to increase employees' motivation and organisational commitment (Poksinska, Swartling and Drotz, 2013). Using the right motivation can lead to wider interest and implementation for Lean Six Sigma (Balzer, Brodke and Thomas Kizhakethalackal, 2015). Since motivated employees do what is right to achieve the organisation's goal and vision, leaders should seek to make their employees sufficiently motivated (Loh, Mohd Yusof and Lau, 2019; Connor and Cormican,

2022). Lean leaders work on inspiring employees to achieve a high level of motivation (Sureeratta, Napompech and Panjakhajo, 2014) and should therefore, have the ability to increase employees' engagement. Having a good relationship with employees for keeping them motivated is crucial (Loh, Mohd Yusof and Lau, 2019). Leaders can enhance their relationship with followers by conducting more informal meeting and gemba walks which give the leaders the opportunity to talk with employees about problem-solving techniques and to examine the process (Aij, Visse and Widdershoven, 2015; Aij and Teunissen, 2017; Loh, Mohd Yusof and Lau, 2019; Maijala et al., 2018).

Leaders need to have the skills to motivate, inspire, stimulate, and facilitate others' development (Aij and Teunissen, 2017) and to be aware of the need to acquire those skills (Millward and Bryan, 2005); when leaders have these skills, individuals are more willing to make any changes necessary for Lean Six Sigma deployment (Al-Balushi et al., 2014). Leaders' behaviour can motivate and inspire employees to achieve a common goal, by motivating them to do their best, and acknowledging their achievements (Loh, Mohd Yusof and Lau, 2019).

2.7.6 Employee empowerment

As the level of Lean implementation is enhanced, employees become empowered and more involved in decision making (Poksinska, Swartling and Drotz, 2013). First of all, these employees should be trained or coached which ensures the knowledge has been transferred to them; then they are able to be trusted and empowered to undertake an action when required (Loh, Mohd Yusof and Lau, 2019; Jadhav, Mantha and Rane, 2014). Leaders should develop their relations-oriented behaviour, as long as the maturity of Lean implementation increase, through stimulating, coaching and developing subordinates (Poksinska, Swartling and Drotz, 2013; Tortorella, van Dun and Almeida, 2019). Empowering leaders enables employees to become leaders themselves (Aij and Teunissen, 2017). Previous literature on Lean has clarified empowering leadership behaviours that include leading by example, sharing information, coaching, and showing concern for employees (Aij, Visse and Widdershoven, 2015; Aij and Teunissen, 2017; Albrecht and Andreetta, 2011; Poksinska, Swartling and Drotz, 2013). Organisations should develop supporting

structures and routines to enable problem-solving and improvement (Poksinska, Swartling and Drotz, 2013). Bortolotti, Boscari and Danese (2015) point out that high power distance inhibits employees' empowerment. Contemporary organisations tend to be more flexible and organic, which enhances their ability to be adaptable to change and to empower employees (Loh, Mohd Yusof and Lau, 2019). Leaders encourage employees to provide improvement ideas and the employees then have the freedom to make decisions and take suitable actions to realise those intended improvements (Poksinska, Swartling and Drotz, 2013). Delegating power and decision making behaviour has been mentioned in a number of previous studies (e.g. Aij, Visse and Widdershoven, 2015; Goodridge et al., 2015; Maijala et al., 2018). Empowering leadership increases employees' engagement that then leads to more commitment and less turnover intention (Aij and Teunissen, 2017; Albrecht and Andreetta, 2011). Supporting and encouraging workers will promote engagement, which enhances the flow of dialogue through all levels of organisations (Aij and Teunissen, 2017; Antony et al., 2007). The employees' engagement can help in obtaining feedback on changes, and in turn leaders recognise the way people are implementing those changes (Willis et al., 2016). Lean leaders pass responsibility on to the employees, so that they can manage and control daily processes, and they pass managerial tasks such as managing performance measures or conducting reviews to the employees (Aij, Visse and Widdershoven, 2015; Poksinska, Swartling and Drotz, 2013). Leaders can pass responsibility and authority through two-way communication, teamwork, and meetings (Aij and Teunissen, 2017; Drotz and Poksinska, 2014). Giving responsibility to the employees increases their sense that they are the owners of processes and tasks (Aij and Teunissen, 2017; Drotz and Poksinska, 2014; Millward and Bryan, 2005), as well as employees are still accountable to the Lean leader (Aij, Visse and Widdershoven, 2015).

2.7.7 Involvement, commitment, and support

Effective leaders provide support and commitment for Lean Six Sigma implementation (Aij et al., 2013; Goodridge et al., 2015; Maijala et al., 2018). They also show commitment and support by being actively involved and participating in improvements initiatives which foster a positive development in the leaders'awareness of their responsibilities (Holmemo, Ingvaldsen and Powell, 2022; Laureani and Antony, 2017).

Furthermore, leaders take responsibility for facilitating culture change that happens gradually through engaging more stakeholders in Lean programmes (Goodridge et al., 2015). Leaders pay attention to actions that support continuous improvement; in turn, the continuous improvement becomes a crucial part in meetings, and improvement programmes are monitored and visualised (Poksinska, Swartling and Drotz, 2013). Further actions and activities that are related to leadership commitment, include providing all necessary resources for success, such as adequate staffing levels, suitable training, conducting events and conferences as a tool for sharing effective practices (Poksinska, Swartling and Drotz, 2013), and ensuring suitable time is allocated (Laureani and Antony, 2017; Poksinska, Swartling and Drotz, 2013). Leaders should provide financial and manpower commitment to enable Lean to be implemented successfully (Aij et al., 2013; Maijala et al., 2018). To support continuous improvement, leaders must also acknowledge initiatives, ideas and effective participation in reaching intended improvements (Poksinska, Swartling and Drotz, 2013a). However, leaders need to show involvement in improvement programmes through their own behaviour; for instance, leaders should present themselves as a role model and act in ways compatible with the organisation's culture and values (Poksinska, Swartling and Drotz, 2013). Also, they can support continuous improvement by demonstrating their willingness to embrace change (Poksinska, Swartling and Drotz, 2013). There are some further traits that leaders should have. For instance, they should have the characteristic of being a high performer (Maijala et al., 2018; Steed, 2012), and have some other qualities such as humility and openness, and ability to communicate (Maijala et al., 2018). Some organisations use accountability to ensure a high commitment of leadership to remove barriers to improvement programmes, in that leaders feel they are accountable to do their best to facilitate Lean Six Sigma implementation (Goodridge et al., 2015). The focus on employee accountability is increased as the Lean implementation progresses (Goodridge et al., 2015).

However, seven *key aspects* have been emerged through reviewing the literature and conducting thematic analysis. The following points summarise the key aspects of the successful implementation of Lean Six Sigma:

- Communication
- Culture of continuous improvement

- Coaching and developing employees
- Creating a vision and aligning goals
- Employee motivation
- Employee empowerment
- Leadership commitment and support

However, another main finding that emerged based on what has been published in previous studies is the *leadership behaviours* that facilitate Lean Six Sigma implementation. The researcher summarises in these points the leadership behaviours:

- Receiving and giving information that conveys ideas which helps leaders to know what is happening in processes, the issues that occur, as well as obtaining suggestions. Also, employees can understand the organisation's goals.
- Leaders communicate information and listen to employees to ensure workers understand the information and to gain more information about employees' experiences, problems, and suggestions.
- Visiting the work floor (Gemba walk) which includes three activities: going to where the value is created, looking at the process, and talking to the workers. These activities enable the leaders to be involved with people, solve the problems, and demonstrate care and recognition.
- Creating a learning environment: leaders consider any mistakes as opportunities for learning.
- Intellectual stimulation: leaders make employees more interested in challenges that they face and make them able to think in new ways to overcome issues.
- Leaders take responsibility for culture change.
- Monitoring and evaluating tasks and processes.
- Leaders should foster and maintain a continuous improvement culture that seeks excellence and considers any mistakes as opportunities to improve.
- This can be achieved through leaders' behaviours that support task identity, feedback, independence, and honesty.
- Supporting continuous improvement (kaizen): all work content, sequence, timing, and outcome should be standardised, which makes discovering problems easy. The connection among employees for the implementation of the processes; the connection must be clear to send requests and receive a response.

- Developing and training employees: using training as an instrument for engaging the employees in improvement initiatives. This training focuses on technical knowledge, Lean thinking, Lean tools and techniques, and Lean principles.
- Promoting employees' self-development: creating plans and structures to support employees' development. Focusing on specific competencies to develop the employees, such as technical knowledge, communication, and teamwork.
- Leaders develop and coach employees to support organisational goals.
- Formulating and communicating goals and objectives to ensure the alignment of priorities and actions that focused on customers' needs.
- Leaders motivate employees who have contributed to fulfilling current goals through recognition, encouragement, and having a good relationships. Also, they can use financial and non-financial rewards, presence, visibility, paying attention to, and acknowledgement for motivating employees.
- Leaders need skills to motivate others.
- Empowering employees by encouraging them to solve problems and improve their workplace. Giving the employees more responsibility for managing and controlling daily operations, to realise improvements. Giving the employees authority to both make decisions and suitable actions.
- Delegating decision making, power, and responsibility.
- Developing a supporting structure that responds to Lean initiatives such as addressing problems and improvement activities.
- Leaders demonstrate commitment and support for Lean implementation, and they feel they are accountable for doing their best.

Seven key aspects have been emerged through analysing and grouping the leadership behaviours based on what has been published in previous studies. The researcher summarise that in table the leadership behaviours that are associated with each key aspect, see appendix (D).

However, the investigation concentrated on published literature relating to leadership and Lean Six Sigma. A thematic analysis was conducted on the previous literature, which helped in identifying the relevant aspects and associating the behaviours with specific aspects. This research highlighted and investigated the leadership role as leadership was identified as one of the critical success factors for Lean Six Sigma

implementation. Therefore, this section has focussed on the leadership behaviours that enable that implementation. This thematic analysis of the published literature has attempted to look at leadership behaviours in some form of structure. The main leadership behaviours that emerged from the analysis were grouped and categorised under key aspects. These behaviours have then been discussed and clarified in detail. Most of these studies focussed on Lean manufacturing, whereas a few of them focussed on Six Sigma and Lean Six Sigma. This section has reviewed the published literature, which has helped comprehensive aspects to emerge.

The findings replicate and expand the findings on leadership aspects through focussing specifically on identifying the relevant behaviours. This paper also provides an understanding of and analyses of how leadership behaviours would support the Lean Six Sigma process, which will help in developing a framework about leadership behaviours that facilitate Lean Six Sigma.

However, it is essential to note that the Lean Six Sigma literature almost unanimously considers the seven key aspects that emerged in this study as the fundamental aspects for Lean Six Sigma implementation. In light of that, there is a consensus among the studies' findings on the aspects that play a vital role in facilitating Lean Six Sigma. This may indicate that these aspects play a vital role in the successful implementation of Lean Six Sigma. The researcher has found that many studies (Dombrowski and Mielke, 2013a; Goodridge et al., 2015; Nogueira, Sousa and Moreira, 2018; Poksinska, Swartling and Drotz, 2013; Seidel et al., 2017, 2019; Toledo et al., 2019; Tortorella, van Dun and de Almeida, 2019) relied on and were grounded in previous study's frameworks or models to identify the leadership traits that would facilitate Lean Six Sigma. This implies there was, to some extent, weakness in these studies' methodology since they relied on specific frameworks and models without studying these aspects from a new angle or perspective. One of the key studies that forms part of the literature is that of Liker (2004) who identified 14 principles of the Toyota (Lean) management system. However, some studies, e.g. Dombrowski and Mielke (2013), used Liker's 4P model to derive five basic principles of Lean leadership. These principles are: improvement culture, self-development, qualification, Gemba, and Hoshin Kanri (Dombrowski and Mielke, 2013). The 4P model names four relevant aspects of Lean: philosophy, process, people and partners, and problem-solving

(Liker, 2004). Another main study is that of Liker and Convis (2011), who identified the main characteristics of Toyota's (Lean) leadership as: be committed to self-development, coach and develop others, support daily Kaizen, and create vision and align goals. Furthermore, Poksinska, Swartling and Drotz's (2013) study is grounded on Yukl's (1997) study that developed four managerial processes: developing and maintaining relationships, obtaining and giving information, making decisions, and influencing people, whereby these key studies were used as a tool for being familiar about leadership aspects and behaviours for successful use of Lean Six Sigma. In other words, previous literature (Liker and Convis, 2011; Liker, 2004; Womack and Jones, 2003; Womack, Jones and Roos, 1990) indicate the importance of Lean leadership; these studies were used as the grounding for the previous studies. Also, there was found to be overlap between these behaviours, attributes and skills. However, this study analyses the literature without focussing on a specific study. New themes have emerged from this analysis that emphasise leadership behaviours specifically.

However, limited studies were found in the literature that focus on leadership behaviours and Lean Six Sigma. One study focused on leadership characteristics that facilitate the use of Lean Six Sigma, see Laureani and Antony (2017). However, identifying characteristics and traits alone are not enough to develop a competent leader. The role of leaders' behaviours have since been highlighted as critical for effective Lean Six Sigma (Mann, 2009; Tortorella, van Dun and de Almeida, 2019; Womack and Jones, 2003). Nevertheless, Tortorella, van Dun and de Almeida (2019) focused on analysing leadership behaviour variation over time, either task-oriented or relation-oriented, without identifying each bundle's specific behaviours. Furthermore, Camuffo and Gerli (2018) identified a group of management behaviours from the literature that creates value in the Lean environment, and then conducted descriptive statistics and a correlation analysis to know the level of adoption of these management behaviours in Lean operations. In light of that, Tortorella, van Dun and de Almeida (2019) and Camuffo and Gerli (2018) did not identify new behaviours from the field study; they just relied on previous literature and measured the intensity and presence of these leadership behaviours. Moreover, van Dun, Hicks and Wilderom (2017) identified a group of values and behaviours of Lean leaders from the literature and participants. Van Dun and her colleagues relied on a set of predefined values and

behaviours to be evaluated and asked participants to suggest more values and behaviours. However, Van Dun and her colleagues did not explain why/how these values and behaviours facilitate Lean and did not ask the participants in the interviews to give explanations. The interviews were conducted just to suggest values and behaviours based on participants' opinions and corroborate and refine the list of values and behaviours. Thus, the methodology that was used has some limitations such as lack of explanations of identifying these behaviours and values, lack of explanations of how these behaviours and values might facilitate effective Lean management, and focus on the statistical side just to know what is most highly ranked. Moreover, Aij, Visse and Widdershoven (2015) identified three lean leadership characteristics in healthcare. However, interviews conducted with only six participants revealed that the findings refer to just one hospital. Aij and his colleagues adopted an ethnographic approach; they stated that their study was based on the authors' personal experiences. These issues may affect the reliability of the study results. However, van Dun, Hicks and Wilderom (2017) and Aij, Visse and Widdershoven (2015) used methodologies that have some limitations; in light of that, the perceived result did not give explanations for the behaviours that identified. Despite that, Loh, Mohd Yusof and Lau (2019) conducted a review of the literature to identify leadership behaviours for Lean implementation. This study just focused on the previously published literature and did not give clear explanations of how leadership behaviours are categorised. Goodridge et al. (2015) conducted a study in the health sector in Canada to know how Lean changes leadership practices. Goodridge and his colleagues focused on how Lean implementation may change leadership, but they did not identify the required leadership behaviours and practices for achieving effective implementation.

However, the current study follows the first studies linking leadership behaviours and Lean Six Sigma together, which also seeks to find explanations about how leadership behaviours facilitate the Lean Six Sigma process. The following section clarifies the knowledge gap in this research area.

2.8 The Jordan context

Since this study investigates leadership behaviours that enable the effective use of Lean Six Sigma in Jordan as a case study. This section provides an overview about

Jordan context and the use of Lean Six Sigma in Jordan, which enhance readers and the researcher understanding about the case that has been chosen for this study.

2.8.1 Background information about Jordan

First of all, the full name of Jordan is the Hashemite Kingdom of Jordan. The name of Jordan refers to the Jordan River, which passes on its western border. Jordan is located on the north of the Arabian Peninsula and West Asia. At its northern border is Syria, in the east is Iraq, in the south and south-east is Saudi Arabia, and in the west are Palestine (the West Bank) and Israel, see figure 2-5. Amman is the capital of Jordan (Ministry of Industry Trade and Supply, 2020). The population is more than 10 million people in 2020 (Dpartment of Statistics, 2020). The majority of the population are Arabs, about 98%. The official language is Arabic, while English is the most common foreign language (Ministry of Industry Trade and Supply, 2020). Officially, Islam is the religion of the country account for 94%, while 6% of the population are Christians. The total area of Jordan is about 92.300 square kilometres. The kingdom has several unique places in the world. Jordan has the lowest point in the world is the surface of the Dead Sea, as well as, Jordan has Petra, which is one of the seven wonders in the world.

Figure 2- 5 Jordan map source: (Harahsheh, 2009)

As a developing country, Jordan seeks to develop its manufacturing and improve competitiveness in local and global markets. In turn, Jordan's joined the World Trade Organisation (WTO) in 2000. Jordan's government support the domestic industry to enable it to compete worldwide. In 2019, there was an increase in the number of industrial and commercial firms by 25%. Also, in the same year, the volume of exports was increased by 8.2% (Ministry of Industry Trade and Supply, 2020). These statistics give an insight that Jordan economy and manufacturing are flourishing. The kingdom considers an attractive and unique investment climate for Arab and foreign investors because of its stability, security, distinguish geographical location, Free Trade Agreements FTAs that give easy access to the international markets, and skilful and qualified workforce (Jordan Industrial Estates Company, 2020). In 2014, Jordan developed the 2025 Vision to develop the private sector to be more dynamic and competitive globally; the government announced policies and processes that seek to achieve this objective (Department of Lands and Survy, 2020). Overall, industry sectors have achieved important success in the technical and economic fields in Jordan (Al-jawazneh, 2015). Even though Jordan faces some pressure in its economy due to Syrian refugees, who constitute one-fifth of Jordan's population, some tools and

techniques such as Lean might influence the economy positively (Sweis, Hiyassat and Al-Hroub, 2016).

2.8.2 The use of Lean Six Sigma in Jordan

The researcher has reviewed several papers that give an insight into the use of Lean Six Sigma in Jordan. This review is very beneficial since the reader and the researcher should be aware of the Jordanian context, which reflects an example of developing countries context in the Middle East. In turn, collecting evidence about using Lean Six Sigma in Jordan can give information about to what extent Lean Six sigma is applied in Jordan and give insight about the manufacturing context in Jordan.

Lean Six Sigma practices seek to achieve operational excellence through continuous improvement (Laureani and Antony, 2019). According to Al-jawazneh (2015), the Jordan industry has a significant ability to compete globally and successfully through current Lean practices in manufacturing firms. Many studies have been investigated the implementation of Lean bundles such as Just in Time (JIT), Total Quality Management (TQM), human resource management (HRM), and total productive maintenance (TPM) in Jordan (e.g. Al-Hyari et al., 2016; AL-Tahat and Jalham, 2015; Alkhaldi and Abdallah, 2019; Kanamori, Shibanuma and Jimba, 2016; Kaylani, Almuhtady and Atieh, 2016). These studies found that TQM positively influences quality performance, and the JIT bundle affects operational performance efficiency (Alkhaldi and Abdallah, 2019). Another study investigated the 5S tool that suggested 5S is a starting point for improving health care quality in Jordan (Kanamori, Shibanuma and Jimba, 2016). Al-Hyari et al. (2016) corroborated with this view that Lean bundles such as JIT, TQM, and human resources management are effective to improve organisation performance in Jordan. According to Shrafat and Ismail (2019), the most commonly used tools of Lean management in Jordan are 5S, total preventive maintenance, and statistical process control.

Furthermore, Jordanian firms adopted ISO certificates as a part of facilitating Lean Six Sigma operations. Researchers in Jordan were curious to know the green manufacturing strategies adopted by ISO 14001 certificate holders; the researchers found three main strategies applied in the manufacturing sector, namely: agile environment, care-taker environment and Lean environment (Migdadi and

Elzzqaibeh, 2018). Another study that investigated one of ISO certifications has developed a model of Lean Six Sigma practices to facilitate ISO 5001 implementation in the pharmaceutical sector (Mkhaimer, Arafeh and Sakhrieh, 2017). This presents that Jordanian organisations concerns about ISO certifications. Salem et al. (2016) point out that the awareness about Lean manufacturing correlated more with ISO-certified companies since some of ISO standards overlap with Lean manufacturing principles. However, other studies investigated Six Sigma bundles; researchers found that Six Sigma positively affects organisations' performance in Jordan (Refaie and Hanayneh, 2014).

Using Lean tools has shown positive outcomes on organisations in Jordan in achieving quality, delivery, and cost reduction while having the least impact on customer focus (Suifan, Alazab and Alhyari, 2019). Another study found that Lean practices in Jordan positively impact the manufacturing sector in different dimensions, namely, product quality, reduce unnecessary processing, conforming to quality standards, reduce defects, and less interruptive breakdowns (Al-jawazneh, 2015). Nimeh, Abdallah and Sweis (2018) supported this view that all Lean practices significantly influence supply chain management practices and the market performance of manufacturing organisations in Jordan. Furthermore, implementing lean manufacturing influences operational performance and business performance positively and significantly (Shrafat and Ismail, 2019). Overall, the level of lean practices in Jordan is excellent regarding total quality management bundle, good in human resources bundle, and acceptable in the just in time bundle (Alkhaldi and Abdallah, 2019).

Jordanian manufacturing firms are concerned about implementing and using Lean Six Sigma in their organisations to get its benefits (Alkunsol et al., 2019). Alkunsol and his colleagues found a strong relationship between Lean Six Sigma and business performance; in other words, implementing Lean Six Sigma can improve all organisations performance in the Pharmaceutical industry in Jordan. Furthermore, Ghaleb, El-Sharief and El-Sebaie (2014) demonstrated that Jordan, as a developing country, showed concern in Lean Six Sigma; the most used factors are time, cost, and defects. A recent study conducted in Jordan identified Lean Six Sigma strategies to improve production performance (Ghaleb, El-Sharief and El-Sebaie, 2014). Therefore, this considerable amount of publishing can be considered evidence of the

maturity of using Lean Six Sigma in the Jordan industry. Also, some of these studies, e.g. (Al-jawazneh, 2015; Nimeh, Abdallah and Sweis, 2018; Shrafat and Ismail, 2019; Suifan, Alazab and Alhyari, 2019), point out the Lean manufacturing and bundles used in Jordan and positively affect the industry, while others, e.g. (Alkunsol et al., 2019; Ghaleb, El-Sharief and El-Sebaie, 2014) prove the positive influence of using Lean Six Sigma in Jordan.

2.9 Research gap

The domain of this research project is about leadership behaviours and Lean Six Sigma. Thus, it addresses the gap between these two main domains. Many organisations seek to implement Lean Six Sigma, while a large number fail to achieve the benefits of implementing Lean Six Sigma successfully (Albliwi, Antony and Lim, 2015). As the literature highlights, leadership plays a vital role in Lean Six Sigma implementation. Thereby, leadership is the main success factor for the successful Lean Six Sigma implementation.

Indeed, the relationship between leadership and Lean Six Sigma has been examined in many studies. The literature reveals that the successful implementation of Lean Six Sigma depends on specific leadership styles (Alnadi and McLaughlin, 2020; Tortorella, Fettermann and Fries, 2016) and, therefore, researchers have studied leadership styles and Lean Six Sigma. However, this domain (leadership styles) has some gaps. Since most of these studies were conducted theoretically, few of them were conducted empirically.

However, there are some challenges that leaders still face in implementing Lean Six Sigma effectively. This issue may be because leadership behaviours are still not clearly identified and need more research to become a well-established discipline with some explanations. Regardless of the importance of leadership behaviours, few researchers have investigated the effective leadership behaviours for Lean Six Sigma. Therefore, there are knowledge gaps in this domain of leadership behaviours that facilitate the effective use of Lean Six Sigma. However, the central research gap that this study responds to is clarified in the following paragraph.

Studies that are similar to this research project are scarce. However, a few studies have begun focusing on leadership behaviours and Lean Six Sigma. For instance, Camuffo

and Gerli (2018) and Loh, Mohd Yusof and Lau (2019) identified a group of management behaviours from the literature that creates value in Lean implementation. However, only a limited number of studies have tried to identify leadership behaviours by conducting field studies (Aij, Visse and Widdershoven, 2015; Goodridge et al., 2015; Tortorella, van Dun and de Almeida, 2019).

However, studies can extend the research on leadership and Lean Six Sigma to different cultures, since a national culture can influence the implementation of Lean Six Sigma (Kull et al., 2014; Laureani and Antony, 2019). Laureani and Antony (2019) demonstrated that some geo-cultural issues influence Lean Six Sigma; this can be a key research direction, since most studies focused on Brazil, Italy, Netherlands, and Canada.

Overall, the researcher of this study aims to clarify the knowledge gaps observed in the literature. The following points summarise these gaps that this study will respond to fill:

- First of all, there is a lack in studies that address leadership behaviours and Lean Six Sigma.
- Moreover, the previous studies did not clearly explain how specific leadership behaviours help facilitate Lean Six Sigma.
- Furthermore, there is a scarcity of studies that tried to develop a framework. This study aims to fill these gaps observed in the literature.
- Thus, this research is among the first to develop a framework and investigate the leadership behaviours that facilitate Lean Six Sigma.
- Also, this study adopted a unique methodology in this research area to identify leadership behaviours and explain how it facilitates the effective use of Lean Six Sigma.
- The researcher decided to take Jordan as a case study that would reflect different cultures and contexts, since Jordan is a developing country in the Middle East. Also, similar studies in this area were scarce in developing countries and Jordan.

2.10 Conclusion

The researcher observed that the literature mainly focused on situational leadership style (task-oriented and relation-oriented behaviours) in investigating Lean Six Sigma. However, contextual variables are considered as a factor affecting leader behavioural orientation and Lean implementation, whereas the big team size inhibit Lean implementation effectively. Although there is considerable attention on Lean, the extent to which leadership styles are relevant to Lean Six Sigma has not yet been properly investigated. Some researchers have neglected to study Lean Six Sigma, while others have started studying Lean Six Sigma with other factors as mentioned previously. This encourages researchers to take a further step in studying Lean Six Sigma.

However, the review concentrated upon published literature relating to leadership and Lean Six Sigma. A thematic analysis was conducted on the previous literature, which helped in identifying the relevant aspects and associating the behaviours with specific aspects. The findings replicate and expand the findings on leadership aspects through focussing specifically on identifying the appropriate behaviours. This chapter also provides an understanding of and analyses how leadership behaviours would support the Lean Six Sigma process, which will help in developing a framework for leadership behaviours that facilitate Lean Six Sigma. Moreover, this chapter reveals the complexity in the different leadership behaviours that enable Lean Six Sigma. Although the researcher categorised each behaviour into a specific aspect, some behaviours appear across aspects. Moreover, while specific behaviours might seem similar, their effects can differ significantly. To illustrate that, the Gemba Walk is a behaviour that supports continuous improvement. Also, it helps in coaching and developing employees. Further, the Gemba Walk helps in motivating employees by demonstrating care and recognition; it positively affects developing and maintaining relationships. From this evidence, it is clear that the Gemba Walk behaviour affects and is related to most of the aspects, namely, communication, continuous improvement, coaching and developing employees and motivating employees. The Gemba Walk, therefore, is one of the key behaviours for Lean Six Sigma implementation. However, some behaviours do not appear across all the emerged

aspects; for example, delegating decision-making, power and responsibility are related mainly to the employee empowerment aspect.

It is important to note that the Lean Six Sigma literature almost unanimously considers the seven key aspects that emerged in this study as the fundamental aspects for Lean Six Sigma implementation. However, this study analyses the literature without focussing on a specific study. New themes have emerged from this analysis that emphasises leadership behaviours specifically. The results show that the organisation should have the vision to use Lean Six Sigma, then they can align the goals that help in achieving this vision. Communication can be considered as an essential background to enable other aspects to work effectively. In addition, the leader should build a culture of continuous improvement and coach and develop the employees. To sustain a Lean Six Sigma operation, top management should demonstrate commitment and support. Also, motivating the employees is necessary to increase their commitment, which in turn helps in achieving progress in Lean Six Sigma implementation. After achieving progress which means the employees are both aware and competent, the leader can empower the employees with decision-making and taking responsibility.

CHAPTER THREE
RESEARCH METHODOLOGY

3. CHAPTER THREE

3 Research methodology

This chapter is considered as the key chapter for the whole thesis. It provides detailed descriptions of why the researcher chooses specific approaches and how they can be adopted. The chapter starts by demonstrating the researcher's philosophy reflected in this study and describes the research design by demonstrating the research approaches, available methodology, and available methods. Clarifications are then provided about the grounded theory methodology by demonstrating the characteristics, misconceptions, different approaches, elements, and data analysis approach for the grounded theory. Since this study is qualitative, three tools are adopted to collect data in this research project. The reasons for choosing these tools and how these tools are adopted are also explained. The last sections show the issues considered to conduct rigorous research.

3.1 Philosophical position

Research philosophy is a system of assumptions about the development of new knowledge (Saunders, Lewis and Thornhill, 2019). Research philosophy enables a researcher to examine core assumptions about reality (Bell, Bryman and Harley, 2019). These assumptions are related to researcher ontology and epistemology (Saunders, Lewis and Thornhill, 2019). The assumptions also reflect the researcher's understanding of research questions, study methods, and how the researcher interprets research findings (Crotty, 1998). Determining assumptions is significant because it helps researchers to articulate existing knowledge and determine how it can be studied. Researcher assumptions about ontology and epistemology are critical for management research quality, since they are the main concern in the research design and its evolution (Easterby-Smith et al., 2018). Accordingly, the researcher should be aware of the reflection between the philosophical position and how researcher undertakes the research (Saunders, Lewis and Thornhill, 2019). The essence of ontology, epistemology, methodology, and the methods and techniques is summarised in Figure 3-1. However, there are five major philosophies in management research (Saunders, Lewis and Thornhill, 2019), as shown in Table 3-1.

Table 3-1 Comparison of the five research philosophies Source: Saunders, Lewis and Thornhill (2019, p 144)

Philosophies	**Ontology** (nature of reality or being)	**Epistemology** (what constitutes acceptable knowledge)	**Typical methods**
Positivism	- Real, external, independent - One reality only - Well-organized	- Scientific method - Observable and measurable facts -Law-like generalisation - Numbers - Causal explanation and forecast as a contribution	- Usually deductive, highly structured, large samples, measurement, usually analysis of data by using a quantitative method, but a range of data can be analysed
Critical realism	- Stratified/layered (the data, and the real) - External, independent - Objective structures - Causal mechanisms	-Epistemological relativism -Knowledge historically situated and transient -Facts are social constructions - Historical causal explanation as a contribution	- In-depth, a historically situated analysis of pre-existing structures and emerging agency -Range of methods and data types to fit the subject matter
Interpretivism	- Complex, rich - Socially constructed through culture and language - Multiple meanings, interceptions, realties	- Focus on narratives, stories, perceptions and interpretations. - Theories and concepts are too simplistic.	- Usually inductive. - Small samples, in-depth investigations, qualitative methods of analysis, but a range of data can be analysed.

	- Flux of practices, process, and experiences	-New understandings and worldviews as a contribution	
Postmodernism	- Nominal - Complex, rich - Socially constructed through power relations - Some meanings, interpretations, and realties are dominated and silenced by others - Flux of practices, process, and experiences	- What is considered as truth and knowledge is decided by dominant ideologies - Focuses on silences, absences and opposed meanings, interpretations, and voices - Exposure of power relations and challenge of dominant views as a contribution	- Usually deconstructive-reading texts and realities against themselves - In-depth investigations of anomalies, silences and absences - Range of data types, usually a qualitative methods of analysis
Pragmatism	- External, rich, complex - Reality is the practical consequences of ideas - Flux of practices, process, experiences	-Practical meaning of knowledge in a specific context - True theories and knowledge are those that enable successful action -Focus on issues, practices and relevance - Problem solving and informed future practice as a contribution	- Following research problem and research question - Range of methods: mixed, multiple, qualitative, quantitative, and action research - Focus on practical solutions and findings

Philosophical assumptions can be scattered along with a multidimensional set of continua between two opposing extremes: objectivism or subjectivism (Niglas, 2010; Saunders, Lewis and Thornhill, 2019). Ontology describes the researcher beliefs on the nature of reality, whether these assumptions are an objective that assumes reality exists and there is a single reality or a subjective that assumes no single reality because people have a different perception of social phenomena (Flowers, 2009). Social constructionism is a less extreme version of subjectivism (Saunders, Lewis and Thornhill, 2019). The idea of constructionism is that reality is constructed through social interaction in which people construct shared meanings and realities (Crotty, 1998; Saunders, Lewis and Thornhill, 2019). In other words, people who determine reality through their interactions rather than determining reality through objective and external factors (Easterby-Smith et al., 2018).

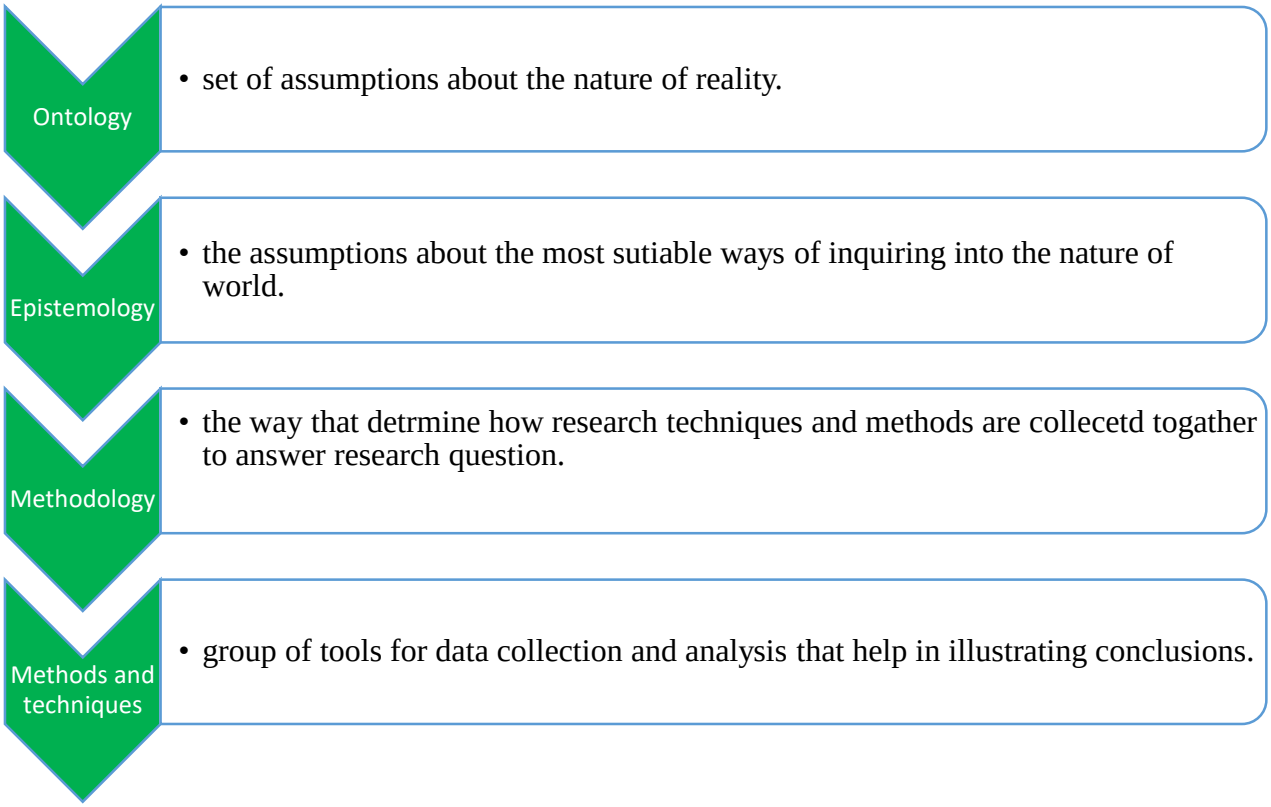


Figure 3-1 Philosophical terms Source: Easterby-Smith et al. (2018)

Recently, Bell, Bryman and Harley (2019) pointed out that this term constructionism refers to making social phenomena real through the research process. When

researchers study social phenomena, they assign meaning to the phenomena, and this assignment of meaning constitutes the reality of study (Bell, Bryman and Harley, 2019). Easterby-Smith et al. (2018) point out that constructionism significantly focuses on how the social actors make sense of their daily interactions with others; social actors can also make sense of the world by sharing their experiences with others.

However, interpretivism is usually linked to a social constructionist ontology (Bell, Bryman and Harley, 2019); this epistemology is in contrast to positivism. Positivists assume that one reality exists, and it is the researcher role to discover it (Mertens, 2014). Positivists consider that knowledge is objective, and the knowledge is developed by examining empirical evidence and testing hypotheses to generate a formal law (Hjorth, Holt and Steyaert, 2015). Positivism aims to explain people's behaviour, while interpretivism is mainly interested in understanding people's behaviour (Bell, Bryman and Harley, 2019).

However, interpretivism considers that there are multiple realities (Denzin and Lincoln, 2018). Interpretivism aims to create a new understanding and interpretations of social phenomena, since business researchers looks at the organization from the perspective of different social actors (Saunders, Lewis and Thornhill, 2019). The writer in this study would use a triangulation technique which gathers multiple perspectives of diverse individuals and observers, in turn, increasing confidence in the accuracy of observations (Easterby-Smith et al., 2018).

3.2 Available approach

This section demonstrates several approaches, methodologies, and methods available for this exploratory study. These wide available choices make the researcher take consideration into the differentiation among these choices to select the most suitable. This section also demonstrates why choosing and adopting a particular approach, methodology, and method for this research project.

3.2.1 Research approach

Deductive and inductive are two main research approaches for theory development that are linked to researcher ontology and epistemology (Saunders, Lewis and Thornhill, 2019). The *deductive* approach is the most common in social research,

whereby the researcher tests the hypothesis or hypotheses (Bryman, 2016). Based on what is known about the study area or context and its theoretical considerations, the researcher deduces hypotheses that should be subjected to empirical scrutiny (Bell, Bryman and Harley, 2019). The deductive approach is helpful for establishing causal relationships between variables (Easterby-Smith et al., 2018). This deductive approach is compatible with the positivist paradigm.

Whereas the *inductive* approach aims to develop a theory generated from research findings (Bryman, 2016). This approach focuses on participants' interpretations and their experiences. The inductive approach tends to be used in interpretive research and is rooted in qualitative research (Saunders, Lewis and Thornhill, 2019). The inductive approach help in creating theory from the research. Corley and Gioia (2011) state that "theory is a statement of concepts and their interrelationships that shows how and/or why a phenomenon occurs". Furthermore, Bell, Bryman and Harley (2019, p.19) "identified theory as a way of explaining observed patterns of associations between phenomena". Therefore, this research project adopts an inductive approach to develop a theory based on participants' perspectives.

3.2.2 Available methodology

Since the researcher selected qualitative method for conducting this research, it would consider the available qualitative methodology suitable to this research. According to Gehman et al. (2018), there are various available approaches to theory building in qualitative research. Teherani et al. (2015) pointed out three approaches commonly used to frame qualitative research, whereas research question determines the appropriate choice of them. The main approaches are ethnography, grounded theory, phenomenology, and action research, see Table 3-2.

Table 3- 2 Determining the suitable methodology for this study

Approach	Aim	Appropriateness
Ethnography	Developing an in-depth understanding of the culture or social world of a group. Researchers understand a context from the point of view of the study subjects through immersion in that setting	It does not help generate theory; it focuses on understating an organization as a cultural entity. Moreover, it tends to interpret ethnographic differentiation. This approach makes

	over an extended period of time.	researchers spend more time in the field and be full-time member to understand the culture under study**.**
Grounded theory	It is developing a theory grounded in study data that is systematically analysed.	This approach is the most appropriate because it complies with the research aim. In addition, this approach enables the researcher to build a theoretical framework that would apply to other contexts with similar social settings.
Phenomenology	Describing the essence of a phenomenon by exploring it from the perspective of those who experienced it to understand the meaning participants ascribe to that phenomenon. Thus, this approach studies people's experiences.	It focuses on people's experiences. However, this research does not focus on leaders' experiences and investigates any phenomenon.
Action research	Working with a group to develop plans to make (implement) changes and evaluate those changes within that group of people**.**	This study does not seek to implement changes among leaders and evaluate how they respond and does not observe if leaders change their behaviours.

Reality is observed as being socially constructed through people's meanings to their actions and experiences in a particular workplace (Saunders, Lewis and Thornhill, 2019). Thus (in that), grounded theory is suitable to this research because the grounded theory is considered a process to analyse and interpret the meaning that people construct to make sense of everyday actions and experiences in a particular workplace (Charmaz, 2014; Suddaby, 2006). Furthermore, grounded theory aims to build theory, while phenomenology aims to describe. Therefore, grounded theory is a suitable methodology for exploring theorising people and social life (Charmaz, 2017a).

3.2.3 Available methods

Quantitative, qualitative, and mixed methods are the available methods in management research (Johnson, Onwuegbuzie and Turner, 2007). The inductive approach is rooted in qualitative research (Saunders, Lewis and Thornhill, 2019). This research method focuses on individual interactions and experiences of the research participants (Creswell et al., 2003). Bell, Bryman and Harley (2019) defined *qualitative research* as a research strategy that can be used to collect and analyse data that is represented through words and pictures and analysed using thematic exploration. Conversely, quantitative data is represented through numbers and analysed by using statistical tools (O'leary, 2017). However, Greener (2008) points out that the qualitative approach is connected with an inductive approach to creating theory. Qualitative researchers, in general, subscribe to inductive, constructionist, and interpretive positions (Bell, Bryman and Harley, 2019). In that, the researcher in this study depends on qualitative methods which can help the researcher to gather sufficient data from participants to construct a theoretical framework. See Table 3-3, which shows the reasons for choosing the qualitative method.

Table 3- 3 Fundamental differences between quantitative and qualitative research
Source: Bryman (2016)

	Quantitative	**Qualitative**
The role of theory in relation to research	Deductive; testing of theory	Inductive; generation of theory
Epistemology-orientation	Positivism	Interpretivism
Ontology-orientation	Objectivism	Constructionism

3.3 The researcher perspective with justifications on chosen methods

This section provides justifications for chosen methods for this study. This research seeks to identify the leadership behaviours that enable the successful use of Lean Six Sigma. After the explanations in section 3.1, the research design becomes more explicit. The first justification is around the chosen philosophy. The researcher's ontology and epistemology are *constructionism* and *interpretivism*, respectively. The reason for choosing this paradigm is that the researcher is interested in different opinions and narratives from different people that can help account for different social realities

(Saunders, Lewis and Thornhill, 2019). People who determine reality through their interactions rather than determining reality through objective and external factors (Easterby-Smith et al., 2018). Moreover, reality is socially constructed through people's interactions. Therefore, leaders' behaviour can be treated as a social construction. This idea implies that leader behaviour is constructed as something whose meaning is built up during interaction.

This study focuses on leadership behaviour; the leaders' behaviours are a product of their interaction with the environment. Leaders may interpret the situation differently based on leaders' views of the world. This differentiation in perception and interpretation may influence leaders' behaviours and practices. Easterby-Smith et al. (2018) point out that constructionism significantly focuses on how the social actors make sense of their daily interactions with others; social actors can also make sense of the world by sharing their experiences with others. As constructivism ontology, it is the researcher's role to seek to understand the different realities of leaders' behaviours in order to be able to make sense of their behaviours in the way that forms a clear image. The constructivism researcher's view is that leaders' behaviour is constructed through the social interactions between leaders and employees. Social constructionism is selected for this research for many reasons, as demonstrated by Easterby-Smith et al. (2018):

1. Human interests are the core drivers of science.
2. The researcher is part of what is being researched.
3. Explanations aim to enhance the main understanding of the situation.
4. Research progresses by gathering rich data, from which ideas are stimulated.
5. Concepts should reflect stakeholders' perspectives.
6. Units of analysis would consider the complexity of whole situations.
7. A generalisation is possible through theoretical abstraction.
8. Sampling requires a small number of suitable cases.

Furthermore, the researcher adds justifications for choosing interpretivism. First of all, interpretivism is usually linked to a social constructionist ontology (Bell, Bryman and Harley, 2019). Since the ontology of this research considers the differences between leaders, the researcher should grasp the subjective meaning of social action (Bell, Bryman and Harley, 2019). Grasping the subjective meaning can be accomplished by interpretivism because of its focus on how people attempt to make sense of the world.

Moreover, interpretivism is a suitable epistemology for this research because social interaction involves people's behaviours, which require a logical interpretation (Eden and Huxham, 1996). Interpretivism also aims to create a new understanding and interpretations of social phenomena, since business researchers looks at the organization from the perspective of different social actors (Saunders, Lewis and Thornhill, 2019).

See Figure 3-2, which shows the researcher's philosophy.

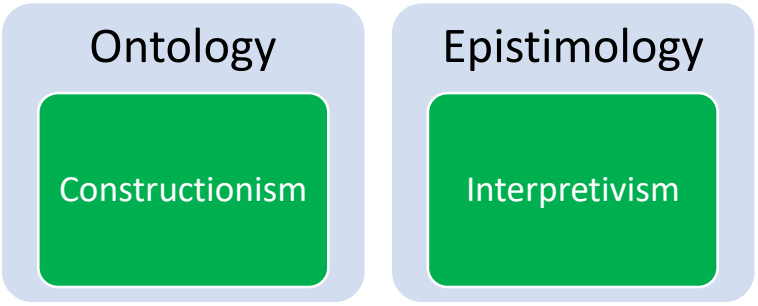


Figure 3- 2 Researcher philosophy

The researcher selected *the inductive approach* and *qualitative method*, which are explained in sections 3.2.1 and 3.2.3. The inductive approach allows theory to evolve during the research (Bryman, 2016). In that, an inductive approach is a suitable approach since this study developed a theory. Integrating the research approach, method, and assumptions is important to produce rigorous and coherent research (Teherani et al., 2015). Hence, approaches and tools in qualitative research should be customised to establish the links between methods and theory (Gehman et al., 2018). Also, inductive tends to be suitable for the interpretive research, where the research paradigm chosen for this study was interpretive (Creswell, 2013). This study focuses on identifying leadership behaviours, and the inductive approach is significant in studies in which human behaviour is the primary element (Ibrahim, 2013). However, the inductive approach is rooted in qualitative research (Saunders, Lewis and Thornhill, 2019). Qualitative research seeks to understand a particular situation from the perception of individual who experienced it (Alkhoraif, 2018). Qualitative research also allows the researcher to preserve the complexities of people's behaviour by adopting a holistic perspective (Alkhoraif, 2018). Another justification is that qualitative research is used to discover and interpret the meaning and perceptions of social interactions. Also, it can be used to collect and analyze data that are represented through words.

However, the research methodology for this research is *grounded theory*, which helps to explore and explain the leadership behaviours that comply with Lean Six Sigma. The grounded theory is a guideline for collecting and analysing qualitative data to develop a theory that is grounded in data produced from the accounts of social actors (Bryman, 2016; Charmaz, 2014). The justifications around using grounded theory in this study. This approach enables the researcher to build a theoretical framework; since the aim of this research to develop a framework. Moreover, helping in exploring and explaining how the leadership behaviours comply with Lean Six Sigma. It gives the researcher a systematic and emergent approach to collecting and analysing qualitative data (Charmaz and Belgrave, 2018). Furthermore, the grounded theory is used to get and develop understandings and explanations about leadership behaviours. This research methodology enables the researcher to get explanations from participants about their everyday activities and to develop a framework for leadership behaviours that facilitate Lean Six Sigma. The mean feature of grounded theory helps develop categories that highlight the data and then develops these categories to create a framework (Corbin and Strauss, 2008). In addition, the reality is observed as being socially constructed through people's meanings to their actions and experiences in a particular workplace (Saunders, Lewis and Thornhill, 2019). Thus, grounded theory is suitable for this research because the grounded theory is considered a process of analysing and interpreting the meaning that people construct to make sense of everyday actions and experiences in a particular workplace (Corbin and Strauss, 2008). However, more details about grounded theory are provided in the next section, 3.4. According to Saunders, Lewis and Thornhill (2019), the tools and techniques that can be used in qualitative research are observation (internet-mediated observation or observation using videography), semi-structured interviews, and in-depth interviews (group, telephone, and internet-mediated interview). Figure 3-3 clarifies the research design; note that the highlighted boxes in green are the researcher's choices.

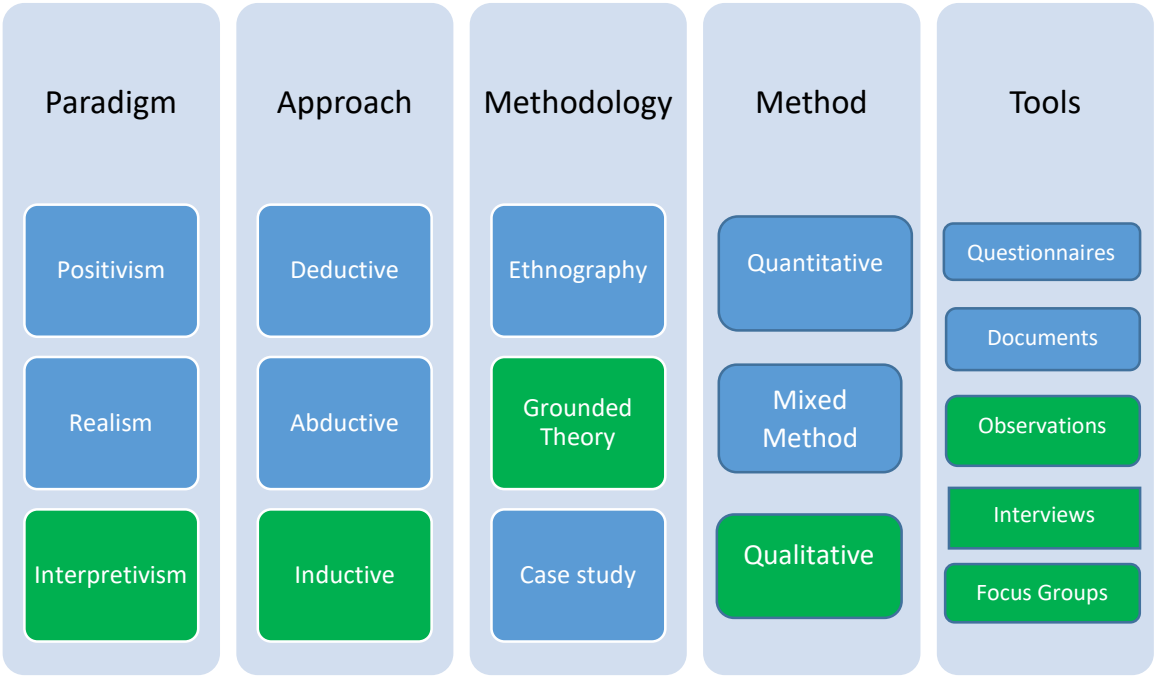


Figure 3- 3 Research design

3.4 Grounded Theory

Glaser and Strauss (1967) developed grounded theory as a contrast to positivism that was used widely by social researchers at that time. They also developed a group of principles and guidelines to conduct grounded theory. As a result, grounded theory has become a common methodology used to develop a theory grounded in data (Ruppel and Mey, 2015). Figure 3-4 shows how theory can be constructed by using grounded theory. Glaser and Strauss (1967) suggested that scientific truth emerged from both the act of observation and developing concordance within a community of observers. Reality is observed as the continuous interpretation of meaning produced by people involved in a common project of observation (Suddaby, 2006). Grounded theory is used to focus on interpreting a process by analysing the real meanings and concepts that are used by individuals in the workplace (Glaser and Strauss, 1967; Suddaby, 2006).

Figure 3- 4 Theory creation through grounded theory Source: Charmaz (2014)

In general, grounded theory aims to generate theory from data rather than testing hypotheses to verify prior theories (Corbin and Strauss, 2015; Greener, 2008). Furthermore, grounded theory aims to elicit new understandings about relationships patterns between individuals and how these relationships and interactions build truth (Glaser and Strauss, 1967). In that, grounded theory can be used to construct theoretical explanations of social interactions in organisations (Saunders, Lewis and Thornhill, 2019). Finally, grounded theory is a process to analyse, interpret and explain the meanings that individuals construct to make sense of their everyday experiences in specific situations (Charmaz, 2014; Glaser and Strauss, 1967; Suddaby, 2006).

3.4.1 Grounded Theory Characteristics

Grounded theory has characteristics that make it unique (Moghaddam, 2006). Grounded theory is widely used in social science research as a qualitative methodology (Golden-Biddle and Locke, 2007). The reasons for this popularity are as follows: it is suitable for developing a new theory or new insights; it generates theory that emerges from what the research participants consider important; and it can expose specific management processes in complex context (Locke, 2001). Grounded theory gives the researcher a systematic and emergent approach to collect and analyse qualitative data (Saunders, Lewis and Thornhill, 2019). The mean feature of grounded theory helps develop categories that highlight the data, then develops these categories to create a framework (Silverman, 2006). Moreover, the grounded theory allows the researcher to explore an unknown context deeply, such as human behaviour (Robson, 2002). Grounded theory helps generate theory from social processes and actions in a specific situation and people experienced in the studied phenomenon (Goulding, 1998). Easterby-Smith et al. (2018) point out that grounded theory is more flexible and preferable when dealing with texts. The strengths of grounded theory, summarised by Guest, MacQueen and Namey (2011), are:

- An interpretation supported by data.
- Useful for studying topics other than individual experiences.
- Suitable for covering the data fully.
- Suitable for smaller data sets.

Furthermore, different grounded theory approaches share similar methodological strategies (Charmaz, 2017b). Saunders, Lewis and Thornhill (2019) summarised common perspectives and strategies that grounded theory authors agreed with:

1- Early beginning of data collection.
2- Concurrent collection and analysis of data.
3- When researchers start collecting and analysing data, they should start developing codes and categories.
4- Use of constant comparison and writing of self-memos to develop conceptualisation and build a theory.
5- Use theoretical sampling and theoretical saturation to build theory rather than achieve population.
6- Initial use of literature as a complementary source to the categories and concepts emerging in the data, rather than as a source to categorise these data.
7- Development of theory that is grounded in the data.

3.4.2 Misconception about Grounded Theory

Different perspectives about grounded theory cause misconceptions for the researchers who commence in using grounded theory. Suddaby (2006) listed six common misconceptions about grounded theory, namely: It is not an excuse to ignore the literature; it is not a presentation of raw data; it is not theory testing, content analysis, or word counts; it is not simply a routine application of the formulaic technique to data; it is not perfect.

3.4.3 Different approach of grounded theory

Since Glaser and Strauss (1967) developed the grounded theory for the first time, these writers of grounded theory took different paths with their distinctive approach to grounded theory (Javadi, 2013). Their differences mainly centred on beliefs about methodological approaches to analyses and the process of theory generation (Heath and Cowley, 2004). On the one hand, Strauss cooperated with Corbin to develop their perspective in their book “basics of qualitative research” (Corbin and Strauss, 1990).

This perspective has been labelled "the reformulated grounded theory" (Hallberg, 2006). Their view of grounded theory looks to be more realistic than Glaser's and includes a rejection of a positivist position (Hallberg, 2006). Corbin and Strauss (1990) argue that reality cannot be completely known but can always be interpreted. Subjectivity enriched the research process because the produced theory is a created "reality", constructed through a transactional process; including the researcher and the data (Hallberg, 2006). Strauss and Corbin suggested three codings: open coding, axial coding, and selective coding (Strauss and Corbin, 1998). Altering this by merging axial coding with open coding and relabelling selective coding as integration coding (Corbin and Strauss, 2008). In 2015, Corbin and Strauss summarised the process of analysing grounded data. Mainly they focused on the role of constant comparison, which involves comparing units of data with other data to see whether these are different or similar. In turn, similar data are grouped using the same code (Corbin and Strauss, 2015).

On the other hand, Glaser (1992) provided further elaboration on grounded theory in his book. His approach is observed as faithful to classic grounded theory (Heath and Cowley, 2004). Hallberg (2006) pointed out that Glaser (2002) looks to assume an objective external "real reality" where the researcher is viewed as a neutral observer. Glaser (2002b, 2002a) pointed out that data just "emerges" without the researcher's intervention. According to Hallberg (2006), Glaser might lean more towards the positivistic paradigm than does Strauss. Table 3-4 shows comparisons between Glaser and Strauss in data analysis. Whereas Table 3-5 provides differences between Strauss and Glaser.

Table 3- 4 Comparison between Glaser and Strauss Source: (Heath and Cowley, 2004)

	Strauss and Corbin	**Glaser**
Initial coding	*Open coding* Use of analytic technique	Substantive coding Data dependent
Intermediate phase	*Axial coding* Reducing and clustering of categories (paradigm model)	Continues with the previous phase. Comparisons, with focus on data, become more abstract,

		categories refitted, emerging frameworks
Final development	*Selective coding* Detailed development of categories, choosing of core, integration of categories	Refitting and refinement of categorise which integrate around emerging core
Theory	Detailed and dense process fully described	Parsimony, scope and modifiability

Table 3- 5 Points of disagreement between Glaser and Strauss Source: Easterby-Smith et al. (2018)

	Strauss and Corbin	**Glaser**
Researcher roles	Active interrogation of data	Maintain distance and independence
Theory	Arises from theorist/data interaction	Emerges from data itself
Ontology	Reality and experience are constructed	World is 'out there'
Pre-understanding	Flexible approach; insights from many sources	Avoid literature from immediate area

However, Charmaz (2000) argued that actual reality exists which can be recreated without being affected by the researcher. Charmaz (2017) pointed out that her idea a constructivist grounded theory (Charmaz, 2014, 2015), differs from previous researchers by: assuming a relativist epistemology; acknowledging a researcher roles; stressing the importance of researcher reflexive stance toward actions, values, relationship with participants; and taking into consideration while conducting the research the historical, social, and situational conditions (Charmaz, 2017a). Charmaz (2014) has introduced a more flexible approach involving two coding stages: initial coding and focused coding. Charmaz (2014) made a distinction between objectivist grounded theory and constructivist grounded theory. She considered the Glaser, Strauss and Corbin approach as being objectivist, which assumes data indicate external reality, just waiting to be discovered.

Nevertheless, Kenealy (2012) suggested that researchers who seek to adopt grounded theory successfully, can choose one approach to this method that the researchers are comfortable with, taking this without over adaptation. Corbin and Strauss (2015) corroborated this view that choosing a particular version of grounded theory to use is related to what extent this version appeals to the researcher. Since, all the different versions of various interpretations of the grounded theory remain used in order to build theory (Corbin and Strauss, 2015).

3.4.4 Grounded theory elements/ tools

There are crucial elements that aid grounded theory development: coding, constant comparison, memo writing, theoretical sampling, theoretical sensitivity, and theoretical saturation (Saunders, Lewis and Thornhill, 2019).

Theoretical sensitivity: the researcher should avoid being sensitised to pre-existing concepts in literature. Theoretical sensitivity means that the researcher must be sensitive to attached meaning in data (Glaser, 1978; Saunders, Lewis and Thornhill, 2019).

Coding: is a key process and element in founded theory. After collecting data, the researcher starts coding data (Bryman, 2016). While a researcher assigns an analytical term to a fragment of data, coding represents or summarises the meaning of that data (Charmaz, 2017b). The researcher use codes that symbolise or summarise the meaning of data, coding can be related to data (such a line, sentence or paragraph in an interview transcript). Coding help in the on-going process of analysis by identifying the properties of data contained in such a data category (Saunders, Lewis and Thornhill, 2019).

Constant comparison: researcher use constant comparison to create categories from the data; this includes coding and analysing data simultaneously (Taylor and Bogdan, 1998). Constant comparison is a process of comparing each collected data item with others and against codes (Bryman, 2016). Comparison constitutes each analytic development stage (Bryant and Charmaz, 2007). The constant comparison involves: comparing incidents applicable to each category, integrating categories and their properties, determining the limits or boundaries of theory, writing the theory (Glaser and Strauss, 1967). Constant comparison aims to check for similarities and differences, promote consistency when coding data, and help the process of analysis

(Strauss and Corbin, 1998). In that, constant comparison aid in reducing and grouping data and codes into meaningful categories (Moghaddam, 2006). Suddaby (2006) pointed out that grounded theory on going iterations of data collection and analysis that produce several ambiguous categorise that over time reduce to fewer, and become clearer conceptual structures. This iterative analytic technique helps to determine if and how data are similar or different from codes. Codes are grouped into categories, and information from categories is abstracted to generate concepts.

Memo writing: memo writing is used to write down notes and ideas during the whole analysis process and theoretical reflections related to each emerging category (Hallberg, 2006). Memo writing comprises of notes about codes, emerging categorise, relationships between these categories, and questions and concerns that may arise along with the analysis (Charmaz, 2017b).

Theoretical sampling: while the researcher is collecting and analysing data, they should decide what to collect next and where to find new participants (Bryman, 2016; Glaser and Strauss, 1967). The developed categories help in indicating the type of new participants to select for more data gathering (Saunders, Lewis and Thornhill, 2019).

Theoretical saturation: theoretical sampling continues until theoretical saturation is reached. This saturation occurs when no new insights, properties, information, dimensions, or relationships emerge during data analysis related to categories or concepts (Moghaddam, 2006; Strauss and Corbin, 1998). In other words, the data do not add new information for developing categories (Creswell, 2002). According to Brown et.al (2002), theoretical saturation is recognised when:

- no new insights can help in emerging a category;
- the category is intense enough to cover variations and process; and
- relationships between categories are well developed and understood.

Utilizing these components of grounded theory implies that the procedure of data collection and analysis becomes increasingly focused, leading to the generation of a contextually based theoretical explanation (Bryant and Charmaz, 2007). Although, as has been discussed in section 3.4.4 that there are different approaches for conducting data analysis in grounded theory, it is worth noting that all subscribe to these elements of grounded theory (Saunders, Lewis and Thornhill, 2019).

3.4.5 Data analysis approach (Coding methods and procedures)

The researcher decided to adopt mainly Strauss and Corbin approach, which suggested two levels of coding: open coding and integration coding (Corbin and Strauss, 2015). Overall, open coding breaks data into units or concepts that stand for the interpreted meaning of raw data. While, selective coding is integrating categories around a core category to develop a grounded theory(Corbin and Strauss, 2015). Grounded theory avoids adopting a priori codes from existing theory (Saunders, Lewis and Thornhill, 2019). These coding processes are explained in the following sections:

Open coding

The collected data is disaggregated into conceptual units and coded with a label (Strauss and Corbin, 1998). The same code will be used for similar units of data. The data dimensions and properties are discovered during this phase, and the concepts are identified (Strauss and Corbin, 1998). Also, in this coding process, researchers identify similarities or differences in data. Concepts represent phenomena related to the subject under study; these are discovered from the data. Properties are the narrowed down characteristics of a category, and dimensions refer to the location or positioning of characteristics across a continuum (Strauss and Corbin, 1998). The data that is conceptually similar to the data in the previous interview is coded using the same conceptual name. The researchers have to learn something about this concept, which enables the researcher to elaborate on its properties and dimensions (Corbin and Strauss, 2015).

Researchers can use techniques for qualitative data analysis that help in conceptualisation and stimulate enquiry, such as basic questions like who, what, when, where, why, and how (Corbin and Strauss, 2015). However, researchers who adopt grounded theory have to look at smaller rather than larger units of analysis in the early stages (Saunders, Lewis and Thornhill, 2019). This process involves conceptualisations that require a researcher to focus on the data detail to identify possible concepts on the level of a few words, a sentence, or a paragraph (Corbin and Strauss, 1990). Charmaz (2014) suggested coding with gerunds rather than coding for themes. Using gerunds makes the coding to be close to the meanings in data and to understand these through the interactions or actions that take place in data. A gerund

is a word that ends in (-ing). Corbin and Strauss (2015) summarised some points in conducting open coding:

- Breaking down data to reflecting that data in memos; these memos enable the researcher to make the necessary linkages between concepts. Also, memos enable the researcher to track of all ideas explored.
- Brainstorming with data to reach for a possible meaning.
- Differentiating between levels of concepts; lower-level concepts (sub-categories) and higher-level concepts (categories).
- Asking questions and making comparisons.
- Developing concepts in term of properties and dimensions.

Selective coding (integration)

The last coding phase is selective coding, which aims to identify one of these principles categories, which becomes known as the core category. The researcher relates the other categories to this with the intention of integrating the research and developing Grounded theory (Corbin and Strauss, 2015). In other words, selecting one category as the core concept and linking all other categories to a particular one. Thus, the researchers' role is to integrate and refine the theory (Strauss and Corbin, 1998). The focus should be on developing and recognising the relationships between core categories in order to develop explanatory theory. Strauss (1987) points out that the researcher can determine if concept qualifies as a core category. This depends if it is sufficiently abstract, it can be used as an explanatory concept linking all the other categories together. Corbin and Strauss (2015) suggested that the researcher can use some techniques to aid integration. These techniques are as follow; writing the descriptive summary memo, writing the conceptual summary memo, making use of integrative diagrams, reviewing and sorting through memos, thinking in terms of metaphors or similes, talking with a professor or colleague.

Corbin and Strauss (1990, p.58) point out to the distinction between the three types of coding is artificial and that "in a single coding session, you might quickly and without self-consciousness move between one form of coding and another, especially between open and axial coding".

3.5 Data collection tools

After being aware about the procedures of data analysis in the previous section; this section provides an overview about collecting data. The researcher has adopted three tools for collecting data, namely interviews, focus groups, and observations. The following sections clarify these tools.

3.5.1 Interviews

Since the research methodology and method for this study are grounded theory and qualitative research, the researcher is used interviews as a tool for collecting data. The interviews help the researcher explore points of interest and clarify and confirm meanings. In turn, the researcher can get valid and reliable data relevant to research questions and objectives (Saunders, Lewis and Thornhill, 2019). Moreover, the researcher chooses this tool in order to get information from and develop understanding about interviewee behaviours, beliefs, and experiences (Rowley, 2012).

Different types of interviews are available, namely structured interviews, semi-structured interviews, and in-depth interviews. The *structured interview* looks like a questionnaire; the researcher asks predetermined questions that are standardised. Also, the answers are predetermined (Denscombe, 2014). Whereas, in the *semi-structured interviews,* researchers have predetermined themes or some main questions related to these themes (Saunders, Lewis and Thornhill, 2019). The order and the level of adaptation of questions depend on conversation flow (Rowley, 2012). This type of interview helps explore themes systematically, allowing the researcher to compare participants' responses to each theme. Since the researcher adopts the interpretive approach (see sections 3.1 and 3.3), new themes may emerge from interviewees' interpretations or the research settings (Saunders, Lewis and Thornhill, 2019). Also, since grounded theory methodology is adopted in this research, semi-structured interviews allow themes to evolve, relying on emerging data from the analysis (Saunders, Lewis and Thornhill, 2019). Another type of interview is an *unstructured interview (in-depth),* which allows the researcher to explore deeply and open up new dimensions and insights. The researcher asks participants about particular instances in their organisation, in turn, the interviewee response by explaining their actions and motives in a specific instance (Easterby-Smith et al., 2018). Therefore, the researcher

can understand the reasons behind specific behaviour and the underlying causes of events. The researcher uses open-ended questions, which helps in discovering the aspects of the workplace (Creswell, 2013).

3.5.1.1 Researcher position for choosing semi-structured and in-depth interviews

The researcher decided to use both semi-structured and in-depth interviews in this research. This choice is for many reasons; some of these are already mentioned in the previous section (3.5.1). Whereas other reasons are mentioned in this section. The purpose of the research; this study is an exploratory study; the researcher is able to infer causal relationships between variables. Also, since the researcher adopts interpretivism philosophy, the researcher wants participants to explain or build on their previous answers. Furthermore, interpretivism researchers seek to understand the meanings that interviewees ascribe to specific phenomena. Therefore, an in-depth and semi-structured interview is the most suitable for open-ended questions (Saunders, Lewis and Thornhill, 2019).

The interview questions should be related to the research question in that the researcher could answer research questions. The question that might emerge is how many interviews the researcher needs to conduct and how the researcher chooses a sample. These questions were answered in the previous section 3.4.4, which is relevant to grounded theory; the researcher described the theoretical sampling and saturation level in that section.

3.5.1.2 General interview concerns

The researcher is aware of being unbiased while conducting the interview, whereas the researcher avoided the questioning process to influence the participants' responses. According to Easterby-Smith et al. (2018), open questions may avoid bias occurrence. Since the in-depth interview aims to understand the underlying meaning and interpret the meaning that people attach to the situation (ibid).

The researcher should take into consideration some practical issues in conducting interviews. These issues are as follow: obtaining trust, being aware of social interaction, using the suitable language and attitude, getting access (permission to conduct the interviews), choosing the location of the interviews, and recording interviews (Easterby-Smith et al., 2018).

These interviews are triangulated with other tools: focus groups and observations. The following sections 3.5.2 and 3.5.3 are providing descriptions for these tools.

3.5.1.3 Conducting semi-structured and in-depth interviews

Saunders, Lewis and Thornhill (2019) suggested that researchers who will conduct interviews should take consideration of these aspects in order to increase research quality:

- Suitability of researcher appearance at the interview;
- Nature of researcher comments to open the interview;
- Approach to questioning; ensuring the research questions have been phrased clearly, avoiding the questions that may lead the interviewee, and trying to avoid theoretical concepts.
- Formulating suitable questions to explore areas;
- Nature and impact of researcher behaviour during the interview;
- Demonstration of attentive listening skills;
- Scope to summarise and test understanding; the researcher can summarise responses provided by the interviewees to confirm his/her summary is adequate.
- Dealing with difficult participants; the researcher should stay polite and do not show any irritation.
- Approach to recording data; it is beneficial to audio-record an interview and makes notes as it progresses. Also, the researcher should record the contextual variables.

These points have to reduce the probability of bias occurrence in the interview and would increase the reliability of the information obtained. Other points related to interviews rigours are clarified in section 3.6.

3.5.2 Focus groups

A *focus group* is a tool used to collect data that involves a discussion between a small group of participants about a particular topic (Wilkinson, 2003). The researcher uses the focus group once the topic to be explored is accurately defined. In this tool, the role of the researcher is to facilitate the discussion among participants rather than lead the discussion (Carson et al., 2001; Krueger and Casey, 2015).

Choosing participants for focus group are often for a specific purpose, such as researcher believes that he will learn from those specific people who are information-

rich (Krueger and Casey, 2015). After selecting the suitable individuals, participants should be grouped in a way to facilitate each individual's possible contribution, encourage every person in a group to participate, and conduct that in a neutral place where participants feel relaxed (Saunders, Lewis and Thornhill, 2019). The researcher should plan to have three or four groups; this depends on reaching saturation; when the researcher is no longer receiving new information, the researcher has heard the full range of ideas (Krueger and Casey, 2015). The focus group comprises from four to twelve participants; the exact number depends on the nature of the participant, topic matter and the interviewers' skills (Saunders, Lewis and Thornhill, 2019).

In order to analyse data collected from focus groups, constant comparison can be used, which was developed in grounded theory research (Leech and Onwuegbuzie, 2007, 2008; Onwuegbuzie et al., 2009). For more details about constant comparison, see section 3.4.4.

3.5.2.1 Reasons for using focus groups

The main advantage of a focus group is allowing participants to hear others' views, which stimulate participants to respond as the discussion develops. Using a focus group helped in that the participants refined the factors, named categories, provided data related to each category, and suggested leadership behaviours. Further benefits of using focus groups are efficient since it saves time and money for obtaining data from different participants (Krueger and Casey, 2015). Another merit of this tool is that participants can feel safe sharing information because of the sense of belonging to a group (Onwuegbuzie et al., 2009; Vaughn, Schumm and Sinagub, 1996). The interactions among participants can help in getting essential data, as well as participants responses, are more spontaneous (Butler, 1996; Onwuegbuzie et al., 2009).

From the interpretivism researcher view, the focus group is used to construct meanings through social interactions and make sense of a topic. Researchers use this tool to the ability to analyse how participants' interactions and group dynamics lead to the construction of shared meaning (Belzile and Öberg, 2012). Furthermore, this tool helps the researcher develop an understanding of why people feel the way they do. Participants can highlight the issues that they see as significant about the given

topic. Participants can argue and challenge each other's views. This tool helps in being aware of how individuals collectively make sense of a phenomenon and construct meanings around it (Bell, Bryman and Harley, 2019).

The researcher used focus groups to develop study findings, which will end up with a framework of leadership behaviours. However, participants are not used to planning and implementing change. The researcher did not work on implementing actions and evaluating it. In other words, the researcher did not work with them to make changes.

Focus groups are used simply as a data source and to refine and develop (aspects, themes) data that works to enhance triangulation; it reinforces what the researcher got from other sources. The first focus group will be asked to group aspects into themes. Then, the researcher looks for behaviours that would create an ideal position. In that, for the second focus group, the researcher will ask participants: "for these themes, what do you suggest to create the ideal position for these themes? In other words, what behaviours do you propose to create this ideal position?"

3.5.3 Observations

Since this study expletory study that concern on what leaders do and how they interact, a suitable way to discover that is by listening and watching them do it. This tool involves the following processes: the systematic viewing, recording, description, analysis and interpretation of people behaviours in a given setting (Saunders, Lewis and Thornhill, 2019). *Observation* is a method of watching, paying attention to, and recording activities, events, and conditions (Schensul, Schensul and LeCompte, 1999). Observation methods can be structured observation or participant observation. *Structured observation* is useful for gathering quantitative data that focus on the frequency of actions, "what rather than why". In comparison, *participant observation* is useful for gathering qualitative data that concerns discovering the meanings that people attach to their actions (Angrosino and Rosenberg, 2011). *Participant observation* involves fieldwork description of behaviours, interpersonal interactions, and actions of observable human experience (Taylor, 2005). The role of a researcher can vary from full participation to passive, where the researcher observes from the margin (Angrosino and Rosenberg, 2011). Collecting data is supplemented by interviewing informants and discussing findings with them. In order to conduct

participants observation process, researchers may consider analysing their data using the Grounded Theory (Saunders, Lewis and Thornhill, 2019). There are some advantages of participant observation compared to qualitative interviewing: seeing through others' eyes, learning the native language, the taken for granted, and the ability to observe behaviour (Bryman, 2016).

During the observations, the interactions between managers and subordinates were observed. The researcher has made notes to record observations that describe social interaction in the work setting. Observations were accomplished during the data collection and helped in data analysis and drawing and interpreting the findings. The researcher used this tool to triangulate with what was found from interviews. In turn, this is another way of looking at what is going on. Instead of leaders talking, the researcher observes leaders' interactions. The researcher is a third party observer, simply observing simple manifestation. The researcher determines if that support what getting from analysis or it is different. This valuable data may confirm the researcher's hearing or maybe open up something quite interesting.

3.6 Rigour in the research

Showing rigour in social research has been considered as key to demonstrating research quality (Golafshani, 2003). Trustworthy research is conducted fairly and ethically whereby findings reflect, as closely as possible, the respondents' experiences (Padgett, 2008). The credibility in social research, whether quantitative or qualitative, relies on the rigour of the entire research process (Morse et al., 2002). Two main criteria for judging research rigour are validity and reliability (Long and Johnson, 2000). Hammersley (1992, p. 69) points out *validity* from a qualitative research perspective: "An account is valid or true if it represents accurately those features of the phenomena that it is in intended to describe, explain or theorise." In comparison, *reliability* reflects whether the results of a study are consistent with the data collected and repeatable (replication) (Javadi, 2013). Qualitative research is not intended to be replicated because qualitative studies reflect the socially constructed interpretations of participants at specific times and settings (Saunders, Lewis and Thornhill, 2019). However, results from qualitative research can be generalised across other settings if the characteristics of the research settings are similar, or learning from the research setting can be applied in other settings (Buchanan, 2012).

The researcher of this study applied strategies and tactics to ensure the research is valid and reliable; see sections 3.5.1.2 and 3.5.1.3. This was accomplished through careful attention to the following points:

- The researcher spent considerable time researching the case study organisations; in turn, he built informal interactions and connections with the organisations' members. This time enabled the researcher to gain respondents' trust; participants became more open to sharing their experiences during data collection. Also, spending enough time in the setting helped the observer to understand it and develop rigorous interpretations. Also, the researcher became more capable of understanding leadership behaviours and how things were done.
- The researcher was aware that, at the time, the interviews reflected reality, but were in a context that is subject to change. To increase the repeatability of this study, the researcher explained how the data were obtained and analysed. Also, the researcher followed some advice from other researchers in order to conduct the interviews. See section 3.5.1.2.1 that illustrates these points.
- The researcher was aware of the reflexivity issue, since the researcher's philosophy is interpretivism, meaning the researcher is part of the research process. As a precaution, the researcher asked two volunteer raters to conduct analysis of the data.
- The researcher ensured he analysed the data directly after finishing the interviews, thus ensuring the discussions were still as fresh as possible in his mind. Since the researcher adopted the grounded theory methodology for this study, the researcher depended on constant comparison to ensure the validity of results, which accurately represent aspects of leadership behaviours.
- In order to increase consistency during research stages, the researcher wrote memos to promote stability in the way data has been coded, analysed and interpreted.
- Notes were taken to describe research settings and social interactions. Since data collection and analysis were part of an ongoing iterative process, observers revisited the earlier observations to analyse and collect data, which maintained consistency of interpretation.

- In order to reduce bias in the observation process and gain benefits from informants' insights, the researcher asked informants to discuss and read some of the observational data.
- Participants' validation was used to check what the researcher collected and analysed from the interviews.
- In order to increase data collection quality and validation, the researcher undertook triangulation between the three sources of data: interviews, observations, and focus groups; see section 3.6.1.
- The audio-record of the interviews was converted into text (transcripts). The researcher translated the transcripts from Arabic into English. In order to validate the translation, the researcher randomly chose thirty-five percent of the interviews and asked different translators to review the translations. This double-check of translations increases reliability.

3.6.1 Triangulation

The term triangulation refers to using more than one method or source of data to study specific phenomena (Bryman and Bell, 2015; Webb, Campbell and Schwartz, 1966). Triangulation helps in improving the research validity and reliability or evaluation of findings (Golafshani, 2003). Furthermore, using triangulation in interpretivism research helps in adding depth, richness, breadth, and complexity to the research (Denzin and Lincoln, 2018; Denzin, 2012). In this triangulation process, the researcher can tackle the main issue in qualitative research by reducing bias and establishing valid propositions (Mathison, 1988). In order to reduce the disadvantages of using a single source or method, the researcher can use several forms of data collection sources and methods (Long and Johnson, 2000).

Adopting several methods, such as interviews, observation, and focus groups, will lead to increase research validity, reliability and diversity in reality construction. To enhance understanding of the construction of research, triangulation is a step taken by the researcher to involve several interpretations of the data at different times and locations (Golafshani, 2003).

The researcher used several data collection tools to ensure rigorous and robust research in this study. These tools were interviews, focus groups, and observations;

see section 3.5. Furthermore, to build the framework, the researcher used literature, data collected, and focus groups which regard the study's objectives, see section 1.4.

3.6.2 Interrater-reliability

Interrater reliability is a method for assessing agreement among the judgements made by two or more people (raters) on a single variable in regard to a specific target (James, Demaree and Wolf, 1984). The extent of agreement among raters is labelled inter-rater reliability (McHugh, 2012). Researchers in social science seek to check the quality of data collection methods and use inter-rater reliability to make judgements (Gwet, 2008). This assessment is helpful in making the analysis of qualitative data more reliable. In addition, inter-rater reliability is used to check the reliability and validity of the collected data (James, Demaree and Wolf, 1984). This assessment includes re-analysis of a representative sample of the transcripts by an independent person and then comparing that person's results with the researcher's results (Gwet, 2002).

Table 3- 6 percentage of agreement scales

Percentage ranges	Level of agreements between raters
91 – 100	Very high
81 – 90	High
71 – 80	Moderate
61 – 70	Fair
51 – 60	Slight
≤ 50	Poor

3.7 Framework validation

Conducting validation for the developed framework responds to the last objective in this study, see section 1.4. Experts, who have exceptional knowledge or skills on a specific topic, used judgement to validate the study results. Experts' validation is the most suitable for this study, since the impact of framework interventions cannot be measured in the short term. The limitation is that the project has a time limit and the researcher cannot exceed the time limit of the current study. However, the experts' judgement is appropriate for the time that is available for this project. In turn, this objective considers the **SMART** objective (Specific, Measurable, Achievable, Realistic, and Timely). The experts' judgment was accomplished by sending a report

containing the framework and information about the content and study context to the experts.

3.8 Search strategy (method)

A thorough literature review was conducted, since these following sections are part of this study aim and objectives. This review would lead to identifying the research gaps, in turn developing the research questions for this research project. The current section 2.6 and the following section 2.7 present a thorough review for the literature that related to leadership behaviours and Lean Six Sigma. Firstly, the main aim of this review is to identify the leadership styles that facilitate Lean Six Sigma operations. This aim is accomplished in section 2.6. Secondly, reviewing the literature to identify leadership behaviours that contribute in facilitating Lean Six Sigma, the second aim is presented in another separate section (section 2.7).

In order to include or exclude the articles, the researcher can review the title and then the abstract; this helps the researcher to save time and effort (Okoli and Schabram, 2010). In order to determine if the paper is relevant to the study aims, the researcher reviews the title, abstract, and conclusion. Then the inclusion criteria were applied. The inclusion criteria for this research were English-language articles that could be an empirical study or a theoretical study. No restriction was placed on the year of publication. Also, the papers that match the review aims were embedded. However, some journals were excluded from the review due to the absence of articles related to the research criteria.

Keywords were differentiated to find the most related papers. Also, the researcher used cross-referencing between papers in order to reduce search bias and get widespread results. For the initial search, the syntax was “leader*” OR “manage*” AND “Lean” OR “Six Sigma”. The initial search identified 3277 documents. Then, 159 potential papers were identified by limiting the search to paper titles. Finally, Google Scholar and EBSCO databases were searched to identify any articles that did not appear through searching the Scopus database. The following figure shows the number of papers that were included in this review.

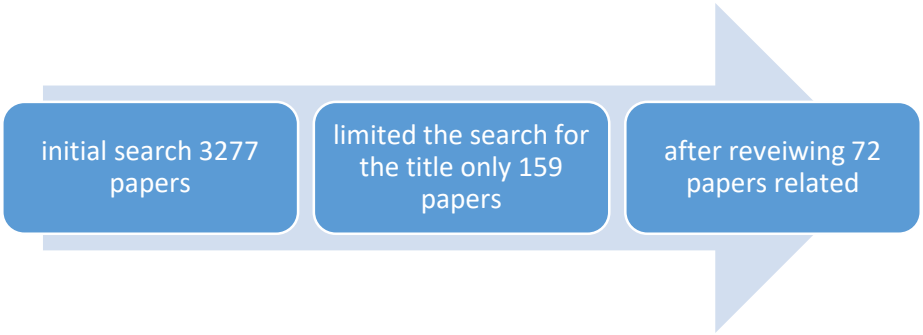


Figure 3- 5 The results of searching the literature review

The following sections provide clarification for each style, then clarify the impact of those leadership styles on Lean Six Sigma implementation. Thus, the organisations are thinking about using Lean Six Sigma can pay attention to the leaders' behaviours and attitudes associated with these styles. Nogueira, Sousa and Moreira (2018) suggested that organisations and practitioners of the Lean Six Sigma implementation process should be aware of the importance of leadership, more than only adopting one style, adopt attitudes related to these attributes.

3.9 Overview of the research methodology

This research project relies on a grounded theory methodology to collect and analyse the data. First, the leadership behaviours were identified from three sources: literature, interviews, and focus group workshop; these sources are shown on the left side of figure 3-6. After analysing the interview data, aspects of leadership behaviours emerged, following which a focus group was conducted to group these aspects into themes. Descriptions about how these themes influence Lean Six Sigma were developed. Following that, the ideal position descriptions for each theme were identified, which assisted in identifying the required leadership behaviours to create that ideal position. Then the similar leadership behaviours were integrated, which addressed the overlap among these sources. These leadership behaviours are the main output of the framework, as can be seen in Figure 3-6. Also, the themes that influence the use of Lean Six Sigma are considered a main component of the framework.

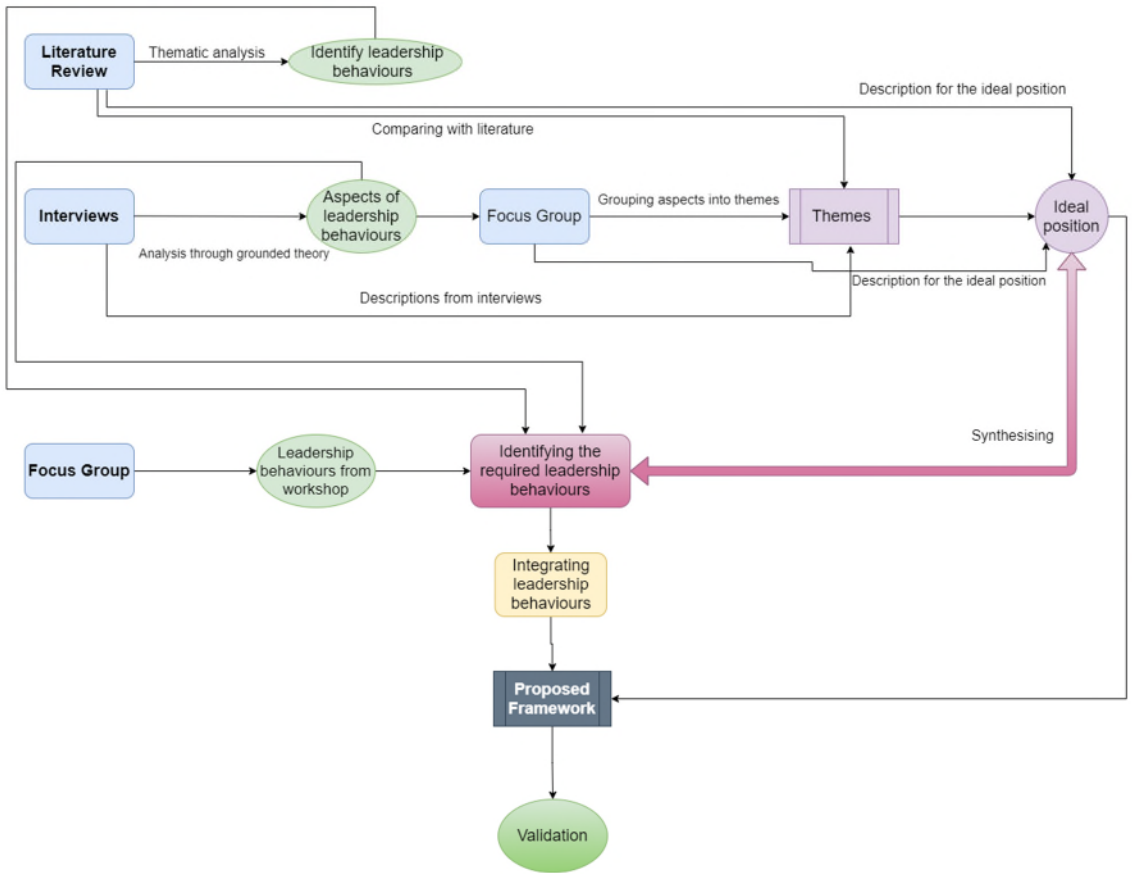


Figure 3- 6 Overview of the research methodology

3.10 Summary

This chapter presented the research methodology that the researcher adopted in this project. Table 3-7 summarises the methodology adopted for this research, showing the reasons and tools used. Accordingly, these choices have been demonstrated earlier in this chapter with a high level of detail.

Table 3- 7 Selection of research methodology

Layers of the research	Selection	Reason
The philosophical stance	Interpretivism	-Reality is constructed through social interaction in which people construct shared meanings and reality. -Aims to create a new understanding and interpretations of social phenomena.

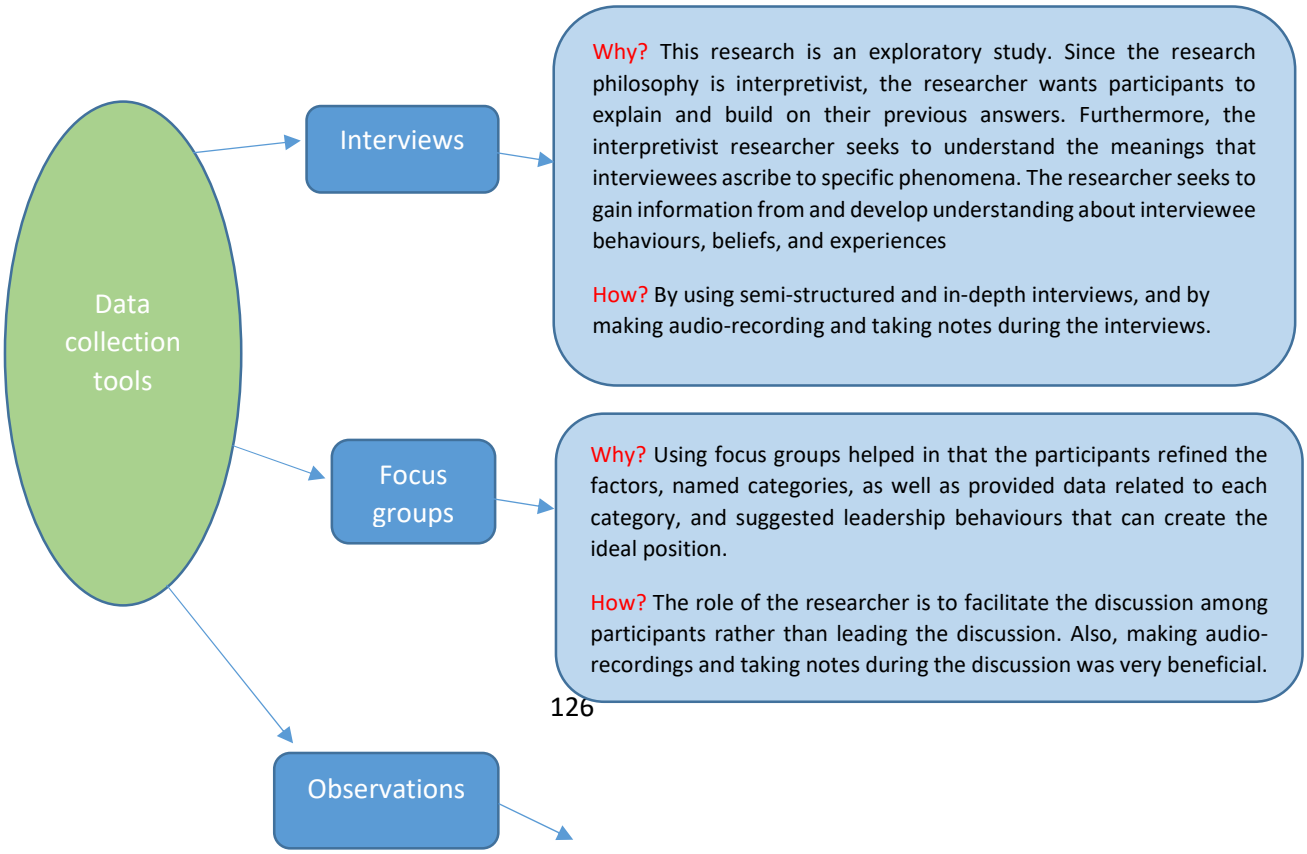
The research approach	inductive approach	-Aims to develop a theory which is generated from research findings.
The research methodology	Grounded theory	- This approach enables the researcher to build a theoretical framework. -Helping in exploring and explaining how the leadership behaviours comply with LSS. - Gives the researcher a systematic and emergent approach to collect and analyze qualitative data
The research method	Qualitative	-To discover and interpret meaning and perceptions of social interactions. -Can be used to collect and analyze data that are represented through words.
Data collection tools	Interviews Observations Focus groups	-The researcher wants participants to explain and build on their previous answers. Furthermore, interpretivism researcher seeks to understand the meanings that interviewees ascribe to specific phenomena. Getting information from and develop understanding about interviewees behaviors, beliefs, and experiences. - The tools and techniques that can be used in qualitative research.

The adopted methodological approaches to achieve the stated objectives were designed based on several stages:

The first phase: a search strategy was designed to structure the literature review chapter and to identify the leadership behaviours that enable the Lean Six Sigma

operation. This identification was conducted through a thematic analysis. **The second phase** was achieved through interviews, observations, and a focus group to collect data from different sources. Figure 3-8 shows the reasons for choosing these tools and how they were used. For this research, the researcher decided to use both semi-structured and in-depth interviews. In-depth and semi-structured interviews are the most suitable for open-ended questions (Saunders, Lewis and Thornhill, 2019). The researcher used the focus group once the topic to be explored had been accurately defined. The researcher used the first focus group to gather data about the themes and then grouped the themes; thus, leadership behaviours were suggested. There are some advantages of participant observation in comparison to qualitative interviews, namely: seeing through others' eyes, learning the native language, the taken for granted, and ability to observe behaviour (Bryman, 2016).

The researcher adopted the Grounded Theory methodology and, in turn, collected and analysed data according to this methodology by using the elements of: theoretical sensitivity, coding, constant comparison, memo writing, theoretical sampling, and theoretical saturation. Grounded theory aims to generate theory from data rather than testing hypotheses to verify prior theories (Corbin and Strauss, 2015; Greener, 2008). Furthermore, grounded theory aims to elicit new understandings about relationship patterns between individuals and how these relationships and interactions build truth (Glaser and Strauss, 1967).



Why? Since this is an exploratory study that concerns what leaders do and how they interact, a suitable way to learn is to listen and watch them.

How? This tool involves: viewing, recording, description, analysis, and interpretation of people behaviours in a given setting.

Figure 3-8 Data collection tools

The third phase: the researcher undertook several procedures to develop the framework. The first focus group was used to group the aspects in order to provide themes. The ideal position descriptions for each theme were then identified. After that, another focus group was used to suggest a series of behaviours to achieve and reach the desired ideal position; see Figure 3-9. Following that, these behaviours were blended with behaviours from the literature and field study, following which the researcher developed the framework from these sources; see Figure 3-6.

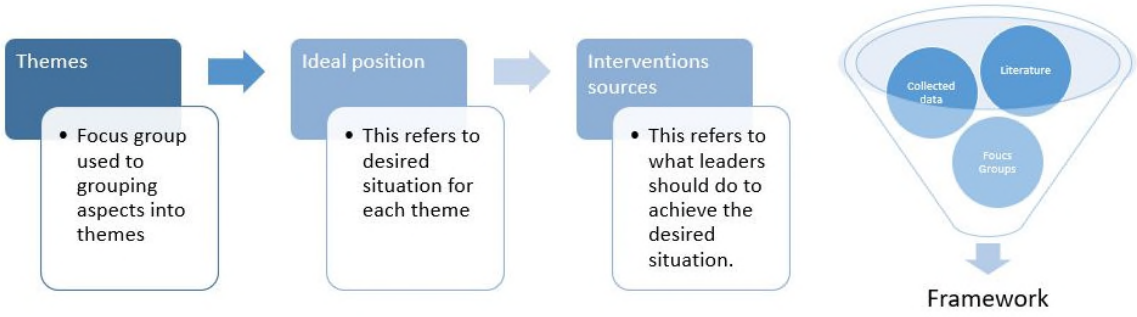


Figure 3-9 Processes of framework development

The last phase, after developing the proposed framework**,** experts' judgment on the framework was accomplished by sending a report to experts contains the framework and information about content and study context. After that, the researcher received valuable comments on the framework.

To ensure **high quality** for this research; the researcher triangulated the data and will use interrater reliability. During data collection and analysis researcher did several

steps to increase research rigours; such as participants validation, obtaining trust from participants, being aware of social interaction, using the suitable language and attitude, getting access (permission to conduct the interviews), choosing the location of the interviews, and recording interviews. The researcher wrote memos to promote stability in the way data has been coded, analysed and interpreted. The observer will take notes to describe research settings and social interactions. Using different translators to review his translation for transcripts.

CHAPTER FOUR
DATA COLLECTION AND ANALYSIS

4. CHAPTER FOUR

4 Data collection and analysis

This chapter responds to objective number two, which aims to conduct a field study to identify leadership behaviours from the manufacturing sector in Jordan that facilitate the effective use of Lean Six Sigma. First of all, the researcher presents some key information about data collection and analysis. Then, the data collection and analysis processes are divided into two main phases. The first phase regards revealing the leadership behaviour aspects that influence the use of Lean Six Sigma in Jordan, while the second phase shows the aggregation and grouping of these aspects to develop themes that were grouped by the focus group. The data are collected from nine manufacturing companies; 27 interviews were conducted to discover leadership behaviours. The data collection and analysis are conducted as described in the methodology chapter; see sections 3.4 and 3.5. Exploring the leadership behaviours from the manufacturing sector in Jordan will be one of the primary sources to construct the intended framework. After developing the themes the researcher seeks to know how these themes influence the effective use of Lean Six Sigma by generating explanations from the data and the literature.

4.1 Participants' characteristics

In-depth interviews were conducted in the field study. The interviewees chose a suitable time and place for conducting the interviews. The sample was chosen from all levels in organisations, namely, shop level, supervisory level, and senior level. Table 4-1 shows the distribution of participants on these levels. This sampling process helps in achieving a comprehensive picture from different perspectives, whereby employees talk about leaders and leaders talk about themselves, which produced a holistic picture and rich data. This helps in exploring different aspects of the social phenomena under study (Starks and Brown Trinidad, 2007).

Table 4-1 Administrative level of the participants

Participants' Position	**Number of participants**
Senior level	6
Supervisory (manager) level	12

Employees on shop floor level	9

The researcher selected organisations from the manufacturing sector in Jordan despite the size of the organisations. There was diversity in the organisations' size and industry types. Some organisations work in the pharmaceutical, textile, food, and electrical industry. See Table 4-2, which clarifies how many companies studied in each sector.

Table 4-2 Manufacturing sectors that participate in the study

Number of companies from each industry	**Industry**
1	Pharmaceutical industry
3	Textile industry
3	Food industry
2	Electrical industry

The industries in the previous table (4-2) participated in the study to provide essential data for this research project. The organisations' industries mentioned in the previous table show the wide variety of manufacturing companies. Collecting data from various industries helps in having a distribution of types of organisations; in turn, the researcher did not focus specifically on one sector (Strauss and Corbin, 1998). The main target was to collect rich data to discover aspects since this study is an exploratory study; this helps in having an in-depth explanation about what leaders do to facilitate Lean Six Sigma (Corbin and Strauss, 2015).

4.2 Conducting interviews

The data collection and analysis processes were applied, as discussed in the previous chapter. Unstructured (in-depth) interviews were conducted to acquire the aspects and dimensions of leadership; the interviews helped to gain a deep understanding and rich explanations about leadership behaviours. Open-ended questions allowed the participants to talk about their experiences freely. The participants were informed that the interview was recorded with the promise that no one will hear the records. These

records were purely used for the purpose of data analysis accuracy. The participants could talk as much they wanted without interruption. The questions that were asked were:

- Tell me about an example (situation) when you have seen Lean Six Sigma operations work well? (Lean Six Sigma implementation you have observed. Tell me about it and describe it?)
- Tell me about an example (situation) of when Lean Six Sigma operations have not worked well? (Or part of a Lean Six Sigma implementation that did not work well?)

These questions were followed up with How and Why questions, to build on participants' answers and to obtain clear explanations about what was happening. The participants could choose which question they wanted to answer first. The researcher stopped conducting interviews after the 27th interview, where the saturation level was achieved. Observations took place by recording and taking notes of important events (Coghlan and Shani, 2018).

These interviews generated the main leadership aspects; Nvivo 12 software helped the researcher in the data analysis stage and coding processes. These processes were time-consuming; it took several months to develop the aspects. Using this software made the analysis accurate and effective. The data did not add new information or explanations for developing categories or aspects. Thereby the saturation level was realised after the last three interviews. The interviews were conducted in a suitable place, as participants preferred. Some of these interviews were conducted face-to-face in companies and others were conducted by telephone. Twelve interviews were conducted by telephone, while the rest were face to face interviews. Telephone interviews took place as a result of the pandemic and social distancing restrictions. The duration of interviews ranged from 30 to 65 minutes. The ice-breaker was to facilitate the discussion and make the participants feel relaxed. The aspects of leadership behaviours are clarified in the following sections.

4.3 Inter-rater assessment

The percentage of agreement was applied to aspects yielded from the data analysis. Two volunteer raters cooperated with the researcher to conduct the analysis. A sample of transcripts was chosen randomly to be coded by the volunteers. The researcher

described the research project, what the study was looking for, and what questions have been asked. Nine of the twenty-seven interviews were used as a sample, which forms about 33%. Participants developed codes through analysis, which helped in refining and adding codes. The researcher checked to what extent the codes that developed by participants closes to those codes that emerged by the researcher analysis for the study data. Thereby this indicates to what extent the analysis is valid and reliable. The researcher was aware that participants would not use exactly the same words. If the researcher has a good cumulative percentage, that is good. See Table 4-3.

Table 4- 3 Reliability and validity of emerged aspects (data analysis)

Interview number	Rater A	Rater B	Average percentage of agreement
3	0.90	0.94	0.92
7	0.88	0.90	0.89
8	0.97	0.96	0.965
13	0.96	0.90	0.93
14	0.90	0.94	0.92
17	0.91	0.97	0.94
22	0.94	0.90	0.92
24	0.95	0.87	0.92
27	0.93	0.90	0.915

The same assessment method was applied on text translation. The researcher randomly chose thirty-five percent of the interviews to give to different translators to review the translation. This double-checking of translations increases research reliability.

4.4 First phase of data collection and analysis

The first phase of data collection and analysis is the process of analysing the interviews and exploring aspects from the data; whereas the second phase is about conducting a focus group, which helps in grouping aspects into themes. The first phase is clarified in the following section.

4.4.1 Exploring the aspects of leadership behaviours that influence the use of Lean Six Sigma

Since this study is an exploratory study, after conducting the data analysis, 36 aspects were developed. The data analysis processes helped in discovering the aspects of leadership that influence the use of Lean Six Sigma in the manufacturing sector in Jordan. The aspects were developed through an iterative process of analysis until the saturation level was reached; no new insights, information, or concepts emerged from the data. The emergent aspects list shows descriptions for each aspect. These aspects and descriptions were given to focus group participants, which helped them group the aspects into themes; see section 4.5. A table 1-1 in appendix (E) shows all aspects that evolved from the data analysis with a brief description of each aspect.

4.4.2 Aspects frequency

Some of the leadership aspects are mentioned repeatedly in a large number of interviews, while some aspects appeared in a few. The aspects that appear in the following table (4-5) show a list of the developed aspects that were obtained from data analysis processes. These findings reflect the factors that influence Lean Six Sigma operations in the manufacturing sector in Jordan. The researcher sorted the aspects according to the number of occurrences in data analysis by depending on Nvivo software, see Table 4-5.

Table 4- 5 Aspects that influence Lean Six Sigma operations

Number	Aspects	Number of Occurrence
1.	Obtaining ideas from the employees	44
2.	Giving training on Lean Six Sigma	39
3.	Management support and commitment	34
4.	Sharing information with employees	34
5.	Making the employees feel they are part of the change	32
6.	Conducting meetings in a short frequency	31
7.	Review and follow up processes	28
8.	Taking the necessary actions to solve problem	28
9.	Giving employees financial rewards	27

10.	Raising employees' awareness about the importance and benefits of Lean Six Sigma	23
11.	Promoting the values that make employees think in a way to eliminate waste and solve problem	22
12.	Evaluating employees' competencies regularly	21
13.	Leading employees to serve and be committed to organization goals	21
14.	Giving training on performing work to acquire new skills	18
15.	Monitoring employees	18
16.	Visiting shop floor	17
17.	Set up plans, goals, and strategies that facilitate Lean Six Sigma	15
18.	Commendation	12
19.	Accountability for the employees	12
20.	Having a good relationship with employees	11
21.	Identify and assign clear responsibilities for employees	11
22.	Developing trainers to enabling perform training in organization	9
23.	Analyze data to do comparisons and improvements	9
24.	Establishing a team work that support standardized work	8
25.	Enabling employees to make suitable decisions	8
26.	Considering Lean Six Sigma as a new way of thinking	7
27.	Coaching	7
28.	Promoting preventive machines maintenance regularly	6

29.	Delegating power and authority	6
30.	Encourage learning	6
31.	Convincing employees	5
32.	Establishing retention program for qualified employees	4
33.	Put the right employee in the right place	3
34.	Seeking to bring new and advanced machines and tools	3
35.	Seeking to get customers' feedback and requirement for products	3
36.	Resolving team conflict to enhance cooperation	2

The frequency of occurrence is an indication of what interviewees consider important. In other words, the aspect that more frequent is going to be more important than the one that least frequent. For instance, the aspect number 2 (*Giving training on Lean Six Sigma*) appear 39 times is considered to be more important than the one that appears 10 times.

The findings show that the highest frequency of these aspects was for the aspect that labelled 'Obtaining ideas from the employees to managers' which appears 44 times, as shown in Table 4-5. To illustrate this aspect, one participant said:

> "The ideas that come from the frontline employee are very important, as these operators are the most important people who stand on the line for many hours. They know what the production line needs of parts and things. They may suggest such things to improve the processes. So taking their opinion into consideration is very important. The opinion of the operator on the production line is very important. There were two ways for obtaining ideas from them: Either tell me face to face or through the phone. Tell me what happened and we can think together about finding a solution, or through my tour on the production lines by asking them: guys what do you have problems. So we communicate with them to know their problems. In turn, we tell them what is

right or wrong".

While 'Giving training on Lean Six Sigma' is the second important aspect which occurred 39 times. In this context participant in interview 16 said:

> "Continuous training was a good example to facilitate implementation. We have a plan that is on what things these employees must be trained, what is Lean and Six Sigma, and how can they implement it and use it in production and, what are the goals of it. So intensive training was given".

However, the field study allows the researcher to discover 36 aspects of leadership that influence the use of Lean Six Sigma in the manufacturing sector in Jordan. These aspects play a key role in facilitating Lean Six Sigma operations. The findings (the aspects) that come out indicates that leadership behaviors influence Lean Six Sigma operations. Even some participants demonstrate the importance of leadership; for example, in interview 15 the participant said:

> "Of course, these projects care or depend 90% on the human element and human capital. One of the most important things that affect the success of these projects is leadership. Leadership for people at all levels is required. The supervisor or the manager, even the CEO, should show leadership and his presence in the shop floor. All of these things contribute to the success of these projects".

These findings give new insights into the power of some leadership behaviours in influencing the successful use of Lean Six Sigma in the manufacturing sector in Jordan. In other words, there are aspects that more important than others. This may help organizations that face challenges in using Lean Six Sigma; the practitioners can be aware of these significant factors.

4.4.3 Comparing the developed aspects with the literature

The developed aspects were compared simultaneously and continuously with the literature. The researcher noted there are some similarities and differences between the aspects that emerged from the data and the literature. All of these factors, whether from the literature or field study, play an important role in the successful use of Lean

Six Sigma. Leadership is identified as a key success factor for facilitating Lean Six Sigma implementation (Laureani and Antony, 2018). There are sufficient details about the literature in chapter two sections: 2.4.1, 2.4.4, and 2.7. However, the following table 4-6 shows where these aspects have been mentioned in the literature.

Table 4- 6 comparing the aspects that have been developed with literature

Number	Aspects	**Compared literature**
1.	Obtaining ideas from the employees	(Loh, Mohd Yusof and Lau, 2019) (Hwang, Hwang and Hong, 2014) (Laureani and Antony, 2017) (Toledo et al., 2019) (Bijl et al., 2019) (Nogueira, Sousa and Moreira, 2018)
2.	Giving training on Lean Six Sigma	(Assarlind, Gremyr and Bäckman, 2013; Henderson and Evans, 2000) (Laureani and Antony, 2017) Snee, 2010)
3.	Management support and commitment	(Aij et al., 2013; Goodridge et al., 2015; Maijala et al., 2018) (Laureani and Antony, 2017; Poksinska, Swartling and Drotz, 2013) (Goodridge et al., 2015)
4.	Sharing information with employees	(Aij, Visse and Widdershoven, 2015; Aij and Teunissen, 2017; Albrecht and Andreetta, 2011; Poksinska,

		Swartling and Drotz, 2013)
5.	Making the employees feel they are part of the change	(Laureani and Antony, 2017; Maijala et al., 2018; Poksinska *et al*., 2013)
6.	Conducting meetings in a short frequency	(Aij, Visse and Widdershoven, 2015; Aij and Teunissen, 2017; Loh, Mohd Yusof and Lau, 2019; Maijala et al., 2018)
7.	Review and follow up processes	(Camuffo and Gerli, 2018) (Spear and Bowen, 1999)
8.	Taking the necessary actions to solve problem	(Liker, 2004a) (Seidel et al., 2019) (Mann, 2009) (Aij *et al*., 2015; Aij and Teunissen, 2017; Loh *et al*., 2019; Maijala *et al*., 2018) (Camuffo and Gerli, 2018) (Mann, 2009)
9.	Giving employees financial rewards	(Laureani and Antony, 2017)(Maijala et al., 2018)
10.	Raising employees' awareness about the importance and benefits of Lean Six Sigma	(Laureani and Antony, 2017)(Maijala et al., 2018)
11.	Promoting the values that make employees think in a way to eliminate waste and solve problem	(Aij *et al*., 2015; Maijala *et al*., 2018) (Toledo *et al*., 2019) (Goodridge *et al*., 2015)
12.	Evaluating employees' competencies regularly	(Seidel et al., 2017) (van Assen, 2018) (Aij and Teunissen, 2017)

13.	Leading employees to serve and be committed to organization goals	(Poksinska *et al.*, 2013) (Aij and Teunissen, 2017; Albrecht and Andreetta, 2011) (Maijala et al., 2018) (Al-Balushi et al., 2014)
14.	Giving training on performing work to acquire new skills	(Assarlind, Gremyr and Bäckman, 2013; Snee, 2010)
15.	Monitoring employees	(Aij *et al.*, 2015; Poksinska *et al.*, 2013)
16.	Visiting shop floor	(Aij and Teunissen, 2017; Antony *et al.*, 2007) (Aij *et al.*, 2015; Aij and Teunissen, 2017; Maijala *et al.*, 2018) (Poksinska *et al.*, 2013) (Loh, Mohd Yusof and Lau, 2019) (Seidel et al., 2019)
17.	Set up plans, goals, and strategies that facilitate Lean Six Sigma	
18.	Commendation	(Antony et al., 2007) (Laureani and Antony, 2017)
19.	Accountability for the employees	(Aij, Visse and Widdershoven,

		2015) (Goodridge et al., 2015) (Mann, 2005)
20.	Having a good relationship with employees	(Tortorella et al., 2018) (Tortorella et al., 2018) (H. van Dun and Wilderom, 2016; Liker and Convis, 2011) (Tortorella and Fogliatto, 2017)
21.	Identify and assign clear responsibilities for employees	(Aij *et al.*, 2015; Poksinska *et al.*, 2013) (Aij and Teunissen, 2017; Drotz and Poksinska, 2014) (Aij and Teunissen, 2017; Drotz and Poksinska, 2014; Millward and Bryan, 2005)
22.	Developing trainers to enabling perform training in organization	
23.	Analyze data to do comparisons and improvements	(Andersen, Rovik and Ingebrigtsen, 2014) (Goodridge et al., 2015)
24.	Establishing a team work that support standardized work	(Loh *et al.*, 2019; Seidel *et al.*, 2019; Spear and Bowen, 1999; Toledo *et al.*, 2019)

25.	Enabling employees to make suitable decisions	(Poksinska *et al*., 2013) (e.g. Aij *et al*., 2015; Goodridge *et al*., 2015; Maijala *et al*., 2018) (Aij *et al*., 2015)
26.	Considering Lean Six Sigma as a new way of thinking	(Poksinska, Swartling and Drotz, 2013)
27.	Coaching	(Maijala *et al*., 2018) (Camuffo and Gerli, 2018) (Poksinska *et al*., 2013)
28.	Promoting preventive machines maintenance regularly	
29.	Delegating power and authority	(Aij *et al*., 2015; Poksinska *et al*., 2013) (Aij and Teunissen, 2017; Drotz and Poksinska, 2014)
30.	Encourage learning	
31.	Convincing employees	
32.	Establishing retention program for qualified employees	
33.	Put the right employee in the right place	
34.	Seeking to bring new and advanced machines and tools	
35.	Customers' feedback and requirement for products	(Loh, Mohd Yusof and Lau, 2019)

		(Womack and Jones, 1996)
36.	Resolving team conflict to enhance cooperation	

The literature shows a variety of factors that influence Lean Six Sigma operations. Some studies revealed some aspects, which did not appear in the field study. The aspects that appeared in literature only, namely 1) Iintellectual stimulation: leaders make employees more interested in challenges that they face, and make them able to think in new ways to overcome issues (Nogueira et al., 2018; Seidel et al., 2017, 2019; Tortorella et al., 2019). 2) Leaders should foster and maintain a continuous improvement culture that seeks excellence and considers any mistakes as opportunities to improve. This can be achieved through leaders' behaviours that support task identity, feedback, independence, and honesty (Aij and Teunissen, 2017; Dombrowski and Mielke, 2013a; Goodridge et al., 2015; Maijala et al., 2018; Mann, 2009; Toledo et al., 2019). 3) Promoting employees' self-development: creating plans and structures to support employees' development. Focusing on specific competencies to develop the employees such as technical knowledge, communication, and teamwork. (Seidel *et al*., 2017; Toledo *et al*., 2019; Tortorella *et al*., 2019).

However, some aspects that are less frequent in the findings of the current study are not shown to be existing in the literature. The aspects that do not appear important in literature are Giving instructions for the employees, External factors influence improvements, Preventative machines maintenance, Give prizes for the employees, Employees expect they will get rewards if they made improvements, and Job rotation brings new ideas and increases employees' experience.

Visiting the work floor (gemba walk). This aspect was highlighted intensively in the literature. Many studies point to this aspect which includes three activities: going to where the value is created, looking at the process, and talking to the workers. These activities enable the leaders to be involved with people, solve the problems, and demonstrate care and recognition (Aij, Visse and Widdershoven, 2015; Dombrowski and Mielke, 2013a; Seidel et al., 2019; Tortorella, van Dun and de Almeida, 2019). Likewise, a great number of studies outline the importance of top management support

and commitment whereas leaders demonstrate commitment and support for Lean implementation, and they feel they are accountable to do their best (Aij et al., 2013; Goodridge et al., 2015; Laureani and Antony, 2017; Maijala et al., 2018; Poksinska, Swartling and Drotz, 2013). Similarly, Obtaining feedback and idea from the employees to managers plays an important role in facilitating Lean Six Sigma implementation. Receiving and giving information that conveys ideas which help leaders to know what is happening in processes, the issues that occur, as well as obtaining suggestions for improvements (Bijl et al., 2019; Hwang, Hwang and Hong, 2014; Laureani and Antony, 2017; Loh, Mohd Yusof and Lau, 2019; Nogueira, Sousa and Moreira, 2018; Toledo et al., 2019). Taking field study and literature together show that there is a wide agreement between the study findings and the literature in the majority of aspects. The more important factors that appear in literature and to some extent in study findings are highlighted in this section.

To facilitate this comparison with the literature, the researcher presented the literature in a structured manner in chapter two, section 2.7. Whereas the researcher conducted a thematic analysis to literature which helps in having clear aspects from the literature which made the comparison easier.

4.5 Second phase of data collection and analysis

Identifying the leadership aspects enables the researcher to move forward in data collection and analysis. After developing the aspects, the researcher continues with the data analysis processes. In turn, a focus group is used to group the aspects. This process responds to constructivism; the participants aggregate the aspects through an intensive discussion session that assigns aspects into themes. The participants also provide descriptions for each theme. This helped the researcher to understand the relationship and discover similarities and differences between each of the themes.

4.5.1 Emerged themes

The researcher used a focus group to categorise the aspects by grouping them into themes. In that, the aspects were grouped around core categories. The processes of data collection and analysis generated fundamental themes that facilitate the use of Lean Six Sigma in the manufacturing sector in Jordan. The following table (4-7)

highlights participants' characteristics, i.e. those who took part in the focus group workshop.

Table 4- 7 Participants' characteristics

Participant number	**Industry**	**Years of experience**	**Job title**
1	Textile industry	8	Lean Manufacturing Coordinator
2	Textile industry	12	Operations Manager
3	Textile industry	5	Team leader
4	Textile industry	7	Shop floor supervisor
5	Textile industry	10	Shop floor employee

The researcher met the participants in person and introduced the research topic to them. Then some talk occurred to break the ice. The researcher provided the aspects with descriptions to the participants, in paper format. The aspects were also presented through a data projector to facilitate grouping them into themes. The participants started by reading the list of aspects and their descriptions and agreed that there were three obvious themes. Next, they started to categorise the aspects into the three themes, having a quick discussion about which aspect belonged to which theme. Then, with the passage of time, they realised that the themes were too vague and, following a break, the participants decided to make them more clear and specific. In reviewing the three themes, it was realised the aspects would relate to something else; through this iterative process of review, they started adding new themes and attached aspects accordingly. This iterative process ensured that each aspect was relevant to the theme, which resulted in a clear and comprehensive theme name (label).

To finalise what they did, participants started reviewing each aspect to ensure it was related, or not, to that theme. They tried to ensure a high level of agreement between

them. Participants in the focus group gave descriptions for each theme, and these clarified the reason for grouping some aspects into a specific theme. The descriptions also gave a clue why these aspects were relevant to that theme. Participants described *Training and Development* as "the process of making employees competent in using Lean Six Sigma and able to conduct their work efficiently." Moreover, participants agreed about the description for *the Continuous improvement and development* theme. It is described as "management should continuously improve processes and develop operations in the organisation and shop floor and consider employees' ideas to provide the best value for customers." Furthermore, participants described the *Communication* theme as an "essential theme to exchange information between management and employees from all levels that aims to improve work and convey information to conduct work efficiently." *Empowering employees* is described by participants as "enabling employees by giving the necessary power and supporting employees by making information and resources available for them." Moreover, *Motivating employees* is described as "providing incentives to stimulate employees, making them efficient in their work and using Lean Six Sigma effectively." *Managing quality and operations* are described as a "Group of activities that leaders and employees should do to manage quality aspects that directly or indirectly related to LSS activities and operations efficiency such as solving problems." *Employees' engagement and involvement* was described as "making the employees loyal to the organisation by making them feel they are part of the organisation and project." Finally, participants described *Supporting culture* as "organisational beliefs and attitudes that should support and encourage learning and seeking improvements." These descriptions present the participants' perspective about the evolved themes. Table 4-8 shows the themes that have emerged and evolved from participants' discussions through the focus group.

Table 4- 8 The developed themes with aspects for each

Themes	**Aspects**
1. Training and development	- Giving training on Lean Six Sigma - Developing trainers to enabling perform training in organization

	- Giving training on performing work to acquire new skills - Coaching - Monitoring employees - Raising employees' awareness about the importance and benefits of Lean Six Sigma - Evaluating employees' competencies regularly
2. Continuous improvement and development	- Identify and assign clear responsibilities for employees - Taking the necessary actions to solve problem - Establishing a team work that support standardized work - Seeking to bring new and advanced machines and tools - Promoting preventive machines maintenance regularly - Seeking to get customers' feedback and requirement for products - Management support and commitment
3. Communication	- Obtaining ideas from the employees - Conducting meetings in a short frequency - Sharing information with employees - Visiting shop floor - Resolving team conflict to enhance cooperation
4. Empowering employees	- Enabling employees to make suitable decisions - Delegating power and authority - Sharing information with employees - Identify and assign clear responsibilities for employees
5. Motivating employees	- Commendation - Giving employees financial rewards

6. Managing qualities and operations	- Considering Lean Six Sigma as a new way of thinking - Set up plans, goals, and strategies that facilitate LSS - Analyze data to do comparisons and improvements - Monitoring employees - Review and follow up processes - Visiting shop floor - Put the right employee in the right place
7. Employees engagement and involvement	- Accountability for the employees - Resolving team conflict to enhance cooperation - Making the employees feel they are part of the change - Leading employees to serve and be committed to organization goals - Establishing retention program for qualified employees - Having a good relationship with employees
8. Supporting culture	- Promoting the values that make employees think in a way to eliminate waste and solve problem - Encouraging learning - Establishing retention program for qualified employees - Having a good relationship with employees - Management support and commitment

Eight themes were evolved from aggregating the aspects of leadership by the focus group workshop. These themes are the pillar to use Lean Six Sigma successfully. Participants provided descriptions for each theme from their perspective. After

developing themes, it is worth to know how these themes influence Lean Six Sigma effectively.

4.5.2 Comparing the themes with literature

Each theme is explained how it influences the successful use of Lean Six Sigma. The emergent themes are compared with the literature to get support and explanation about each theme. The participants constructed these themes in the focus group discussions. Furthermore, the themes are supported by participants' quotations that help in constructing and explaining these themes. The following sections clarify how each theme effect the use of Lean Six Sigma. Theoretical characteristics of themes (categories) are referred to in the literature as either properties or concepts begin to surface. During this stage, the researcher begins making meaning of themes, shifting from a focus on comparisons between incidents in data to comparisons between categories in their dimensions.

Theme 1: Training and development

Training employees is essential to increase their awareness about Lean Six Sigma philosophy and tools (Assarlind, Gremyr and Bäckman, 2013; Henderson and Evans, 2000). Widespread training in organisations has been observed as an instrument for involving the employees in improvement initiatives (Laureani and Antony, 2017). Developing employees were found to be supported by training; the participants 23 stated that:

> "Frankly, the most important thing is training and competencies. These things represent the starting point; you cannot begin without their presence. Operators who work on machines must have training in operating and maintaining it based on certain procedures such as safety. Holding training for the operator is very important, technically. Also, this training will be in the field of quality, public safety, documentation, and Lean Six Sigma".

To promote employees' self-development, the leaders begin to identify the competencies that employees need through conduct dialogue with the employees. The following competencies are assessed: teamwork, technical knowledge, business vision, Lean thinking, communication and results for the company (Toledo et al., 2019). However, factors that are related to employees' development are

empowerment and trust building (van Assen, 2018). Being coached means the leadership role is facilitating, supporting, and functioning. This was supported by a participant:

> "…they suggest that the worker should be trained on several skills, not one skill. So the worker can work elsewhere because we trained him on something else. If a circumstance occurs or the employees in a certain department are absent, they will be compensated from the other departments. Thus we maintain the productivity of the department".

This role of leadership, coaching, seems to be the dominant style for successful Lean Six Sigma implementation (Maijala et al., 2018). Leaders tend to be both coaches and teachers who provide support for team members (Camuffo and Gerli, 2018). They also focus on individual employees' skills, experience, and ability and set challenges which enhance and encourage growth in the employee (Poksinska, Swartling and Drotz, 2013). Participant No 8 confirm the leadership role in facilitating and supporting activities, which are part of coaching employees:

> "Approaching the Lean Six Sigma implementation through training. We have the Lean champion. The Lean champion is the person who is taking care for other team members. In Lean manufacturing, you need to have a core team, as well as a Lean function team all that teams need to be recognised among the same team.
>
> The Lean champion help in Lean Six Sigma implementation through guidance, exampling, and showing the way. Basically, the Lean function team axis in between the Lean champion and the operational level team members who are in the process."

Theme 2: Continuous improvement and development

Leaders pay attention to activities that support continuous improvement (Poksinska, Swartling and Drotz, 2013). In turn, continuous improvement becomes a crucial part in meetings, and improvement programs are monitored and visualised (Poksinska, Swartling and Drotz, 2013). To support continuous improvement, leaders must also acknowledge initiatives ideas, and effective participation in reaching intended improvements (Poksinska, Swartling and Drotz, 2013a). Management that practices

continuous improvement focuses on finding a better way in all circumstances and pursues an understanding of customers' needs so that goods can be customised (Loh, Mohd Yusof and Lau, 2019). Also, findings from the field study showed that customers' feedback is important; participants 19 demonstrated:

> "Frankly, we care about the customer's opinion a lot. We take into consideration the customer's opinion about our product because he is number one. The customer opinion is a measure of quality; we rely on customers' feedback significantly. If the customer notices a problem with a specific product, contact us. Therefore, we take action until we solve it and not repeat it again."

Leaders should support continuous improvement by allocating time and resources and being open to ideas that help achieve improvements (Poksinska, Swartling and Drotz, 2013). Interviewees 11 mentioned that:

> "In order to make a change, you need support; the management was very committed to providing support. The management has embraced the project and supported everyone and given the required time, money, effort, equipment and infrastructure."

The best lean adopter develops work and standers with their team; they use these standers as a reference point for continuous improvement (Adler, 1993; Camuffo and Gerli, 2018). Leaders are competent to solve problems and thinking scientifically for improvements (van Assen, 2018; van Dun, Hicks and Wilderom, 2017; Toledo et al., 2019). Lean tools and techniques such as root-cause analysis and lean principles are forming the follow-up of the continuous improvement in organisations (Toledo et al., 2019). Moreover, leaders should give opportunities for employees, who are close from the problems that occurred in the floor, to take role in being master in solving problems (Aij and Teunissen, 2017; Toussaint and Berry, 2013). Participant 13 stated that:

> "We got some complaints, and now we are following the root cause analysis. We have followed Lean Six Sigma implementation through the root cause, which had a great positive impact so that the employee searches and tries to

> develop in a way that he avoids the occurrence of problems again. Whether the problem is related to the accuracy, maintenance, follow-up, or cooperation. It was good that the problems were solved in the root cause analysis method."

In advanced levels of implementing Lean Six Sigma, leaders evaluate performance processes that they are responsible for, with quick and regular feedback to other managerial levels (Camuffo and Gerli, 2018). Leaders should support and practise daily kaizen (Liker and Convis, 2011). There are two rules that leaders can use to support continuous improvement (kaizen) (Spear and Bowen, 1999; Toledo et al., 2019). The first means all work content, sequences, timing, and outcomes should be standardised, which makes problems easier to discover. The second rule specifies the connection among individuals for the implementation of the operations; the connection must be clear regarding sending requests and receiving a response (Spear and Bowen, 1999).

Theme 3: Communication

Aij and Teunissen (2017) point out that effective leaders both communicate information and listen carefully to subordinates, which helps in building trust and gaining more information. Establishing effective two-way communication that enhances information flow across the organisation's hierarchy is necessary to increase the work floor employees' understanding of the current goals and objectives (Loh, Mohd Yusof and Lau, 2019). Also, it is essential to involve and engage employees in improvement programmes (Laureani and Antony, 2017; Maijala et al., 2018; Poksinska, Swartling and Drotz, 2013). One of the participants stated that:

> "The employees who work on the production line were communicating directly with the supervisor to inform him about the issues that appear as well as they suggest some solutions."

Communicating make the information available for the work floor employees (Poksinska, Swartling and Drotz, 2013), and informs them about what is expected from them (Loh, Mohd Yusof and Lau, 2019). Visual tools help in clarifying goals and providing on-time feedback on process performance (Poksinska, Swartling and Drotz, 2013). Daily performance management uses whiteboards and dashboards to

display information using simple charts (Hung et al., 2015; Poksinska, Swartling and Drotz, 2013). In line with that, participants number 15 said:

> "These dashboards can show information about productivity. So that they can monitor the performance indicators with us (management). Through these dashboards, they see that … productivity is increasing."

The meetings play an important role in communication; the information is passed through these meetings. The meeting's agenda discuss improvements issues such as examine the conditions to meet daily demand, discussing different problems, and develop and deploy strategies, which enhance employees involvement (Poksinska, Swartling and Drotz, 2013). Leaders should communicate with people from all levels of organisation in order to facilitate information deployment and to be aware of employees' experiences, problems, and ideas (Aij and Teunissen, 2017). One of the interviewees confirmed this:

> "Meetings are a major thing. I know where I got, how I got there, and why I didn't get there. For example, I achieved something. Yes, that's great. How did you achieve it, or why did you not achieve it? This way, we learn from our mistakes and share information and experiences. At the meeting, an idea for improvement is proposed usually."

Leaders communicate with work floor employees through the Gemba Walk; the leaders walk along the shop floor with their employees supporting daily kaizen (Toledo et al., 2019). The Gemba Walk refers to visiting the work floor by leaders to help in identifying waste, solving problems, and supporting employees (Aij, Visse and Widdershoven, 2015; Mann, 2009).

The Gemba Walk is a behaviour that supports continuous improvement. Also, it helps in coaching and developing employees. Further, the Gemba Walk helps in motivating employees by demonstrating care and recognition; it has a positive effect on developing and maintaining relationships (Poksinska *et al*., 2013). The Gemba Walk also extends to the employees' empowerment aspect; during this Walk, all the people are together and, in turn, they are in a position to rapidly take suitable decisions and starting implementing them (Aij *et al*., 2015). From this evidence it is clear that the

Gemba Walk behaviour affects and is related to most of the aspects, namely communication, continuous improvement, coaching and developing employees, motivating employees (Aij *et al*., 2015; Dombrowski and Mielke, 2013; Poksinska *et al*., 2013; Seidel *et al*., 2019; Tortorella *et al*., 2019). The Gemba Walk, therefore, is one of the key behaviours for Lean Six Sigma implementation.

Theme 4: Empowering employees

Empowerment is a significant aspect for Lean implementation (Vänje and Brännmark, 2017). Aij, Visse and Widdershoven (2015) confirm that empowerment is related to job satisfaction and successful Lean implementation. Empowering leaders enables employees to become leaders themselves (Aij and Teunissen, 2017). Previous literature on Lean has clarified empowering leadership behaviours that include leading by example, sharing information, coaching, and showing concern for employees (Aij, Visse and Widdershoven, 2015; Aij and Teunissen, 2017; Albrecht and Andreetta, 2011; Poksinska, Swartling and Drotz, 2013). Organisations should develop supporting structures and routines to enable problem-solving and improvement (Poksinska, Swartling and Drotz, 2013). Interviewees have highlighted these behaviours of leaders:

> "The Lean champion help in Lean Six Sigma implementation through guidance, exampling and showing the way."

Leaders encourage employees to provide improvement ideas, and the employees then have the freedom to make decisions and take suitable actions to realise those intended improvements (Poksinska, Swartling and Drotz, 2013). Delegating power and decision-making behaviours have been mentioned in a number of previous studies (e.g. Aij, Visse and Widdershoven, 2015; Goodridge et al., 2015; Maijala et al., 2018). Empowering leadership increases employees' engagement that then leads to more commitment and less turnover intention (Aij and Teunissen, 2017; Albrecht and Andreetta, 2011). Interviewees 13 stated that:

> "We apply what is called the self-managed team. This system gives empowerment to employees, you are a decision-maker, and you are supposed to be conscious in order to take action regarding quality and reduce production wastes."

Lean leaders pass the responsibility on to the employees, so that they can manage and control daily processes, and they pass managerial tasks such as managing performance measures or conducting reviews to the employees (Aij, Visse and Widdershoven, 2015; Poksinska, Swartling and Drotz, 2013). Leaders can pass responsibility and authority through two-way communication, teamwork, and meetings (Aij and Teunissen, 2017; Drotz and Poksinska, 2014). Giving responsibility to the employees increases their sense that they are the owners of processes and tasks (Aij and Teunissen, 2017; Drotz and Poksinska, 2014; Millward and Bryan, 2005), as well as employees are still accountable to the Lean leader (Aij, Visse and Widdershoven, 2015). One of the participants confirmed these characteristics (priorities):

> "If one supervisor is responsible for all of this division, then things get messy. A supervisor must be assigned to each station in this section, so you will find that there is more control, and in this way, you can control things."

Sharing information and knowledge with subordinates enables empowerment which in turn allows employees to participate in decision making and contribute to organizational performance (Ford and Fottler, 1995). Information sharing and teamwork are essential for Lean processes (Netland, Schloetzer and Ferdows, 2015). Empowerment behaviour of leadership is an essential behaviour for stimulating employees to use Lean tools (Jones, Latham and Betta, 2013). One of the participants revealed that:

> "There is a dashboard for this process for this event. So everything can be easily recognisable. This is how communication can go easily to the shop floor. The employees can easily identify the problem, the bottlenecks. This called visual management."

One of the central aspects of the Toyota Production System TPS is workplace learning (Jönsson and Schölin, 2014). They found that empowering leadership facilitates learning in TPS context. Van Assen (2018) pointed out that there is a positive correlation between empowered leadership style and the use of Lean tools. Nogueira, Sousa and Moreira (2018) confirm this result by finding that an empowering leadership style positively influences Lean management implementation. These

studies in line with Aij, Visse and Widdershoven (2015), that proves the importance of employees empowerment for implementing Lean.

Theme 5: Motivating employees

Leaders should motivate themselves for implementing Lean Six Sigma before inspiring the employees (Loh, Mohd Yusof and Lau, 2019). Highly motivated leaders are essential for successful Lean implementation and Lean sustainability (Loh, Mohd Yusof and Lau, 2019). Employees get rewards for active participation in improvements or submitting new ideas (Bortolotti, Boscari and Danese, 2015). Leaders support Lean Six Sigma operations by giving recognition to employees who provide improvement ideas and actively participate in the realisation of processes enhancements (Poksinska, Swartling and Drotz, 2013). Giving proper motivation for employees lead to broad interest and implementation, which in turn sustain Lean operations by having motivated people (Balzer, Brodke and Thomas Kizhakethalackal, 2015). Laureani and Antony (2017) revealed that rewards systems play a vital role in Lean Six Sigma deployment; two sub-themes were identified, namely non-financial and financial rewards. The former relates to Lean Six Sigma deployment more than the latter (Laureani and Antony, 2017). Participants 23 stated that:

> "Motivation is a lot important by introducing an incentive. The bonus system and these rewards are all a lot to contribute to improvements. This corresponds with expectation theory, the worker expects if he produced a certain amount within a short period of time, he would receive a reward."

During Gemba walks effective Lean leaders demonstrate care and recognition by acknowledging the value of employees' work (Aij and Teunissen, 2017; Antony et al., 2007; Loh, Mohd Yusof and Lau, 2019). Leaders show care for individuals by making regular visits, during which they can respond to employees' questions and put results on visual metrics boards (Aij, Visse and Widdershoven, 2015).

The leaders influence employees' attitudes and behaviours towards the Lean Six Sigma philosophy through recognition and positive reinforcement (Poksinska, Swartling and Drotz, 2013); that recognition can have many forms and attributes such

as encouragement, emotional rewards, and attention and acknowledgement (Aij and Teunissen, 2017). These practices of rewards and recognition aim to increase employees' motivation and organisational commitment (Poksinska, Swartling and Drotz, 2013). Using the right motivation can lead to wider interest and implementation for Lean Six Sigma (Balzer, Brodke and Thomas Kizhakethalackal, 2015). Since motivated employees do what is right to achieve the organisation's goal and vision, leaders should seek to make their employees sufficiently motivated (Loh, Mohd Yusof and Lau, 2019). Leaders' behaviour can motivate and inspire employees to achieve a common goal, by motivating them to do their best, and acknowledging their achievements (Loh, Mohd Yusof and Lau, 2019). Participants in interview 9 mentioned that:

> "We use commendation, prizes, and rewards when someone does something that saves time or cost on the organisation. We give that person a letter of thanks or commend the employee in front of his colleagues. So the employee likes to be proud of himself and confident; he became proud that he provided a valuable thing for the company."

Theme 6: Managing qualities and operations

Leaders from different units and departments ensure the alignment of priorities and actions horizontally and vertically (Goodridge et al., 2015; Tortorella, van Dun and de Almeida, 2019). The Lean leader's role is to organise the work of employees in different teams and units (Aij and Teunissen, 2017), also, ensuring the connection between the workgroup and other units of the organisation (Emiliani, 2008). A strategic planning system is intended to be consistent with Lean implementation (Goodridge et al., 2015), and through that system, leaders interpret and spread the organisation vision and goals to teams (Liker and Convis, 2011). It is also a method of aligning goals with customer focus (Aij and Teunissen, 2017).

In order to create visionary and forward-thinking in organisations, leaders explain to employees the reasons for implementing Lean Six Sigma (Loh, Mohd Yusof and Lau, 2019). The leaders are responsible for aligning and implementing the vision on the organisation's priorities and goals to be achieved by the employees (Dombrowski and Mielke, 2013a; Inamizu et al., 2014; Toledo et al., 2019).

Employees can achieve improvements that include decreasing the lead time, cost and waste, as well as increasing productivity and quality (Monden, 2011; Toledo et al., 2019). In advanced levels of implementing Lean Six Sigma, leaders evaluate performance processes that they are responsible for, with quick and regular feedback with other managerial levels (Camuffo and Gerli, 2018). Leaders should support and practise daily kaizen (Liker and Convis, 2011). One of the participants indicates to the importance of evaluation:

> "The benefit of the evaluation, which is based on a scale from 1 to 3, is to make the employee feels that we are checking something critical."

Furthermore, interviewees 24 added on this context:

> "The employees became aware that there is monitoring, so they made every effort to do their best. Even the officials are competing with each other to show their best images because they know that there is monitoring."

Daily performance management uses whiteboards and dashboards to display information using simple charts (Hung et al., 2015; Poksinska, Swartling and Drotz, 2013). Visually displaying daily progress performance is known more formally in Lean terminology as the use of a "daily management" or "daily engagement" system (Maijala et al., 2018). This visual display aid in enabling people to directly know the standard and avoid mistakes (Poksinska, Swartling and Drotz, 2013). Lean leaders are responsible for collecting and displaying the relevant data by using tools such as boards, as well as Lean leaders develop quality improvements to tackle the problems identified from existing data (Goodridge et al., 2015; Maijala et al., 2018). The collected data is important to held leaders accountable for improvements, and it promotes fairness in decision making (Goodridge et al., 2015). Participants 16 point out for the importance of data:

> "Matters related to Lean Six Sigma is reviewing data at the end of each month from studies that appear at the end of the month... We make new decisions that clarify how we can organize the work, and how it reduces the existing waste."

Management activities include identifying problems, classifying, and solving activities (Aij et al., 2013; Aij, Visse and Widdershoven, 2015; Lorden et al., 2014;

Maijala et al., 2018; Steed, 2012). Management activities mainly focus on implementing tools such as root cause analysis, and measuring tools for monitoring improvements (Goodridge et al., 2015; Maijala et al., 2018). Whereas Poksinska, Swartling and Drotz (2013) point out that employees get more responsibility for managing and controlling daily activities, also employees play a role in monitoring performance measures or conducting audits.

The Gemba Walk refers to visiting the work floor by leaders to help in identifying waste, solving problems, and supporting employees (Aij, Visse and Widdershoven, 2015; Mann, 2009). Leaders can enhance their relationship with followers by conducting more informal meetings and Gemba Walks which allow the leaders to talk with employees about problem-solving techniques and to examine the process (Aij, Visse and Widdershoven, 2015; Aij and Rapsaniotis, 2017; Loh, Mohd Yusof and Lau, 2019; Maijala et al., 2018). During visiting the shop floor, leaders promote learning through suggesting challenges then follow-up that in next walk, which enables solving problems quicker (Aij, Visse and Widdershoven, 2015; Mann, 2009; Toledo et al., 2019). In line with that, interviewees 15 said:

> "When a problem occurs, rather than talk with the supervisor, we talk to the employee who is in the shop floor about what happens, and how can we improve."

Similarly, participants 21 comments on that:

> "… through my tour on the production lines by asking them: guys what do you have problems. So we communicate with them to know their problems. In turn, we tell them what is right or wrong."

Theme 7: Employees engagement and involvement

Employees should feel that Lean Six Sigma philosophy is not imposed on them. In that, leaders provide prizes to make employees feel that they are part of this new philosophy (Toledo et al., 2019). Lean leaders work on inspiring employees to achieve a high level of motivation (Sureeratta, Napompech and Panjakhajo, 2014) and should, therefore, have the ability to increase employees' engagement. Leaders need to have the skills to motivate, inspire, stimulate, and facilitate others' development (Aij and

Teunissen, 2017) and to be aware of the need to acquire those skills (Millward and Bryan, 2005); when leaders have these skills, individuals are more willing to make any changes necessary for Lean Six Sigma deployment (Al-Balushi et al., 2014). This confirmed by interviewee's number 13, who believed that:

> "The motivation had a role in improving employee engagement. Without the stimulus, it would not have been possible to make progress in using Lean and Six Sigma project."

Furthermore, having a good relationship with employees for keeping them motivated is crucial (Loh, Mohd Yusof and Lau, 2019). Leaders can enhance their relationship with followers by conducting more informal meetings and Gemba walks which allow the leaders to talk with employees about problem-solving techniques and to examine the process (Aij, Visse and Widdershoven, 2015; Aij and Teunissen, 2017; Loh, Mohd Yusof and Lau, 2019; Maijala et al., 2018). The effective Gemba walks leaders show recognitions, engagement, a focus on leaders-employees relationship, and fairness (Aij, Visse and Widdershoven, 2015; Aij and Teunissen, 2017; Steed, 2012). Leaders should gain employees' trust through the ability to be honest and benevolent (Aij and Teunissen, 2017). The trust between leaders and employees can evolve from confidence in the honesty of each other (Aij and Teunissen, 2017). Leaders' ability to engage employees is essential. Leaders can enhance their relationship with employees by conducting more meetings. Also, developing trust and respect between leaders and employees is significant elements for creating motivation among employees (Loh, Mohd Yusof and Lau, 2019). Employees who are motivated have a good relationship with their leaders; which facilitate coaching and teaching employees about Lean management (Loh, Mohd Yusof and Lau, 2019; Sureeratta, Napompech and Panjakhajo, 2014). One of the participants corroborates the importance of having a good relationship with employees:

> "Frankly, my relationship with everyone is excellent. I have a personal relationship with a worker on the frontline. So When I have something new to do, and the customer urgently needs it, I am talking to him, and he pleased to help me."

Making employees feel heard has a significant impact on staff engagement level, which can be related to positive changes in operations (Aij and Teunissen, 2017; Willis et al., 2016). Leaders can improve engagement by supporting and encouraging employees, which improve the two-way communication among all levels in organisation (Antony et al., 2007; Willis et al., 2016). In order to achieve a high level of involvement, leaders can use methods such as visual control, daily meetings with a standardised agenda, two-way communication flow, and building a system of continuous improvement (Poksinska, Swartling and Drotz, 2013). In similar with that, one of participant claimed:

> "We used to have meetings with them and tell them that everyone is responsible from the senior management to the worker. Conduct meetings with all groups so that everyone feels they are important. In this way, we were encouraging them."

Moreover, conducting training can lead to making employees more involved in Lean thinking (Al-Balushi et al., 2014). Supporting culture, training, and staff involvement are the most factors that enable Lean implementation (Andersen, Rovik and Ingebrigtsen, 2014; Maijala et al., 2018). Since the successful implementation of Lean depends on the active involvement of the whole organisation; Lean leaders play a significant role in communicating and teaching Lean principles and philosophy (Poksinska, Swartling and Drotz, 2013). Employees involved in improving daily operations, also employees more involved in decision making; since Lean implementation progressed (Poksinska, Swartling and Drotz, 2013). Gemba reflects leaders involvement with employees who do the work that adds value (Aij, Visse and Widdershoven, 2015; Aij and Teunissen, 2017; Al-Balushi et al., 2014; Womack and Jones, 2003). This is supported by participant 24:

> "This has changed the way workers think. They say to themselves, so come to work like this. Like I told you something essential, he feels the employee is part of the job. It is part of the success or failure that may happen."
> "After training, workers became interested in increasing productivity further. They have come to my office to tell me about the wastes, or the breakdowns in their departments. Even their language has changed among themselves, and

> they become discuss with each other about the wastes. Their outlook became different. Interested in the arrangement and the 5S. When they took the training course, they understood the topic, so they wanted to apply the things that have been learned in the course."

Theme 8: Supporting culture

Lean implementation aims to create a culture of continuous improvement, where employees are empowered to drive improvements and to eliminate waste (Poksinska, Swartling and Drotz, 2013). Culture is perceived as a building block in organisations (Berg and Black, 2014); Lean leader must ensure that the culture is serving the organisation's objectives to achieve improvements (Aij and Teunissen, 2017). A suitable organisational culture is widely considered to be essential for Lean Six Sigma implementation (Antony and Banuelas, 2002; Cheng, 2007; Kwak and Anbari, 2006; Zu, Robbins and Fredendall, 2010). Leaders should support continuous improvement by allocating time and resources and be open to ideas that help in achieving improvements (Poksinska, Swartling and Drotz, 2013). Likewise, one of the participants said:

> "From the start, there was a commitment from top management. They were focused on embracing any initiative idea. Any new idea must be welcomed even if it comes from the cleaning employee because any idea may have creativity. Every person from his place may have creativity."

The leaders work on extended assignments, with in-depth processes and people knowledge; leaders' behaviours go beyond being just coordinators of resources, and frequently rotating on assignments, their behaviours change to emphasise the importance of providing managerial versatility (Camuffo and Gerli, 2018). Another behaviour of leadership is creating and supporting the development of a learning organisation culture (Aij, Visse and Widdershoven, 2015; Maijala et al., 2018). Leaders should support Lean Six Sigma operations to create an environment in which mistakes are regarded as opportunities for learning; learning by seeing and doing, and being committed to lifelong learning (Aij et al., 2013; Aij, Visse and Widdershoven, 2015; Goodridge et al., 2015; Steed, 2012). This learning environment can be useful in encouraging employees to submit new ideas, they know there will be no blame for any mistakes that occur; also leaders dare to acknowledge their own mistakes (Aij,

Visse and Widdershoven, 2015; Loh, Mohd Yusof and Lau, 2019). Effective leaders help in building this culture in which all employees embrace the method of identifying errors in processes without being blamed (Aij and Teunissen, 2017; Toussaint and Berry, 2013). Participant's number 18 stated that:

> "Management does not blame the employees about mistakes; management understands why mistakes happened and what the employees' needs are."

Moreover, effective leaders provide support and commitment for Lean Six Sigma implementation (Aij et al., 2013; Goodridge et al., 2015; Maijala et al., 2018). They also show commitment and support by being actively involved and participating in improvements initiatives (Laureani and Antony, 2017). Leaders pay attention to actions that support continuous improvement; in turn, the continuous improvement becomes a crucial part in meetings, and improvement programmes are monitored and visualised (Poksinska, Swartling and Drotz, 2013).

Aij and Teunissen (2017) point out that many studies addressed the leaders' ability to foster and maintain an improvement culture. To implement Lean effectively, Lean identified as a change of focus leaders move towered sustain effort to change the organisational culture (Goodridge et al., 2015). Leaders have a role in addressing cultural changes that gradually happened with engaging more people in Lean activities (Goodridge et al., 2015).

Leaders should provide financial and workforce commitment to enable Lean to be implemented successfully (Aij et al., 2013; Maijala et al., 2018). To support continuous improvement, leaders must also acknowledge initiatives, ideas and effective participation in reaching intended improvements (Poksinska, Swartling and Drotz, 2013a). Also, leaders can support continuous improvement by demonstrating their willingness to embrace change (Poksinska, Swartling and Drotz, 2013). There are some further traits that leaders should have. For instance, they should have the characteristic of being a high performer (Maijala et al., 2018; Steed, 2012), and have some other qualities such as humility and openness, and ability to communicate (Maijala et al., 2018). Participants number 11 comments on supporting:

> "In order to make a change, you need support; the management was very committed to providing support. The management has embraced the project

and supported everyone and given the required time, money, effort, equipment and infrastructure."

4.6 Conclusion

The findings that come out from this chapter indicate that leadership behaviour plays a vital role in Lean Six Sigma operations. Some of the leadership aspects are mentioned repeatedly in a large number of interviews, while some aspects appeared in a few. The field study conducted through interviews showed the top four aspects that facilitate the effective use of Lean Six Sigma. These findings give new insights into the power of some leadership behaviours in influencing the successful use of Lean Six Sigma in the manufacturing sector in Jordan. In other words, some aspects are more important than others. This may help organisations that face challenges in using Lean Six Sigma; the practitioners can be aware of these significant factors and pay attention for them.

Nevertheless, the top four aspects share two main elements: developing employees and communication. The results indicate the importance of these two themes that practitioners should focus on. However, the chapter findings disclosed that leaders' attitudes play a vital role. In that, leaders should maintain a good relationship with employees by being humble with employees, socialising, and being interested in their needs. Showing concern for employees' social side, providing support for them, and putting great concern for employees' needs to make them feel they are part of the organisation are essential aspects for Lean Six Sigma.

However, the researcher noted there are some similarities and differences between the aspects that emerged from the data and the literature. Some studies revealed some aspects which did not appear in the field study. Taking field study and literature together shows that there is a wide agreement between the study findings and the literature in the majority of aspects.

However, the data collection stopped when the saturation level was achieved. The saturation level was realized after the last three interviews. From the analysis of the data, thirty-six leadership aspects emerged. The participants in the focus group took part to aggregating data; thus, the participants grouped aspects into themes. As a result, eight themes emerged from this workshop. The most targeted theme was

training and development. During the interviews, participants also intensively highlighted giving training. This indicates the vital role for training in realising the benefits of Lean Six Sigma and facilitate the effective use of this improvement approach.

Overall, this inductive process explored eight themes that were socially constructed based on participants' perspectives, which facilitate effective use of Lean Six Sigma in the manufacturing sector in Jordan. These themes do not stand alone; there are interdependent and interconnection between them. The themes descriptions showed that there is clear interconnection among these themes.

CHAPTER FIVE
FRAMEWORK DEVELOPMENT

5. CHAPTER FIVE

5 Framework development

The themes that influence the effective use of Lean Six Sigma were identified in chapter four; see section 4.5.1. In this chapter, the researcher seeks to develop descriptions for the ideal position for each theme. On the one hand, the ideal position will be the desired endpoint and targeted by leadership behaviours. Describing the ideal position for each theme enables the researcher to identify the required leadership behaviours to create that ideal position. This process can be considered as a starting point in developing the framework. Knowing the ideal position, and the required leadership behaviours to create that position, are the main components of the framework.

On the other hand, the leadership behaviours will emanate from three sources: the literature, focus group workshop, and interviews' analysis. A literature review was conducted in chapter 2; from that review, the researcher identified the leadership behaviours that support the developed themes to help to create the ideal position. A focus group was conducted to suggest behaviours that could be appropriate to facilitate effective use of Lean Six Sigma. Leadership behaviours may also come directly from leadership aspects that emerged from the interviews' analysis; see chapter 4, section 4.4. Each source of leadership behaviours provided input for developing a rigorous and robust framework.

In this study context, the identified leadership behaviours encourage leaders to act or behave in a certain way in organisations. Therefore, the proposed leadership behaviours create the desired practices in organisations. The leadership behaviours also support the themes and help in creating the ideal positions. These leadership behaviours would address the gap between the current and ideal position of the developed themes; therefore, leadership behaviours create the desired endpoint. These leadership behaviours overlap and there is repetition across the three sources; as a result, the similar leadership behaviours are integrated.

In section 5.1, the researcher seeks to develop descriptions for the ideal position for each theme to identify the required leadership behaviours for the ideal position, as

shown in section 5.2. Then, integrating the leadership behaviours resulting from the three sources is described in section 5.3.

5.1 Ideal position

The ideal position is the desired endpoint and is what leaders should try to achieve. Also, the ideal position describes what a theme looks like in an organisation and where it is most effective. The ideal position is also a *description of the most perfect organisation*; what that organisation would look like, how it would work, how employees/managers act, and the processes it would have. From the description, practitioners can understand what that organisation would be and how managers behave. Also, it will help practitioners to realise matters related to that theme. Moreover, since the ideal position is the desired endpoint in the most perfect organisation, it becomes the target position. Thereby, leaders should encourage their organisation to reach that target position by adapting and modifying behaviours in line with the ideal position descriptions. Determining the leadership behaviours that create the ideal position will help organisations to start the journey of transformation from their current position to the ideal position. Thus, the leadership behaviours that would help to create the ideal position are the focus of this study; to reduce the gap between current and ideal positions. In that respect, the researcher will investigate what leadership behaviours are required to create that ideal position, see section 5.2. Meanwhile, in this section, a brief description of the ideal position for each theme is developed, which reflects the desired position for effective use of Lean Six Sigma.

The descriptions of the ideal position are not only derived from the participants' perspective, but are also supported by the literature; these two sources reflect different perspectives from different angles. These descriptions have been supported by the literature reviewed in this study to ensure high rigour and validity, which will lead to a better understanding and form a comprehensive picture around each theme. Then, it would be clear what the ideal organisation would be; the researcher will know how managers behave and see things related to that theme in that organisation.

On the one hand, the researcher reviewed the literature by comparing the emerged themes with the published literature to identify the ideal position for each theme. In that regard, the researcher knew how and what that theme looks like in an organisation

and where it is most effective. On the other hand, the focus group participants developed descriptions for each theme, see section 4.5.1 in chapter 4. However, the researcher tried to synthesise the participants' descriptions and what the literature mentions to create a combination of the two. The researcher found overlaps between participants' descriptions and the literature descriptions. The process of blending and combining the participants' perspectives with the literature help to gain comprehensive descriptions for the ideal position for each theme. Thereby, the ideal position description for each theme was developed as a combination of the two sources.

5.1.1 Training and development ideal position

The ideal position for training and development refers to organisations with the principle of qualification as a long-term strategy for employees' development and continuous learning (Aij and Teunissen, 2017; Al-Balushi et al., 2014; Dombrowski, Mielke and Scheele, 2014). Managers perceive the employees as assets and resources that they can develop (Poksinska, Swartling and Drotz, 2013). Also, in most established organisations, managers usually encourage, promote, and enable organisational learning and knowledge sharing (Mann, 2005). Furthermore, the organisations that have adopted Lean Six Sigma successfully provide many development opportunities and training programmes for employees and implied new tasks in their work (Poksinska, Swartling and Drotz, 2013). All the employees in the most effective organisations are trained in the Lean Six Sigma philosophy and tools to reduce waste and variation in processes. All the organisation employees and departments are evaluated annually by the Lean Six Sigma team, taking into consideration Lean Six Sigma philosophy and practices, such as: identify the waste in the process, identify ideas for improvements, implement these ideas, recognise where the variation in the process happened and remove this variation (Toledo et al., 2019). Managers try to develop employees' capabilities and skills by set challenges that would nurture and encourage growth in employees (Poksinska, Swartling and Drotz, 2013). Organisations promote employees' self-development through diagnosis and analysis of the competencies and the individual development process. The competencies analysis should be conducted annually through a dialogue between a manager and an employee. During that dialogue and interview, these competencies

should be evaluated: Lean thinking, teamwork, business vision, technical knowledge, and communication. In turn, the manager will be able to propose a development plan for each individual. The plan of employee development targets two essential skills and competencies: technical knowledge and Lean Six Sigma thinking, which enhance the employee's understanding of the points of waste, bottlenecks, and variation in processes (Toledo et al., 2019).

5.1.2 Continuous improvement and development ideal position

Leaders in the most established and effective organisation systematically focus on the activities that support continuous improvement. In turn, continuous improvement is considered as a key agenda in meetings, and there are monitorisation and visualisation for all improvement activities in the effective organisation. Moreover, organisations allocate the necessary time and resources to enable continuous improvement activities (Poksinska, Swartling and Drotz, 2013). Effective leaders visit the front-line every day and set aside two hours for each visit. During this visit, leaders seek input from front line employees by asking several questions and watching the process. Furthermore, leaders show care and recognition during the visit by showing respect, recognising the added value of work, and encouraging workers, as well as using the production area as the classroom through Gemba walks (Aij and Teunissen, 2017; Antony et al., 2007; Kent, 2006; Mann, 2005).

The best Lean Six Sigma practitioners have managers who have a holistic view. The most important practices that managers focus on is continuous learning, which refers to learning from mistakes, learning by seeing and doing, and being committed to long-term learning (Aij et al., 2013; Aij, Visse and Widdershoven, 2015; Goodridge et al., 2015; Maijala et al., 2018; Steed, 2012). The leaders' role usually is to develop an explanation of a problem and its possible solution. In turn, they develop processes and other types of standards in collaboration with teams and rely on them as a key point for initiating continuous improvement (Adler, 1993; Camuffo and Gerli, 2018). As teaching and learning progress in the organisation, the managers' role changes and starts to challenge their followers and promote a follow-up, which enables solving problems faster (Aij, Visse and Widdershoven, 2015; Mann, 2009; Toledo et al., 2019).

5.1.3 Ideal position for Communication

Most effective organisations establish and utilise effective communication systems and structures by having verbal and visual communication systems that reinforce communicating a message (Laureani and Antony, 2017). Organisations support two-way communication and focus on reinforcing effective information flow from the front-line to top management and vice versa. Rather than using the traditional ways of communicating messages, such as email, information boards, and documents, the messages and information are disseminated through short meetings. These meetings enable managers to receive direct feedback from individuals. The managers use a standardised agenda in the meetings, which is a list of items to be discussed at a formal meeting. This agenda list can consist of updating employees with any changes in processes of production, checking the conditions to meet the day's demands, planning daily processes and activities, reviewing team goals, and discussing different problems of the work (Poksinska, Swartling and Drotz, 2013). Furthermore, in the morning meeting, these agenda and goals are reviewed at the team level and categorised into different priorities. The team leaders assign these to the flow manager, who should communicate them to the next managerial levels (Poksinska, Swartling and Drotz, 2013). Leaders usually communicate and listen carefully to employees, showing respect. Successful managers should frequently communicate with individuals from different levels in order to gain more information about employees' experiences, suggestions, and problems. Leaders who frequently contact employees can clarify and convey information effectively and clearly, which enhances communication in an organisation (Aij and Teunissen, 2017).

However, developing means for visual communication and control is important in an effective organisation. The daily management system visually displays daily progress and performance indicators. Data walls collect and display relevant data; the visual means and tools are used to clarify objectives and present timely feedback on processes' performance. Many dashboards display information and several charts with standardised colour codes, which help in getting immediate and visually stimulating information. Using information technology and dashboards supports the daily improvement of the processes. Also, it gives the staff the ability to control the problem and quickly identify if anything is going wrong (Maijala et al., 2018;

Poksinska, Swartling and Drotz, 2013). In other words, organisations practice visualisation to help team members identify areas for improvement and demonstrate accomplishments on improvement boards (Bijl et al., 2019).

5.1.4 Empowering employees ideal position

Managers focus on empowering employees to be more involved in decision making, more authorised to control their work processes, and more involved in improvements activities. Employees should be stimulated to submit suggestions and improvement ideas and be responsible for planning and realising improvements. In turn, employees have the power to make suitable decisions and take the necessary actions to achieve the desired improvements. Effective organisations empower employees to plan, organise, and control daily processes and take over some managerial roles and duties such as monitoring and updating performance measures or conducting reviews and inspections. Organisations use tools and methods to enhance and support employees' empowerment and involvement, such as visual control, short daily meetings with a standardised agenda, two-way communication flow, and building a system of continuous improvement (Aij and Teunissen, 2017; Loh, Mohd Yusof and Lau, 2019; Poksinska, Swartling and Drotz, 2013).

Furthermore, instead of leaders being controllers, their influential role is to be coaches and facilitators. The leaders' role changes and they start to delegate responsibilities and coach employees. When employees are coached, their capabilities increase; in turn, rather than leaders solving problems by themselves, leaders pass this task to employees and their role becomes a facilitator in the problem-solving process. In order to enable employees to take new responsibilities and roles, organisations create new development opportunities and training programmes for employees. Organisations manage work and move towards a team-based organisation where team leadership is central for Lean Six Sigma production. From that, work is organised in teams that are responsible for accomplishing assignments and these teams are considered as the key point of improvements and solving problems. The management passes responsibility to teams, which shows a type of shared leadership. This shared leadership style is an instrument to realise participation, empowerment, and gain the benefits of employees' skills (Poksinska, Swartling and Drotz, 2013; van Rossum et al., 2016; Seidel et al., 2019).

5.1.5 Motivating employees ideal position

The most effective and well-established organisation uses several means to stimulate employees and give recognition. Such an organisation conducts events and conferences as a platform to show success story cases, which in turn increase eagerness and awareness for improvements across the whole organisation (Laureani and Antony, 2017). Furthermore, managers are more available in the workplace (shop floor) to support and talk with their employees. Managers are aware of the importance of formal and informal meetings to be close to employees and talk with them. In turn, managers visit the shop floor where value is created and walk-in organisation to talk with employees and participate in coffee breaks (Poksinska, Swartling and Drotz, 2013). Managers rewarded employees whose performance contributes to the realisation of current objectives (Poksinska, Swartling and Drotz, 2013). Also, they give rewards and recognition for submitting effective ideas and active participation in order to achieve improvements. Managers provide positive and constructive feedback, usually to increase enthusiasm and grit to make more improvements. Effective leaders do not blame employees for conducting mistakes; they encourage the employees to learn from their mistakes and keep submitting ideas. Organisations can also provide financial and non-financial rewards as recognition of good performance and achievement.

5.1.6 Managing qualities and operations ideal position

Managing qualities and activities in most efficient organisations implies different actions and agendas, namely, planning daily activities and production, checking the conditions to meet daily demands, and discussing daily work. Furthermore, employees should be aware of current goals and understand strategies to be involved in improving quality, safety, and productivity. In the most effective organisation, four indicators should be measured daily and communicated at all levels of the manufacturing organisation; these indicators are quality, delivery, cost, and safety. Teams are responsible for developing planning production and follow-up improvements (Poksinska, Swartling and Drotz, 2013). Also, team members establish and maintain new process-focused measures alongside conventional measures. They use technology to collect and present the data, such as dashboards; in turn, members can

measure and use data effectively. Lean Six Sigma management relies on high availability and efficient use of better data (Goodridge et al., 2015).

In an organisation that is more advanced in Lean Six Sigma operations' practices, leaders have a tendency to evaluate the performance of the processes by reporting the state of the operations with quick and frequent feedback loops with next-level management (Camuffo and Gerli, 2018). Team members responsible for Lean Six Sigma prepare a monthly report about the current practices of Lean Six Sigma and to what extent employees have a commitment to using Lean Six Sigma tools and philosophy. They visit all organisational levels, especially the shop floor, to evaluate and collect data, and then they are be able to prepare reports with valuable data (Camuffo and Gerli, 2018; Goodridge et al., 2015). From that, managers can take corrective actions to sustain Lean Six Sigma processes in an organisation, such as make the needed resources available to do the work, and conduct improvements, like an IT resource to pull required data. Also, managers rely on these reports to hold employees accountable for realising Lean Six Sigma commitment. Employees usually demonstrate a high level of commitment, and they feel responsible and accountable to do their best to ensure the success of Lean Six Sigma operations (Goodridge et al., 2015).

Organisations develop and implement structures and processes that can facilitate and tackle Lean Six Sigma initiatives that cross internal boundaries (Maijala et al., 2018). Leaders in the most effective organisation have a horizontal organisational focus; they focus on the horizontal flow of value along entire value streams rather than on tiny functional issues (Camuffo and Gerli, 2018). Managers at the strategic level develop governance arrangements that cross departments' boundaries, supporting a long-term and comprehensive vision of the company's value-producing processes. Also, managers align the aims and objectives of divisions across the whole organisation to be consistent with Lean Six Sigma philosophy and tools (Goodridge et al., 2015). Managers use the term "unity of purpose" to imply coordination and alignment to achieve unity in goals (Aij and Teunissen, 2017; Toussaint and Berry, 2013). Unscheduled and unpredictable tasks may occur as a result of high demand from customers. Standardised work considers this situation and provides documentation on tackling these issues (Goodridge et al., 2015).

5.1.7 Employees engagement and involvement ideal position

The most effective organisation makes the employees feel that they are a vital part of the new initiative; in that regard, this new philosophy is not about to impose on them. The organisation also develops a systematic programme where rewards are used to make employees feel part of this change. Leaders have essential traits that increase the level of engagement and involvement; leaders are charismatic, stimulating, and supportive, which makes the employee do their best to achieve the organisation's goals (Toledo et al., 2019). Furthermore, there is high demand for some leaders' traits, including being a high performer and being servants, with qualities such as modesty and openness (Maijala et al., 2018). Leaders should also be authentic to gain workers' trust by demonstrating traits such as honesty and benevolence and demonstrating well-intentioned behaviour (Aij, Visse and Widdershoven, 2015; Aij and Teunissen, 2017; Braithwaite, Iedema and Jorm, 2007; Kent, 2006). The relationship between leaders and employees relies on developing trust, which evolves from reliance on the integrity of each other, collaboration, fostering interactions, and sharing information (Aij and Teunissen, 2017; Poksinska, Swartling and Drotz, 2013). In the effective Gemba walks, leaders show recognition, engagement, a focus on a leader-employee relationship, and fairness (Aij, Visse and Widdershoven, 2015; Aij and Teunissen, 2017; Steed, 2012).

Moreover, leaders behave as role models and act in ways suitable to the company values and culture. In that regard, leaders provide high support for improvements and show that they are willing to embrace change (Poksinska, Swartling and Drotz, 2013). Leaders collaborate with team members to develop work and other types of standards of operations, help team members, and worry about the needs of their teams.

Leaders make employees feel that they are heard, which effectively influences staff engagement, which is related to positive changes in the organisation (Aij and Teunissen, 2017; Willis et al., 2016). Leaders support and encourage employees, which improves engagement by improving the two-way communication among all divisions in the company (Antony et al., 2007; Willis et al., 2016). In order to achieve a high level of involvement, leaders use several means such as visual control, daily meetings with a standardised agenda, two-way communication flow, and building a system of continuous improvement (Poksinska, Swartling and Drotz, 2013).

5.1.8 Ideal position for Supporting culture

To succeed in Lean Six Sigma, organisations need to have a culture where all employees from all divisions and organisational levels eliminate waste. Employees understand that their contribution is vital for the organisation, the team they work with, and for customers. Furthermore, the organisation has a culture where employees' essential needs are fulfilled and understood. The organisation also has a strategy to fulfil and meet employees' mental and spiritual needs (Andersson, Eriksson and Torstensson, 2006). Leaders aim to make employees understand and live the organisation's culture by teaching them its culture and values. Organisational culture attributes are trust, shared responsibility, and openness to experimentation with improvement intention (Poksinska, Swartling and Drotz, 2013). Indeed, things may not succeed the first time, and experimentation allows the team to discover the failure and learn until they are on track. Having a learning organisation culture where organisations have environments that consider failure as an opportunity for learning and mistakes provide openings for improvement, this learning organisation culture is supported by no-blame approaches for mistakes and errors (Aij and Teunissen, 2017; Goodridge et al., 2015; Steed, 2012). Honesty allows leaders and employees to admit and learn from mistakes (Aij, Aernoudts and Joosten, 2015; Al-Balushi et al., 2014). The leaders who are honest and promote honesty help to build a culture in which employees embrace the style to identify mistakes in operations without blaming anyone (Toussaint and Berry, 2013).

The organisation creates conditions that sustain Lean Six Sigma philosophy and culture of continues improvement. Organisational culture is an essential element, so leaders ensure that culture is devoted to continuous improvement (Aij and Teunissen, 2017; Berg and Black, 2014). Having an open and proactive culture increases customer satisfaction and continuous improvement, and everyone's participation is applied anywhere in the organisation's departments (Dahlgaard and Dahlgaard-Park, 2006). Senior leaders adopt Lean Six Sigma as a key element in their company's strategy and approach; Lean Six Sigma culture deploys as a result of consistent effort, and seeks for perfection by the way employees do their work (Mann, 2009). Some features that demonstrate organisational success are: celebrating success, fostering a culture of innovation, collaboration and creativity, a passion for excellence, and

collaborative teamwork (Maijala et al., 2018). Leaders should adopt task identity, feedback, autonomy, belief in improvement, and honesty to improve the culture that facilitates Lean Six Sigma (Aij and Teunissen, 2017). Briefly, task identity is when employees have identified tasks and complete all the work tasks and realise the importance of their contribution to the entire production process (Drotz and Poksinska, 2014). Feedback about process and employees' performance is offered through dashboards and visual control (Crump, 2008; Drotz and Poksinska, 2014). Leaders can foster autonomy by giving employees more responsibility, more authority to take decisions, and to enable self-managed teams. To achieve a culture of continuous improvement, leaders must be a facilitator during problem-solving and enable employees to solve the problem, allowing them to be masters in problem-solving (Aij and Teunissen, 2017; Toussaint and Berry, 2013).

Descriptions of the ideal positions are summarised in Table 1-1 in appendix (F). These ideal positions were confirmed from the literature. Stating the ideal positions for the eight themes can be considered as references for identifying the required leadership behaviours.

The ideal position descriptions show what a theme looks like in the most perfect organisation. The ideal position is the target position and leaders want organisations to reach that target position by using their behaviours. Hence, the researcher needs to know what leaders should do to create that ideal position to use Lean Six Sigma successfully. The following sections will identify the required leadership behaviours based on the ideal position descriptions.

5.2 leadership behaviours sources

The researcher adopted and relied on three sources to identify the possible leadership behaviours to develop the proposed framework. These sources are a focus group workshop, interviews analysis, and the literature; see Figure 5-1. The leadership behaviours from the three sources will constitute a proposed framework that would facilitate the effective use of Lean Six Sigma. Leadership behaviours target the ideal position, which refers to the desired endpoint in the most perfect organisations. The following sections will present the leadership behaviours identified from each source; the areas (themes, ideal position) that leaders need to achieve have already been

identified. The leadership behaviours provide a high-level description of how leaders behave and what they need to do. Therefore, the leadership behaviours will resemble a top-level overview rather than specific actions. Leadership behaviours encourage leaders to act and behave in a certain way.

The researcher will look for what leadership behaviours are required to create the ideal position to support the theme. This identification of leadership behaviours is based on the ideal position descriptions that were developed in section 5.1.

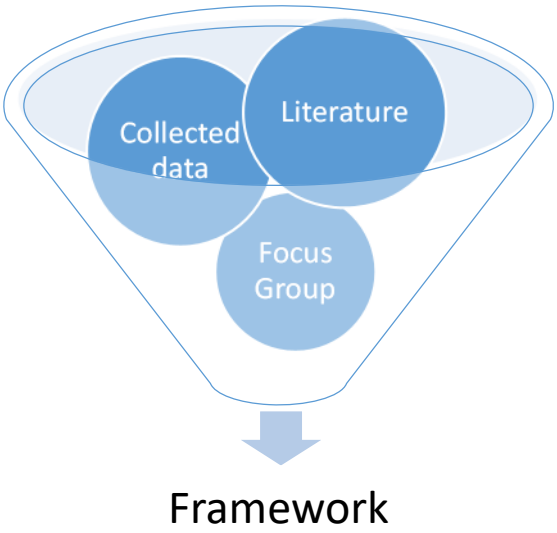


Figure 5-1 leadership behaviours sources

5.2.1 Leadership behaviours identified by the focus group

The researcher conducted a face-to-face focus group to identify leadership behaviours that create the ideal position to support themes. The focus group enabled participants to hear others' views, which stimulated participants to respond as the discussion developed. Using a focus group helped in that the participants named and refined leadership behaviours. Five participants were able to take part in this focus group and Table 5-2 presents the characteristics of contributing participants.

Table 5- 2 participants' characteristics

Participant's number	**Industry**	**Years of experience**	**Job tittle**

1	Textile industry	8	Lean Manufacturing Coordinator
2	Textile industry	12	Operations Manager
3	Textile industry	5	Team leader
4	Electrical industries (production of electric equipment)	7	Shop floor Supervisor
5	Electrical industries (production of electric equipment)	10	Shop floor employee

The focus group was organised to brainstorm ideas related to leadership behaviours to facilitate Lean Six Sigma. The ideal position for each theme was given to the participants, so they would know the desired endpoint for each theme with a purpose of making suggestions of possible leadership behaviours that facilitate Lean Six Sigma. The researcher asked the participants, "what leadership behaviours do you think would help in creating these ideal positions?" These emerged ideas were subjected to debate and refined in an iterative process to obtain the required leadership behaviours to achieve the ideal position. After reading the ideal position description, the participants started to think about what leadership behaviours are required to create that specific ideal position. During this process, the participants recognised that some of these behaviours can work and target more than one theme. The participants continued the discussion and argued with each other until they collectively agreed about the specific behaviour. These leadership behaviours are based on participants' perceptions that should impact the themes and help to create the ideal position. This

focus group generated a list of leadership behaviours related to actions that leaders can do. These leadership behaviours are presented in Table 5-3.

Table 5- 3 leadership behaviours that developed by focus group

	Leadership behaviours	**Targeted ideal position**
1.	Be open and receptive to feedback and listen actively to what others say	• Communication • Employees' engagement and involvement
2.	Enhancing the role of team work in realising improvements	• Empowering employees • Employees' engagement and involvement • Continuous improvement and development
3.	Encourage collaboration: Collaborating on work or projects can help develop better ideas and even improve employee engagement.	• Employees' engagement and involvement • Continuous improvement and development • Managing qualities and operations • Supporting culture
4.	Go to the production area: Ask your employees for feedback; it makes them feel that their opinions matter and plays an important part in the company.	• Communication • Employees' engagement and involvement
5.	Promote honesty: When employees understand that telling the truth comes with no major consequences, small problems can be identified early and solved before they worsen.	• Supporting culture • Continuous improvement and development

6.	Provide training	• Training and development
7.	Identify individuals' training needs	• Training and development
8.	Rewarding employees	• Motivating employees • Employees' engagement and involvement
9.	Show respect for individuals	• Motivating employees • Communication • Employees' engagement and involvement
10.	Delegating some responsibilities to employees by adhering to the rules and regulations of the company	• Empowering employees

The proposed leadership behaviours reflect the participants' perspectives who are practitioners of Lean Six Sigma in the manufacturing sector in Jordan. Ten leadership behaviours emerged from this source. The researcher will continue to look for leadership behaviours from the other sources in the following sections.

5.2.2 Identifying leadership behaviours from leadership aspects that emerged from the interviews' analysis

The researcher identified 36 aspects of leadership behaviours in the data analysis stage, in chapter 4, that enable the successful use of Lean Six Sigma in the manufacturing sector in Jordan. However, this section identified leadership behaviours that are required to create the ideal position. The source of these leadership behaviours is the primary data. In the previous section, early in this chapter 5.1, descriptions for the ideal positions were developed. However, in this section, these descriptions of the ideal positions allow the researcher to identify the leadership behaviours required to create the ideal position. In order to identify the required leadership behaviours, the researcher followed specific procedures. Therefore, each

aspect of leadership behaviours that emerged in the previous chapter is compared with all ideal positions descriptions. These comparisons enabled the researcher to ascertain whether that leadership behaviour creates the ideal position and identify which ideal position can be created. This process of precise and thorough comparisons enabled the researcher to identify the leadership behaviours that create the ideal position. Also, these comparisons helped develop explanations of why certain leadership behaviours are chosen and create pieces of evidence of how behaviours can create the ideal position. Thus, this section presents clarification on how and why each specific leadership behaviour creates the ideal position. In other words, each of the leadership behaviours will show which ideal positions are created specifically, by providing pieces of evidence from ideal position descriptions. The researcher provides pieces of evidence from descriptions of ideal positions and explanations from data to give a comprehensive picture of each leadership behaviour.

In that, the researcher was able to identify leadership behaviours that create the ideal position. It is worth noting that some of the provided pieces of evidence can be related to several and contain several behaviours simultaneously. Also, some leadership behaviours may create several ideal positions. The following sections present leadership behaviours that enable the effective use of Lean Six Sigma.

1. **Sharing information with employees**

   Leaders share the necessary information with employees that enable efficient work. This information can be related to the processes' performance, which includes sending updates to employees. The necessary information should be disseminated across the department with employees who can get benefit from it. There are several methods that leaders can make the information available for employees, such as visual management, which includes information boards, dashboards, and Anodon lights. These tools of sharing information provide employees with timely information.

   The researcher gets this behaviour as required to create an ideal position based on the descriptions of the ideal position. The following evidence from the ideal position description provides clarification for getting this leadership behaviour related to *the training and development theme.*

> *Also, in most established organisations, managers usually encourage, promote, and enable organisational learning and knowledge sharing…*

This leadership behaviour also enables to create the ideal position for *Communication*. Therefore, it comes to be necessary leadership behaviour based on the following description for the ideal position:

> *Developing means for visual communication and control is important in an effective organisation. The daily management system visually displays daily progress and performance indicators… The visual means and tools are used to clarify objectives and present timely feedback on processes' performance. Many dashboards display information and several charts with standardised colour codes, which help in getting immediate and visually stimulating information. Using information technology and dashboards supports the daily improvement on the processes. Also, it gives the staff the ability to control the problem and quickly identify if anything is going wrong.*

Moreover, sharing information with employees is relevant to create the ideal position for *empowering employees*. This relevance is based on a clear description for that ideal position; the description was:

> *Organisations use tools and methods to enhance and support employee's empowerment and involvement, such as visual control, short daily meetings with a standardised agenda, two-way communication flow, and building a system of continuous improvement.*

This leadership behaviour, sharing information with employees, can also create the ideal position for *managing qualities and operations*. The following evidence from the ideal position description provides clarification:

> *In the most effective organisation, … indicators should be measured daily and communicated at all levels of the manufacturing organisation. … They use technology to collect and present the data, such as dashboards; in turn, members can measure and use data effectively. Lean Six Sigma management relies on high availability and efficient use of better data.*

Furthermore, sharing information with employees create the ideal position for *employees engagement and involvement.* This role for that behaviour in increasing trust is explained in the following description:

> *The relationship between leaders and employees relies on developing trust, which evolves from reliance on the integrity of each other, collaboration, fostering interactions, and sharing information.*

This description indicates the importance of trust in the relationship between leaders and employees; sharing information is implicit for creating that ideal postin by increasing trust levels, which enhances the relationship between leaders and employees. Another support that shows this leadership behaviour create the ideal position for employees *engagement and involvement*:

> *In order to achieve a high level of involvement, leaders use several means such as visual control …*

2. Making the employees feel they are part of the change

Effective leaders seek to make their employees involved and interested in Lean Six Sigma processes. Leaders make employees feel they are part of this implementation and change. It is not a project that is enforced to follow it; they are involved in this journey to reach the desired point. As a result of that, employees become focusing on employing Lean Six Sigma philosophy in their work. This leadership behaviour is identified as required to create the ideal position for *employees engagement and involvement.* The following paragraph provides a section from the ideal position description to support that:

> *The most effective organisation makes the employees feel that they are a vital part of the new initiative; in that this new philosophy is not from abroad to impose on them. Organisation also develops a systematic program where suggestions and rewards are used to make employees feel part of this change.*

However, based on the ideal position descriptions, this leadership behaviour creates the ideal position only for *employees engagement and involvement.*

Interviewee number five describe the importance of making the employees feel they are part of the organisation:

> *We are looking for employees as assets and as a key to achieving any improvement. We have to give him an excellent environment to make them feel they are a part of the organisation.*

Moreover, this leadership behaviour was described by Interviewee number eighteen:

> *Management feeling of with employees. Of course, in factories, the most important category is the production line workers. Frontline people play the most important role in Lean manufacturing and Six Sigma failure or success. Likewise, the Quality Department and Quality Engineers are of the greatest influence on that. So those people feeling that their management exists and understand them, and their management is supportive of them and works to encourage them."… "So regardless of the mechanism in which this feeling is created. The important thing is that they should feel that they are part of the management process and also that the management levels are with them in the same line and also the management feels with them and give them the appreciation that they deserve.*

These descriptions from participants support and clarify the importance of this leadership behaviour.

3. Conducting meetings in a short frequency

Leaders conduct meetings with employees with a standard agenda. These meetings enable the leaders to discuss some ideas for improvement and listen to employees' views. Furthermore, leaders can talk with employees about the problems that occur in the work and stimulate employees to think critically about these problems in order to identify possible solutions. In that, employees can learn from their mistakes or from other mistakes and exchange information related to issues that face them. The researcher gets this behaviour as required to create the ideal position based on several pieces of evidence. First of all,

conducting meetings in a short frequency can create the ideal position for *continuous improvement and development*. The evidence for that was clarified in the following description of the ideal position:

> *Leaders in the most established and effective organisation systematically focus on the activities that support continuous improvement. In turn, continuous improvement is considered as a key agenda in meetings… Leaders' role usually is to develop an explanation of a problem and its possible solution.*

Furthermore, this leadership behaviour is highlighted in the description of the ideal position of *communication*; the following descriptions clarify that.

> *…the message and information are disseminated through short meetings. These meetings enable managers to receive direct feedback from individuals. The managers use a standardised agenda in the meetings, which is a list of items to be discussed at a formal meeting. This agenda list can consist of updating employees with any changes in processes of production, checking the conditions to meet the day's demands, planning daily processes and activities, reviewing team goals, and discussing different problems for the work. Furthermore, in the morning meeting, these agenda and goals are reviewed at the team level and categorised into different priorities…*

Moreover, conducting meetings in a short frequency is essential to create the ideal position of *empowering employees*. In line with that, the description of the ideal position was:

> *Organisations use tools and methods to enhance and support employee's empowerment and involvement, such as visual control, short daily meetings with a standardised agenda, two-way communication flow…*

In that, the previous description shows that daily meetings are essential to support employee's empowerment. However, this leadership behaviour is also related to creating the ideal position for *employees engagement and involvement*.

> *Leaders support and encourage employees, which improves engagement by improving the two-way communication among all divisions in the company. In order to achieve a high level of involvement, leaders use several means such as visual control, daily meetings with a standardised agenda, two-way communication flow, and building a system of continuous improvement.*

Overall, conducting meetings in a short frequency create the ideal position for several themes such as *continuous improvement and development, communication, empowering employees, and employees engagement and involvement.*

4. **Review and follow up processes**

Effective leaders seek to develop the operations in the organisation to tackle the issues that hinder creating value and make the processes more efficient. In order to create these improvements, leaders need to tracking the processes through having a high volume of data. Then, leaders analyse these data to develop processes and prepare reports about the processes' performance in cooperation with the team. Also, leaders should should evaluate the processes and employees to eliminate waste and improve the operations. This leadership behavior was mentioned tacitly in the description of the ideal position for *continuous improvement and development*. In turn, based on the following description is elicited that review and follow-up processes can create that ideal position.

> *Leaders' role usually is to develop an explanation of a problem and its possible solution. In turn, they develop processes and other types of standers in collaboration with teams and rely on them as a key point for initiate continuous improvement. As teaching and learning progress in the organisation, the managers' role is changed … promoting a follow-up, which enables solving problems faster.*

Moreover, review and follow-up processes can create the ideal position for *managing qualities and operations*. Based on the following description of the ideal position, the researcher got to this leadership behaviour.

In an organisation where more advanced in Lean Six Sigma operation practices, leaders have a tendency to evaluate the performance of the processes by reporting the state of the operations with quick and frequent feedback loops with next-level management. Team members responsible for LSS prepare a monthly report about the current practices of LSS and to what extent employees have a commitment to using LSS tools and philosophy.

5. Giving employees financial rewards and commendation

Leaders give prizes such as money or something valuable for a well-done job or given for someone as a motivation to reinforce desirable behaviour. For instance, leaders give prizes to employees for an initiative idea or improve customers' value. Also, leaders reinforce these behaviours in employees, namely, discover problems, provide solutions, make high performance by accomplishing the work efficiently. Thus, the presence of financial rewards helps in having motivated employees to eliminate waste and improve operations.

However, commendation refers to positive feedback, which leaders can express by using positive words. These words are used as a result of doing something valuable include doing something that saves reduce waste, adding value for customers, and providing effective ideas.

The following description of the ideal position clarifies that these two behaviours can create the ideal position for *motivating employees*.

Managers rewarded employees who their performance contribute to realisation of current objectives. Also, they give rewards and recognition for submitting effective ideas and active participation in to achieve improvements. Managers provide positive and constructive feedback usually to increase enthusiasm and grit to make more improvements. Organisations can provide financial and non-financial rewards as a recognition for good performance.

The participants in interview number 6 demonstrated the role of prizes in motivating employees to use Lean Six Sigma effectively:

> *I would say motivating the employees by using competition between the employees for using Lean Six Sigma in their operations is essential. We use the employee of the month prize. This increased the employees' commitment to implementing Lean Six Sigma.*

Participants 12 also added:

> *There is the CEO's award, which is an annual award given to 6 projects of the group's. Any company that has a creative idea applied and the idea proves that it improved product quality and reduced waste. The idea is presented to a committee, and a prize of 10,000 or 5,000 dollars can be given.*

6. Promoting the values that make employees think in a way to eliminate waste and solve problems

Leaders focus on letting employees follow organisation culture and values, which influences employees' attitudes to be concerned and interested about eliminating waste and solving problems in new ways. In that this type of culture can be ingrained among employees; they become seek for improvements in daily work since this the culture of their organisation. This leadership behaviour, promoting the values that make the employees think to eliminate waste and solve problems, enables creating the ideal position for supporting culture. Many descriptions were mentioned for that ideal position which provides pieces of evidence that this leadership behaviour creates the ideal position for *supporting culture*. Firstly, the following description shows that all employees should have this culture in their work.

> *To succeed in Lean Six Sigma, organisations need to have a culture where all employees from all divisions and organisational levels eliminate waste. Employees understand that their contribution is vital for the organisation, the team they work with, and for customers.*

Furthermore, another description emphasises that this leadership behaviour creates the ideal position for *supporting culture*.

> *Leaders aim to make employees understand and live the organisation's culture by teaching them its culture and values. Organisation culture*

> *attributes are trust, shared responsibility, and openness to experimentation with improvement intention.*

In line with that, the description for the ideal position for *supporting culture* mentioned more pieces of evidence that support this leadership behaviour creates that ideal position.

> *… Lean Six Sigma culture deploy as a result of consistent effort, and seek for perfection be the way employees do their work." …"To achieve a culture of continuous improvement, leaders must be as a facilitator during problem-solving and enable employees to solve the problem to let them be masters in problem-solving.*

However, the researcher compares this leadership behaviour with other ideal position descriptions; it does not appear related to create the ideal position for other themes. Nevertheless, based on the previous descriptions, this leadership behaviour can create the ideal position for *supporting culture*.

7. Evaluating employees' competencies regularly

Competent employees are able to accomplish their work efficiently. Since they have the required skills and ability for specific tasks. The leaders should evaluate the employees' competencies to know the employees' current capabilities. Then leaders suggest a training program for the employees who have a shortage in capability; in that this training closes the gap between the current and required competencies. The main point of having competent workers is that they can increase productivity and reduce defects. This leadership behaviour is identified as required to create the ideal position for *training and development*. This identification is based on the following descriptions:

> *All the employees and departments are evaluated annually by the Lean Six Sigma team, taking into consideration Lean Six Sigma philosophy and practices such as identify the waste in the process, identify ideas for improvements, implement these ideas, recognize where the variation in the process happened and remove this variation. Managers try to*

> *develop employees' capabilities and skills by set challenges that would nurture and encourage growth in employee.*

Another description for the ideal position that is congruent with identifying this leadership behaviour is to create the ideal position for *training and development.*

> *Organisations promote employees' self-development through diagnosis and analysis of the competencies and the individual development process. The competencies analysis should be conducted annually through a dialogue between a manager and an employee. During that dialogue and interview, these competencies should be evaluated: lean thinking, teamwork, business vision, technical knowledge, communication, and results for the organisation. In turn, the manager will be able to propose a development plan for each individual. The plan of employee development targets two essential skills and competencies: technical knowledge and Lean Six Sigma thinking, which enhances the employee understanding of the points of waste, bottlenecks, and variation in processes.*

These previous descriptions consistent with the importance of this leadership behaviour can create the ideal position for *training and development.* These descriptions also provided clarification and details of these leadership behaviours. In that, leaders can have a clear understanding of how to adopt this leadership behaviour.

8. Giving training on Lean Six Sigma

Leaders establish training initiatives and programs that seek to teach the employees about some tools that the organisation use in its operations. Employees should get training to be fully aware of Lean Six Sigma philosophy. In turn, that enables employees to use tools and philosophy effectively and how they can make improvements and reduce waste.

> *All the employees in an most effective organisation are trained in the Lean Six Sigma philosophy and tools to reduce waste and variation in processes.*

Based on the previous description, this leadership behaviour has been identified as required to create the ideal position for *training and development*.

Participant number twenty-four describe the importance of giving training on Lean Six Sigma:

> *For any new employee who comes in, we give him training on safety and quality matters and how to treat the product. We did a training course about seven wastes and Lean Six Sigma in general. After training, workers became interested in increasing productivity further. They have come to my office to tell me about the wastes, or the breakdowns in their departments. Even their language has changed among themselves, and they become discuss with each other about the wastes. Their outlook became different. Interested in the arrangement and the 5S. When they took the training course, they understood the topic, so they wanted to apply the things that have been learned in the course.*

Moreover, giving training on Lean Six Sigma is essential to achieve effective use of Lean Six Sigma. Participants number sixteen clarifies that:

> *Continuous training was a good example to facilitate implementation. We have a plan that is on what things these employees must be trained, what is Lean and Six Sigma and, how can they implement it and use it in production and, what are the goals of it. So intensive training was given.*

9. Giving training on performing work to acquire new skills

Leaders create development paths that suitable for each individual to develop his/her competencies. Providing opportunities for employees to develop their skills or get knowledge is an essential. In the long run, it can increase employees' capabilities to accomplish different works or be able to conduct

their work effectively. This leadership behaviour is identified to create the ideal position of *training and development* based on the following description:

> *training and development refers to organisations with the principle of qualification as a long-term strategy for employees' development and continuous learning. Managers perceive the employees as assets and resources that they can develop.*

Further description for the ideal position of *training and development* highlights that organisation should offer several training programs to enable employees development, see the following description.

> *Furthermore, the organisations that adopted the Lean Six Sigma successfully provide many development opportunities and training programs for employees and implied new tasks in their work.*

Participant number eleven clarifies the importance of giving training on performing work and learn new skills:

> *The training was essential and necessary when we brought a new machine. We needed training because we changed the design to reduce waste. To reduce the waste, the production of all the pieces has become at the same time, but the workers must be trained to know what parts they need and what parts others need. It was necessary to have training some of the terminology and how to put the pieces on the board. The training was essential, so people learn to look differently and learn to do their job by providing materials and time for the company.*

The participant added:

> *He needed the training to acquire the skills to do it differently... So the training was very essential, especially in the early stages, until they became use it automatically. After that, it became part of their regular skills.*

10. Visiting shop floor (Gemba walk)

This leadership behaviour refers to the activity that leaders walk on the factory floor where value is created. It enables leaders to identify wastes and

opportunities for improvements through observing and understanding the value stream issues. Main activities that leaders practice during the visit the shop floor namely being involved with employees, understanding and solving problems, and showing respect and recognition for employees. Visiting the shop floor can create the ideal position for several themes. First of all, based on the description of the ideal position for *continuous improvement and development*, this leadership behaviour can create that ideal position.

> *Effective leaders visit the front-line every day with set aside two hours for each visit. During this visit, leaders seek input from front line employees by asking several questions and watching the process. Furthermore, leaders show care and recognition during the visit by show respect, recognising the added value of work, encouraging workers, as well as, to use the production area as the classroom through Gemba walks.*

Furthermore, visiting the shop floor can create the ideal position for *Motivating employees*. This can be demonstrated through the following description:

> *Furthermore, managers are more available in the workplace (shop floor) to support and talk with their employees. Managers are aware of the importance of formal and informal meetings to be close to employees and talk with them. In turn, managers visit the shop floor where value is created and walk-in organisation to talk with employees and participate in coffee breaks.*

Moreover, this leadership behaviour is related to create the ideal position for *Managing qualities and operations*. This is confirmed and supported through the following description:

> *They visit all organisational levels, especially the shop floor, to evaluate and collect data, then they can be able to prepare reports with valuable data. In that, managers can take corrective actions to sustain Lean Six Sigma processes in an organisation, such as make the needed resources available to do the work, and conduct improvements*

The last ideal position that is identified by comparing this leadership behaviour with the descriptions of the ideal position's descriptions is employee *engagement and involvement*. Based on the following descriptions, visiting the shop floor creates the ideal position for *Employees engagement and involvement.*

> *In the effective Gemba walks, leaders show recognition, engagement, a focus on a leaders-employee relationship, and fairness.*
>
> *Leaders make employees feel that employees are heard, which effectively influences staff engagement level, which is related to positive changes in the organisation. Leaders support and encourage employees, which improves engagement by improving the two-way communication among all divisions in the company.*

11. Having a good relationship with employees

This leadership behaviour refers to leaders' efforts to strengthening relations with individuals. The strong relationship between leaders and employees influences productivity and morale for employees. In that, having a good relationship with employees is vital. Leaders can build a strong relationship with employees by being humble and trustworthy, socializing and respecting employees, listening, and focusing on fulfilling employees' needs. However, this leadership behavior identified after precise comparison with ideal position descriptions; it has been found that having a good relationship with employees can create the ideal position for two ideal positions including *Communication, and Employees engagement and involvement.* The following description provides evidence that having a good relationship with employees creates the ideal position for *Communication*.

> *Leaders usually communicate and listen carefully to employees with showing respect. Successful managers should frequently communicate with individuals from different levels in order to gain more information about employees' experiences, suggestions, and problems. Leaders who frequently contact employees can clarify and convey information*

> *effectively and clearly, which enhances communication in an organisation.*

Furthermore, this leadership behaviour also creates the ideal position for *Employees engagement and involvement.* This identification is based on the following description of the ideal position.

> *Furthermore, there is high demand for some leaders' traits, including being a high performer and being servants such as modesty and openness. Leaders should also be authentic to gain workers' trust by demonstrating traits such as honesty and benevolence and demonstrating well-intentioned behaviour. The relationship between leaders and employees relies on developing trust, which evolves from confidence and reliance on the integrity of each other, collaboration, fostering interactions, and sharing information.*

12. Identify and assign clear responsibilities for employees

Leaders rely on their power to assign responsibilities and duties to employees to carry out new activities. These responsibilities should be well defined and specific; in that employees can accomplish their work effectively. Leaders decide the tasks that they must do and which tasks they should delegate to employees. As a result of that employees can manage, control and organise the work. However, this leadership enables in creating the ideal position for *Empowering employees.* It is identified as a required based on the following descriptions for the ideal position that confirm this leadership behaviour is essential to create the desired endpoint that organisations should seek to achieve.

> *Effective organisations empower employees to plan, organize, and control daily processes and take over some managerial roles and duties such as monitoring and updating performance measures or conducting reviews and inspections.*

> *Leaders' role is changed to start delegate responsibilities and coach employees. When employees are coached their capabilities increase; in turn, rather than leaders solve problems by themselves, leaders pass*

this task to employees and their role becomes as a facilitator in the problem-solving process.

Organisations organise work and move towards a team-based organisation where team leadership is central for Lean Six Sigma production. In that, work is organised in teams which are responsible for accomplishing assignments and these teams are considered as the key point of improvements and solving problems. The management passes responsibility to teams which shows a type of shared leadership. This shared leadership style is an instrument to realise participation, empowerment, and get benefits of employees' skills.

The previous descriptions **demonstrate** identifying and assigning clear responsibilities for employees related to creating the ideal position of *Empowering employees.*

13. Establishing a team work that support standardized work

Leaders group some employees into teams that facilitate Lean Six Sigma. The teams work on sustain standardised work and the use of Lean Six Sigma. Standardized work includes precise work sequence, standard inventory, and documentation of the current process. These structures and teams consider as vital for continuous improvement and workflow smoothly. However, this leadership behaviour identified as required for creating the ideal position for *continuous improvement and development*, based on the following description:

they develop processes and other types of standers in collaboration with teams and rely on them as a key point for initiate continuous improvement.

Moreover, establishing and creating a structure and teams supporting standardized work creates the ideal position for *Empowering employees*. The following descriptions demonstrate that:

Organisations use tools and methods to enhance and support employee's empowerment and involvement, such as visual control,

short daily meetings with a standardised agenda, two-way communication flow, and building a system of continuous improvement.

Organisations organise work and move towards a team-based organisation where team leadership is central for Lean Six Sigma production. In that, work is organised in teams which are responsible for accomplishing assignments and these teams are considered as the key point of improvements and solving problems. The management passes responsibility to teams which shows a type of shared leadership.

Furthermore, this leadership behaviour is identified as required to create the ideal position for *Managing qualities and operations*. This claim is proved through the following description, which appeared as a description for the ideal position for *Managing qualities and operations*.

Team members responsible for LSS prepare a monthly report about the current practices of LSS and to what extent employees have a commitment to using LSS tools and philosophy. They visit all organisational levels, especially the shop floor, to evaluate and collect data, then they can be able to prepare reports with valuable data.

14. Enabling employees to make suitable decisions

Leaders delegate employees in decision-making. This leadership behaviour enables in creating the ideal position for *Empowering employees*. It was identified based on the description for *Empowering employees*; the following description demonstrates that:

The employees should be stimulated to submit suggestions and improvement ideas and be responsible for planning and realising improvements. In turn, employees have the power to make suitable decisions and take the necessary actions to achieve the desired improvements.

Participant number thirteen describe that this leadership behaviour is related to empowering employees:

We apply what is called the self-managed team. This system gives

> *empowerment to employees, you are a decision-maker, and you are supposed to be conscious in order to take action regarding quality and reduce production wastes.*

Furthermore, enabling employees to make suitable decisions can reflect empowering employees to participate in decision making. In that, decision making is shared between the leader and the subordinate. This comment can be seen in the following description from interview number fourteen.

> *The agreement to make decisions through the attendance of the managers in the meetings was the greatest support for the success of the project. The management gives the employees a feeling that they are interested in every detail of the project's success.*

15. Encouraging learning

Leaders should consider learning as a key part of improvements; creating an environment that supports learning that considers any mistake and issue as an opportunity for improvement. Leaders encourage employees to learn new skills and get knowledge and do not blame employees for mistakes to let them learn from mistakes and discover new ways to address issues. This leadership behaviour has been identified based on comparison with the ideal position descriptions that were developed early in this chapter. Encourage learning can create the ideal position for *Training and development*. This link identified based on the following descriptions for the ideal position:

> *… refers to organisations with the principle of qualification as a long-term strategy for employees' development and continuous learning.*
>
> *Also, in most established organisations, managers usually encourage, promote, and enable organisational learning and knowledge sharing.*
>
> *organisations … provide many development opportunities and training programs for employees and implied new tasks in their work.*

Moreover, this leadership behaviour can create the ideal position for *Continuous improvement and development*. This point is proved from the ideal position description:

> *The best Lean Six Sigma practitioners have managers who have a holistic view. The most important practices that managers focus on is the continuous learning, which refers to learning from mistakes, learning by seeing and doing, and being committed to long term learning.*

Furthermore, encouraging learning is identified as required to create the ideal position for *Supporting culture*. The following description shows in detail that this leadership behaviour is essential.

> *Indeed, things may not succeed from the first time, and experimentation allows the team to discover the failure and learn until being on track. Having a learning organisation culture where organizations have environments that consider failure as an opportunity for learning and mistakes are possible for improvement, this learning organisation culture is supported with no-blame approaches for mistakes and errors. Honesty allows leaders and employees to admit and learn from mistakes. The leaders who are honest and promote honesty help build a culture in which employees embrace the style to identify mistakes in operations without blaming anyone.*

Based on these descriptions, this leadership behaviour is identified as essential for creating the ideal position for several themes: training and development, continuous improvement and development, and supporting culture.

16. Management support and commitment

Managers in the top levels of the organisations are involved in supporting Lean Six Sigma philosophy and improvements efforts. Also, managers are very committed to providing support, such as time, money, effort, and equipment, to facilitate the improvements activities. This leadership behaviour has been identified as required to create the ideal position for *Continuous improvement and development*. This is proved based on the following ideal position description.

Moreover, organisation allocate the necessary time and resources to enable continuous improvement activities.

The most important practices that managers focus on is the continuous learning, which refers to learning from mistakes, learning by seeing and doing, and being committed to long term learning.

Furthermore, management support and commitment were identified by comparing it with the ideal position description. The description of the ideal position for *Managing qualities and operations* demonstrates that this leadership behaviour can create the ideal position for *Managing qualities and operations.*

Team members responsible for Lean Six Sigma prepare a monthly report about the current practices of Lean Six Sigma and to what extent employees have a commitment to using Lean Six Sigma tools and philosophy. They visit all organisational levels, especially the shop floor, to evaluate and collect data, then they can be able to prepare reports with valuable data.

Also, managers rely on these reports to hold employees accountable for realising Lean Six Sigma commitment. Employees usually demonstrate a high level of commitment, and they feel responsible and accountable for doing their best to ensuring the success of Lean Six Sigma operations .

17. Obtaining ideas from the employees

Leaders seek to stimulate employees to provide ideas that help in achieving improvements in the processes. Leaders ask the teams about their ideas for a particular issue. Thereby, employees may suggest some things to improve the processes. Then, leaders study the advantages and disadvantages of the idea. Finally, the leader discusses the decision about adopting or rejecting the idea with employees. This leadership behaviour was compared with all ideal position descriptions. In that, obtaining ideas from the employees is identified as a required leadership behaviours to create the ideal position for several themes. First of all, this leadership behaviour can create the ideal position for *Motivating*

employees themes. This interconnection is demonstrated through the following description of the ideal position for *Motivating employees*:

> *Also, they give rewards and recognition for submitting effective ideas and active participation in to achieve improvements... they encourage the employees to learn from their mistakes and keep submitting ideas.*

Participants number six prove that obtaining ideas from the employees can create the ideal position for *Motivating employees*. The following quotation from interview number six show that:

> *We are encouraging the employees to discover the problems and give suggestions to improve the quality.*
>
> *We encourage the employees to give us feedback about what is happening during traying using LSS. So we have a suggestion box because sometimes the workers afraid of the supervisor so they do not give us feedback. This box encourages and prevents the employees from any accountability.*

Moreover, obtaining ideas from the employees can create the ideal position for *Empowering employees* theme. This identification is based on the description of the ideal position of *Empowering employees*.

> *The employees should be stimulated to submit suggestions and improvement ideas and be responsible for planning and realising improvements.*

Participants 21 point out the importance of this leadership behaviour with providing some explanations for it:

> *The ideas that come from the frontline employee are very important, as these operators are the most important people who stand on the line for many hours. They know what the production line needs of parts and things. They may suggest such things to improve the processes. So taking their opinion into consideration is very important. The opinion of the operator on the production line is very important. There were two*

ways for obtaining ideas from them: Either tell me face to face or through the phone. Tell me what happened and we can think together about finding a solution, or through my tour on the production lines by asking them: guys what do you have problems. So we communicate with them to know their problems.

However, these leadership behaviours were identified from primary data (interviews) as required to create many ideal positions, and these leadership behaviours have been attached to the specific ideal position. The following table (5-4) summarises the identified leadership behaviours and the targeted ideal position for each leadership behaviour.

Table 5- 4 leadership behaviours from aspects that emerged from interviews' analysis

	Identified leadership behaviours from interviews'	**Targeted ideal position**
1.	Sharing information with employees	• Training and development • Communication • Empowering employees • Managing qualities and operations • Employees engagement and involvement
2.	Making the employees feel they are part of the change	• Employees engagement and involvement
3.	Conducting meetings in a short frequency	• Continuous improvement and development • Communication

		• Empowering employees • Employees engagement and involvement
4.	Review and follow up processes	• Continuous improvement and development • Managing qualities and operations
5.	Giving employees financial rewards and commendation	• Motivating employees
6.	Promoting the values that make employees think in a way to eliminate waste and solve problems	• Supporting culture
7.	Evaluating employees' competencies regularly	• Training and development
8.	Giving training on Lean Six Sigma	• Training and development
9.	Giving training on performing work to acquire new skills	• Training and development
10.	Visiting shop floor (Gemba walk)	• Continuous improvement and development • Motivating employees • Managing qualities and operations • Employees engagement and involvement

11.	Having a good relationship with employees	• Communication • Employees engagement and involvement
12.	Identify and assign clear responsibilities for employees	• Empowering employees
13.	Establishing a team work that support standardized work	• Continuous improvement and development • Empowering employees • Managing qualities and operations
14.	Enabling employees to make suitable decisions	• Empowering employees
15.	Encouraging learning	• Training and development • Continuous improvement and development • Supporting culture
16.	Management support and commitment	• Continuous improvement • Managing qualities and operations
17.	Obtaining ideas from the employees	• Motivating employees • Empowering employees

In this source, the essential leadership behaviours were identified using the procedure that was identified early. The leadership behaviours that emerged from the comparison of ideal positions and leadership behaviours aspects are relevant to

effectively facilitate the use of Lean Six Sigma. These leadership behaviours were also linked to the targeted ideal positions depending on the ideals positions' description.

5.2.3 Identifying leadership behaviours from the literature

The researcher had reviewed the literature for identifying leadership behaviours that facilitate the effective use of Lean Six Sigma in organisations; in chapter 2, see section 2.7. However, this source of leadership behaviours is the third that will be an input of the intended framework. This section identified leadership behaviours that are required to create the ideal position by referring to the literature. The source of these leadership behaviours is the literature review that was conducted in chapter 2. Identifying the required leadership behaviours is accomplished based on the ideal position descriptions. In that, the ideal position descriptions were compared with the identified leadership behaviours from the literature. The descriptions of the ideal positions for each theme were identified early in this chapter (see section 5.1) which enabled the researcher to identify the required leadership behaviours. This process of comparison between ideal positions and leadership behaviours from the literature helps in identifying the required leadership behaviour that can create the ideal positions. This is supported by pieces of evidence from ideal position descriptions and the literature. The researcher also provides clarifications of leadership behaviours from the literature to give a clear understanding of each leadership behaviour.

1. **Leaders demonstrating commitment and provide support for Lean Six Sigma implementation**

   Leaders who practise Lean Six Sigma effectively demonstrate involvement and commitment to Lean Six Sigma and improvements initiatives (Aij et al., 2013; Aij, Visse and Widdershoven, 2015; Goodridge et al., 2015; Maijala et al., 2018; Steed, 2012). According to Laureani and Antony (2017), leadership commitment and support are vital factors for successfully deploying Lean Six Sigma. Leaders can demonstrate commitment in several ways, such as leaders who actively participate in development initiatives, are willing to embrace change, and ensure that all required resources are available for achieving success in Lean Six Sigma implementation. These resources include financial and staff resources available; suitable training availability; and ensuring suitable time is allocated (Aij et al.,

2013; Aij and Teunissen, 2017; Hung et al., 2015; Laureani and Antony, 2017; Maijala et al., 2018; Poksinska, Swartling and Drotz, 2013). However, this leadership behaviour can promote the ideal position for several themes. Firstly, leadership commitment and support for Lean Six Sigma create the ideal position for *Continuous improvement and development.* This connection was identified based on the following descriptions for the ideal position for this theme.

> *Moreover, organisation allocate the necessary time and resources to enable continuous improvement activities (Poksinska, Swartling and Drotz, 2013).*
>
> *Effective leaders visit the front-line every day with set aside two hours for each visit. During this visit, leaders seek input from front line employees by asking several questions and watching the process.*

Furthermore, it has been found that this leadership behaviour can create the ideal postion for this theme *Managing qualities and operations.* Several descriptions for the ideal position of that theme illustrate that.

> *In that, managers can take corrective actions to sustain Lean Six Sigma processes in an organisation, such as make the needed resources available to do the work*
>
> *Leaders collaborate with team members to develop work and other types of standers of operations and help team members and worry about the needs of their teams.*
>
> *Team members responsible for Lean Six Sigma prepare a monthly report about the current practices of Lean Six Sigma and to what extent employees have a commitment to using Lean Six Sigma tools and philosophy. They visit all organisational levels, especially the shop floor, to evaluate and collect data, then they can be able to prepare reports with valuable data.*
>
> *Also, managers rely on these reports to hold employees accountable for realising Lean Six Sigma commitment. Employees usually demonstrate a high level of commitment, and they feel responsible and accountable*

for doing their best to ensuring the success of Lean Six Sigma operations.

Overall, demonstrating commitment and support for Lean Six Sigma identified as a required leadership behaviour for creating the ideal position for *Continuous improvement and development, and Managing qualities and operations* themes. This identification is based on the descriptions of the ideal positions.

2. Leaders motivate employees who have contributed to the fulfilment of current goals

Leaders motivate employees by giving recognition and rewards for achieving the desired achievements (Poksinska, Swartling and Drotz, 2013). These ways of motivating employees can influence employees' behaviours in that employees provide improvement ideas and participate effectively in improvements initiatives for the processes (Aij and Teunissen, 2017; Laureani and Antony, 2017; Poksinska, Swartling and Drotz, 2013). Since motivated employees do what is right to achieve the company's goal and vision, leaders should seek to make their employees suitably motivated (Loh, Mohd Yusof and Lau, 2019). However, this leadership behaviour that came from the literature is identified as required to create the ideal position for *motivating employees.* This identification is proved through the following description for the ideal position.

Managers rewarded employees who their performance contribute to realisation of current objectives (Poksinska, Swartling and Drotz, 2013). Also, they give rewards and recognition for submitting effective ideas and active participation in to achieve improvements. Managers provide positive and constructive feedback usually to increase enthusiasm and grit to make more improvements. Organisations can provide financial and non-financial rewards as a recognition for good performance.

Further, this leadership behaviour promotes the ideal position for *Motivating employees* (see chapter 2, section 2.7). The following quotation shows an example of what was explained:

These practices of rewards and recognition aim to increase employees' motivation and organisational commitment (Poksinska, Swartling and

> *Drotz, 2013). Using the right motivation can lead to wider interest and implementation for Lean Six Sigma (Balzer, Brodke and Thomas Kizhakethalackal, 2015). Lean leaders work on inspiring employees to achieve a high level of motivation (Sureeratta, Napompech and Panjakhajo, 2014).*

The descriptions provided early in this section demonstrate that this leadership behaviour can create the ideal position for *Motivating employees* theme.

3. **Delegating decision making, power, and responsibility**

   This leadership behaviour was mentioned as an essential in a number of studies (e.g. Aij, Visse and Widdershoven, 2015; Goodridge et al., 2015; Maijala et al., 2018). Leaders made employees responsible for realising improvements and delegating decision-making to take suitable actions to achieve the desired improvements (Poksinska, Swartling and Drotz, 2013). Effective leaders pass some responsibilities to employees, which allow employees to manage and control daily operations, and leaders pass some managerial tasks such as managing performance measures or conducting reviews to the employees (Aij, Visse and Widdershoven, 2015; Poksinska, Swartling and Drotz, 2013). Employees who have responsibilities would have a sense of ownership and performance of the task or effectiveness of the performance (Aij and Teunissen, 2017; Drotz and Poksinska, 2014; Millward and Bryan, 2005). However, this leadership behaviour identified from the literature can create the ideal position for *Empowering employees* theme. The following descriptions for the ideal position of empowering employees demonstrate that it can create the ideal position.

   > *The employees should be stimulated to submit suggestions and improvement ideas and be responsible for planning and realising improvements. In turn, employees have the power to make suitable decisions and take the necessary actions to achieve the desired improvements. Effective organisations empower employees to plan, organize, and control daily processes and take over some managerial*

> *roles and duties such as monitoring and updating performance measures or conducting reviews and inspections.*
>
> *rather than leaders solve problems by themselves, leaders pass this task to employees and their role becomes as a facilitator in the problem-solving process. In order to enable employees to take new responsibilities and roles, organisations create new development opportunities and training programs for employees*

Moreover, delegating decision making, power, and responsibility can create the ideal position for *Managing qualities and operations* theme. Based on the literature, employees should receive increased responsibility for managing and controlling daily operations and take several managerial tasks such as monitoring and updating performance measures (Poksinska, Swartling and Drotz, 2013). This piece of evidence from the literature is confirmed the importance of this leadership behaviour to promote *Managing qualities and operations* theme. This leadership behaviour is also identified from the literature based on the following descriptions of the ideal position for *Managing qualities and operations.*

> *Teams responsible for developing plaining production and follow-up improvements (Poksinska, Swartling and Drotz, 2013). Also, team members establish and maintain new process-focused measures alongside conventional measures. They use technology to collect and present the data, such as dashboards; in turn, members can measure and use data effectively. Lean Six Sigma management relies on high availability and efficient use of better data (Goodridge et al., 2015).*
>
> *Team members responsible for Lean Six Sigma prepare a monthly report about the current practices of Lean Six Sigma and to what extent employees have a commitment to using Lean Six Sigma tools and philosophy.*

4. Developing and training employees

Leaders seek to give training systematically and repeatedly to employees on many aspects include solving problems, following scientific thinking and methods for

improvement; all of that would increase employees' competences (van Assen, 2018; Emiliani, 2008; H. van Dun and Wilderom, 2016; Spear and Bowen, 1999). Employees from all organisation's departments should get training on Lean philosophy and tools (root cause analysis, flow mapping and analysis, 5S, etc.) that focus on eliminating waste and creating value that customers desire (Toledo et al., 2019). However, this leadership behaviour can promote the ideal position for *employees engagement and involvement* theme, which is demonstrated in the literature. Providing training for employees can encourage them to be more involved in Lean thinking (Aij and Teunissen, 2017; Al-Balushi et al., 2014). Also, widespread training increases employees' awareness about Lean Six Sigma and is related to engaging employees by participating in improvement initiatives (Laureani and Antony, 2017). Based on the literature, this leadership behaviour creates the ideal position for *employees engagement and involvement.*

Nevertheless, developing and training employees can create the ideal position for *training and development* theme. Therefore, this leadership is identified as required to create the ideal position for that theme based on the ideal position descriptions. The following descriptions provide pieces of evidence for that:

> *organisations with the principle of qualification as a long-term strategy for employees' development and continuous learning (Aij and Teunissen, 2017; Al-Balushi et al., 2014; Dombrowski, Mielke and Scheele, 2014). Managers perceive the employees as assets and resources that they can develop (Poksinska, Swartling and Drotz, 2013).*

> *All the employees in an most effective organisation are trained in the Lean Six Sigma philosophy and tools to reduce waste and variation in processes. All the organisation employees and departments are evaluated annually by the Lean Six Sigma team, taking into consideration Lean Six Sigma philosophy and practices such as identify the waste in the process, identify ideas for improvements, implement these ideas, recognize where the variation in the process happened and remove this variation (Toledo et al., 2019).*

The previous descriptions proved that developing and training employees is vital to create the desired situation for *employees engagement and involvement,* and *training and development* themes.

5. Promoting employees' self-development

In order to promote employees' self-development, leaders analyse employees' competencies, and development stages and processes. Leaders should support employees self-development, which can create the ideal position for *training and development* theme. The following ideal position description provides a piece of evidence that demonstrates the role that this leadership behaviour plays in creating the desired situation.

> *Organisations promote employees' self-development through diagnosis and analysis of the competencies and the individual development process. The competencies analysis should be conducted annually through a dialogue between a manager and an employee. During that dialogue and interview, these competencies should be evaluated: lean thinking, teamwork, business vision, technical knowledge, communication, and results for the organisation. In turn, the manager will be able to propose a development plan for each individual. The plan of employee development targets two essential skills and competencies: technical knowledge and Lean Six Sigma thinking, which enhances the employee understanding of the points of waste, bottlenecks, and variation in processes (Toledo et al., 2019).*

Another description for the same ideal position proves that promoting employees' self-development is necessary for creating the ideal position for *training and development* theme.

> *organisations with the principle of qualification as a long-term strategy for employees' development and continuous learning (Aij and Teunissen, 2017; Al-Balushi et al., 2014; Dombrowski, Mielke and Scheele, 2014). Managers perceive the employees as assets and resources that they can develop (Poksinska, Swartling and Drotz, 2013).*

Moreover, this leadership behaviour is identified as required to create the ideal position for *Empowering employees.* This identification is based on the literature and ideal position description. In the literature, some studies highlight that employees' self-development and innovation are related to empowering employees (van Assen, 2018; Spear and Bowen, 1999). Also, the following ideal position description demonstrates that.

> *In order to enable employees to take new responsibilities and roles, organisations create new development opportunities and training programs for employees.*

6. Creating a learning environment

This leadership behaviour was clarified early. However, it has been identified to create the ideal position based on evidence from the ideal position descriptions. This leadership behaviour can create the ideal position for several themes. First of all, the ideal position description for the *Continuous improvement and development* theme demonstrate the importance of this leadership behaviour to enable continuous improvement and development in organisations that seek to use Lean Six Sigma effectively.

> *The best Lean Six Sigma practitioners have managers who have a holistic view. The most important practices that managers focus on is the continuous learning, which refers to learning from mistakes, learning by seeing and doing, and being committed to long term learning (Aij et al., 2013; Aij, Visse and Widdershoven, 2015; Goodridge et al., 2015; Maijala et al., 2018; Steed, 2012)*

Moreover, creating a learning environment is identified to create the ideal position for *Supporting culture* theme. This is demonstrated through the ideal position description for supporting culture.

> *Indeed, things may not succeed from the first time, and experimentation allows the team to discover the failure and learn until being on track. Having a learning organisation culture where organizations have environments that consider failure as an opportunity for learning and*

> *mistakes are possible for improvement, this learning organisation culture is supported with no-blame approaches for mistakes and errors. Honesty allows leaders and employees to admit and learn from mistakes. The leaders who are honest and promote honesty help build a culture in which employees embrace the style to identify mistakes in operations without blaming anyone.*

Furthermore, this leadership behaviour promotes the ideal position for *Training and development* theme. Identifying that was based on the following description of the ideal position.

> *in most established organisations, managers usually encourage, promote, and enable organisational learning and knowledge sharing (Mann, 2005).*

Overall, this leadership behaviour is identified as required to create the ideal position for *Continuous improvement and development, Supporting culture,* and *Training and development* themes.

7. Intellectual stimulation

Leaders enhance employees interest in and awareness of problems and issues (van Assen, 2018; Nogueira, Sousa and Moreira, 2018; Pongpearchan, 2016). In turn, employees question their old ways of doing things (Mulla-Feroze and Krishnan, 2000). This enables employees to think about problems that they face in new ways (van Assen, 2018; Nogueira, Sousa and Moreira, 2018; Pongpearchan, 2016). During the workshop visit, the leader promotes learning by posing challenges and then following up it on the next walk to enable employees solve problems (Aij, Visse and Widdershoven, 2015; Mann, 2009; Toledo et al., 2019). It is worth noting that this behaviour is one of the components of transformational leadership. However, this leadership behaviour was identified from the literature as required to create the ideal position for *Continuous improvement and development* theme. This identification is based on evidence from the ideal position description, which demonstrates the role of this behaviour.

> *As teaching and learning progress in the organisation, the managers' role is changed, starting to challenge their followers and promoting a follow-up, which enables solving problems faster (Aij, Visse and Widdershoven, 2015; Mann, 2009; Toledo et al., 2019).*

Moreover, intellectual stimulation is related to create the ideal position for *Empowering employees* theme. This connection is confirmed and supported through the following description for the ideal position:

> *Leaders' role is changed to start delegate responsibilities and coach employees. When employees are coached their capabilities increase; in turn, rather than leaders solve problems by themselves, leaders pass this task to employees and their role becomes as a facilitator in the problem-solving process.*

Furthermore, this leadership behaviour can create the ideal position for *Supporting culture*. This point is proved from the ideal position description:

> *organisations need to have a culture where all employees from all divisions and organisational levels eliminate waste. Employees understand that their contribution is vital for the organisation, the team they work with, and for customers.*

8. Leaders should foster and maintain a continuous improvement culture that seeks excellence and considers any mistakes as opportunities to improve

Fostering and maintaining an improvement culture is vital for Lean Six Sigma implementation, and leaders should have the ability to enhance the improvement culture (Dombrowski and Mielke, 2013a). Leaders aim to achieve excellence in operation, but mistakes sometimes occur. Leaders see the failures as an opportunity to improve the processes; team members investigate the failure root causes to ensure that will not happen another time (Aij and Teunissen, 2017). Leaders encourage honesty to allow employees admit and learn from mistakes (Aij, Aernoudts and Joosten, 2015; Al-Balushi et al., 2014). To create an effective improvement culture, leaders should behave a role models for their employees (Dombrowski and Mielke, 2013a). The core leadership attributes to enable

successful implementation of improvement culture are task identity, feedback, autonomy, belief in improvement, and honesty, see (Aij and Teunissen, 2017). This leadership behaviour was identified from the literature as a required to create the ideal position for *Supporting culture* theme. This identification is based on the following descriptions for the ideal position for supporting culture.

> *The organisation creates conditions that sustain Lean Six Sigma philosophy and culture of continues improvement. Organisation culture is an essential element, so leaders ensure that culture is devoted to continuous improvement (Aij and Teunissen, 2017; Berg and Black, 2014). Having open and proactive culture increases customer satisfaction and continuous improvement, and everyone's participation is applied anywhere in the organisation's departments (Dahlgaard and Dahlgaard-Park, 2006).*
>
> *Honesty allows leaders and employees to admit and learn from mistakes (Aij, Aernoudts and Joosten, 2015; Al-Balushi et al., 2014). The leaders who are honest and promote honesty help build a culture in which employees embrace the style to identify mistakes in operations without blaming anyone (Toussaint and Berry, 2013).*
>
> *Leaders should adopt task identity, feedback, autonomy, belief in improvement, and honesty to improvement culture that facilities Lean Six Sigma (Aij and Teunissen, 2017). Briefly, task identity is when employees have identified tasks and complete the whole tasks of the work and realise the importance of their contribution to the entire production process (Drotz and Poksinska, 2014). Feedback about process and employees' performance is offered through dashboards and visual control (Crump, 2008; Drotz and Poksinska, 2014).*

Furthermore, this leadership behaviour, fostering and maintaining a continuous improvement culture, also can create the ideal position for *Employees engagement and involvement* theme. The following description for the ideal position demonstrates that.

Moreover, leaders behave as role models and act in ways suitable to the company values and culture. In that, leaders provide high support for improvements and show that they are willing to embrace change (Poksinska, Swartling and Drotz, 2013). Leaders collaborate with team members to develop work and other types of standers of operations and help team members and worry about the needs of their teams.

9. Receiving and giving information

Leaders share information that adds value with team members; sharing involves receiving and giving new ideas, information, and knowledge by team members (Swift and Virick, 2013; de Vries, van den Hooff and de Ridder, 2006). Information sharing enables team leaders to collaborate with team members to solve problems and develop new ideas (H. van Dun and Wilderom, 2016; Wang and Noe, 2010). Leaders engaged in team members conversations to be aware of any issues the team may face and to understand effectively the reasons for the issue that emerged (Bijl et al., 2019). Information related to processes performance and progress should be shared with employees using emails, dashboards, and Andon lights. Leaders openness for sharing information is vital to lean-team effectiveness since mistakes will not (re)occur more likely (H. van Dun and Wilderom, 2016). This leadership behaviour is identified as required to create the ideal position for several themes. Receiving and giving information promotes the ideal position for *Communication* theme. Identifying that was based on the following descriptions of the ideal position for *Communication* theme.

Organisations support two-way communication and focus on reinforcing effective information flow from the front-line to top management and vice versa. Rather than using the traditional ways of communicating messages such as email, information boards, and documents; the message and information are disseminated through short meetings. These meetings enable managers to receive direct feedback from individuals.

> *Leaders usually communicate and listen carefully to employees with showing respect. Successful managers should frequently communicate with individuals from different levels in order to gain more information about employees' experiences, suggestions, and problems. Leaders who frequently contact employees can clarify and convey information effectively and clearly, which enhances communication in an organisation (Aij and Teunissen, 2017).*
>
> *However, developing means for visual communication and control is important in an effective organisation. The daily management system visually displays daily progress and performance indicators. Data walls collect and display relevant data … The visual means and tools are used to clarify objectives and present timely feedback on processes' performance. Many dashboards display information and several charts with standardised colour codes, which help in getting immediate and visually stimulating information.*

Moreover, this leadership behaviour that comes from the literature can create the ideal position for *Empowering employees* theme. Sharing information with employees support their empowerment; this is demonstrated through the following description of the ideal position for empowering employees.

> *Organisations use tools and methods to enhance and support employee's empowerment and involvement, such as visual control, short daily meetings with a standardised agenda, two-way communication flow, and building a system of continuous improvement (Aij and Teunissen, 2017; Loh, Mohd Yusof and Lau, 2019; Poksinska, Swartling and Drotz, 2013).*

Furthermore, this leadership behaviour also creates the ideal position for *Managing qualiites and operations*. This identification is based on the following descriptions of the ideal position.

> *Managing qualities and activities in most efficient organisations imply different actions and agendas, namely, planning daily activities and*

> *production, checking the conditions to meet daily demands, and discussing daily work.*
>
> *In the most effective organisation, four indicators should be measured daily and communicated at all levels of the manufacturing organisation; these indicators are quality, delivery, cost, and safety.*
>
> *Furthermore, employees should be aware of current goals and understand strategies to be involved in improving quality, safety, and productivity.*
>
> *They use technology to collect and present the data, such as dashboards; in turn, members can measure and use data effectively. Lean Six Sigma management relies on high availability and efficient use of better data (Goodridge et al., 2015).*

Furthermore, this leadership behaviour promotes the ideal position for *Employees engagement and involvement* theme. Identifying that was based on the following description of the ideal position.

> *The relationship between leaders and employees relies on developing trust, which evolves from confidence and reliance on the integrity of each other, collaboration, fostering interactions, and sharing information (Aij and Teunissen, 2017; Poksinska, Swartling and Drotz, 2013).*

To sum up, receiving and giving information is a necessary leadership behaviour that is identified from the literature. This leadership behaviour promotes creating the ideal position for *Communication, Empowering employees, Managing qualities and operations, and Employees engagement and involvement* themes.

10. Leaders communicate information and listen to employees

This leadership behaviour shows that leaders should listen to employees' concerns and interests with great attention (Qian et al., 2019). Effective leaders' listing behaviour can motivate speakers to speak more and disclosure more about issues and concerns (Bavelas, Coates and Johnson, 2000; Lloyd et al., 2015). In that, leaders who practice active listening can get more valuable feedback from

employees (Qian et al., 2019). Effective leaders also listen carefully to employees, which developing trust and gaining ideas and a deep understanding of an issue (Aij and Teunissen, 2017; Kent, 2006).

This leadership behaviour that identified from the literature can create the ideal position for *Communication* theme. The following descriptions for the ideal position demonstrate that can create the ideal position *communication*.

> *Leaders usually communicate and listen carefully to employees with showing respect. Successful managers should frequently communicate with individuals from different levels in order to gain more information about employees' experiences, suggestions, and problems. Leaders who frequently contact employees can clarify and convey information effectively and clearly, which enhances communication in an organisation (Aij and Teunissen, 2017).*
>
> *the message and information are disseminated through short meetings. These meetings enable managers to receive direct feedback from individuals.*

Moreover, communicate information and listen to employees can create the ideal position for *Employees engagement and involvement*. This can be demonstrated through the following description for the ideal position for *Employees engagement and involvement* theme:

> *Leaders make employees feel that employees are heard, which effectively influences staff engagement level, which is related to positive changes in the organisation (Aij and Teunissen, 2017; Willis et al., 2016). Leaders support and encourage employees, which improves engagement by improving the two-way communication among all divisions in the company (Antony et al., 2007; Willis et al., 2016).*

Leaders put followers interests ahead of their interests and support followers' personal development by listening and developing long term relations. This attention to followers enables leaders to understand followers needs and goals (Liden et al., 2008).

11. Visiting the work floor (gemba walk)

The Gemba Walk refers to visiting the work floor by leaders to promote identifying waste, solving problems, and supporting employees (Aij, Visse and Widdershoven, 2015; Mann, 2009). During Gemba walks, effective Lean leaders demonstrate care and recognition by acknowledging the value of employees' work (Aij and Teunissen, 2017; Antony et al., 2007; Loh, Mohd Yusof and Lau, 2019). This leadership behaviour was identified from the literature as required to create the ideal position for a number of themes. Based on the literature description, this leadership behaviour promote the ideal position for *Motivating employees* themes. The following description from the literature prove that: the Gemba Walk helps in motivating employees by demonstrating care and recognition; it has a positive effect on developing and maintaining relationships (Poksinska et al., 2013). Moreover, the ideal position description for Motivating employees provides another piece of evidence that this leadership behaviour creates the ideal position for *Motivating employees* theme.

> *Furthermore, managers are more available in the workplace (shop floor) to support and talk with their employees. Managers are aware of the importance of formal and informal meetings to be close to employees and talk with them. In turn, managers visit the shop floor where value is created and walk-in organisation to talk with employees and participate in coffee breaks (Poksinska, Swartling and Drotz, 2013).*

Furthermore, visiting the work floor can create the ideal position for *Managing qualities and operations* theme. This can be demonstrated through the following description:

> *They visit all organisational levels, especially the shop floor, to evaluate and collect data, then they can be able to prepare reports with valuable data (Camuffo and Gerli, 2018; Goodridge et al., 2015). In that, managers can take corrective actions to sustain Lean Six Sigma processes in an organisation, such as make the needed resources available to do the work…*

This leadership behaviour also was identified as essential to create the ideal position for *Continuous improvement and development* theme. The following ideal position description provides a piece of evidence that demonstrates the role this leadership behaviour plays to create the desired situation.

> *Effective leaders visit the front-line every day with set aside two hours for each visit. During this visit, leaders seek input from front line employees by asking several questions and watching the process. Furthermore, leaders show care and recognition during the visit by show respect, recognising the added value of work, encouraging workers, as well as, to use the production area as the classroom through Gemba walks (Aij and Teunissen, 2017; Antony et al., 2007; Kent, 2006)(Mann, 2005).*

The literature demonstrates the importance of this leadership behaviour to enable *Employees engagement and involvement.* The following pice of the literature clarify that:

Gemba reflects leaders involvement with employees who do the work that adds value (Aij, Visse and Widdershoven, 2015; Aij and Teunissen, 2017; Al-Balushi et al., 2014; Womack and Jones, 2003). Despite of that, other evidence from the ideal position description shows that visiting the work floor create the ideal position also for Employees engagement and involvement demonstrate the theme.

> *In the effective Gemba walks, leaders show recognition, engagement, a focus on a leaders-employee relationship, and fairness (Aij, Visse and Widdershoven, 2015; Aij and Teunissen, 2017; Steed, 2012).*

12. Leaders take responsibility for culture change

To effectively use Lean Six Sigma, leaders should initiate an organisational culture change that influences processes and job aspects (Kaplan et al., 2014); this change is socio-cultural ones (Zhang, Narkhede and Chaple, 2017). Lean Six Sigma introduces significant changes in organisation elements, which requires a culture change (Aij, Visse and Widdershoven, 2015; Mann, 2012). Leaders play a vital role in creating Lean Six Sigma culture (Bhasin and

Burcher, 2006; Liker and Convis, 2011; Seidel et al., 2019). The leadership behaviours were identified as significant factors for the effective use of Lean Six Sigma (Camuffo and Gerli, 2018; Mann, 2009). The success in Lean Six Sigma implementation depends on knowing how to implement changes and depends on a cultural change (Aij, Visse and Widdershoven, 2015). Leaders should promote a culture that fosters change, which considers the implementation of changes as the everyday procedure is normal (Anand, Chhajed and Delfin, 2012; Mann, 2009; Simon and Canacari, 2012). Leaders also create an environment that focuses on improving the processes and make each individual focus on horizontal processes, which would add value for customers (Liker and Convis, 2011). However, in order to implement Lean Six Sigma effectively, behavioural change is required in an organisation, which in turn, demands leadership behaviours and the ability to make the desired change (Mann, 2012); an improvement culture is part of this behavioural change (Dombrowski and Mielke, 2013; Goodridge et al., 2015). This leadership behaviour was identified from the literature as a required to create the ideal position for *Supporting culture* theme. This identification is based on the following descriptions for the ideal position for supporting culture.

> *To succeed in Lean Six Sigma, organisations need to have a culture where all employees from all divisions and organisational levels eliminate waste. Employees understand that their contribution is vital for the organisation, the team they work with, and for customers.*
>
> *Leaders aim to make employees understand and live the organisation's culture by teaching them its culture and values. Organisation culture attributes are trust, shared responsibility, and openness to experimentation with improvement intention (Poksinska, Swartling and Drotz, 2013). Indeed, things may not succeed from the first time, and experimentation allows the team to discover the failure and learn until being on track.*
>
> *Having open and proactive culture increases customer satisfaction and continuous improvement, and everyone's participation is applied*

> *anywhere in the organisation's departments (Dahlgaard and Dahlgaard-Park, 2006). Senior leaders adopt Lean Six Sigma as a key element in their company's strategy and approach; Lean Six Sigma culture deploy as a result of consistent effort, and seek for perfection be the way employees do their work (Mann, 2009).*

13. Monitoring and evaluating tasks and processes

Leaders should assess the state of operations in their divisions; they can use scales to evaluate employees progress in using Lean Six Sigma (Shah and Ward, 2007). Further, Camuffo and Gerli (2018) point out that performance evaluation is vital leadership behaviour associate with the effective use of Lean manufacturing. In organisations that are more advanced in Lean Six Sigma implementation, leaders evaluate performance by referring to the state of their operations with rapid and frequent feedback loops with next-level management (Camuffo and Gerli, 2018). Leaders should follow the processes that include identifying the value, making the value flow, letting customers pull the product, and seeking perfection after measuring performance (Womack and Jones, 2003). Having the right process will yield the desired results (Liker, 2004). Leaders should measure and analyse the current performance of the processes, which enable leaders to realise areas of possible improvement; Lean tools can be used to reach the desired improvements (Dibia, Dhakal and Onuh, 2014).

This leadership behaviour was identified from the literature based on the ideal position description for *continuous improvement and development theme.*

> *Leaders' role usually is to develop an explanation of a problem and its possible solution. In turn, they develop processes and other types of standers in collaboration with teams and rely on them as a key point for initiate continuous improvement. As teaching and learning progress in the organisation, the managers' role is changed … promoting a follow-up, which enables solving problems faster.*

Moreover, monitoring and evaluating tasks and processes can create the ideal position for *managing qualities and operations.* Based on the following description of the ideal position, the researcher got to this leadership behaviour.

In an organisation where more advanced in Lean Six Sigma operation practices, leaders have a tendency to evaluate the performance of the processes by reporting the state of the operations with quick and frequent feedback loops with next-level management (Camuffo and Gerli, 2018). Team members responsible for Lean Six Sigma prepare a monthly report about the current practices of Lean Six Sigma and to what extent employees have a commitment to using Lean Six Sigma tools and philosophy.

14. Receiving and giving information that conveys ideas

Leaders should support improvements by being open to ideas that help in achieving improvements (Poksinska et al., 2013). This environment can be effective in encouraging employees to submit new ideas, they know there will be no blame for any mistakes that occur (Goodridge et al., 2015; Loh et al., 2019). Leaders support Lean Six Sigma operations by giving recognition to employees who provide improvement ideas and actively participate in the realisation of processes enhancements (Poksinska et al., 2013). In some organisations, teams have to provide a certain number of ideas during a specific period (Poksinska et al., 2013). Leaders encourage employees to provide improvement ideas and the employees then have the freedom to make decisions and take suitable actions to realise those intended improvements (Poksinska et al.,2013). Teaching workers about identifying and solving problems, and empowering followers to implement their ideas, is considered as a supporter to Lean systems (Liker and Convis, 2011; Seidel et al., 2019). To support continuous improvement, leaders must also acknowledge initiatives, ideas and effective participation in reaching intended improvements (Poksinska et al., 2013). However, this leadership behaviour was compared with ideal position descriptions. In that, it identified as a required leadership behaviour to create the ideal position for two themes. First of all, this leadership behaviour can create the ideal position for *Motivating employees* theme. This identification is demonstrated through the following description of the ideal position for *Motivating employees*:

> *Also, they give rewards and recognition for submitting effective ideas and active participation in to achieve improvements... they encourage the employees to learn from their mistakes and keep submitting ideas.*

Moreover, receiving and giving information that conveys ideas can create the ideal position for *Empowering employees* theme. This identification is based on the description of the ideal position of *Empowering employees*.

> *The employees should be stimulated to submit suggestions and improvement ideas and be responsible for planning and realising improvements.*

However, the following table summarises the identified leadership behaviours that came from the literature, creating the ideal position for many themes.

Table 5- 5 leadership behaviours from the literature that emerged from literature review

	Identified leadership behaviours from the literature	**Supporting literature**	**Targeted ideal positions (themes)**
1	Leaders demonstrating commitment and provide support for Lean Six Sigma implementation, and they feel they are accountable to do their best.	(Tortorella, van Dun and de Almeida, 2019), (Goodridge et al., 2015), (Mann, 2009)	• Continuous improvement and development • Managing qualities and operations
2	Leaders motivate employees who have contributed to the fulfilment of current goals, through recognition, encouragement, and having a good relationship. Also, they can use financial and non-financial rewards, presence,	(Tortorella, van Dun and de Almeida, 2019), (Aij and Teunissen, 2017), (Loh, Mohd Yusof and Lau, 2019), (Seidel et al., 2019), (Laureani and Antony, 2017)	• Motivating employees

	visibility, paying attention to, and acknowledgment for motivating employees.		
3	Delegating decision making, power, and responsibility.	(Tortorella, van Dun and de Almeida, 2019), (Maijala et al., 2018), (Aij and Teunissen, 2017), (Aij, Visse and Widdershoven, 2015), (Loh, Mohd Yusof and Lau, 2019), (Seidel et al., 2019), (Poksinska, Swartling and Drotz, 2013)	• Empowering employees • Managing qualities and operations
4	Developing and training employees: using training as an instrument for engaging the employees in improvement initiatives. This training focuses on technical knowledge, Lean thinking, Lean tools and techniques, and Lean principles.	(Tortorella, van Dun and de Almeida, 2019), (Laureani and Antony, 2017), (Nogueira, Sousa and Moreira, 2018)	• Employees engagement and involvement • Training and development
5	Promoting employees' self-development: creating plans and structures to support employees' development. Focusing on specific competencies to develop the employees such as technical knowledge, communication, and teamwork.	(Toledo et al., 2019), (Tortorella, van Dun and de Almeida, 2019), (Seidel et al., 2017)	• Training and development • Empowering employees

6	Creating a learning environment: leaders consider any mistakes as opportunities for learning.	(Tortorella, van Dun and de Almeida, 2019), (Goodridge et al., 2015), (Maijala et al., 2018), (Loh, Mohd Yusof and Lau, 2019)	• Continuous improvement and development • Supporting culture • Training and development
7	Intellectual stimulation: leaders make employees more interested in challenges that they face, and make them able to think in new ways to overcome issues.	(Nogueira, Sousa and Moreira, 2018), (Tortorella, van Dun and de Almeida, 2019), (Seidel et al., 2019), (Seidel et al., 2017)	• Continuous improvement and development • Empowering employees • Supporting culture
8	Leaders should foster and maintain a continuous improvement culture that seeks excellence and considers any mistakes as opportunities to improve	(Aij and Teunissen, 2017), (Dombrowski and Mielke, 2013a), (Toledo et al., 2019), (Maijala et al., 2018), (Goodridge et al., 2015), (Mann, 2009)	• Supporting culture • Employees engagement and involvement
9	Receiving and giving information that conveys ideas which help leaders to know what is happening in processes, the issues that occur, as well as obtaining suggestions. Also, employees can understand the organisation's goals.	(Tortorella, van Dun and de Almeida, 2019), (Bijl et al., 2019), (Nogueira, Sousa and Moreira, 2018), (Seidel et al., 2017), (H. van Dun and Wilderom, 2016)	• Communication • Empowering employees • Managing qualities and operations • Employees engagement and involvement
10	Leaders communicate information and listen to employees to ensure workers understand the information and to gain more information	(Maijala et al., 2018), (Aij and Teunissen, 2017), (Laureani and Antony, 2017), (Gelei, Losonci and Matyusz, 2015),	• Communication • Employees engagement and involvement

	about employees' experiences, problems, and suggestions.	(Inamizu et al., 2014), (Loh, Mohd Yusof and Lau, 2019), (Poksinska, Swartling and Drotz, 2013)	
11	Visiting the work floor (gemba walk) which includes three activities: going to where the value is created, looking at the process, and talking to the workers. These activities enable the leaders to be involved with people, solve the problems, and demonstrate care and recognition.	(Tortorella, van Dun and de Almeida, 2019), (Aij, Visse and Widdershoven, 2015), (Dombrowski and Mielke, 2013a), (Seidel et al., 2019)	• Employees engagement and involvement • Continuous improvement and development • Managing qualities and operations • Motivating employees
12	Leaders take responsibility for culture change	(Tortorella, van Dun and de Almeida, 2019), (Aij, Visse and Widdershoven, 2015), (Maijala et al., 2018), (Sankowska and Rygowska-Zielińska, 2014), (Goodridge et al., 2015), (van Dun, Hicks and Wilderom, 2017)	• Supporting culture
13	Monitoring and evaluating tasks and processes	(Tortorella, van Dun and de Almeida, 2019), (van Dun, Hicks and Wilderom, 2017), (Camuffo and Gerli, 2018)	• Continuous improvement and development • Managing qualities and operations
14	Receiving and giving information that conveys ideas	(Toledo et al., 2019), (Seidel et al., 2017), (Poksinska,	• Motivating employees • Empowering employees

		Swartling and Drotz, 2013), (Loh, Mohd Yusof and Lau, 2019), (Liker and Convis, 2011),	

The researcher used the ideal positions as a key to search the literature and identify leadership behaviours that are used or developed by organisations that practice Lean Six Sigma. These are the common leadership behaviours identified from the literature that would influence Lean Six Sigma and create the ideal position.

5.3 Integrating leadership behaviours

The previous sections presented the possible leadership behaviours that leaders should adopt to facilitate Lean Six Sigma. This is likely to motivate leaders to develop their behaviour to act in a certain way. The previous sections, 5.2.1, 5.2.2, and 5.2.3, show that the leadership behaviours came from the focus group, interviews' analysis, and the literature, respectively. These three sources show that some leadership behaviours overlap. This overlap between leadership behaviours from different sources indicates that there are repetitions. To address repetition, each leadership behaviour was compared and contrasted with the other sources of leadership behaviours. This process of comparison and contrast among sources enabled the researcher to recognise where there are overlaps or not; in other words, the researcher can know which leadership behaviours are supported or highlighted by the other sources. Then, the researcher synthesised and integrated the leadership behaviours when they were similar or contained the same descriptions and actions. This integration can lead to addressing duplications. Therefore, the proposed leadership behaviours emerged after this process of comparison was accomplished. Table 5-6 clarifies the source of each of the leadership behaviours to identify which are common over these three sources. The researcher used a serial number for each of the leadership behaviours, so the reader knows the source of a particular behaviour. By referring to the serial number, the reader can understand why some certain leadership behaviours are integrated. For instance, "*Leaders demonstrating commitment and providing support for Lean Six Sigma implementation*" is a leadership behaviour that came from the literature and has the serial number 1. This leadership behaviour is similar to serial number 16, which

came from the interviews' analysis; see the following table 5-6. These leadership behaviours are integrated since they were similar and share commonalities and serve similar purposes. Overall, whenever similarities appeared among leadership behaviours from the focus group, and/or interviews' analysis, and/or the literature, they were synthesised.

Table 5- 6 Source of each leadership behaviours

Integrated leadership behaviours	**leadership behaviours from the literature**	**leadership behaviours from interviews analysis**	**leadership behaviours from focus group**
Leaders demonstrating commitment and providing support for Lean Six Sigma implementation.	1	16	NA
Leaders motivate employees who have contributed to the fulfilment of current goals, through recognition, encouragement. Also, they can use financial and non-financial rewards, and acknowledgment for motivating employees.	2	5	8
Delegating decision making, power, and responsibility.	3	14	NA
Maintaining a good relationship with employees by showing trust and respect.	NA	11	9
Developing and training employees: using training as an instrument for engaging the employees in improvement initiatives. This training focuses on technical knowledge to acquire new skills, Lean thinking, Lean tools and techniques, and Lean principles.	4	8,9	6

Promoting employees' self-development through evaluating and analysing employees' competences	5	7	7
Intellectual stimulation: leaders make employees more interested in challenges that they face, and make them able to think in new ways to overcome issues.	7	6	NA
Leaders should foster and maintain a continuous improvement culture that seeks excellence and considers any mistakes as opportunities for improvement through promoting honesty	8	NA	5
Sharing information with employees	9	1	NA
Leaders listen to employees to ensure workers understand the information and to gain more information about employees' experiences, problems, and suggestions.	10	NA	1
Visiting the work floor (gemba walk) which includes three activities: going to where the value is created, looking at the process, and talking to the workers. These activities enable the leaders to be involved with people, solve the problems, and demonstrate care and recognition.	11	10	4
Leaders taking responsibility for culture change.	12	NA	NA
Monitoring and evaluating tasks and processes.	13	4	NA
Encourage collaboration: Collaborating on work or projects can help develop better	NA	NA	3

ideas and even improve employee engagement.			
Making the employees feel they are part of the change	NA	2	NA
Conducting meetings in a short frequency	NA	3	NA
Identifying and assigning clear responsibilities for employees	NA	12	10
Enhancing the role of the team work in realising improvements and support standardized work	NA	13	2
Creating a learning environment	6	15	NA
Obtaining ideas from the employees	14	17	NA

Forty-one leadership behaviours identified earlier from the three sources have been integrated into twenty proposed leadership behaviours, as shown in Table 5-6. This integration between leadership behaviours is based on the overlap and similarities among the different sources of leadership behaviours. These aggregated leadership behaviours make it possible to build the framework. The overlaps and repetition between leadership behaviours that came from the three sources show that some common behaviours and actions make Lean Six sigma work successfully. Despite that, some leadership behaviours came only from one source, which enables the effective use of Lean Six Sigma.

5.4 Constructing the framework

In this chapter, the researcher identified the ideal position for each theme and then identified the leadership behaviours required to create the ideal position for each theme. Following that, leadership behaviours that came from the three sources were integrated to address duplication among these leadership behaviours. Constant comparison between the three sources had allowed the researcher to combine similar leadership behaviours. This process of integration allowed the proposed leadership behaviours to emerge. In this chapter, the researcher constructed a framework of leadership behaviours to facilitate the effective use of Lean Six Sigma. This

framework is a series of leadership behaviours that targets specific themes. The framework was built based on leadership behaviours that came from the three sources and based on the identified themes and their descriptions. These leadership behaviours create the ideal position for each theme, influencing Lean Six Sigma to be effective. In this study, leadership behaviours are actions that leaders should adopt and practise with the aim of fostering the effective use of Lean Six Sigma. This framework is also based on a grounded theory methodology; qualitative data is analysed and synthesised based on participants' perspectives of social constructivism. The framework provides a group of leadership behaviours that help close the gap between the current situation for organisations and the ideal position, which facilitates the effective use of Lean Six Sigma.

Constructing the framework was based on several stages that are useful to realise a robust framework. These stages start with identifying the ideal position for each theme, then identifying the required leadership behaviours to create the ideal position. Then, the leadership behaviours were combined (integrated) from the three different sources to realise the proposed leadership behaviours. The last two stages are accomplished in this chapter: constructing the proposed framework and validating it through experts' judgement, see Figure 5-1.

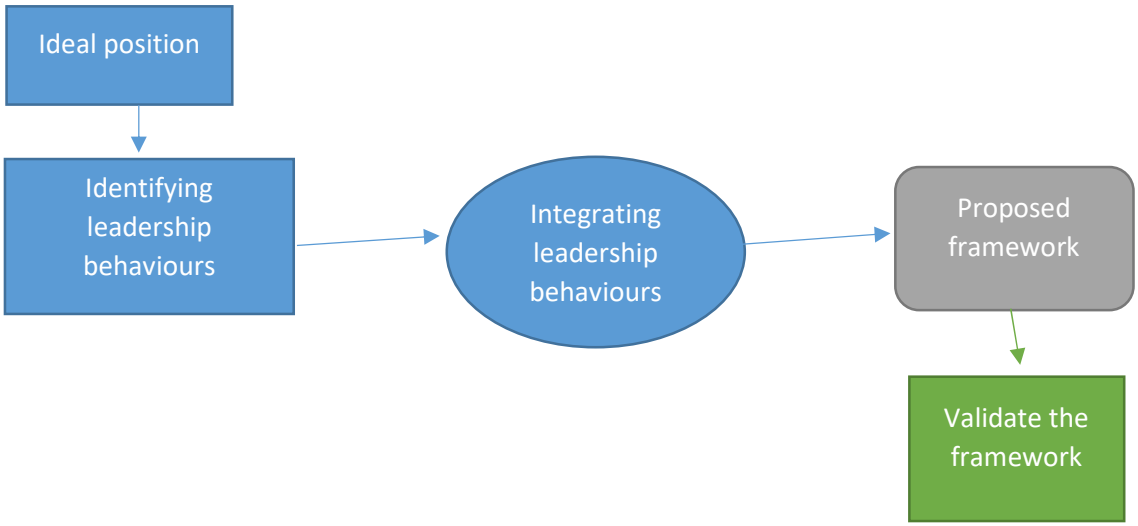


Figure 5-1 Stages of developing the framework

5.4.1 Proposed framework

This framework identified the desired leadership behaviours to boost and foster the effective use of Lean Six Sigma, and the leadership behaviours interact to achieve the successful use of the Lean Six Sigma. In addition, these leadership behaviours can positively support themes that influence Lean Six Sigma, which enable its effective use in the manufacturing sector. The leadership behaviours' influences on themes were described in this chapter (see section 5.2); in other words, the section provided explanations why particular behaviours are attached to specific themes. These explanations are based on ideal position descriptions that came from participants and the literature. The researcher combined the framework components, in that, the leadership behaviours that influence specific themes are put together (see Table 5-6). This table is related to the previous work ideal position descriptions (section 5.1), leadership behaviours' sources (section 5.2), and integrating leadership behaviours (section 5.3).

The behaviours are likely to develop leaders' actions; leaders should take specific actions for organisations based on these proposed leadership behaviours. The leadership behaviours help support themes and create the ideal position for each theme (see Table 5-7). The themes can be achieved by adopting the proposed leadership behaviours, which are required to create the ideal position; see Figure 5-2, which shows the relationship between the framework components.

Implementing Lean Six Sigma is more likely to occur successfully when leaders adopt or consider these groups of leadership behaviours. These leadership behaviours with the ideal position descriptions provide a road map to make organisations effective in using Lean Six Sigma. The outcomes of these leadership behaviours should close the gap between the themes' current practices and their ideal positions. This effect of the leadership behaviours shifts organisations from the current situation to reach the desired situation. The leadership behaviours and the targeted themes are summarised in Table 5-7.

Figure 5- 2 relationship between leadership behaviours and ideal position for themes that facilitate effective use of Lean Six Sigma

Table 5- 7 Framework components

List of leadership behaviours	**Targeted themes**
Leaders demonstrating commitment and providing support for Lean Six Sigma implementation.	• Continuous improvement and development • Managing qualities and operations
Leaders motivating employees who have contributed to the fulfilment of current goals through recognition and encouragement. Also, they can use financial and non-financial rewards, and acknowledgment for motivating employees.	• Motivating employees
Delegating decision making, power, and responsibility.	• Managing qualities and operations • Empowering employees
Maintaining a good relationship with employees by showing trust and respect.	• Communication • Employees' engagement and involvement • Motivating employees
Developing and training employees: using training as an instrument for engaging the employees in improvement initiatives. This training focuses on technical knowledge to acquire new skills, Lean thinking, Lean tools and techniques, and Lean principles.	• Employees' engagement and involvement • Training and development
Promoting employees' self-development through evaluating and analysing employees' competences.	• Training and development • Empowering employees
Intellectual stimulation: leaders make employees more interested in challenges they face, and make them able to think in new ways to overcome issues.	• Continuous improvement and development • Empowering employees • Supporting culture

Leaders should foster and maintain a continuous improvement culture that seeks excellence and considers any mistakes as opportunities for improvement through promoting honesty.	• Supporting culture • Continuous improvement and development • Employees' engagement and involvement
Sharing information with employees	• Communication • Empowering employees • Managing qualities and operations • Employees' engagement and involvement • Training and development
Leaders listen to employees to ensure workers understand the information and to gain more information about employees' experiences, problems, and suggestions.	• Communication • Employees' engagement and involvement
Visiting the work floor (Gemba Walk) which includes three activities: going to where the value is created, looking at the process, and talking to the workers. These activities enable leaders to be involved with people, solve problems, and demonstrate care and recognition.	• Employees' engagement and involvement • Continuous improvement and development • Managing qualities and operations • Motivating employees • Communication
Leaders take responsibility for culture change.	• Supporting culture
Monitoring and evaluating tasks and processes.	• Continuous improvement and development • Managing qualities and operations

Encourage collaboration: Collaborating on work or projects can help develop better ideas and even improve employee engagement.	• Employees' engagement and involvement • Continuous improvement and development • Managing qualities and operations • Supporting culture
Making employees feel they are part of the change.	• Employees' engagement and involvement
Conducting meetings in a short frequency	• Continuous improvement and development • Communication • Empowering employees • Employees' engagement and involvement
Identify and assign clear responsibilities for employees	• Empowering employees
Enhancing the role of the team work in realising improvements and support standardised work	• Continuous improvement and development • Empowering employees • Managing qualities and operations • Employees' engagement and involvement
Creating a learning environment	• Continuous improvement and development • Supporting culture • Training and development
Obtaining ideas from the employees	• Motivating employees • Empowering employees

It is clear that each leadership behaviour has multiple effects to achieve the desired situation. In other words, a specific leadership behaviour may create the ideal position for several themes. Also, these themes and leadership behaviours are interconnected and interdependent, since some leadership behaviours are common for different themes. The framework represented a guide for leaders and practitioners on how leaders play a vital role in successfully using Lean Six Sigma.

This framework is based on the participants' perspective. First, participants identified the themes that influence the effective use of Lean Six Sigma; this was accomplished based on the leadership aspects that emerged from the interviews' analysis. Then, after establishing these themes, the researcher went further to find the ideal position for each theme. Finally, based on identifying the ideal position for each theme, the researcher was able to reach the stage of identifying the required leadership behaviours to create the ideal positions, which in turn contribute to the effective use of Lean Six Sigma. Therefore, due to taking an action research approach and engaging with participants to help in developing the framework based on practitioners views, the framework is grounded on participants and relevant literature (see Figure 5-3).

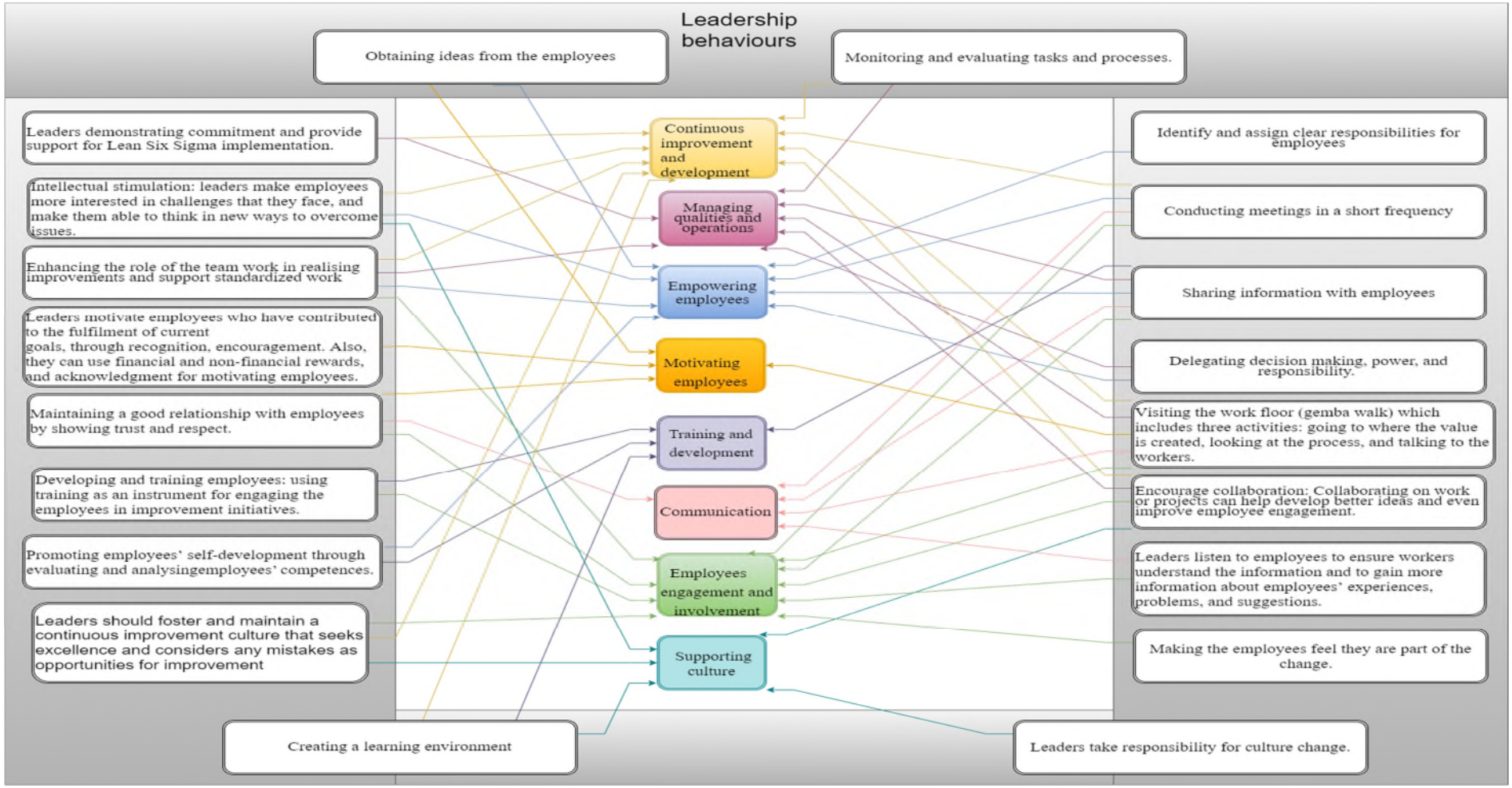


Figure 5- 3 Lean Six Sigma framework LSSF

5.4.2 Framework validation

The last objective of this research project is to validate the proposed framework through experts' judgment. The researcher looked for practitioners who have exceptional knowledge and experience about Lean Six Sigma implementation. During the data collection and analysis phase, the researcher identified possible experts to be contacted. The experts did not participate in any stage of developing the framework to avoid any exposure to the study data and avoid bias. The researcher sent an email to the experts with the framework and information about the content and study context. Potential feedback could emerge from this process that enabled the researcher to revise the framework. The characteristics of the selected experts are provided in Table 5-8.

Table 5- 8 Experts' characteristics

Expert	**Educational level**	**Type of business**	**Position**	**Years of experience**
A	Bachelor	Food industry	Lean champion	14
B	Master's	Food industry	Operations manager	17
C	Bachelor	Electrical equipment	Quality assurance manager	12

The experts provided an integral view from their perspective on the proposed framework; this contribution and participation from experts increase validity and ensure the framework's applicability in Jordan. The experts provided valuable comments and suggestions on the framework to make it effective. The experts' comments were received by email in English. The following sections highlight the key feedback from the experts based on their experience and knowledge:

Expert A

The expert A, who was an Lean champion in a manufacturing organisation in Jordan, sent a brif feedback. The expert evaluation and comment was:

"I think there are no notes, and your framework is very excellent and covers all topics. Thank you for your efforts."

Expert B

The expert feedback was:

"The proposal reviewed and what I can conclude its very comprehensive and reflect an actual experience. Linking the with is good and seems very good, following this scheme will lead to the desired targets contributing in upgrading the environment in addition to increasing the efficiency and performance of the work place. Connection of the leadership behavior cover most of the aspects and impact. I have no further remarks to contribute but WELL Done."

Expert C

Expert C sent who is a quality assurance manager commented on the proposed framework:

"Please note that I have reviewed the frame work and found it a very informative tool that may facilitate the application of Lean Six Sigma for the leaders those who are seeking for a kind of help or facilitator to bring the theory to life, and to have a good frame work in their organization for LSS applications."

Overall, the experts commend on the proposed framework and believe that framework is useful for effective use of Lean Six Sigma. The experts' feedback that this framework comprehensive and cover all topics. They believe that adopting these behaviours can lead to achieve the desired goal which enhance operations efficiency. Also, the experts demonstrate that this framework effective in facilitating the Lean Six Sigma implantation.

5.5 Clarifications around the steps that occurred to develop the framework

This framework was constructed based on the primary data and secondary data. The primary data were the interviews analysis and the focus group workshop that was conducted to suggest leadership behaviours, while the secondary data was the literature review. These points provide clarifications on the derivation process of the developed framework:

- The researcher adopted and relied on three sources to identify the possible leadership behaviours to develop the proposed framework. These sources are a focus group workshop, interviews analysis, and the literature.
- The first source was to review the literature to identify leadership behaviours that facilitate Lean Six Sigma. This occurred through conducting a thematic analysis of the literature.

- The second source was to collect and analyse data from the manufacturing sector in Jordan to identify the leadership behaviours that enable successful Lean Six Sigma implementation.
- The third source was the focus group workshop that identified a group of leadership behaviours that enable Lean Six Sigma based on the ideal position's descriptions.
- After analysing the data, the researcher asked participants in the focus group to group aspects into themes.
- Then the ideal position descriptions for each theme were developed; since the ideal position is the desired endpoint in the most perfect organisation, it becomes the target position.
- Based on this identification of the ideal position, the researcher was able to identify the required leadership behaviours from the three sources that can create the ideal position for each theme.
- Each leadership behaviour that emerged previously is compared with all ideal position descriptions. These comparisons enabled the researcher to ascertain whether that leadership behaviour creates the ideal position and to identify which ideal position can be created. This process of precise and thorough comparisons enabled the researcher to identify the leadership behaviours that create the ideal position.
- Each of the leadership behaviours showed which ideal positions are created specifically by providing pieces of evidence from ideal position descriptions. The researcher provides pieces of evidence from descriptions of ideal positions and explanations from data to give a comprehensive picture of each leadership behaviour.
- Following that, leadership behaviours that came from the three sources were integrated to address duplication among these leadership behaviours. Constant comparison between the three sources had allowed the researcher to combine similar leadership behaviours.
- This process of integration allowed the proposed leadership behaviours to emerge. In that, the framework is constructed by putting the two main components together and represented in a table, then encapsulated into a figure representing the relationships among the framework components.
- Finally, the proposed framework was validated through experts' judgment. Following that, the final framework was represented.

Overall, the identified leadership behaviours encourage leaders to act or behave in a certain way in organisations. Therefore, the proposed leadership behaviours create the desired practices in organisations. The leadership behaviours also support the themes and help in creating the ideal positions. Constructing the framework was based on several stages that are useful to realise a robust framework. These stages start with identifying the ideal position for each theme and then identifying the required leadership behaviours to create the ideal position. Then, the leadership behaviours were combined from the three different sources to realise the proposed leadership behaviours. These leadership behaviours can positively support themes that influence Lean Six Sigma, which enables its effective use in the manufacturing sector.

5.6 Conclusion

In light of the findings that emerged in this chapter, ideal position descriptions can help practitioners understand what that organisation would be and how managers behave. Also, it will help practitioners to realise matters related to that theme. Determining the leadership behaviours that create the ideal position will help organisations to start the journey of transformation from their current position to the ideal position. However, the researcher found overlaps between participants' descriptions and the literature descriptions. The process of blending and combining the participants' perspectives with the literature help to gain comprehensive descriptions of the ideal position for each theme.

However, the researcher synthesised and integrated the leadership behaviours when they were similar or contained the same descriptions and actions. This integration can lead to addressing duplications. Whenever similarities appeared among leadership behaviours from the focus group, and/or interviews analysis, and/or the literature, they were synthesised. The overlaps and repetition between leadership behaviours that came from the three sources show that some common behaviours and actions make Lean Six sigma work successfully. Despite that, some leadership behaviours came only from one source, which enables the effective use of Lean Six Sigma.

The identified leadership behaviours encourage leaders to act or behave in a certain way in organisations. Therefore, the proposed leadership behaviours create the desired practices in organisations. These leadership behaviours overlap, and there is repetition across the three sources; as a result, similar leadership behaviours are integrated.

The leadership behaviours that help in developing the framework that comes from both interviews and focus group workshops are similar. This resemble indicates generating the leadership behaviours from different angles in Jordan, resulting in similar findings that support each other. Most leadership behaviours came from primary data (interviews analysis), which shows the importance and the effectiveness of this source in developing the framework since it provided rich and detailed data.

There are some leadership behaviours that were not involved in the developed framework, which might mean those are not effective like that were involved in the framework.

Each of the leadership behaviours show which ideal positions are created specifically by providing pieces of evidence from ideal position descriptions. It is worth noting that some of the provided pieces of evidence can be related to several and contain several behaviours simultaneously. Also, some leadership behaviours may create several ideal positions.

This framework identified the desired leadership behaviours to support the effective use of Lean Six Sigma, and the leadership behaviours interact to use Lean Six Sigma successfully. These leadership behaviours can positively support themes that influence Lean Six Sigma, which enables its effective use in the manufacturing sector. Implementing Lean Six Sigma is more likely to occur successfully when leaders adopt or consider these groups of leadership behaviours. It is clear that each leadership behaviour has several effects on achieving the desired situation. Also, these themes and leadership behaviours are interconnected and interdependent since some leadership behaviours are common for different themes.

CHAPTER SEVEN

DISCUSSION, RECOMMENDATIONS, AND CONCLUSION

6. CHAPTER SIX

6.1 Discussion

Using Lean Six Sigma is challenging since many organisations have failed to use it successfully (Albliwi, Antony and Lim, 2015; Timans et al., 2012). Some studies highlighted leadership as a critical success factor, and leadership plays a significant role to make Lean Six Sigma effective (Achanga et al., 2006; Gamal Aboelmaged, 2010; Laureani and Antony, 2019; Snee, 2010). However, there were few studies considering leadership behaviours that enable the successful use of Lean Six Sigma. In turn, this study has developed a framework to enable and facilitate the successful use of Lean Six Sigma. This study was conducted to facilitate the use of Lean Six Sigma in the manufacturing sector in Jordan. Many organisations seek to use Lean Six Sigma successfully and embed the method in their operations.

The project developed a framework that was based on participants' perspectives. There is a clear need for help and guidance for people implementing Lean Six Sigma. Therefore, this framework provides support for practitioners and facilitates the Lean Six Sigma journey by overcoming the challenges that practitioners face during Lean Six Sigma implementation. Validators reinforce this view; they are in agreement that this framework is effective for facilitating the successful use of Lean Six Sigma. Also, the validators confirm that this framework is comprehensive since it covers all the aspects and areas.

6.1.1 Highlight the main results of the literature review

6.1.1.1 leadership styles

This research fulfilled the first research objective; the literature review identified and discussed the aspects of leadership behaviours that aid facilitating Lean Six Sigma. The researcher thoroughly and intensively examined and reviewed the literature in this field. The researcher conducted a review to provide insight into the studies that investigated leadership styles that facilitate Lean Six Sigma implementation (Alnadi and McLaughlin, 2020). The corresponding leadership styles that were mentioned in previous studies of leadership literature were identified. These leadership styles are as follows: situational (task-oriented or relation-oriented behaviours), transformational,

servant, authentic, empowering, and distributed leadership. This variety in leadership behaviours may indicate that there is no single leadership style to successfully implement Lean Six Sigma (Poksinska, Swartling and Drotz, 2013). However, effective leadership shows a balanced set of multiple styles (van Eeden, Cilliers and van Deventer, 2008). This indicates the possibility of studying leadership beyond specific lenses. Researchers can conduct studies to build new perspectives and theories about the suitable attributes for Lean Six Sigma (Alnadi and McLaughlin, 2020).

The results indicate that previous studies mainly focused on the *situational leadership style* (task-oriented and relation-oriented behaviours) in investigating Lean Six Sigma. Several studies concluded that task-oriented behaviour is more effective than relation-oriented behaviour in the early stages of Lean Six Sigma deployment (Tortorella et al., 2018). *Transformational leadership* is a supportive style, since leaders show concern and recognition of individual needs (Rafferty and Griffin, 2004). By creating a vision for followers that can improve their understanding of the significance and qualities related to desired results, transformational leadership increases followers' performance and raises their readiness to work towards a common goal (Jung, Chow and Wu, 2003). This style increases follower's commitment and motivation to achieve long-term goals and leaders' visions (Pongpearchan, 2016). There is a contrast between studies that studied *servant leadership*. Some of these studies found a positive connection in using this style and Lean manufacturing, e.g. van Dun, Hicks and Wilderom, 2017, while other studies disprove this, e.g. Rafferty and Griffin, 2004. This divergence indicates this servant style may be less effective than other styles for facilitating Lean Six Sigma implementation. *Authentic leadership* focuses on developing leaders' behaviours to be trustworthy and believable, whereby leaders should learn to develop these behaviours and qualities (Liker and Convis, 2011; Lumby, 2019). This might intersect with Lean leadership that emphasises self-development, which is mentioned as the first step to leadership development at Toyota (Liker and Convis, 2011). Researchers studied the authentic style that is necessary for both Lean and Six Sigma, but they did not study the relationship between the authentic style and Lean Six Sigma. Also, contextual variables are considered as a factor affecting leader behavioural orientation and Lean implementation, whereby the big

team size inhibits effective Lean implementation. The importance of studying contextual variables that relate to leadership style is to plan and design the organisational structure (size of teams and hierarchy levels) to fit with desired outcomes for Lean implementation (Tortorella et al., 2017). Also, it helps in developing programmes for leadership development to fulfil the Lean implementation phase requirement and to stimulate the suitable behaviours of leaders. However, the researcher considerably reviewed the literature to identify behaviours of leaders that facilitate the successful use of Lean Six Sigma.

6.1.1.2 leadership behaviours from the literature

The researcher synthesised the results of the previous literature on leadership behaviours that enable successful Lean Six Sigma implementation. A thematic analysis was conducted on the previous literature, which helped in identifying the relevant aspects and associating the behaviours with specific aspects. After analysing the literature, seven key aspects have emerged. Thematic analysis in this field is scarce. Organisations and practitioners of Lean Six Sigma can take into consideration these behaviours as a key to the successful implementation of Lean Six Sigma. They can adjust their behaviours and know the behaviours that need to be developed among leaders. This would facilitate the Lean Six Sigma journey by overcoming the challenges that face practitioners during Lean Six Sigma implementation.

The researcher, in this thematic analysis, replicated and expanded the findings on leadership aspects by focusing specifically on identifying the relevant behaviours. The results indicate that specific behaviours might seem similar, but their effects can differ significantly. To illustrate that, the Gemba Walk is a behaviour that supports continuous improvement. Also, it helps in coaching and developing employees. Further, the Gemba Walk helps in motivating employees through demonstrating care and recognition; it has a positive effect on developing and maintaining relationships (Poksinska et al., 2013). The Gemba Walk also extends to the employees' empowerment aspect; during this Walk, all the people are together and, in turn, they are in a position to rapidly take suitable decisions and start to implement them (Aij et al., 2015). From this evidence, it is clear that the Gemba Walk behaviour affects and is related to most of the aspects, namely: communication, continuous improvement, coaching and developing employees, and motivating employees (Aij et al., 2015;

Dombrowski and Mielke, 2013; Poksinska et al., 2013; Seidel et al., 2019; Tortorella et al., 2019). The Gemba Walk, therefore, is one of the key behaviours for Lean Six Sigma implementation (Alnadi and McLaughlin, 2021). However, some behaviours do not appear across all the emerged aspects; for example, delegating decision making, power, and responsibility are related mainly to the employee empowerment aspect (Alnadi and McLaughlin, 2021).

However, this review analyses the literature without focusing on a specific study. New aspects have emerged from this analysis that emphasises leadership behaviours specifically. The review results indicate that the organisation should have the vision to use Lean Six Sigma, then they can align the goals that help in achieving this vision. Communication can be considered as an essential background to enable other aspects to work effectively. In addition, the leader should build a culture of continuous improvement and coach and develop the employees (Alnadi and McLaughlin, 2021). To sustain a Lean Six Sigma operation, top management should demonstrate commitment and support. Also, motivating the employees is necessary to increase their commitment, which in turn helps in achieving progress with Lean Six Sigma implementation employees (Alnadi and McLaughlin, 2021). After achieving progress, which means the employees are both aware and competent, the leader can empower the employees with decision making and taking responsibility (Alnadi and McLaughlin, 2021).

6.1.2 The emerged aspects of leadership behaviours

The early stage of this research project was to identify the aspects from participants' perspectives by conducting interviews; these aspects influence Lean Six Sigma in terms of leadership behaviours that enable the use of Lean Six Sigma. This responds to fulfilling the second objective of this research project. The researcher conducted interviews in Jordan in the manufacturing sector to know the aspects of leadership behaviours that influence Lean Six Sigma. The field study conducted through interviews showed that the top four aspects that facilitate the effective use of Lean Six Sigma are:

- Obtaining ideas from employees
- Giving training on Lean Six Sigma

- Management support and commitment
- Sharing information with employees

These aspects have been presented in chapter 4. Also, the description of each aspect was presented and the meaning of the main findings was clarified in section 4.4.1. These aspects play a crucial role in facilitating the use of Lean Six Sigma in the manufacturing sector in Jordan. The findings that are revealed indicate that leadership behaviours influence Lean Six Sigma operations. All of these factors play a key role with essential support from leaders to leverage the Lean Six Sigma operations. These findings give new insights into the power of some factors in influencing the successful use of Lean Six Sigma in the manufacturing sector in Jordan. Some aspects of leadership behaviours are less frequent than others; thereby, there are less important aspects than others. This may help organisations face challenges in using Lean Six Sigma; practitioners can be aware of these significant factors and pay great attention to them. These four aspects are also mentioned in previous studies, so they are consistent with those studies.

First of all, "Obtaining ideas" appeared dominant among the aspects that most influenced the use of Lean Six Sigma. This result indicates the importance of "Obtaining ideas" for the effective use of Lean Six Sigma. Kaizen approach (continuous improvement) relies on ideas that convey improvements. Employees are more familiar with processes than managers because employees work every day on the same process. So it is the leaders' responsibility to ask and seek to get ideas from workers at the operational level. Obtaining feedback and ideas as well is mentioned and described in the literature. Obtaining feedback and ideas, from employees to managers, plays an important role in facilitating Lean Six Sigma implementation. Receiving and giving information that conveys ideas help leaders to know what is happening in processes, the issues that occur, and obtain suggestions for improvements (Bijl et al., 2019; Hwang, Hwang and Hong, 2014; Laureani and Antony, 2017; Loh, Mohd Yusof and Lau, 2019; Nogueira, Sousa and Moreira, 2018; Toledo et al., 2019).

During the interviews, participants also intensively highlighted *giving training*. This indicates the vital role for training in realising the benefits of Lean Six Sigma. Giving

training was also highlighted highly in the literature. Training employees is essential to increase their awareness about Lean Six Sigma philosophy and tools (Assarlind, Gremyr and Bäckman, 2013; Henderson and Evans, 2000). In addition, widespread training in organisations has been observed as an instrument for involving the employees in improvement initiatives (Laureani and Antony, 2017).

Likewise, *management support and commitment* were emphasised as an aspect that influences Lean Six Sigma. This indicates that management should be committed to providing support such as time, money, effort, and equipment. Management embraces the project and, in turn, they welcome any new ideas and insist on overcoming obstacles. A significant number of studies outline the importance of top management support and commitment, whereas leaders demonstrate commitment and support for Lean implementation, and they feel they are accountable to do their best (Aij et al., 2013; Goodridge et al., 2015; Laureani and Antony, 2017; Maijala et al., 2018; Poksinska, Swartling and Drotz, 2013).

Finally, in this study of the manufacturing sector in Jordan, data-gathering indicated that *sharing information* plays a vital role in the successful use of Lean Six Sigma. Leaders give employees the necessary information about processes' performance and update employees with any information related to operations. Leaders circulate to find information among departments. Aij and Teunissen (2017) point out that effective leaders both communicate information and listen carefully to subordinates, which help in building trust and gaining more information. Sharing information can take several forms, such as visual tools through use of whiteboards and dashboards to display information using simple charts (Hung et al., 2015; Poksinska, Swartling and Drotz, 2013). Sharing information makes the information available for the shop floor employees and provides on-time feedback on process performance (Poksinska, Swartling and Drotz, 2013). Overall, as can be seen, the top four aspects share two main elements: developing employees and communication. The results indicate the importance of these two themes that practitioners should focus on.

However, leaders' attitudes play a vital role. Leaders should maintain a good relationship with employees by being humble with employees, socialising, and being interested in their needs. Showing concern for employees' social side, providing

support for them, and putting great concern for employees' needs to make them feel they are part of the organisation are essential for Lean Six Sigma. The importance of leaders' attitudes is deduced from this aspect "having a good relationship with employees".

Taking the field study and the literature together shows that there is a similarity between the study findings and the literature that studies Lean Six Sigma implementation. Moreover, the findings of this research project corroborate the results of several other studies (see section 4.4.3, where most of the factors were highlighted in the literature). These findings can help organisations in the manufacturing sector in developing countries pay attention to these aspects in the future to ensure the effective use of Lean Six Sigma.

6.1.3 The framework components

This research project accomplished objectives three and four. Bearing in mind the previously stated problem, which was mentioned briefly at the beginning of the chapter that some organisations fail to realise the benefits of Lean Six Sigma, the solution is proposed to adopt the identified leadership behaviours that influence certain themes that support the effective use of Lean Six Sigma. This section adds important comments on the developed framework that consist of two main components: *themes* and *leadership behaviours*. Leadership behaviours identify what leaders need to do to enable and facilitate Lean Six Sigma and the other components show the targeted themes that influence the use of Lean Six Sigma. The main output of this research project is the leadership behaviours grounded with themes that reflect the ideal position. After accomplishing the interviews, a focus group was conducted. During the focus group, the participants grouped the aspects that helped to develop the themes and structure them. A description of each theme was developed to define what leaders should do to create the ideal position that would facilitate the use of Lean Six Sigma. Section 4.5.2 provided explanations for each theme and made a comparison among those that came from the primary data and the literature. The researcher explained how each theme influenced the successful use of Lean Six Sigma. Thereby, these themes should be taken into account when considering how to use Lean Six Sigma successfully. These themes do not stand alone; there are interdependence and interconnection between them. Considering all of them at the

same time is significant, since the absence of one of these eight themes would affect the effectiveness for realising the desired effect. To clarify the interdependence among themes, the communication theme can be considered essential for empowering employees. For instance, effective communication through sharing information with employees can make employees more competent in managing their operations, since the required information is available for them. Another example, the motivating employees theme, can support the employees' engagement and involvement theme. Through recognition and positive reinforcement, leaders influence employees' attitudes and behaviours towards the Lean Six Sigma philosophy. Giving proper motivation to employees leads to broad interest and implementation, which in turn sustains Lean operations by having motivated people (Balzer, Brodke and Kizhakethalackal, 2015). However, the *employees' engagement and involvement* theme was the most targeted theme from leadership behaviours; ten of the leadership behaviours seek to create the ideal position for that theme. Meanwhile, the *continuous improvement and development* theme and *empowering employees* theme were targeted from nine and eight leadership behaviours, respectively. This would indicate the importance of these themes in supporting Lean Six Sigma and signify that most of the leaders' behaviours focus on these three themes.

The themes indicate the importance of leadership for the successful use of Lean Six Sigma. The leadership role was mentioned and clarified in the literature and through the participants. Themes such as *Continuous improvement and development* clarified the role of leadership, for instance, leaders should support continuous improvement by allocating time and resources and be open to ideas that help in achieving improvements (Poksinska, Swartling and Drotz, 2013), as well as be competent to solve problems and thinking scientifically regarding improvements (van Assen, 2018; van Dun, Hicks and Wilderom, 2017; Toledo et al., 2019). Moreover, the *Communication* theme also highlighted the role of leadership. Leaders communicate to make information available for the shop floor employees (Poksinska, Swartling and Drotz, 2013), and inform them about what is expected from them (Loh, Mohd Yusof and Lau, 2019). Likewise, the other themes mentioned presented the importance of leadership in the successful use of Lean Six Sigma.

The description of the ideal position indicates what that theme looks like in the most perfect organisation. Defining the ideal position helps leaders and practitioners in implementing the framework. In turn, practitioners can know how these leadership behaviours influence Lean Six Sigma. Also, leaders can know the objectives of proposed leadership behaviours. Leaders can compare their current position and practices with the ideal position. Then leaders can seek to reach the desired state. To implement the framework effectively, leaders should understand and analyse the gap between the current and ideal positions. Also, it would be possible to choose the most appropriate leadership behaviours to fill the gap and realise the successful use of Lean Six Sigma.

The most suitable leadership behaviours for facilitating Lean Six Sigma can be selected by analysing the gap between the two positions. The process of adopting the framework can take time from leaders, requiring persistence and firmness to travel the journey's distance. While, top management should initiate and establish development programmes for leaders to develop and change their behaviours. This implementation can gradually be rooted and embedded in the organisational culture. The organisational culture plays a vital role in implementing Lean Six Sigma; the culture was identified as a critical success factor. Culture also plays a role in leading behaviours in organisations. This requires organisations to pay attention to an organisational culture that may work as an incubator for enhancing these actions. The results corroborated that supporting culture was identified as one of the essential themes for effective Lean Six Sigma.

However, as mentioned earlier, the main output from this study is leadership behaviours; this part discusses the second component of the framework, which is leadership behaviours. Section 6.1 shows the framework outlined in this research is based on a series of twenty leadership behaviours grounded on eight themes. The developed framework of this research project indicates the significant role of leadership behaviours in using Lean Six Sigma successfully. Thereby these leadership behaviours encourage leaders to act or behave in a certain way. These leadership behaviours create the desired behaviours that leaders should adopt to facilitate the use of Lean Six Sigma in organisations.

This framework suggested what leaders could do to create the ideal position for each theme that support Lean Six Sigma; the ideal position of each theme is described in chapter 5, see section 5.1. The proposed leadership behaviours comprise a series of linked leaders' actions to make organisations closer to the ideal position of using Lean Six Sigma. Each leadership behaviour targets one theme at least. It is possible the same leadership behaviour has multiple effects to achieve the desired situation. The leadership behaviours could target several themes at the same time. Some leadership behaviours can influence five themes; these behaviours include sharing information with employees and visiting the workshop floor. These multiple effects of each leadership behaviour indicate the complexity of measuring the desired effect or knowing the specific effect for certain behaviour. However, some leadership behaviours may have unintended consequences, since these behaviours are interactive and influence the use of Lean Six Sigma and are related to other aspects. This also reflects the complexity of adopting behaviours and measuring their influence.

Generally, the influence of some leadership behaviours can take time, such as maintaining a good relationship with employees by showing trust and respect as well as creating a learning environment. However, the benefits of these behaviours are difficult to be tangible in the short term. Meanwhile, some leadership behaviours can initiate immediate change and influence, such as use of financial and non-financial rewards, acknowledgement for motivating employees, and sharing information with employees. Lean Six Sigma is a journey, not a destination; leaders can gradually make the required change in the organisation and behaviours. The existence of leaders' behaviours during this journey is necessary for success; leadership behaviours mainly focus on employees' engagement and involvement. Leaders should show commitment and support for this philosophy for it to be ingrained. This leads to inspiring employees and creating a suitable environment and making whatever is necessary available for improvements. This enables organisations to use Lean Six Sigma effectively; thereby, organisations can reap the benefits.

However, these leadership behaviours came from three sources (the literature, focus group, and interview data), and there were a high overlap and repetition between these three sources. This indicates there are some common behaviours that facilitate the use of Lean Six Sigma. Furthermore, these common leadership behaviours came from

different sources that reflect practitioners' perspectives in the Jordanian manufacturing industry and other contexts. Thereby, this indicates that some leadership behaviours can be generalised and used in other similar contexts.

6.1.4 Implications (theoretical and practical)

Organisations and practitioners of Lean Six Sigma can take into consideration the identified behaviours in the framework as a key to the successful implementation of Lean Six Sigma. They can adjust their behaviours and know the behaviours that need to be developed among leaders that would facilitate Lean Six Sigma. This proposed framework would facilitate the Lean Six Sigma journey by overcoming the challenges that practitioners face during Lean Six Sigma implementation. Also, it brings new perspectives of leadership into the manufacturing sector in fulfilling missions and sustaining improvements.

First of all, these findings from the inductive processes could be useful for *theoretical implications*. For instance, future studies may rely on the current aspects to identify leadership characteristics and skills that would facilitate Lean Six Sigma implementation. Having these themes might influence future research in this area; researchers who seek to develop a framework can take advantage of these evolved aspects. Researchers can compare themes identified in this study with themes from other studies and rely on these themes to construct a comprehensive framework. To build a comprehensive theory about Lean Six Sigma leadership, researchers need three constructs, namely: attributes, behaviours, and context. This study can help researchers to build theory about Lean Six Sigma leadership since this study covered the behavioural aspect. Studying these behaviours' effect may change through context, industry type, or developed or developing countries. Further empirical work can explore the interdependencies between these behaviours; since certain behaviours impact others, such as Gemba Walk effect on other behaviours.

Usually, researchers focus on the technical side of using Lean Six Sigma; however, adopting Lean Six Sigma tools and techniques are not enough to deliver sustainable results. This research indicates that the leaders' role is vital to achieving sustainable and desired outcomes of Lean Six Sigma.

This research will have *managerial implications*, helping organisations that are about to embark on a Lean Six Sigma journey to ensure they have the right leadership in place. Whereas, identifying behavioural aspects of leadership would help in more understanding about the variance associated with the success or failure outcomes of Lean Six Sigma process and operation (Narayanamurthy and Gurumurthy, 2016). In turn, organisations can identify behavioural gaps and needs in terms of soft skills development among their leaders (Tortorella, 2019). In that respect, the practical implication of this research is to describe the practices that the leadership of organisations must develop to maintain high levels of Lean Six Sigma deployment. Furthermore, the proposed framework showed some leadership behaviours that leaders should adopt in their organisation to facilitate Lean Six Sigma operations. This framework would bring a new perspective and aspects of a leadership role in organisations, particularly in the operations management field, to overcome challenges, fulfil missions, and sustain improvements. The list of leadership behaviours would be a base for the development of formal Lean Six Sigma leadership development programmes. That list can be used to evaluate leaders' effectiveness and provide training programmes about suitable leadership behaviours for Lean Six Sigma. Furthermore, the identified list of behaviours influence how leaders act to support Lean Six Sigma. This description of how leaders should act is useful as they are responsible for Lean Six Sigma practice success and achieving operations efficiency.

6.1.5 Step-by-step implementation guidance for the presented framework.

This framework provides support for practitioners and facilitates the Lean Six Sigma journey by overcoming the challenges practitioners face during Lean Six Sigma implementation. This section presents the steps that can be taken to implement the framework in organisations effectively.

- First of all, the ideal position descriptions show what a theme looks like in the most perfect organisation. The ideal position is the target position, and leaders want organisations to reach that target position by using their behaviours. Knowing the ideal position provides a road map to make organisations more effective in using Lean Six Sigma. This process can be considered a starting point in implementing the framework.

- Then, to implement the framework effectively, leaders should understand and analyse the gap between the current and ideal positions.
- Practitioners would evaluate the leadership capabilities that are required to implement the framework. Identify what capabilities they have then they can identify whether there are some gaps.
- Then, it would be possible to choose the most appropriate leadership behaviours to fill the gaps and realise the successful use of Lean Six Sigma. In other words, the most suitable leadership behaviours for facilitating Lean Six Sigma can be selected by analysing the gap between the two positions.
- Determining the leadership behaviours that create the ideal position will help organisations to start the journey of transformation from their current position to the ideal position. Thus, the leadership behaviours that would help create the ideal position are the focus on reducing the gap between current and ideal positions.
- Following that, they can deal with these gaps, possibly through training or possibly replacing those leaders.
- The identified leadership behaviours would be a base for the development of formal Lean Six Sigma leadership development programmes. That list can be used to evaluate leaders' effectiveness and provide training programmes about appropriate leadership behaviours for Lean Six Sigma.

Following these steps can provide successful implementation of the presented framework. However, the process of adopting the framework can take time from leaders, requiring persistence and firmness to travel the journey's distance. Nevertheless, this implementation can gradually be rooted and embedded in the organisational culture with the passage of time. The outcomes of these leadership behaviours should close the gap between the themes' current practices and their ideal positions. This effect of the leadership behaviours shifts organisations from the current situation to reach the desired situation.

6.1.6 Novel contributions

This research project adds significant contributions to knowledge. The areas of contribution are highlighted in the following points.

- A framework to facilitate the effective use of Lean Six Sigma identifies the leadership behaviours required to enable and facilitate Lean Six Sigma.

- An empirical evidence of the leadership behaviours' aspects that leverage the use of Lean Six Sigma in the manufacturing sector in Jordan has emerged from the field study.
- Themes were developed through participants' perspectives, which influence the successful use of Lean Six Sigma. These themes explained how they would influence the use of Lean Six Sigma.
- This research developed the ideal position descriptions for the identified themes where practitioners can be aware about the best practices for each theme.
- This research is the first to summarise leadership behaviours in a structured way by conducting a thematic analysis of the literature.
- This framework, which has been validated, confirms the role of leadership behaviours in the effective use of Lean Six Sigma.

This study contributes to identifying the leadership behaviours and actions that are more suitable for the successful use of Lean Six Sigma. This identification would be helpful for organisational practice or for organisations about to use Lean Six Sigma to understand what leaders should do and how they should behave.

6.2 Limitations and future work

After accomplishing the research aim, based on the methodology adopted and on the study's findings, the researcher was able to describe the limitations of this work and suggest future work. Thus, the researcher thought critically about the research project. Also, he assessed the study design that was chosen for this research project. The second part of this chapter suggests some future works to address the study's limitations to encourage other researchers to build on the study's results. In other words, other researchers can continue with this work beyond these limitations and expand on this research.

6.2.1 Limitations

This research project accomplished the study aim and objectives as developed in chapter 1; see sections 1.3 and 1.4. However, the research faced some limitations. First of all, this research project took Jordan as a case study. Thus, other geographical contexts have not been covered by this study. The researcher considers this as a

limitation as more countries should be studied to increase generalisability. Another research limitation regards the sector chosen; the scope of this research was only on the manufacturing sector. Also, the study did not take into consideration company size, due to the limited number of organisations that implement Lean Six Sigma in Jordan. However, nine organisations participated in providing valuable data that helped in accomplishing this research. Regarding the sample, the researcher did not separate the participants' responses between leaders or shop floor employees. This study decided to build a comprehensive picture through responses from both leaders and shop floor employees. Since leaders may not be fully aware of their behaviours, employees who deal and interact daily with leaders can effectively observe and describe leaders' behaviours. However, interview participation comprised of 18 leaders in comparison with nine shop floor employees. The pandemic, COVID-19, affected the data collection processes, since some of the interviews were conducted by telephone. These telephone interviews have prohibited seeing facial interactions and eye contact, which influence the level of observation as a tool for data collection.

Moreover, the framework does not provide details about the cost and time required to adopt it and does not determine if there is a need for specific resources. The researcher sought to validate the framework through three experts from the industry. The time limit available to accomplish this research was three years (according to the researcher's scholarship). The time limit did not allow for conducting further validation through the use of different techniques. Thus, expert judgment validation was the most suitable method to fit with the time limit. However, the research limitations related to the study methodology, since qualitative research possibly has issues with validity and reliability. To ensure high quality for this research, the researcher uses triangulation whenever possible and used inter-rater reliability to ensure data analysis quality. Also, the researcher used focus groups in some research phases to gain participants' perspectives, which helps avoid any bias in the study. During data collection and analysis, the researcher took several steps to increase research rigour, such as participants' validation, being aware of social interaction, permission to conduct the interviews, recording the interviews, and using different translators to review the researcher's translation for transcription.

6.2.2 Future work

The previous section highlighted the main limitations of this study, which could be tackled by future research. Further research may consider the need to think about how to change the behaviours of leaders. This kind of research puts pressure on change management. Moreover, future research can increase the scope of this study by researching other countries and sectors such as the service and health care sectors. This would help in building a comprehensive picture from different perspectives and undertaking triangulation between these different perspectives. Different countries have different social cultures; are the same leadership behaviours required in different countries? Furthermore, further work can take into consideration the specific organisational size and managerial level. Organisational size might influence the level of adopting and using Lean Six Sigma. This may give different results depending on the organisation's size. Regarding the managerial level, future work can separate interviews with leaders according to the senior and middle management levels. This enables knowing how leaders behave at different managerial levels and whether the same or different leadership behaviours should be adopted according to managerial levels for the effective use of Lean Six Sigma. This differentiation between the senior and middle management levels would be more suitable in large organisations.

Moreover, positivist research can test the correlations between these behaviours and themes that influence Lean Six Sigma. This research attached specific leadership behaviours with themes; it would be beneficial to know to what extent these behaviours are associated with those themes by relying on a wide representative sample. Also, it is important to measure the variation of the influence of the leadership behaviours, which can assist in focusing on the significant behaviours that have a strong influence. Further empirical work also can explore the interdependencies between these behaviours; since certain behaviours impact others, such as the Gemba Walk effect on other behaviours.

The researcher suggests that the developed framework can be expanded to other sectors. Thus, future research can show how this framework can be expanded to other sectors by adding to it. Also, future work can demonstrate how the framework would be implemented and gauge the response after implementing it. Then researchers can know what they need to look for and what measures are required to implement the framework effectively. However, this study covered the behavioural aspects of

leadership; the researcher suggests that other studies can cover the skills aspects and expand the current framework to be more comprehensive through studying leadership from different angles. In addition, the future direction of further work can take into consideration organisational culture by identifying the cultural aspects that would support and assist in creating these leadership behaviours.

6.3 Recommendations

These recommendations are presented in order to establish suggestions which enhance the successful implementations of Lean Six Sigma. The recommendations are based on the data analysis accomplished in chapter 4 and based on the findings that emerged by developing the framework in chapter 5. The following points illustrate these vital recommendations that practitioners should take into account.

- To apply this framework in other countries, the national culture influences the organisational culture and influences the leadership approach. Practitioners should identify the impact of those on the framework that could be developed.
- Take advantage of industry 4.0 and the internet of things (IoT), such as big data, to manage the operations, provide on-time reports, and help improve productivity and reduce cost, which in itself serve the purpose of Lean Six Sigma.
- Integrating these leadership behaviours of Lean Six Sigma into the organisational culture to be a part of the organisational culture since organisational culture influences leaders' beliefs and attitudes which in turn change their behaviours according to these attitudes ingrained in organisational culture.
- Coordinating with an external trainer to give training or an external consultant who supports this implementation. Considering some organisations do not have the competencies to perform training related to Lean Six Sigma.
- Create tools for assessment and evaluation for leaders to see their commitment to adopting the proposed leadership behaviours in the framework, which can sustain Lean Six Sigma implementation in the organisation in the long run.

6.4 Conclusion

This chapter presents a summary and highlights what this study has accomplished. It starts with an overview of the study objectives, links these objectives with specific chapters, and shows how, by chapter, particular objectives were achieved. The

following section shows the research questions that were accomplished with summary responses to these questions from the field study.

The researcher studies a social phenomenon to reveal leadership behaviours and how it will facilitate the use of Lean Six Sigma. This study is an exploratory study that seeks to explore and develop a framework in the manufacturing sector in Jordan. In that, this research answers the research questions and achieves the project aim. This research project answers the main research question: "How can leadership behaviours facilitate the use of Lean Six Sigma?". The answer is by adopting the specific leadership behaviours that support certain themes that influence the effective use of Lean Six Sigma. The research aim is: "The aim of this research is to develop a framework of leadership behaviours to facilitate the effective use of Lean Six Sigma"; it is believed that this thesis has achieved this aim successfully. As chapter six shows, this research project developed a framework of leadership behaviours that facilitate the effective use of Lean Six Sigma; see section 6.1.

6.4.1 Overview of the research project objectives and chapters

The research objectives were accomplished through several chapters, namely 2, 4, 5, and 6. The following research objectives were developed in *chapter one* (the introduction):

1. To perform a critical review of the literature that is relevant to the study domain and research questions in order to determine research gaps and related works.
2. To adopting grounded theory methodology enables identifying the appropriate leadership behaviours based on the themes that emerged from the data analysis.
3. To collect empirical data from the manufacturing sector in Jordan to identify leadership behaviours that facilitate Lean Six Sigma operation.
4. To develop a framework of leadership behaviours to facilitate the effective use of Lean Six Sigma. This objective will be accomplished by combining literature and empirical data.
5. To validate the developed framework through experts' judgment from the industry.

The researcher accomplished these objectives by developing several chapters. For instance, in *chapter two*, the literature review has been accomplished. First of all, that chapter gave broad information about leadership and Lean Six Sigma. Then, it linked

these two topics together to identify the leadership styles and leadership behaviours, through thematic analysis, that facilitate the use of Lean Six Sigma. This identification is one of the main inputs to the framework. Moreover, a review of the existing literature on leadership and Lean Six Sigma revealed that leadership plays a vital role in facilitating the use of Lean Six Sigma. Finally, chapter two also demonstrated the research gap that this research responded to fill. Thus, the researcher achieved the first objective through chapter two.

The researcher needed a chapter that describes the study design and works as a backbone for the whole study. Thus, *chapter three described* the research methodology used to achieve the aims and objectives of this research project. The chapter showed that the researcher adopted constructivism philosophy. This was chosen since the researcher is interested in different opinions from different peoples that assist in forming different realities. However, there were a number of available approaches that the researcher could adopt.

Nevertheless, the most suitable approach for accomplishing this research project was Grounded theory. Grounded theory is a process of analysing and explaining the meanings people construct to make meaning of their everyday actions. This Grounded theory methodology helps in exploring and explaining the leadership behaviours that facilitate Lean Six Sigma. Then the tools and coding for analysis were explained; further details about the study methodology are provided in chapter three.

The researcher used three tools to collect data from the manufacturing sector in Jordan: interviews, observations, and a focus group. This was achieved in *chapter four*, which fulfils the second objective. Further in chapter four, the researcher collected and analysed data according to Grounded Theory elements such as constant comparison and theoretical saturation. After this analysis, the leadership behaviours that facilitate Lean Six Sigma in the manufacturing sector in Jordan were identified. These thirty-six leadership behaviours identified in chapter four are the second main input to the framework. After the aspects emerged from the analysis, the researcher conducted a focus group to group the aspects of leadership behaviours into core categories (themes). Eight themes emerged from the focus group workshop. Indeed, the second objective was accomplished completely in chapter four.

However, *chapters five* and *six* provide responses to objective number three; see objective number three above in this section. After developing the themes in chapter four through the focus group workshop, the researcher started developing the framework by generating descriptions for the ideal positions and then synthesising leadership behaviours. Firstly, in *chapter five*, the ideal position descriptions for each theme were developed. This enabled the researcher to identify the required leadership behaviours for each theme by relying on three sources: the literature, aspects of leadership from the data analysis, and a focus group workshop. Forty-one leadership behaviours were identified from the three sources, as required, to create the ideal position for the effective use of Lean Six Sigma. At the end of that chapter, the researcher integrated and synthesised the leadership behaviours required to create the ideal position for the themes. Whereas in *chapter six*, the framework consisted of two main components: leadership behaviours and targeted themes. The framework was encapsulated into a diagram that makes the framework easy for practitioners to understand. The framework consists of eight themes and twenty leadership behaviours.

Moreover, *chapter six* highlighted the validation process that responds to the last objective (objective number four). After developing the framework, the researcher sent it, with information about the study, by email to experts in the industry in Jordan. The experts agreed that this framework is comprehensive and valuable for boosting the use of Lean Six Sigma. However, all the research objectives were achieved through chapters two, four, five, and six.

Nevertheless, the thesis continued by developing discussions, limitations and future, and recommendations about the study findings and highlighting the main findings in *chapter seven*.

6.4.2 Research questions

This study seeks to answer the research questions outlined in section 1.5. This exploratory study builds explanations to gain a greater understanding of the role of leadership behaviours in using Lean Six Sigma. The main research question was supplemented by three sub-questions. A brief response to these questions is summarised in Table 6-1.

Table 6-1 Research questions and review informed by the research

Research questions	Summary response to questions
The main research question: How can leadership behaviours play a vital role in bring the successful use of Lean Six Sigma operations?	The eight themes identified in this research project give deep explanations of how they influence Lean Six Sigma. In addition, the leadership behaviours that support the eight themes were identified since these themes influence the effective use of Lean Six Sigma. This identification of leadership behaviours was based on the ideal position description for each theme.
Sub question: What are the leadership behaviours that can improve the use of Lean Six Sigma?	The researcher looked to identify the leadership behaviours that enable the successful use of Lean Six Sigma. These were informed through the literature review, interviews analysis, and focus group workshop. Forty-one leadership behaviours were identified from the three sources.
Sub question: What are the themes that influence the effective use of Lean Six Sigma in the manufacturing sector in Jordan?	Participants played a role in this research project. They grouped the thirty-six aspects that emerged from the data analysis into eight themes. Then, explanations for these themes were developed to identify how they influence Lean Six Sigma.

Answering these research questions have contributed to creating a novel contribution to this research project. The main details about the research contribution to knowledge were described in this chapter

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Appendices

Appendix (A): Ethical approval form

16 August 2019

Dear Mr Alnadi ,

Reference: CURES/9177/2019
Title: Developing Framework of Leadership Behaviours to Facilitate Productivity Improvement Through the Use of Lean Six Sigma in Manufacturing

Thank you for your application to the Cranfield University Research Ethics System (CURES).

We are pleased to inform you your CURES application, reference CURES/9177/2019 **has been reviewed. You may now proceed with the research activities you have sought approval for.**

If you have any queries, please contact CURES Support.

We wish you every success with your project.

Regards,

CURES Team

Appendix (B): Consent form

Participation form in an interview

Participant's name: …… I agree to participate in conducting an interview.

Dear participants,
All the things you are said are confidential. No individual data kept, the aggregate data kept. Please note that the interview will be recorded and transcribed. No individual or company name will be recorded. You have the

option to terminate the interview in any point. However, based on the nature of the research, sensitive personal data and commercial sensitive data will not be collected.

Participant Signature

Appendix (C): Validation email that sent to particpants

Dear ,

There are some companies fail to implement Lean Six Sigma successfully. This study tray to facilitate the use of Lean Six Sigma by specifically focusing on leadership behaviours. The researcher developed a framework to facilitate effective use of Lean Six Sigma. The framework consists of leadership behaviours which identifying what leaders need to do to enable and facilitate Lean Six Sigma and the second component showing the targeted themes which influence the use of Lean Six Sigma. This framework is supposed to facilitate the effective use of Lean Six Sigma. So, these leadership behaviours can positively **influence** themes that facilitate Lean Six Sigma.

Please note leadership behaviours are on the side of the diagram while the themes are in the middle and are coloured in several colours. The attached picture contains 20 leadership behaviors and 8 themes.

Could you please give me your feedback? I suggest you can make an overview to tell me the possible improvements or highlight weaknesses

Best regards,

Mohammad Alnadi

PhD researcher

Cranfield University

UK

Appendix (D): A table that summarises the key findings that emerged from reviewing the literature and conducting thematic analsysis

Table 1-1 The key aspects for successful implementation of Lean Six Sigma and associated behaviours for it

	Key aspects	**Leadership behaviours**	**Supporting literature**
	Communication	Receiving and giving information that conveys ideas which help leaders to know what is	(Tortorella, van Dun and de Almeida, 2019), (Bijl et al., 2019),

		happening in processes, the issues that occur, as well as obtaining suggestions. Also, employees can understand the organisation's goals.	(Nogueira, Sousa and Moreira, 2018), (Seidel et al., 2017), (H. van Dun and Wilderom, 2016)
		Leaders communicate information and listen to employees to ensure workers understand the information and to gain more information about employees' experiences, problems, and suggestions.	(Maijala et al., 2018), (Aij and Teunissen, 2017), (Laureani and Antony, 2017), (Gelei, Losonci and Matyusz, 2015), (Inamizu et al., 2014), (Loh, Mohd Yusof and Lau, 2019), (Poksinska, Swartling and Drotz, 2013)
		Visiting the work floor (gemba walk) which includes three activities: going to where the value is created, looking at the process, and talking to the workers. These activities enable the leaders to be involved with people, solve the problems, and demonstrate care and recognition.	(Tortorella, van Dun and de Almeida, 2019), (Aij, Visse and Widdershoven, 2015), (Dombrowski and Mielke, 2013a), (Seidel et al., 2019)
	Culture of continuous improvement	Creating a learning environment: leaders considers any mistakes as opportunities for learning.	(Tortorella, van Dun and de Almeida, 2019), (Goodridge et al., 2015), (Maijala et al., 2018), (Loh, Mohd Yusof and Lau, 2019)
		Intellectual stimulation: leaders make employees more interested in challenges that they face, and make them able to think in new ways to overcome issues.	(Nogueira, Sousa and Moreira, 2018), (Tortorella, van Dun and de Almeida, 2019), (Seidel et al., 2019), (Seidel et al., 2017)

		Leaders take responsibility for culture change.	(Tortorella, van Dun and de Almeida, 2019), (Aij, Visse and Widdershoven, 2015), (Maijala et al., 2018), (Sankowska and Rygowska-Zielińska, 2014), (Goodridge et al., 2015), (van Dun, Hicks and Wilderom, 2017)
		Monitoring and evaluating tasks and processes.	(Tortorella, van Dun and de Almeida, 2019), (van Dun, Hicks and Wilderom, 2017), (Camuffo and Gerli, 2018)
		Leaders should foster and maintain a continuous improvement culture that seeks excellence and considers any mistakes as opportunities to improve. This can be achieved through leaders' behaviours that support task identity, feedback, independence, and honesty.	(Aij and Teunissen, 2017), (Dombrowski and Mielke, 2013a), (Toledo et al., 2019), (Maijala et al., 2018), (Goodridge et al., 2015), (Mann, 2009)
		Supporting continuous improvement (kaizen): all work content, sequence, timing, and outcome should be standardised, which makes discovering problem easy. Connection among employees for the implementation of the processes; the connection must be clear to send requests and receive a response.	(Loh, Mohd Yusof and Lau, 2019), (Toledo et al., 2019), (Seidel et al., 2019), (Spear and Bowen, 1999).
	Coaching and developing employees	Developing and training employees: using training as an instrument for engaging the employees in improvement initiatives. This training focuses on technical knowledge, Lean	(Tortorella, van Dun and de Almeida, 2019), (Laureani and Antony, 2017), (Nogueira, Sousa and Moreira, 2018)

		thinking, Lean tools and techniques, and Lean principles. Promoting employees' self-development: creating plans and structures to support employees' development. Focusing on specific competencies to develop the employees such as technical knowledge, communication, and teamwork. Leaders develop and coach employees to support organisation goals.	(Toledo et al., 2019), (Tortorella, van Dun and de Almeida, 2019), (Seidel et al., 2017) (Toledo et al., 2019), (Maijala et al., 2018), (Seidel et al., 2017), (Poksinska, Swartling and Drotz, 2013), (Loh, Mohd Yusof and Lau, 2019)
	Creating vision and aligning goals	Formulating and communicating goals and objectives to ensure the alignment of priorities and actions that focused on customers' needs.	(Tortorella, van Dun and de Almeida, 2019), (Toledo et al., 2019), (Nogueira, Sousa and Moreira, 2018), (Goodridge et al., 2015), (Seidel et al., 2017)
	Employee motivation	Leaders motivate employees who have contributed to the fulfilment of current goals, through recognition, encouragement, and having a good relationship. Also, they can use financial and non-financial rewards, presence, visibility, paying attention to, and acknowledgment for motivating employees. Leaders need skills to motivate others.	(Tortorella, van Dun and de Almeida, 2019), (Aij and Teunissen, 2017), (Loh, Mohd Yusof and Lau, 2019), (Seidel et al., 2019), (Laureani and Antony, 2017) (Laureani and Antony, 2017), (Aij and Teunissen, 2017)
	Employee empowerment	Empowering employees through encouraging them to solve problems and improve their workplace. Giving the employees more responsibility for managing and controlling daily operations,	(Tortorella, van Dun and de Almeida, 2019), (Maijala et al., 2018), (Aij and Teunissen, 2017), (Aij, Visse and Widdershoven, 2015),

		to realise improvements. Giving the employees authority to both take decisions and suitable actions. Delegating decision making, power, and responsibility. Developing a supporting structure that responds to Lean initiatives such as addressing problems and improvement activities.	(Loh, Mohd Yusof and Lau, 2019), (Seidel et al., 2019), (Poksinska, Swartling and Drotz, 2013) (Mann, 2009), (Poksinska, Swartling and Drotz, 2013)
	Leadership commitment and support	Leaders demonstrating commitment and support for Lean implementation, and they feel they are accountable to do their best.	(Tortorella, van Dun and de Almeida, 2019), (Goodridge et al., 2015), (Mann, 2009)

Appendix (E): The aspects that evolved from the data analysis with a brief description of each aspect.

Table 1-1 Leadership behaviour aspects that influence Lean Six Sigma in Jordan

Number	Aspects	Descriptions
1.	Obtaining ideas from employees	Leaders can conduct meetings or use a suggestion box, or ask employees to hear from them. So, employees may suggest something to improve the processes. Any worker can make a comment or speak to suggest ideas. These ideas aim to improve processes and eliminate waste. After employees present or submit ideas, the management studies them to decide if the submitted ideas are applicable or not. As well as the management studying the benefits and disadvantages of the idea, the

		management discusses the decision with employees.
2.	Giving training on Lean Six Sigma	Organisations train employees to be competent in using Lean Six Sigma tools. Employees can gain knowledge about Lean Six Sigma philosophy and how to use specific Lean Six Sigma tools through training programmes.
3.	Management support and commitment	Management shows determination for this project. Management is very committed to providing support, such as time, money, effort, and equipment. Management embraces the project in turn; management provides support to overcoming obstacles.
4.	Sharing information with employees	Leaders give employees necessary information about processes' performance and update employees on any information related to operations. Leaders ensure circulation of the information among departments. Leaders can make information available to employees through Visual management, like information boards, dashboards, and Andon lights (traffic light system), which provides information to employees faster and is permanent. Each employee has to read these

		instructions. Management repeats the information in a different way, such as meetings and emails. Instructions might be related to processes, machine operation or maintenance.
5.	Making employees feel they are part of the change	The processes of making employees involved in Lean Six Sigma operations and make them interested in focusing and participating in Lean Six Sigma. An important point is to make workers feel that they are a part of this implementation and change. Thus, employees become focused mainly on their work in using Lean Six Sigma philosophy.
6.	Conducting meetings in a short frequency	During meetings with employees, leaders can discuss ideas for improvements, identify problems that employees face, learn from mistakes, and share information and experiences.
7.	Review and follow up processes	Leaders are responsible for tracking the processes through the data. They review and follow up tasks and analyse data and statistics related to processes control and make sure that nothing could hinder the work. Also, employees should pay attention to the machine's alert

		in the event of a mistake or bottleneck in the process.
8.	Taking the necessary actions to solve problems	Solving problems is one of the essential ways to improve processes and eliminate waste. Leaders are responsible for discovering problems and identifying the root cause of a problem. This may include developing a statement to describe the problem. Creating the necessary and required solutions to addressing issues through conducting meetings, coaching, and feedback. Leaders can use some techniques to solve and manage issues, such as root cause analysis.
9.	Giving employees financial rewards	Leaders work on motivating employees through financial reward. The presence of incentives helps in having motivated employees. Leaders give financial rewards when employees discover problems, provide solutions, submit useful ideas, make a good performance, and efficiently use Lean Six Sigma tools.
10.	Raising employees' awareness about the importance and benefits of Lean Six Sigma	Employees should know and understand the benefits and importance of using Lean Six Sigma, which would benefit organisational goals. They should also know and understand how they

		can use the Lean Six Sigma in their work. In turn, leaders explain the benefits of using Lean Six Sigma, which includes increasing customer satisfaction, reducing time and cost, increasing productivity, and growth in revenue.
11.	Promoting the values that make employees think in a way to eliminate waste and solve problems	Organisations identify the desired goals and values, such as removing waste. Leaders make the employees concern in Lean Six Sigma philosophy. In turn, employees understand the required behaviour. This changes employees' behaviours. For instance, there is an ingrained culture among employees to discover problems and remove waste.
12.	Evaluating employees' competencies regularly	Having the necessary skills and ability is vital to accomplish a specific job efficiently. The availability of competent workers increases productivity and reduces defects. Leaders evaluate the employees' competences to know the gap between their capabilities and the required competences to perform the work
13.	Leading employees to serve and be committed to organisational goals	Embracing organisational goals and seeking to achieve them. Employees should be committed to organisational goals by giving time

		and energy to a specific job. Thus, employees are committed to using Lean Six Sigma. They feel that they are responsible and play an important role in increasing productivity or discovering problems. So, they have feelings towards the company that they are part of this company and that when they do work in the right way, this would serve the company.
14.	Giving training on performing work to acquire new skills	Developing employees to be more competent and skilful, in turn, employees become more able to perform in their work. Also, they can get a better understanding of their tasks and duties. Some employees may have a few gaps in knowledge or skills; training programmes fill these gaps through teaching them new skills. These skills make the employees more competent in doing their work.
15.	Visiting the shop floor	Leaders make a tour of the shop floor, which enables the leaders to be involved with employees, solve problems, and demonstrate care and recognition.
16.	Monitoring employees	Monitoring employees is to follow up on tasks that employees work on and know what is going on in the

		workplace. Monitoring employees also enables leaders to know employees' performance and watch any mistakes on the shop floor. Thus, employees can improve their performance and correct mistakes. A supervisor comes to observe, notice, and watch employees to ensure that the products meet the required specifications.
17.	Setting up plans, goals, and strategies that facilitate Lean Six Sigma	Leaders put clear objectives that the employees have to achieve; daily production plan for production, plan work that shows what the team will do, and how to change the process. Also, management develops strategies and sets priorities that facilitate the implementation of Lean Six Sigma.
18.	Commendation	Group of words or statements that leaders say or give to employees as a result of doing something admirable or valuable, such as submitting ideas, doing something that saves time or cost, or added value for customers.
19.	Accountability for the employees	Holding employees responsible for accomplishing something and for achieving goals and job tasks. Employees should feel that each one is responsible, as well as they

		should be aware of their obligations and that they play an important role.
20.	Having a good relationship with employees	Leaders' attitudes play a vital role. Leaders should maintain a good relationship with employees by being humble with employees, by socialising, and being interested in them. Showing concern for the employees' social side and providing support for them, and placing great concern for employees' needs to make them feel they are part of the organisation.
21.	Identifying and assigning clear responsibilities for employees	Leaders delegate responsibilities to employees and set a clear responsibility for each employee. This makes each employee have clear responsibilities and tasks; in turn, employees can be responsible for accomplishing their work efficiently. Employees also can manage specific operations and processes without necessarily being supervised.
22.	Developing trainers to enable them to perform training in the organisation	Some organisations do not have the competencies to perform training related to Lean Six Sigma. Therefore, they ask an external trainer to give training or an external consultant who supports this implementation. Leaders should bring in experienced trainers

		to train some employees; this is called Training of Trainers (ToT). In turn, these employees can be trainers in the future.
23.	Analysing data to do comparisons and improvements	The existence of real data and being committed to recording it enables leaders to compare and analyse how the performance progressed and how it changed. Also, leaders become knowledgeable on where to focus and what needs improvement. Leaders get many benefits from this data, such as knowing employees' productivity and process efficiency.
24.	Establishing team work that supports standardised work	Having standardised work is considered as a core for continuous improvement. This standardised work might include precise work sequence, standard inventory, and documentation of the current process, which depends on collecting and recording data in order to make the work flow smoothly. Leaders create teams that facilitate standardised work. The team members should work together to maintain the standardised work in the organisation.
25.	Enabling employees to make suitable decisions	Leaders give employees authority about decision making. So leaders delegate employees to take actions

		related to quality and reduce production waste.
26.	Considering Lean Six Sigma as a new way of thinking	Leaders should not consider Lean Six Sigma as only a new initiative or a box of tools. Rather, they must see Lean Six Sigma as a way of thinking that is embraced and used in work, even if this work is not related to production. Lean Six Sigma becomes part of their work and the work of their employees. They should also ensure that everything is interconnected and directed towards a common goal, and all departments should try to achieve it.
27.	Coaching	The activity of training employees is targeting one employee especially or a few individuals. Coaching helps employees in improving their skills and performance, which teaches them how to solve problems. Leaders meet with an employee to discuss his/her progress and to provide and guide employees to acquire and improve their skills. Leaders use examples and visual tools to support employees in different situations and show the way.
28.	Promoting preventive machine maintenance regularly	Maintenance should be conducted regularly on machines to reduce the

		possibility of an unexpected breakdown. In turn, machines can work continuously and efficiently.
29.	Delegating power and authority	Employees need the power and authority to manage activities. There should be a balance between the delegated responsibilities and powers. Authority should be well defined and shared. Management should not interfere with employees' authority.
30.	Encouraging learning	When employees make a mistake, management should avoid blaming or saying someone did something undesirable, in order to encourage learning. Creating an environment that supports learning, considering any mistake and issue as opportunity for improvement.
31.	Convincing employees	Leaders should act in a way to convince employees about change and to embrace Lean Six Sigma philosophy and tools.
32.	Establishing a retention programme for qualified employees	When employees leave the business, an organisation suffers from a lack of trained and qualified employees. In turn, this turnover is considered as a potential threat of knowledge loss. In turn, leaders seek to keep qualified employees within the organisation though providing a competitive salary,

		personal development and growth, and recognition.
33.	Putting the right employee in the right place	Management changes the location of the worker from one place to another regularly until it finds the best employee to perform the work efficiently; employing each one in work according to his/her abilities. Grouping specific employees in the same team; in turn, they can work together which increases their productivity.
34.	Seeking to bring new and advanced machines and tools	Management should seek to buy advanced and smart machines that are faster, more efficient, and more reliable. Old machines are more likely to consume energy and have breakdowns.
35.	Resolving team conflict to enhance cooperation	Some employees do not want or are unable to cooperate and work with others in an organisation. So, they want to disrupt work related to others because they are jealous or have conflicts with some employees. Leaders try to solve issues among team members to enhance cooperation.
36.	Seeking to get customers' feedback and requirements for products	Organisations should focus on achieving customers' requirements and consider customers' opinions about products that enable

		organisations to enhance and improve products. Leaders identify what adds value for customers and seek to fulfil customers' needs.

Appindex (F): Summarisation of the ideal positions descriptions

Descriptions of the ideal positions are summarised in Table 1-1. These ideal positions were confirmed from the literature. Stating the ideal positions for the eight themes can be considered as references for identifying the required leadership behaviours.

Table 1-1 Ideal position for the developed themes

Themes	**Description of the ideal position**	**Supporting literature**
Training and development	Leaders perceive the employees as assets and resources that they can develop. Furthermore, the organisations that adopted Lean Six Sigma successfully provide many development opportunities and training programmes for employees and implied new tasks in their work. Organisations also promote employees' self-development through diagnosis and analysis of the competencies and the individual development process.	(Assarlind, Gremyr and Bäckman, 2013; Camuffo and Gerli, 2018; Henderson and Evans, 2000; Poksinska, Swartling and Drotz, 2013)
Continuous improvement and development	Continuous improvement is considered as a key agenda in meetings, and there are monitorisation and visualisation for all improvement activities in	(Aij et al., 2013; Aij, Visse and Widdershoven, 2015; Goodridge et al., 2015; Loh, Mohd Yusof and

	the effective organisation. Moreover, organisations allocate the necessary time and resources to enable continuous improvement activities. The most important practice that managers focus on is the continuous learning, which refers to learning from mistakes, learning by seeing and doing, and being committed to long-term learning.	Lau, 2019; Maijala et al., 2018; Poksinska, Swartling and Drotz, 2013; Steed, 2012)
Communication	Organisations support two-way communication and focus on reinforcing effective information flow from the front-line to top management and vice versa. The managers use a standardised agenda in meetings, which is a list of items to be discussed at meetings. Successful managers should frequently communicate with individuals from different levels in order to gain more information about employees' experiences, suggestions, and problems. Developing means for visual communication and control is important in an effective organisation. The daily management system visually	(Poksinska, Swartling and Drotz, 2013) (Loh, Mohd Yusof and Lau, 2019) (Aij and Teunissen, 2017)

	displays daily progress and performance indicators.	
Empowering employees	Employees should have the power to make suitable decisions and take the necessary actions to achieve the desired improvements. Effective organisations empower employees to plan, organise, and control daily processes and take over some managerial roles and duties. Rather than leaders solving problems themselves, leaders pass this task to employees and their role becomes a facilitator in the problem-solving process. Organisations manage work and move towards a team-based organisation where team leadership is central for Lean Six Sigma production. Accordingly, work is organised in teams.	(Poksinska, Swartling and Drotz, 2013) (Aij, Visse and Widdershoven, 2015; Poksinska, Swartling and Drotz, 2013) (e.g. Aij, Visse and Widdershoven, 2015; Goodridge et al., 2015; Maijala et al., 2018)
Motivating employees	Managers provide positive and constructive feedback, usually to increase enthusiasm and grit to make more improvements. Organisations can provide financial and non-financial rewards as recognition of good performance. Motivation of employees leads	(Bortolotti, Boscari and Danese, 2015) (Poksinska, Swartling and Drotz, 2013) (Balzer, Brodke and Thomas Kizhakethalackal, 2015). Laureani and Antony (2017)

	to wide interest and implementation of Lean Six Sigma, which in turn sustain Lean Six Sigma operations by having motivated employees.	
Managing qualities and operations	Leaders should manage the necessary activities that are related to and facilitate Lean Six Sigma. Managing qualities and activities in most efficient organisations implies different actions and agendas, namely, planning daily activities and production, checking the conditions to meet daily demands, and discussing daily work.	(Camuffo and Gerli, 2018; Goodridge et al., 2015; Maijala et al., 2018) (Aij et al., 2013; Lorden et al., 2014; Steed, 2012)
Employees engagement and involvement	The organisation makes the employees feel that they are a vital part of the new initiative. Leaders should also be authentic to gain workers' trust by demonstrating traits such as honesty and benevolence and demonstrating well-intentioned behaviour. Making employees feel they are part of this project, that they are responsible and accountable for Lean Six Sigma processes. Leaders should have a good relationship with employees to	(Aij and Teunissen, 2017; Al-Balushi et al., 2014; Loh, Mohd Yusof and Lau, 2019; Willis et al., 2016)

	keep them motivated. Making employees feel heard makes them more willing to make necessary changes for Lean Six Sigma deployment.	
Supporting culture	Leaders aim to make employees understand and live the organisation's culture by teaching them its culture and values. Organisational culture attributes are trust, shared responsibility, and openness to experimentation with improvement intention. Having a learning organisation culture where organisations have environments that consider failure as an opportunity for learning and mistakes provide openings for improvement. Having an open and proactive culture increases customer satisfaction and continuous improvement, and everyone's participation is applied anywhere in the organisation's departments. Leaders should adopt task identity, feedback, autonomy, belief in improvement, and honesty to improve the culture that facilitates Lean Six Sigma.	(Aij et al., 2013; Aij, Visse and Widdershoven, 2015; Aij and Teunissen, 2017; Goodridge et al., 2015; Loh, Mohd Yusof and Lau, 2019; Poksinska, Swartling and Drotz, 2013; Steed, 2012)

Appindex (G): Copy of the interviews questions, the focus group questions, and the experts questions

- **The questions that were asked for participants in the interviews:**

  Tell me about an example (situation) when you have seen Lean Six Sigma operations work well? (Lean Six Sigma implementation you have observed. Tell me about it and describe it?)

  Tell me about an example (situation) of when Lean Six Sigma operations have not worked well? (Or part of a Lean Six Sigma implementation that did not work well?)

- **The question that was asked in the first focus group:**

  Could you please group these aspects into themes?

- **The question that was asked in the second focus group:**

  For these themes, what do you suggest to create the ideal position? In other words, what behaviours do you propose to create this ideal position?

- **The question that was asked to experts:**

  Could you please give me your feedback? I suggest you can make an overview to tell me the possible improvements or highlight weaknesses.

Appendix (H): One copy from each data collection method

- **An Interview transcript:**

Sometimes when we work on some machines, we notice that there is a waste. The department of Industrial Engineering makes some adjustments to the machine to maintain the quality of the product and to eliminate the waste that appeared. This situation often occurs in the factory.

There is employee involvement in improvement through Kaizen. It is a system that all employees know. Any employee has the right to participate in a specific improvement idea. The employee presents his idea through a specific document by presenting the proposed improvements after the structure is presented to the management. There are recommendations that ideas are applicable or not applicable. The benefits and disadvantages of the idea were examined by what we are going to benefit from. Do the idea actually improve by the waste, but affect the quality? So the recommendations come from the technical team that the idea is acceptable or not. They do validation of the new method, and if it proves that it is really improving without any effect on production

methods, the idea is approved and then reflected on the standard operating. The main source of the idea is the employee because he is in a position to know where the strengths or weaknesses are everywhere.

In addition, we do awareness-raising from time to time. There are training programs for employees on Lean Six Sigma, in particular, how to reduce the waste, how to calculate the yield of the product, how to maintain quality and the on ISO certification such as 9001. We have quarterly courses that all employees take. Training raises awareness among employees, which increases their commitment more by using Lean and Six Sigma in advance.

There was a machine in which a piece had to be changed in order to produce another product. This process was every time it took time for the part to be changed. Through the ideas from the engineering department, machine was modified so that it could produce other products without having to change the piece.

From the start, there was a commitment from top management. They were focused on embracing any initiative idea. Any new idea must be welcomed even if it comes from the cleaning employee because any idea may have creativity. Every person from his place may have creativity. We are a company within a group of companies. The mother company believes in the idea that creative ideas should be supported. There is the CEO's award, which is an annual award given to 6 projects of the group's. Any company that has a creative idea applied and the idea proves that it improved product quality and reduced waste. The idea is presented to a committee, and a prize of 10,000 or 5,000 dollars can be given.

Every new person who comes to the company, we explain this idea to him during the orientation period. What you provide ideas that would benefit the business, and you could compete with your idea for the CEO's award. This philosophy is cultivated in the minds of employees from the moment they enter the company by knowing that development and improvement is the main goal of the company and that you will be rewarded for your creativity. Every year we conduct a presentation to share the idea and to show what its benefit and how it was implemented. Another thing is that the idea that has been applied has spread over the branches. Also, it has been pointed out that this is the idea of that person, here he feels distinguished, which encouraged them to provide more.

I cannot deny that there are ideas presented that are ineffective and illogical. But the person who presents it insists that his idea is correct. The technical team discuss with the employee, and they try to convince him that his idea has no benefit. The issue seems the management should be careful in applying because they take into consideration the available capabilities.

Can you tell me more about the management commitment?

Management commitment was essential to implementing ideas. We support ideas that improve work greatly. The idea that has been implemented, we put the name of its owner on board, along with a picture of its owner with the manager, so that all employees can see his name and the picture. This is one of the things that encourage employees.

An important point of communication. Communication is mainly through the e-mail in our company. We do circulation for any information that benefits the Lean and Six Sigma implementation. Communication is a basic thing, communication can be about a good thing, but if information about something that you did and you did not share with others, they could not take advantage of learning about it. The most important thing here is the benchmark. We have branches in Jordan and in the Emirates. The thing that succeeds in a particular branch is transferred to another branch. Benchmark is an important thing.

When the person feels, he is the owner of the process he works with, and at the same time, he is held accountable. The supervisor is the one who delivers reports on performance and productivity, and you are responsible for the waste side of the department. As a supervisor, you should monitor the junior staff, and the supervisor's follow-up on the employees is reflected through results that appear in KPIs. Every month there is KPI that reflects the out of specification during production, for example, we are setting a limit that it does not exceed 1% of specification, the quality control department is reviewing specification. If there is a defect, then accountability and responsibility are directed to the supervisor. You are responsible for the department. What happened to your department? Anything outside the specification appears directly with a thing called quality failure. They contact with all relevant people and do on an investigation report. You are the line supervisor. You have a problem with a specific line. Come, we want to talk. You (supervisor) identify for me who are the people who work in the department and have a relationship and responsibility with the problem that appeared. In order to make everyone

knows what is the reason for this problem. He has more information than anyone. I am a process owner of quality, but he is the engine of all the process. Technical data are taken from the supervisor and the team that works with him. Being responsible and part of decisions, and what is the cause of the problem, then he feels that he is responsible.

There is a follow-up through daily reports. Also, there is a daily production plan for production supervisors that they know about it a day before, in order to prepared for the next day. It is a day before I know what he wants, this point reflects you the responsibility of the supervisor, and thus the confusion is avoided by work so that the supervisor does not come and tell me there are some materials that are not available so if there is a shortage of a specific article he tells us and that is better than to waste a production day until the missing material is brought. This part of the supervisor's responsibility, he is the one who is supposed to commit to the plan that was assigned out for him. At the end of the day, he should send a report confirming the production plan. For example, if 200 were produced, and the plan is 250, then he must make a justification for why he did not achieve the plan, or could there be over-production, and he must give me a justification for why an over-production occurred. Because over-production is a waste; some products possible to expire before selling it, or it may cause a burden in inventory.

At the end of the week, there will be a meeting consist of production manager, the quality manager, the director and the purchasing manager. At the meeting, an analysis of the program took place in terms of quality, operations and maintenance, and what are the problems that we faced and determine if we need support from the top management. For example, we tell top management that this machine has a lot of problems, which causes a pause. We recommend buying a new machine. It is not decisions, but recommendations at the leadership meeting.

Also, there is a monthly meeting with the CEO, and all of these issues are brought up in order to obtain approval for them to have an official application. In addition, there are weekly meetings of initiative product. I previously told you about meetings related to general product. We have a director of research and development, and he deals with 40 to 60 products and research and development department does not work independently because it is related to sales and marketing and also is related to quality because the quality department can reject the product if it outside of the limit, you must change or

amend it. Or even the operations department may say for the research and development department that we cannot produce this product within the available capabilities. All of these things are collected and discussed in the new initiative product meetings. We conduct meetings on a regular basis, some meetings at the level of supervisors, at the level of managers, and others at the senior management level.

There are aspects that hindered the Lean and Six Sigma implementation. In general, the main factor is something related to the personality of people; some of them are afraid of change. You know, there are characters who like routine work and do not want to change. Of course, the biggest catastrophe when this person is in a managerial position. He is like to do a specific routine while he is afraid of trying something new. Frankly, we face this issue enormously. There are a lot of projects that can solve problems and improve but are delayed because of them.

Another factor that inhibits Lean and Six Sigma is financial support; there are improvements that take a long time to get approval because the management is very interested in the financial aspect. There are some improvements that lead to a decrease in costs, but a reflection of the improvement in quality. Sometimes financial management takes time to be persuaded.

Actually, I am proud that I am working with this factory because the support provided by the management is very great. For example, your powers and authority as a quality or production manager, the senior management do not interfere it. Sometimes if you take the decision to destroy (ravage) 30 tons of products, senior management comes to discuss you to understand only, but senior management does not interfere with your powers. But you should be able to explain to them; the management is very understanding.

- **Experts transcript**

  The proposal reviewed and what I can conclude its very comprehensive and reflect an actual experience. Linking the with is good and seems very good, following this scheme will lead to the desired targets contributing in upgrading the environment in addition to increasing the efficiency and performance of the work place. Connection of the leadership behavior cover most of the aspects and impact. I have no further remarks to contribute but WELL Done.