

The Development of a Sustainability Framework via Lean Green Six Sigma Practices in SMEs Based upon RBV Theory

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Small and Medium Enterprises (SMEs) are considered the driving force for the Malaysian economy. They stimulate the local economy, provide employment, and for large companies, they participate in supply chains. However, limited studies have been found on SMEs which are related to the achievement of sustainability. On the other hand, lean, green, six sigma and sustainability performance are among the most commonly discussed topics in the literature of business operations. Despite the linkages among these concepts, there have been nominal efforts at integrating the concepts of lean, green and six sigma concerning sustainability performance in SMEs. Therefore, this study suggests a conceptual framework for the implementation of lean, green and six sigma practices which impact on the sustainability performance within business operations of SMEs in Malaysia. This conceptual paper shines a light on the integration of lean green manufacturing practices with the combination of six sigma practices in SMEs. The combination of these concepts provides benefits to industry, as well as society. These days, society is demanding those business models which are socially responsible and more sustainable. Therefore, the sustainability concept has now become a basis to help understand many firms' success in the current competitive contexts. Therefore, the findings emanating from the study will aid SMEs to understand the importance of lean green, six sigma practices which effect on their day to day performance, as well as to formulate an effective approach to pursue the path towards sustainability.

Keywords: *Lean, Green, Six Sigma, Sustainability Performance, SMEs.*

Introduction

All over the world, the whole business establishment is ruled by small and medium enterprises. The key to the creation of wealth and to improve their living state are SMEs from Asia to Africa. Although there is a vast establishment of SMEs, the failure rate is also very high in the first five years of establishment (Ahmad et al., 2009; Rahman et al., 2016; Yusoff et al., 2018). In Malaysia, the failure rate of SMEs is sixty per cent (Chong, 2012; Husin et al., 2014; Nil et al., 2011). Despite having the government program and assistance, the failure rate in new entry SMEs is getting higher (Chong, 2012; Rahman et al., 2016). The main reason regarding this is that the SME owner does not know about business challenges, especially related to management and financial skills (Beh, 2014). The total business establishment in Malaysia is 99 per cent SMEs (Hashim, 2015). SMEs contribute 36.6 per cent of the nation's GDP, and the total employment share is 56 per cent (SME Annual report, 2016–17). As the SME Corporation Malaysia Chief Executive Officer (CEO) stated in 2015, there is a need to restructure the financial system of SMEs, concentrating on high-quality services and products and improving management skills to ensure their survival. Global factors like resource scarcity, climate change, increased globalisation level and increased awareness of stakeholders on environmental and social responsibility, as well as in all industries, low-profit margins and aggressive competition, have forced companies for the attainment of long term survival to retain, regain, and sustain their competitive advantages. Global factors give birth to innovations and these innovations determine the direction of industry evolution. Sustainability is considered to be the leading concept of the latest innovation wave (Seebode et al., 2012). Corporations, in last two decades, experienced a significant change to progress into more sustainable forms of themselves to meet the stakeholder's expectations and to follow the regulations, with the aim to guard their profitability undamaged (Corbett et al., 2006; Folinas et al., 2013). The urgency to raise the social and environmental pillars along with economic pillars of the triple bottom line was due to fact that companies have started facing more intense pressure than ever before from different stakeholders (Mollenkopf et al., 2010; Tasdemir et al., 2018; Wu et al., 2015).

Conditions which carry organisational long term survival include social, environmental, and financial excellence (Tasdemir & Gazo, 2018; Yakovleva et al., 2012). Due to the lack of complete understanding of various perspectives, including sustainability, environmental, social, and economic excellence interdependency, it forbade companies from realising and foreseeing potential gains, which can be achieved through initiatives of sustainable development or sustainability. True sustainability contributes towards organisations' economic prosperity, as well as environmental protection, natural resources preservation and the well-being of other living things and people (Tasdemir & Gazo, 2018). In addition to that, should there be any biases towards sustainability, the three pillars would incline towards failure as it would not be different from a tripod which has legs but with unequal lengths.



Consequently, academicians and professionals should acknowledge sustainability, including all three pillars, and they must be handled simultaneously to achieve significant results. According to the National Council for Advanced Manufacturing (NACFAM) — from a manufacturing sector perspective — the primary purpose of sustainability is to ensure those manufacturing processes and practices which lead towards profit maximisation as well as serve the environmental and social responsibilities (Tasdemir & Gazo, 2018).

An exceptionally competitive manufacturing world and industrial globalisation have provided exceptional opportunities to SMEs through cost-effectiveness and the enhancement of qualities for the development and growth. However, it has also provoked the SMEs to accept the regulations and boundaries which belong to the responsibilities of environment and to integrate different types of manufacturing paradigms which result in zero waste (Tan et al., 2014). A literature review on the implementation of the lean system in developing countries' SMEs reports diverse views. Hence, there is a dire need to investigate the importance of different lean practices and their effects on performance determinants to understand an organisation's lean behaviour (Thanki et al., 2016). Green manufacturing targets all the streams based on wastes associated with designing as well as manufacturing and functioning with the removal of material and products, which is an integrated, systematic, and economically driven approach (Sezen et al., 2013). Green manufacturing produces economically feasible products with less social and environmental impact (Mittal et al., 2014). In addition, SMEs carry limited resources, so for the achievement of sustainability, SMEs need to take into account the environmental, economic and social issues through adopting lean and green initiatives (Siegel et al., 2019), as both lean and green enhance SMEs competitiveness in a sustainable way (De et al., 2018). Therefore, SMEs are struggling to effectively integrate lean with green management (Farias et al., 2019). However, guidelines are needed for SMEs, including benefits and frameworks to encourage them to implement lean and green to improve sustainability performance (Siegel et al., 2019). In order to become ultimately successful and to improve their global competitive advantage, companies must implement both existing and new systems of production and quality, such as lean manufacturing, green manufacturing and six sigma (Garza-Reyes, 2015a; Kovach et al., 2005). These production systems can be adopted together for enabling companies to produce customised quality products on demand in order to facilitate customer requirements (Garza-Reyes, 2015a; Kovach et al., 2005).

Inconclusive and limited research is done on the collaboration between lean and green practices as well as the performance of the organisation. Garza-Reyes (2015b) called for more extensive and robust research to fill this gap. Although the lean green system is considered to be a practical management approach for the achievement of higher operational and environmental performance (Dües et al., 2013), it however may inherit the challenges and limitations of every individual approach. Therefore, to address these type of limitations,

six sigma compatibility and integration have been proposed as a solution which complements the lean green approach and therefore, enhances its effectiveness (Garza-Reyes, 2015a). In management approach, which is project driven, six sigma applications range growing from defects reduction in processes of organisations in their services and products to become six sigma — a business strategy, which focusses towards improvement and understanding related to customer requirements, financial performance, and business productivity. For high-quality services or products provision at a low cost, large firms depend heavily upon SMEs. The highly accomplished processes of business and high-quality products increasing the demand by large organisations left no choice for SMEs to study business strategy based upon the six sigma introductions in their organisations. There is an apparent shortfall of previous work which examines six sigma implementation within SMEs (Antony et al., 2005; Fonseca, 2017). A six sigma approach integration occurs with other improvement processes. For instance, lean operations produce high synergistic benefits, as well as six sigma complements lean green. There is a compatibility among lean, green and six sigma, if they are integrated in a unified style (Baker, 2003; Garza-Reyes, 2015a).

Literature Review

The Concept of Sustainability

The meaning of sustainability can be constructed in many ways, but the conventional interpretation, which is used mostly, is related to the development of humans on earth. Brundtland (1987) originally defined the sustainable development concept on behalf of the UN General Assembly. Sustainable development came into being as a response related to the increasing concerns regarding the economic growth connection with environmental damage (Factbook, 2008). The commission defines sustainable development as a development which meets present needs without compromising the future generations' ability to encounter their own needs (Brundtland, 1987).

Sustainability Performance

Sustainability incorporates performance based upon the environmental and social with the economic dimension (Fauzi et al., 2010). In the evaluation and measurement of sustainability, performance can be understood through additional aspects, including that the company's responsibility does not only regard the generation of economic welfare, but also the environment and people are equally important (Fauzi et al., 2010; Wu et al., 2015). Sustainability performance accommodates along with shareholders and various stakeholder groups' interests in the society (Colbert et al., 2007; Henriques et al., 2013). However, researchers have used different methodologies for the evaluation of sustainability performance (Gross, 2015). Therefore, sustainability performance measures integrate three

dimensions including social, environmental and economic (Cornelius et al., 2008; Furnish et al., 2013; Hubbard, 2009; Norman et al., 2004; Slaper et al., 2011). Through several researchers, a parallel idea has been reinforced (Jonker et al., 2004; Van Marrewijk et al., 2003) which indicates the firm objective synergies creation among environmental, social and economic aspects, which subsequently improves sustainability performance (Rasi et al., 2014). Organisation's sustainability approach has moved from the control of pollution to eco-efficiency and then socio-efficiency. Therefore, these underlying concepts are focussed towards win-win solutions, as economic benefits straighten up with environmental performance. For instance, reducing the consumption of resources and minimisation of waste, and with social performance, i.e. negative social minimisation and positive one's maximisation (Young et al., 2006). In consequence, sustainability performance in managerial practices could be interpreted as a significant shift from not only being business oriented and social oriented, but also planet oriented (Fauzi et al., 2010; Wu et al., 2015).

Triple Bottom Line

The sustainability concept can be summarised in the triple bottom line (TBL) or three pillars model. This concept of the TBL was developed by Elkington (1994) and addresses the significance of incorporating economic and social dimensions to sustainable development for the achievement of environmental progress. Rather than maximising shareholder profit for corporations, this concept calls to serve stakeholders interest. According to Jennifer Ho et al. (2007), stakeholders must be concerned about social-environmental issues in addition to financial performance. The TBL concept is considered as sustainability's three pillars. Due to economic efficiency, the nonexistence of environmentally friendly and socially viable manufacturing is stated to be bearable but cannot be considered sustainable.

Lean Manufacturing

The word lean is related to lean production or lean manufacturing as it consumes less of everything, associated with mass production. In a factory, it uses half the human effort, half the manufacturing space, half the investment in tools, and half the engineering hours to develop a new product in half the time. According to the research conducted by Bayou et al. (2008), lean manufacturing is a strategy with less input and goals of organisation achievement while producing better output, where input is related to the usage of physical resources, and their cost and output are related to sold products quality and quantity and equivalent customer service. According to Narasimhan et al. (2006), lean manufacturing literature established that resources efficient use through waste minimisation is the essential lean part as lean manufacturing's aim is a reduction of non-value added activities and the reduction of waste. Essentially, the lean manufacturing core idea is to minimise waste while maximising customer value. The goal of lean production implementation is productivity

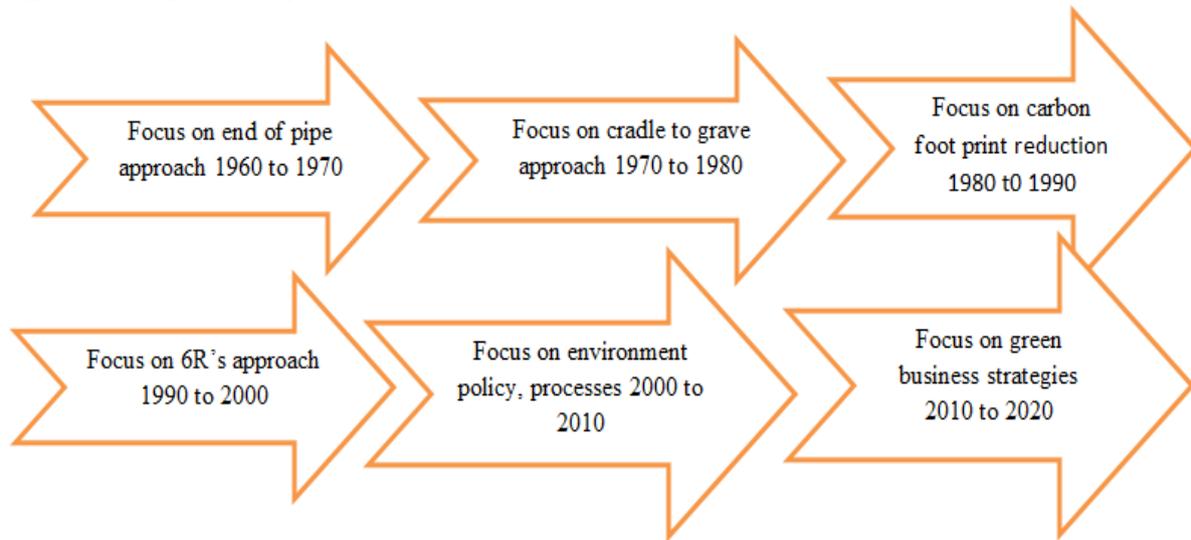
increase, cost reduction, shortening of lead times and the enhancement of quality. The above mentioned factors indicate lean production system performance. Lean manufacturing techniques were first acknowledged as the reason for Japanese success. The idea was built on the fact that the first development of the lean management model was by the Japanese Toyota motor company to reduce cost after the second world war. Thus, the lean introduction has meaningfully changed the market as well as the strategy in its first occurrence in the car industry development, which was established by the Toyota Production System (TPS). TPS's success shows and demonstrates that lean techniques are significant and influential. From different countries' industries, such as electric and electronics, machine tool industry, wood, ceramic, auto and machinery, automotive and so on, the devastating scenario has directed them for lean implementation in their manufacturing. Therefore, most companies have implemented lean and assessed lean practices in their own way. The reason lies in internal issues, such as a lack of lean understanding, knowledge, skills, and culture. Other factors, which include size and age, also contribute to lean tool and techniques adoption in one's company.

Green Manufacturing

Green Manufacturing is defined as “a manufacturing practice which does not harm the environment during any of its journey phases”. It includes green product design, the usage of raw material which is environmentally friendly, packaging in an environmentally friendly way, distribution, and after product end life reuse. It slows natural resources depletion and lowers trash (Foster, 2001). It stresses on reducing parts, material rationalising, and components reuse. It covers several manufacturing issues involving the 3Rs, regulatory compliance, waste management, conservation, environmental protection, pollution control and other joined requirements (Jawahir et al., 2006). The deficiency of natural resources and energy, waste generation and toxic materials release a necessitated manufacturing paradigm development which has a lower environmental effect. This led to the evolution of green manufacturing. Through efficient raw material usage, a well designed green manufacturing system reduces operational cost, labour and energy, and adds value to a product. To improve the efficiency of an organisation via GM Practices, there are abundant opportunities along with the protection of the environment that influences financial gains (Roy et al., 2016). Balancing economic and environmental performance has become noteworthy for organisations facing competitive, regulatory and community pressures (Bai et al., 2015). Many campaigns have started in different countries for the promotion of GM and emphasise on recycled material usage with energy consumption reduction (Woo et al., 2016). Hazardous gas emissions and the consumption of high energy reflects firm's poor environmental performance. The managers of a firm must adopt practices like ISO 14001 (Govindan et al., 2015), which will lead towards the satisfaction of customers, reduces waste generation and resource utilisation. Practising the 3Rs offers the reduction of costs through the development

of products and process manufacturing with less consumption of material, allowing material utilisation in original form, which subsequently provides better resource efficiency (Thanki et al., 2016). The GM concept originated from Germany, however its activities nature, scope and focus keep changing with respect to time. It is not restricted to manufacturing only. It has been evolving continuously and demanding comprehensive treatments.

Figure 1. Major Changes in GM over the Years



Lean Green Integration in SMEs Context

In recent years, lean green concepts have gained a high popularity (Cherrafi et al., 2019). Green and lean are two different approaches which have been developed differently; they are compatible and synergetic strategies due to a joint focus on the reduction of waste and efficient resources usage (Garza-Reyes, 2015b). Consequently, from the two approaches, tools and principles have been integrated under a unified improvement approach called 'lean green' for the achievement of both sustainability and operational excellence (Dües et al., 2013). Lean green is an integrated approach which purpose is to achieve improvements, not only operational or financial, but also environmental (Leong et al., 2019). For organisations, lean green can be a new opportunity for the improvement of sustainability performance. According to Cherrafi et al. (2017), organisations which implemented lean green practices simultaneously, achieved better results, as compared to those which only focussed on one of the initiatives. There is a lack of a complete and structured framework for lean and green in the SMEs context. There is a need to describe the key elements which are required for SMEs to achieve sustainable profitability through the savings of cost, while at the same time, being environmentally and socially conscious. Businesses found both paradigms integration and implementation challenging. There is a lack of awareness regarding the need for improvement methods like lean green, a lack of management support and responsibility, as

well as a lack of integration strategy and employee involvement (Cherrafi et al., 2016; Kurdve et al., 2014).

Lean Green Practices

Mindset and Attitude

Mindset and attitude are fundamental to lean green successes. Within the organisation, there must be a long-term commitment to lean green practice. A change in people's thinking and doing things differently can help organisations to achieve different results. Many failed attempts for the implementation of lean green practice start with the fundamental concept of misunderstanding. Therefore, the key is to learn the cognitive dimension, tools, and concepts. For the successful implementation of the lean green practice, previous studies have identified mindset and attitude as the key aspects which include lean green thinking, openness towards learning, and confidence in success in implementing lean green practice (Zhan et al., 2018).

Leadership and Management

A strong strategic leadership commitment denotes continual investment in employees and willingness towards the commitment of resources for the promotion of a lean green culture leading towards continuous improvement (Al-Najem et al., 2012). Nothing diminishes shop floor employees' commitment faster than leadership and management which do not follow their commitments towards lean green practice. Without a profound understanding of lean green philosophy, leaders will be unable to implement lean green practice and to create a lean green culture. Also, managers need to ensure that there are right people at the right places who are required for the success of the lean green practice (Zhan et al., 2018).

Employee Involvement

Only through the efforts of employees in the organisation, can the achievement of a successful lean implementation be done, as stated by Zhu et al. (2005). Moreover, according to the studies, the improvement of pollution control can be made through employee involvement. For instance, Dow Chemical, through encouraging employee involvement, has been able to reduce waste and pollution (Denton, 1999). An organisation's environmental performance and business performance can be improved through employees in three ways. Firstly, as a long-term approach, it requires permanent employee commitment. Therefore, to change thinking, the way of doing things, discipline and continuous learning, employee commitment is required. If people decline towards change and their work method, then lean green success chance is minimal. According to Womack et al. (2003), different skill sets are required as compared to non-lean green forms of organisations. It is essential that employees

must have a deeper understanding of the concept for underpinning lean green practice, which is not only related to its tools and technique, but the core of the lean green practice is human capital development. Therefore, for overall lean green transformation processes, the employee development process should be linked. In addition to that, if employees are fundamental to lean green success, then they should be involved deeply in all aspects of lean green practice, including planning and execution (Zhan et al., 2018).

Integrated Approach

The key towards successful implementation of lean green practice is the integration of two approaches, as stated by Vachon et al. (2006). The lean green integrated approach is a helpful emerging tool to enhance the business performance of the organisation by creating customer value, eliminating waste, and ensuring continuous improvement through sustainable integration practice. It can also improve the environmental performance of the organisation by reducing environmental degradation and pollution (Alshuwaikhat et al., 2008). This research builds an integrated approach requirement and refers to structures and systems alignment, which includes behaviours as well as infrastructure to support lean green practice. Lean green practice integration with technology and other programs and systems brings alignment ability with personal issues within the operating system (Zhan et al., 2018).

Tools and Techniques

In developing countries, tools and techniques have a fundamental role in different types of industries (Hines et al., 2004; Srivastava, 2007). Implementing lean green tools and techniques is a proven method to beat the competition and improve business performance. Lean and green manufacturing paradigms carry equal influence on firm overall performance. To achieve the desired outcome for the performance of firm, quality and customer satisfaction are strong drivers which must receive preference. It serves as a road map for managers to improve firm performance without compromising ecological based efficiency and to move the firm successfully towards sustainability (Thanki et al., 2016). The tools and techniques of lean green are considered to be those principles and concepts which aim to identify and remove waste with optimisation of resource utilisation. Every organisation uses a different variety of tools according to their needs and the size of the company. The most common lean tool is the 5S tool (sort, set, shine, standardise, sustain), now with a sixth edition related to safety. It is followed by total productive maintenance (TPM), value stream mapping, total quality management, visual workplace and supplier network. Whereas, the most frequently applied green tool was the green value stream mapping (Chiarini, 2014; Piercy et al., 2015). The eco design, ISO 14001, life cycle assessment was applied by a few of the companies. Most of the companies rely entirely on lean tools for the achievement of lean as well as environmental objectives (Siegel et al., 2019). According to the study results

conducted by Thanki et al. (2016), TPM, 5S, and kaizen, are the most influential lean practices. Whereas, ISO 14001, DFE, and the 3Rs are leading practices of green. To improve, the environmental performance of the organisation, some of the above methods can be used, such as kaizen. Additionally, in 2007, the United States Environmental Protection Agency introduced a tool kit which offers environmental practitioners and lean operations managers practical techniques to reduce business risk and cost, identify and eliminate waste, and improve environmental performance (Zhan et al., 2018). Likewise, top management commitment and support, mindset and attitude, and employee involvement are considered to be important factors for the successful implementation of lean green (Siegel et al., 2019).

Six Sigma

Six sigma has grown to become an addition to total quality management (TQM). Six sigma is a management approach which is project driven. Its application ranges from organisation's defects reduction from products and services, and processes to develop a business strategy which focusses on the improvement of customer requirements in understanding financial performance and business performance. Six sigma has primarily split out from electronic industries (Texas Instruments and Motorola) and towards many other sectors. This growth has become widespread in the last two decades. In an in-service industry supply chain context, six sigma has been implemented in local governments, hospitals and the public sector as well (Antony et al., 2002; Marzagão et al., 2016).

Six sigma is defined as a statistical set contained with quality management for the construction of a framework for process improvement. The objective is the improvement of six sigma is stated as serious to quality which shows the requirements of the customer through group tools for data analysis. The statistical tools detected are a leading indicator of quality which is per million parts and based upon non-conforming products acquiring six sigma level, meaning to have a process which produces outputs based upon 3.4 defective ppm. Six sigma is identified as a problem-solving method which uses statistical tools and quality for the improvement of basic process but is not a comprehensive management system (Antony & Banuelas, 2002; Marzagão & Carvalho, 2016; Monteiro de Carvalho et al., 2014).

It is also defined as a customer oriented, systematic, structured, multifaceted, proactive, business improvement quantitative philosophical approach to speed up deliveries, reduce cost and to increase quality. Six sigma is an investigation methodology which uses scientific methods. It is a continuous improvement, well-structured methodology to remove waste and reduce process variability within business processes. Furthermore, supporting this by noting six sigma as a widely used and popular quality improvement methodology. It is also stated that six sigma is an addition towards quality improvements decisions such as TQM, as there are similarities between the six sigma DMAIS method and Deming's plan, do, check, act.

The DMAIS method can help in integrating human and process aspects within six sigma implementations (Antony & Banuelas, 2002; Marzagão & Carvalho, 2016; Monteiro de Carvalho et al., 2014).

Key Ingredients for Six Sigma Program

In order to improve and manage the process output, those key input variables which affect the output and are noteworthy are identified from the literature. For the successful implementation of the six sigma program, 11 critical success factors (CSF) were identified from the literature which included: management participation and involvement; cultural change; organisational infrastructure; training; linking six sigma to business strategy; linking six sigma to customers; linking six sigma to suppliers; linking six sigma to employees; understanding six sigma methodology; project selection and prioritisation; and project management skills. According to the studies done by Dubey et al. (2016) and Timans et al. (2012), the most important critical success factors for manufacturing SMEs in implementing a successful six sigma are management participation and involvement, linking six sigma to business strategy, and linking six sigma to customers. This was followed by understanding six sigma methodology, organisational infrastructure, six sigma training, and project prioritisation and selection (Antony, 2004; Monteiro de Carvalho et al., 2014).

Linking Six Sigma to Business Strategy

Linking six sigma to business strategy is an essential key practice for six sigma. Therefore, in this study, this key practice as a dimension for six sigma is used. Six sigma cannot be dealt with as another standalone activity. Instead of just using a few improvements, quality tools and techniques, it needs adherence to a whole philosophy and somewhat a few useful tools and techniques related to quality improvement (Dale et al., 2000). It needs clarity on how other activities and six sigma projects are linked to customers, competitiveness and core processes (Dubey et al., 2016; Pande et al., 2000). As every organisation goal is to make profits, business processes can be profitable through six sigma projects while attacking variability leads towards a high rate of scrap and rework, and low productivity. The link between business strategy and project objectives should be identified (Antony & Banuelas, 2002; Dubey et al., 2016).

Linking Six Sigma to Customer Requirements

The methodology of the six sigma program's success key elements are its ability based upon linkage to customers. The project should be started with determination based upon customer requirements. Therefore, Pande et al. (2000) stated that there should be proper understanding about the organisation and linkage towards various business activities before the needs of

customers can be met with complete success. Linking six sigma processes to customers, therefore, can be divided into two steps:

1. Identifying core processes, defining processes key outputs, defining key customers which they serve.
2. Identifying and defining the need of customers and requirements.

The selection of characteristics which are critical to quality is the important issue. In six sigma starting phase methodology, these CTQs should be identified quantitatively. For an understanding of needs, customers' expectations and their translation into engineering and design departments, the deployment of quality function is a powerful technique (Antony & Banuelas, 2002; Dubey et al., 2016).

Resource Based View Theory

The resource-based view of the firm has been a discussion subject in the strategic management field among researchers. RBV suggests that the success of the organisation depends upon the capabilities and resources which have specific characteristics (Galbreath, 2005). Firm capabilities and resources can be distinct, as including all capabilities, assets, organisational processes, firm knowledge, and attributes controlled by a firm allows the firm to grow and implement those strategies which can improve their effectiveness and efficiency (J. B. Barney, 1995). This available factors bundle is possessed and controlled by the firm and can be used for building up and implementing their strategies (Amit et al., 1993). Sustainable competitive advantage can be generated through the firm's capabilities and resources when they have the following characteristics, including non-substitutability, rarity, value, and inimitability (J. Barney, 1991). Later, J. B. Barney (1995) emphasised that sustained competitive advantage needs unique capabilities and resources which firms could bring towards their environment and competition. Business managers and owners must discover these capabilities and resources by looking inside the firm for those resources which are rare, valuable and imperfectly imitable and then achieve these resources. Only those firms and resources which retain these attributes can generate and sustain competitive advantage leading towards superior performance. J. Barney (1991) stated that the resources of the firms are categorised in accordance with the physical, human, and capital resources of the organisation. Physical capital involves plant and equipment, physical technology, access towards raw material and geographical location. Human capital involves intelligence, experience, training, relationships, the attributes and abilities of workers and managers. Organisational capital involves reporting structures, informal and formal planning and firm whole organisational process. Financial resources is a new category which was been added by J. B. Barney (1995) and that includes equity, debt and retained earnings. RBV emphasises upon effective and efficient resources deployment and heterogeneous inimitable resources at



the disposal of the company to obtain a competitive advantage (J. Barney, 1991; Hackman et al., 1995; Khanchanapong et al., 2014). The resources right combination is compulsory to accomplish a sustainable competitive advantage (Ulrich et al., 1995). Individually, green lean practices can be measured as imitable resources and may limit organisation ability to achieve a competitive advantage when applied in separation (Enz, 2008). It has been stated that sustainable competitive advantage can never be obtained through one resource.

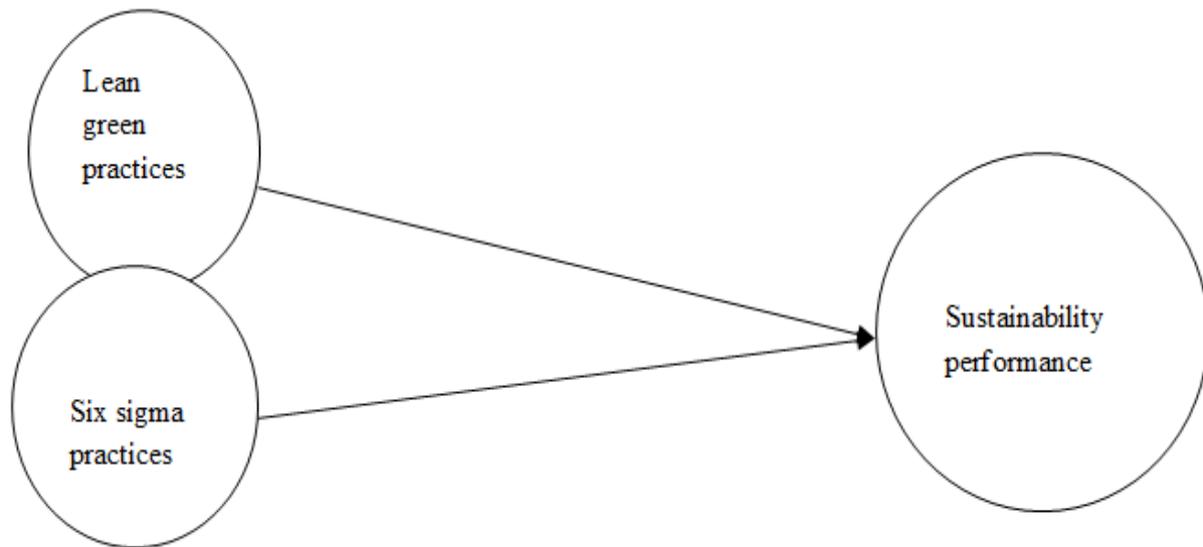
In bundling resources in an innovative way, organisations should think about which may become difficult for competitors to imitate. In a green lean practices context, an integrated green lean practice's synergistic effect can generate heterogeneity, higher value and innovation through production and design, and delivery process performance can be improved (Colicchia et al., 2017; Garza-Reyes, 2015b; Yang et al., 2011). Considering different organisation resources, green lean when applied simultaneously enhances the resources complexity which competitors will try to imitate. The synergistic application of them would drive innovation and will deliver increased performance as compared to each of them, if implemented in separation (Cherrafi et al., 2017; Cua et al., 2001; Garza-Reyes, 2015b; Ketokivi et al., 2004; Khanchanapong et al., 2014).

Likewise, a concept of the twenty-first century is based upon six sigma which denotes a resource-based, customer-driven, and process focussed concept. To achieve the perfection of processes and activities, enterprises have implemented a business concept based upon six sigma. The essence of the six sigma concept is that the satisfaction of customers can be achieved through increasing the quality of products. Product quality can be enhanced through the increase of processes quality. Finally, the quality of processes depends upon resources and capabilities, as well as their combination. It is more than a business concept, which indicates how expensive these defects are. Therefore, the concept of six sigma complements with the theory of the resource-based view, as it encourages the efficient usage of existing resources as well as resource-based development concerning external factors (Pesic, 2007).

Proposed Framework

Therefore, this study proposes the following framework:

Figure 2. Significance of the study



Assessing a literature review of the last decade, the focus of researchers and practitioners tilted towards studying and practising those manufacturing practices which contribute towards the achievement of the sustainability performance of the firm. These types of manufacturing practices result in significantly less damage to the environment and society as well as enhance the economic performance of the firm. Therefore, this research is an effort towards lean, green, and six sigma practices and their effects on the sustainability performance of SMEs. The collective measure of these constructs provided a basis for the sustainability performance of SMEs. For researchers, policymakers, and professionals, the outcome of this study provides a foundation to assess the lean, green, and six sigma practices and sustainability performance. The outcome of this study provides a platform for the researchers to explain future research and strengthen SMEs and sustainability performance.

Conclusion and Directions for Future Research

The above figure proposes the framework which incorporates the practices of lean green six sigma's effect on the sustainability performance of SMEs. It also directs towards the improved quality of products, improved production processes, reduction of cost production, and market share expansion of an organisation through satisfying customers who gaze for green products and manufacturing. In future, researchers may extend this study in different organisations for results generalisability and can explore possible moderators.

Conflict of Interest

The author(s) declare that they have no conflict of interest(s).



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