

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Lean Manufacturing (LM) is recognised as one of the most important manufacturing philosophy that facilitates the companies to compete and sustain in the current dynamic and competitive business world (Filho and Barco, 2015). LM originated in Japan and quickly spread to the USA, Europe as well as in most of the developed and developing countries (Pavnaskar et al., 2003). In the beginning, LM was mainly accepted in the automobile sector. In continuation to this, the implementation of various Lean manufacturing Practices (LMPs) have been causing a profound impact on the majority and wide range of sectors irrespective of the size of the firm. This list of sectors includes process industries, textile, hi-tech industries, aviation/aerospace, healthcare, and many others (Abdulmalek and Rajgopal, 2006; Wang, 2008; Ehret and Cooke, 2010; Kumar et al., 2015; Henrique et al., 2016). LM has also been applied in conjunction with other management approaches, such as Green Manufacturing (GM), Agile Manufacturing (AM) and Sustainable Manufacturing (SM) (Verrier et al., 2014; Putnik, 2012; Cabral et al., 2012).

Nowadays, manufacturing firms worldwide are set to confront their sustainability performances to satisfy their multiple stakeholders (Ganapathy et al., 2014). Stakeholder theory proposes that the “business entity should be used as a means for coordinating stakeholder interests rather than simply maximising shareholder profit” (Freeman, 1984). The stakeholders and the manifestation of their interest drive firms to adopt sustainable strategies. During recent times, sustainability has emerged as a new competitive criterion and becomes the primary objective of most forward-thinking organisations (Wang et al., 2015). Thus, sustainability performance improvement of the industrial processes has become a business imperative (Cherrafi et al., 2016). Sustainability focuses on the ‘triple bottom line’ (3BL) of ‘people, profit and planet’ (Elkington, 1997; Mitra and Datta, 2014) which considers the social and environmental values of business assessments along with their economic significance.

Micro, small and medium enterprises (MSMEs) frequently known as Small and medium enterprises (SMEs) are playing a crucial role in formulating the economies of most countries in the world (MSME, 2012; Bhamu and Sangwan, 2014) In literature, the terms MSMEs and SMEs are interchangeably used. The MSMEs are acting as the engine of the economic growth and providing social stability by generating the direct and indirect employment opportunities (Hu et al., 2015; Wang, 2016). In most of the developed and developing countries, a major share of the manufacturing output is from the contributions of MSMEs. But the MSMEs all over the world are facing a lot of challenges and problems in doing the business compared to large firms. Ensuring the sustainable growth and performance of the MSMEs are necessities of the current manufacturing world.

A conflict of interest exists in SMEs, between the entities of 3BL, as the focus is more on profit compared to people and the planet (Wong and Wong, 2014). Consequently, this conflict makes the decisions on balancing the operational or financial performances with sustainability performance of MSMEs too complicated. SMEs have started implementation of the various manufacturing paradigms adopted by the large sized industries for their sustainable development (Singh et al., 2008; Panizzolo et al., 2012). The researchers also have studied and recommended solutions to the problems and difficulties faced by MSMEs. These changes have helped MSMEs in emerging as the engine of economic growth (Singh et al., 2008; Hu et al., 2015; Wang, 2016) and as the principal instrument for promoting sustainable development of economies (Klewitz and Hansen, 2014).

Interestingly, LMPs are now increasingly being recognised by the MSMEs in different countries, and this approach proved as a successful operational model in developing economies, as well as in some large Indian companies (Panizzolo et al., 2012; Bhamu and Sangwan, 2014). The Government of India has instituted the 'lean manufacturing competitiveness scheme' for MSMEs to assist them in reducing waste, increasing the productivity, and imbibing a locale of continuous improvement (Thanki and Thakkar, 2014).

The linkage between lean and sustainability has been studied by several authors (Rothenberg et al., 2001; Azevedo et al., 2012; King and Lenox, 2001; Kainuma and Tawara, 2006; Mollenkopf et al., 2010; Xavier Alves and Murta Alves, 2015; Piercy and Rich, 2015). These researches have concentrated primarily on large-scale industries such as automotive, pharmaceutical and fast moving consumer goods (FMCG) industries where the impacts of the linkage are more significant than MSMEs (Bhasin, 2012; Shaw and Ward, 2003; Piercy and Rich, 2015). Moreover, large organisations have greater awareness and availability of a lean manufacturing system while MSMEs usually lag behind (Pannizzolo et al., 2012; Upadhye et al., 2013). The MSMEs also have constraints for mobilising the resources, which in turn, will force them to operate with limited resources, and may even ignore the environmental and social requirements (Theyal and Hofmann, 2012). The negative impact of all these factors results in lack of attention in the business, and the role of strategies for sustainable development gets sidelined. To overcome this barrier, MSMEs need a special attention in their sustainable development (Loucks et al., 2010).

The previous studies in MSMEs have examined LMPs effects on operational, financial and environmental performances independently (Filho et al., 2016; Bonavia and Marian, 2006; Upadhe et al., 2013; Rahman et al., 2010; Panizzolo et al., 2012; Khanchanapong et al., 2014; Zhou, 2012). None of these studies have investigated the effect of LMPs on different dimensions of sustainability performance in a single study. Also, these researchers have not focused on the relationship between LMPs and sustainability performance. Hence, the effect of LMPs on sustainability performances grouped into economic, environmental and social sustainability performances in MSMEs have been uncertain till this date.

Implementation of sustainable manufacturing practices has become a requirement, primarily due to the changes in laws and regulations in the new global business environment. The insistence from stakeholders has increased the pressure and responsibility of manufacturers in making sure the sustainable manufacturing practices are implemented (Martínez-Jurado and Moyano-Fuentes, 2014; Yusup et al., 2015).

This necessitates the integration of existing manufacturing practices such as LM with sustainable manufacturing (Hallstedt et al., 2013).

Such integration helps to establish continuity in improving the manufacturing operations, as well as increasing the level of competitiveness in a new global manufacturing environment (Schrettle et al., 2014). The novelty of this work lies in analysing how the lean practices influence sustainability performances and verifying the association between these performances in Indian manufacturing MSMEs.

1.2 RESEARCH PROBLEM

The research problem is formed from the aspiration and vital necessity to improve on the conventional lean performance model that have been espoused by most researchers so far. The existing lean performance models and studies concentrated on the effect of LMPs on operational, financial performances, mostly on a large scale industries. There are no such studies which focused on MSMEs to bring out the effect of LMPs on their sustainability performances. The interrelationships between the sustainability performance generated by the LMPs implementation in MSMEs are also unfamiliar. Similarly, limited studies have been reported in the areas of linkage between lean operations and sustainability in MSMEs. Most of the prior studies on sustainability, considered lean, just as a means for waste reduction and the consequent benefits of environmental protection.

However, some prior studies have mentioned some of the broad areas of linkage between lean and sustainability in large-scale industries. There is a need to identify all the relevant areas of linkage between lean practices and sustainability in MSMEs. The primary intention to ascertain whether there is any relationship between LMPs and sustainability performances in Indian MSMEs. Hence, following research questions were proposed concerning MSMEs.

1. What are the effects of lean practices on the sustainability performances of MSMEs?
2. What are the areas of linkage between lean and sustainability in MSMEs?

3. What are the factors affecting the areas of linkage between lean and sustainability in MSMEs?

1.3 RESEARCH OBJECTIVES

This study aims at contributing a new insight towards the effect of LMPs on economic, environmental and social performances in MSMEs. The primary objectives of this study are grouped into five divisions as follows.

1. To identify the various lean manufacturing practices and sustainability performance measures in MSMEs.
2. To identify the areas of linkage between lean practices and sustainability in MSMEs.
3. To investigate whether the areas of linkage are same or statistically different for the MSMEs classified according to the levels of investment, manufacturing process, product category and the manufacturing sector belong to.
4. To assess the influence of lean practices on the sustainability performance of MSMEs.
5. To verify the interrelationship between triple bottom line sustainability performances

1.4 RESEARCH METHODOLOGY

The methodology adopted for this research work is explained in Figure 1.1. The steps followed are illustrated below.

1. Based on the literature review and discussion with subject experts, define the problem and formulate the preliminary framework for the study.
2. Design a questionnaire using the variables identified from the literature review and conduct pretesting and pilot survey before starting the survey.
3. Collect the data by surveying the firms belonging to MSMEs, which are representative of various product types, level of investment, manufacturing sector and manufacturing process to get the real representation of MSMEs.

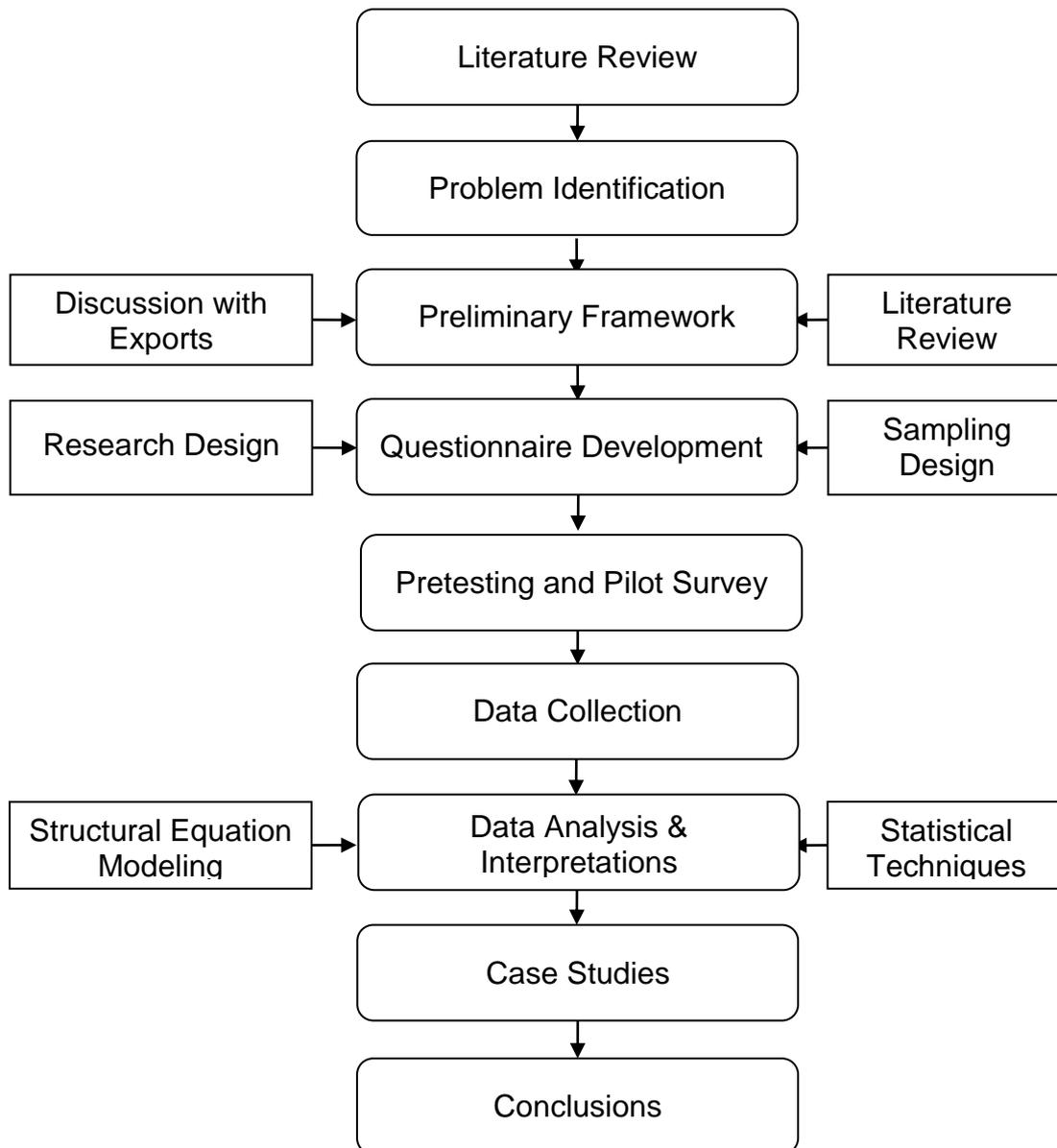


Figure 1.1 Research Methodology

4. Analyse the data to identify and interpret the relationship between the factors chosen using Structural Equation Modeling (SEM) and other statistical Techniques.
5. Conduct the case studies to check and validate the findings from the statistical analysis to throw the light on improvements possible.
6. From both statistical analysis and case study approach, conclude the major findings from this study.

1.5 STRUCTURE OF THE THESIS

This thesis comprises of eight chapters, organised logically to facilitate the reader to know the views of the author in accomplishing the aims of the study. Figure 1.2 provides the general idea of the structure of this thesis. The contents of each of these chapters are précised as follows.

Chapter 1 describes the introduction and background of the study in detail. The chapter also expresses the research motivation, research gap, research problem and the proposed objectives of the study. At the end of the chapter, the research methodology followed in this work is described. .

Chapter 2 titled ‘Literature Review’ describes LM in general and the various studies related to lean and performance improvements. The chapter discusses the suitability of LM approach towards the sustainable development of the manufacturing firms through the review of the literature. It also describes the classification of MSMEs in different regions and the nature of MSMEs in comparison with large-scale industries. The chapter fulfils the requirement of this study by identifying and describing LMPs broadly, selected from various literature related to MSMEs.

Chapter 3 presents the model developed for this work. The chapter lists and explains the constructs and variables of the model. The research design, stages of questionnaire development, pretesting and pilot survey, sampling method, and data collection methods adopted for the study are explained in this chapter.

Chapter 4 establishes the fundamental analysis of the level of adoption of LMPs in MSMEs and the important sustainability performance derived from these practices. This chapter also investigates the areas of linkages between lean and sustainability and the effect of contextual variables on the similarity of the respondents

Chapter 5 addresses the underlying structure of the variables of LMPs and sustainability performances using the data collected from the sample frame. This chapter explains the procedure of Exploratory Factor Analysis (EFA) and explores the underlying factors of dependent and independent variables

Chapter 6 presents the hypotheses developed about the relationship between LMPs and various factors of sustainability performance generated from chapter 5. The study describes the measurement model and structural model formed during the confirmatory factor analysis (CFA) and corresponding model fit details. The chapter gives the SEM results and interpretation of the results.

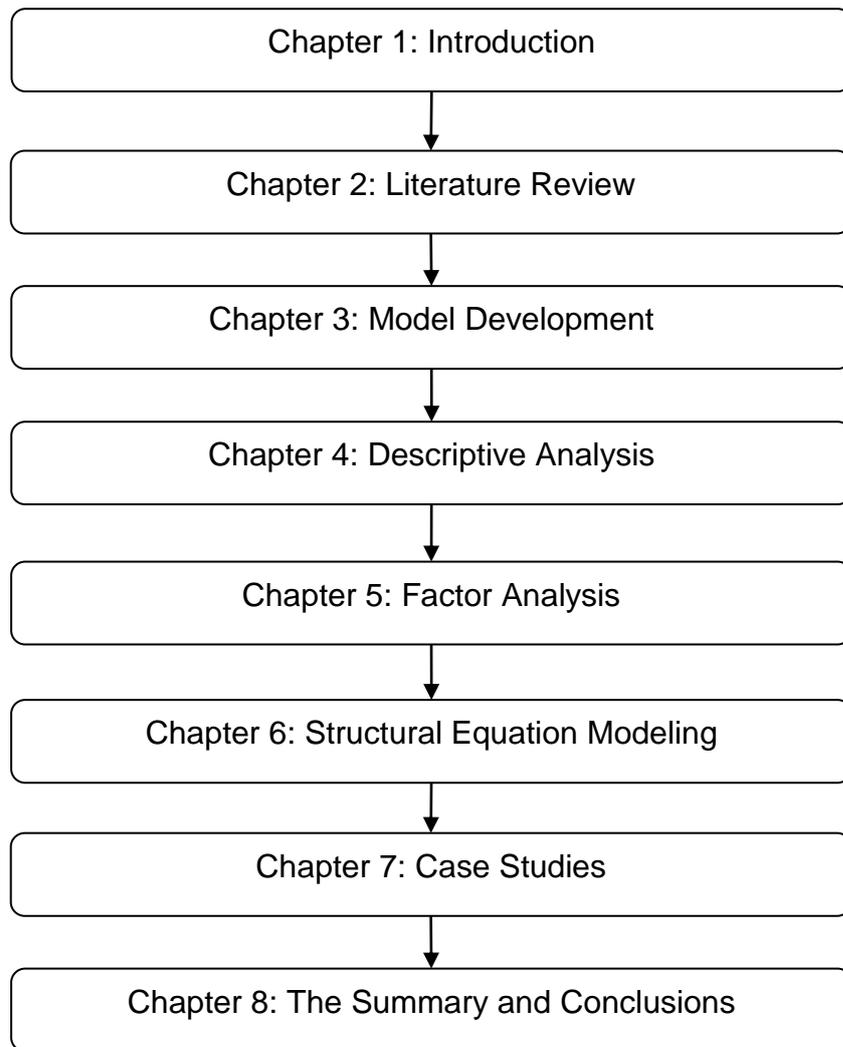


Figure. 1.2. Structure of the Thesis

Chapter 7 presents the findings of the case studies conducted in five different manufacturing firms to verify the results of the statistical analysis presented in the previous chapters. The chapter ends with the conclusions from the findings of the case studies.

Chapter 8 presents the summary and conclusions of the present work. The chapter lists the findings from the study and the conclusions in detail. The chapter ends with the limitations and future scopes of the study.

1.6 CONCLUSION

A concise introduction to this study by stating the relevance of the LM and the sustainability concepts in the preview of MSMEs were presented in this chapter. The relevance of MSMEs in framing the industrial economies in different nations is also brought out. The research problem is stated, and further, the objectives of the study were outlined. The research methodology adopted for the study and the structure of the thesis were accounted at the end of the chapter.