Chapter 1

Introduction

"We believed then and we are convinced today . . . that there is an 'infinite capacity to improve everything'—but there was no methodology or discipline attached to that belief. There is now. It's Six Sigma qualities, along with a culture of learning, sharing, and unending excitement" (Strong, 2003).

This review of Six Sigma by General Electricals' most successful CEO- Jack Welch demonstrates the stand of repute Six Sigma has achieved in the field of quality improvement. Six Sigma was initially launched by Motorola during 1985 to improve manufacturing defects of their semiconductor production sector. To recover major downturn in semiconductor production sector, Motorola initiated Six Sigma programme during 1987. The Six Sigma programme was initiated with stretched goal of improving product and service quality ten times by 1989 and at least hundred-times by 1991. Vogue of Six Sigma is so much so that as reported by American Society for Quality (ASQ) (2009), 82% of Fortune 100 companies and more than 53% of Fortune 500 companies are using Six Sigma approach. In spite of pre-presence of many quality improvement programmes, Six Sigma has achieved momentous repute as quality improvement approach due to the following reasons:

- One of the major reasons for Six Sigma's grand success is its ability to leverage financial growth of the company with billion dollar savings (Gerald et al., 2000). GE reported $330 million saving through its Six Sigma adoption (Strong, 2003). It has been estimated that Six Sigma has saved $427 billion of Fortune 500 companies in last 20 years (ASQ, 2009).
- Bringing the cultural change through establishing uninterrupted linkages between people, process, customer and culture is the unique characteristics of Six Sigma that puts it at advantageous position compare to other quality improvement programmes (Strong, 2003).
- With major focus on customer requirement, Six Sigma contributes significantly to the bottom line growth. Six Sigma propose disciplined structure for resource allocation and thereby creating quality focused organizational culture.
- Six Sigma propose quantitative goal as the end result of process improvement efforts. This helps keeping process improvement efforts aligned and focused towards customer requirements.

Realizing these inimitable characteristics of Six Sigma it is important to understand the characteristics of Six Sigma philosophy. Though the most conventional conceptualization of Six Sigma is based on reducing number of defects in Critical To Quality (CTQ) parameter by 3.4 Defects Per Million Opportunity (DPMO), Six Sigma literature has defined it as many other different ways as: metric, methodology, philosophy, set of tools and so on. According to Muralidharan (2015), "*A Six Sigma initiative is a customer focused problem-solving approach with reactive and proactive improvements of a process leading to sustainable business practices. The sustainable business practices include innovation, improvement, competition, environmental compliance, customer satisfaction, and growth of the organization*"

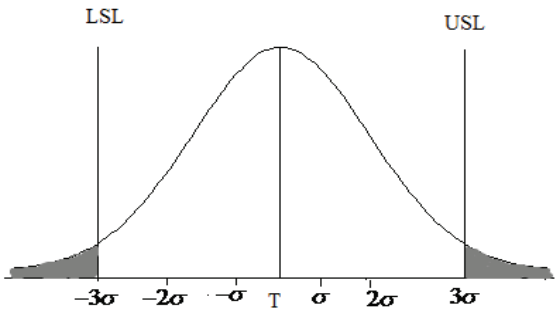
All these varied perspectives inspire us to dig down to understand more about Six Sigma. Six Sigma has now advanced to one more step ahead; in marketing and sales, with intense focus on improving revenue and thereby improving Return On Investment (ROI). This new scientific perspective of looking towards marketing function helps marketing managers to overcome audacity associated with marketing from so long and hence brings more credit to marketing function to increase cash flow. We now examine the different perspective of Six Sigma approach.

1.1. Different perspectives of Six Sigma

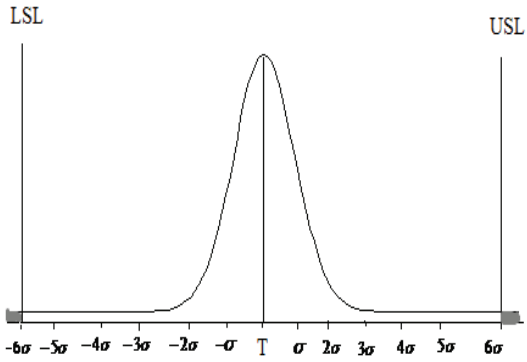
1.1.1. Six Sigma as a metric

Metric definition of Six Sigma is widely recognized as 3.4 DPMO to achieve high quality among product and services delivered to the customers. This metric based definition of Six Sigma achieves at most resemblance with Six Sigma nomenclature compare to other definitions. Metric definition of Six Sigma is based on treating variation as an evil to achieve higher level of quality. This definition aimed at keeping tight control over variation of parameters which are CTQ of the final product or service. According to this definition more variation among CTQs results into more heterogeneous finished product which ultimately leads to high defect rate. In order to keep defect rate as low as possible, it is important to keep variation of CTQs as low as possible.

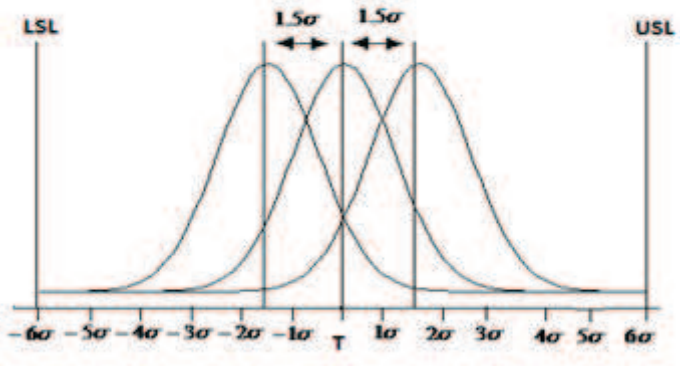
This form of Six Sigma was originated from conventional 3σ approach of Statistical Quality Control (SQC). According to this approach process target should be at the 3σ distance from the nearest specification limit as shown in Figure 1.1(a). Following this conventional approach to examine process variation results into 99.73% of the curve area falls under specification limit with 0.27% of area falling outside specification limits. This outside specification area results into 2,699 DPMO based on 3σ approach. Moreover, process mean shifts around targeted value over long run as shown on Figure 1.1(c). This results into 6.68% out of specification curve area with 66,807 DPMO.



(*a*) *Conventional 3σ approach*



(*b*) *Motorola's 6σ approach*



(*c*) *Motorola's 6σ approach with 1.5σ mean shift*

Fig 1.1. *Comparison between conventional 3σ and Motorola's 6σ approach*

Table 1.1. *DPMO based on different sigma level*

Specification limit	DPMO	
	Targeted distribution	**Shifted distribution**
$\pm 1\sigma$	317310	691462
$\pm 2\sigma$	45500	308537
$\pm 3\sigma$	2699	66807
$\pm 4\sigma$	63.34	6210
$\pm 5\sigma$	0.57	233
$\pm 6\sigma$	0.002	3.4

With focus to improve quality by 100 times within four years of duration from 1987 to 1991, Motorola initiated Six Sigma programme. Contrary to 3σ approach this Six Sigma approach focus upon reducing variation so much so that there is 6σ distance between process target and nearest specification limit. Motorola's 6σ approach is depicted in Figure 1.1(b). This dramatically reduced variation leads to 99.9999998% area of the curve within the specification limits. Only 0.0000002% area outside specification limits results into only 2 DPMO. This further increase to 3.4 DPMO due to process mean shift.

Even though process performance is examined through different SQC techniques like control charts, process mean shifts around target value over long run. Extensive discussion of this issue based on statistical tolerance analysis is found in literature. According to literature, process mean shifts over the range of 1.4σ to 1.6σ, with 1.5σ shift recommended for major processes. Although this is a contentious issue, scientists (Six Sigma professionals) have taken this for granted. In chapter 3, we provided a scientific justification to this shift and numerically evaluate the process shift.

1.1.2. Six Sigma as a methodology

Improving quality requires phase based process management structure that support high quality standards of end product or service. Six Sigma follow structured DMAIC (Define-Measure-Analyze-Improve-Control) methodology to streamline quality improvement efforts. Though promoted under the umbrella of Six Sigma, DMAIC is the generic improvement methodology that can be applied anywhere (Hoerl, 2004).

This DMAIC methodology originated from series of steps proposed by Walter A Shewhart during 1939 know as the "Shewhart Cycle". Shewhart proposed three step cyclic methodology (Shewhart, 1939) as shown in Figure 1.2(a) to manage mass production scientifically. "Shewhart Cycle" later on modified by Deming and eventually re-casted by Japanese as PDCA (Plan-Do-Check-Act) cycle (Kaizen, 1986) as shown in Figure 1.2(b).

(a) *Shewhart cycle*

(b) *Japanese PDCA (Plan-Do-Check-Act) cycle*

Fig 1.2. *Ancestors of DMAIC methodology*

DMAIC methodology of Six Sigma is generalization of PDCA cycle to manage processes scientifically. This DMAIC methodology provides framework to understand how to integrate various statistical tools for process improvement (Montgomery and Woodall, 2008). After each phase of DMAIC methodology there is a review process to examine performance of each phase. This review process is important to understand achievement of each phase and to maintain time schedule of project.

Six Sigma advocates DMAIC methodology to improve upon existing process. If process performance is so poor that it requires complete refusal of existing process and establishment of new process structure, or if new product or service is required then Six Sigma propose different methodology. This new methodology focuses upon with great embedded quality in process, product or service. Since it is important to focus on designing part of process, product or service, it is called DFSS (Design For Six Sigma) methodology. DFSS is also recommended when achieving higher sigma level is not feasible with existing process. DFSS

statistical tool kit includes different methods like design of experiment (DOE), response surface methodology, Taguchi methods etc.

1.1.3 Six Sigma as a set of statistical tools

One of the reasons that DMAIC is so successful is that it focuses on the effective use of statistical tools. Though all the previous SQC programmes used different statistical tools, Six Sigma has achieved unique position among quality improvement programme due to array of statistical tools used in different phases of DMAIC methodology. Six Sigma proposed extensive statistical tool kit to fulfil requirement of each phase of DMAIC methodology. Many authors have discussed non technical aspect of DMAIC methodology recently (George (2002), Snee (2010), Muralidharan and Raval (2017)). Guidelines for using statistical tools based on difference phases of DMAIC methodology is proposed by Muralidharan (2015) and Hahn (2005). Use of all these statistical tools in logical manner under the frame work of DMAIC methodology and thereby improving products and services gives Six Sigma the unique accent among other quality improvement programmes.

1.1.4. Six Sigma as a management philosophy

Genetic code of Six Sigma goes well beyond metric definition and DMAIC methodology of Six Sigma. Since Six Sigma evolves from statistical quality control, scientific management, and quality engineering, it is based on core scientific principle instead of rhetoric (Mast and Bisgaard, 2007). This scientific principle of Six Sigma is deep rooted in Francis Bacon's (1561-1626) idea of knowledge development. Bacon proposed knowledge generation follow as observation-axiom-law and hence knowledge generation is an interplay between inductive and deductive logic. In line with Bacon philosophy, Mast and Bisgaard (2007) and Muralidharan (2015) explained following tenet of Six Sigma philosophy:

- Improvement structure of Six Sigma is based on causal model,

$$Y = f(X_1, X_2, X_3 \ldots X_n) \tag{1.1}$$

  Here Y is Critical to Quality characteristic. To control quality of Y, we need to understand factors affecting performance of Y-called causal variables denoted by X.

Six Sigma resemble with empirical science based on developing this causal connection between variables.

- Development of this causal connection is based on iterative step of discovery and justification as shown in Figure 1.3 (Mast and Bisgaard, 2007). Discovery is based on developing hypothesis, ideas or conjecture based on observation. These theories are tested based on empirical evidence and hence justified through scientific method.

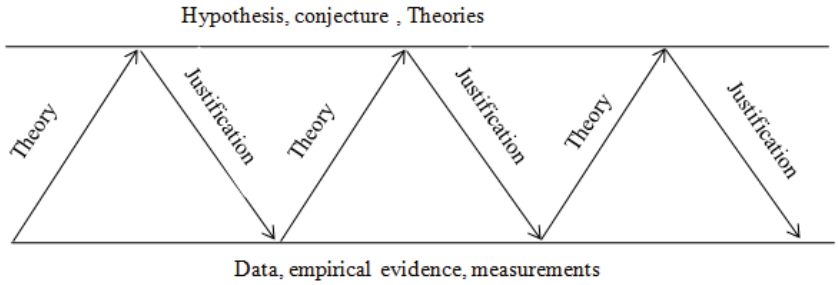


Fig 1.3. *Model of Scientific inquiry*

Six Sigma promote this theory-Justification based inquiry model at all level of organizational hierarchy. Defining research problem precisely, data base decision making and following each step of inquiry rigorously, these characteristics put Six Sigma at the higher cadre of quality improvement theories.

All the above explanation and perceptions about Six Sigma helps us to understand very nature of this scientific approach. However, Six Sigma as a quality improvement approach has progressed immensely in past few years. From structured manufacturing environment to service environment (George, 2000), from production to transactional business functions (Pestorius, 2007), from shallow defect reduction objective to holistic value creation objective (Montgomery and Woodall, 2008) – Six Sigma has undergone massive transformation.

To cope up with ever changing market scenario organizations required to manage each of their business functions effectively. Marketing has unique position of repute among all other organizational function with capacity to bring customers to the door step of the organization. Effective management of marketing function can put organization at competitive advantage in the market place. Still marketing is facing many challenges as a business function. As

mentioned by Aaker (2011) marketing is still required to improve based on following challenges:

- In the situation of market sluggishness, marketing has great responsibility to be innovative enough to create such an enhancement of offering that cannot be evaded by customers.
- Marketing has to be strategic instead of tactic through customer insights, value proposition and brand strategy.
- Getting rid of product, country and functional silos, marketing need to foster communication and cooperation instead of competition and isolation.
- Marketing need to inject energy and involvement into their brand to achieve brand equity.
- Marketing need to use different available tools such as digital platform and social media tactically.

This list of required changes offers great room for marketing function to improve its functionality. Improving effectiveness and efficiency of marketing function can help organizations to promote their offerings in much convincible way.

Six Sigma as a customer focused improvement approach addresses both the dimensions uniquely-being effective through unique value proposition in the market and being efficient by reducing variability of CTQ characteristics. These characteristics of Six Sigma are providing opportunity for its expansion over other areas well as other organizational functions except manufacturing. Different organizational functions are also marching towards applying this approach to improve upon their effectiveness and efficiency. As mentioned by Pestorius (2007), sales and marketing are the latest functions to join Six Sigma bandwagon.

Marketing as an organizational function has always been debated for its productivity and end results (Rust et al., 2004). Six Sigma with reputation of profit generations in manufacturing setup comes handy to marketing professional to address its productivity issues. Six Sigma as a data driven process improvement approach can help marketing to leverage its full potential to manage firm-offering-customer link profitably (Muralidharan and Raval, 2017).

Though Six Sigma is carrying reputation of sophisticated quality improvement programme, its integration with marketing has remained under explored field relatively. From years Six Sigma and marketing professionals are working in isolation, with no motivation of

integration between two fields. This is largely because of marketing manager's conventional understanding about Six Sigma as "*it is for production*". On the other hand realizing potential of Six Sigma, Six Sigma experts are ready to explore new horizon of Six Sigma implementation. These fanatical efforts to integrate both the fields have given rise to novel vibrant field of Six Sigma Marketing (SSM). This thesis offers a critical yet comprehensive account of SSM as a new area of application of Six Sigma. While embarking the SSM concepts further in various chapters, we would be answering the following questions from an academic perspective:

- What is Six Sigma for Marketing?
- Why we need Six Sigma for Marketing?
- Why examining sigma level is important in SSM?
- How SSM can be applied to a market case?
- How SSM can be used as a tool for sustainable business practice?

1.2 Literature Survey

Extensive literature survey has been done to understand current status of Six Sigma and marketing fields as well as to understand their history. Around 250 resources have been reviewed to get profound knowledge of subject matter. Major referred resources includes: Journal articles, Books, Magazine articles, report, conference proceedings. Our objective is not to study the concept of Six Sigma and marketing independently as both of them up to some extent are matured enough. However, to set the study in good perspectives, we need to look at them separately and then based on identified significant components, we propose the integrating structure of these two practices.

To understand recent practices of both the fields' information from reputed sources like Forbes, American Marketing Association, Quality Progress, iSixSigma are also collected. Literature review for Six Sigma has been done based on its definition, concept of sigma shift, major components of Six Sigma approach, Lean Six Sigma etc. The summary of major studies and publication as per our literature survey are presented in Table 1.2.

Literature review of marketing is done based on understanding very nature of marketing field with reference to different definitions, current marketing scenario, value based marketing, digital marketing etc. Major studies of the marketing field are shown in Table 1.3.

Table 1.2. *Six Sigma Literature review*

Six Sigma elements	Remarkable studies	Major journals and magazines
Defining Six Sigma	Mast and Bisgaard (2007), Montgomery and Woodall (2008), Schroeder et al., (2008)	• International Journal of Six Sigma and Competitive Advantage • Harvard Business Review • Quality and reliability engineering international
1.5σ shift	Bender (1968), Kuo and Tsai (2011), Buckingham (1921), Mansoor (1963), Raval and Muralidharan (2016)	• International Journal of Production Research, • Manufacturing Review • International Journal of Computational Mathematics and Numerical Simulation
Six Sigma components identification	Hahn et al.,(1999) Moosa and Sajid (2010), Raisinghani et al.,(2005)	• American Statistician • The TQM magazine • Measuring Business Excellence • Journal of Applied Statistics • Quality progress
Application of Six Sigma in service sector	Biolos (2003), Does at el., (2002), Antony et al., (2007), George (2000)	• Quality Engineering • International Journal of Quality and Reliability Management • Havard Management Update
Lean Six Sigma	Chugani et al. (2017), George (2002), Zamri et al., (2013)	• International Journal of Lean Six Sigma • Business Management and Strategy

The review of literature from both the fields have helped to conceptualize integration between them based on theoretical and application ground. We also came across some important but limited books on Six Sigma Marketing and its concept. These literatures are as follows:

- Sales and Marketing: The Six Sigma way by *Webb and Gorman (2006)*: In this book author proposed process based Six Sigma approach with its utility in marketing, where the authors demonstrate Six Sigma application in marketing based on improving performance of a company's website named Technical Resume Group (TRG).
- Six Sigma Marketing: From cutting costs to growing marlet share by *Reidenbach (2009)*: In this book author discussed about value based Six Sigma Marketing

approach. Author propose different Six Sigma tools and their usage with reference to customer value management.

- Applying the science of Six Sigma to the art of Sales and Marketing by *Pestorius (2007)*: In this book author discuss data based Six Sigma approach in different marketing activities like recruitment of sales person to maintaining sales effectively.
- Six Sigma for marketing process: An overview for Marketing Executives, Leaders and Managers by *Creveling M. C.,Hambleton L. and McCarthy B. (2007)* : In this book author discuss Six Sigma application at three levels of marketing, Strategic, tactical and operational. For all these levels their gate and termination point with intermediate steps are discussed. Tools used in all process steps are discussed in details.

Table 1.3. *Marketing Literature review*

Marketing elements	**Remarkable studies**	**Major journals and magazines**
Defining marketing	Kotler and Levy (1969), Shaw (2015), Wilkie and Moore (2003), Zinkhan and Williams (2007)	• Journal of marketing • Journal of historical research in marketing • Journal of public policy and marketing
Changing marketing paradigm	Aijo (1996), Hoffman and Novak (1997), Grönroos (1996), Snow (1997)	• European Journal of marketing • Management decision • The information society • Journal of the Academy of Marketing Science
Value based marketing	Almquist et al., (2016), Sheth et al., (1991), Woodruff (1997), Gro¨nroos (2004)	• Harvard Business Review • Journal of Business Research • Journal of Consumer Research • Industrial marketing management

Due to exploratory nature of this topic, very few academic articles have been published on this topic. Few remarkable studies in the form of article are by Salzarulo and Krehbiel (2012), Niemes (1999), Das et al. (2006), Muralidharan and Raval (2015) and the references contained therein.

1.3 Six Sigma Marketing: The idea

Six Sigma Marketing (SSM) is defined as a fact based data driven disciplined approach to growing market share by providing targeted product/markets with superior value (Harry, 2000; Pestorius, 2006; Creveling et al. 2007). SSM for marketing and sales are relatively new approaches to enable and sustain growth. Some of the other specific objectives of SSM are,

- Influencing customers in such a way that it would motivate them to opt for the offered products or services.
- Six Sigma seeks to remove the randomness from marketing and make it systematic and predictable.
- A process that can allow an organization to concentrate its limited resources on the greatest opportunities to increase sales and achieve a sustainable competitive advantage.
- Activities making sure that organization are continuing to meet the needs of their customer and are getting appropriate value in return.

SSM enables companies to improve the marketing's strategic, tactical and operational processes as a way to enhance the top line to drive revenue (Creveling et al., 2007). By applying Six Sigma to marketing, organizations can identify leading indicators of growth and become proactive about performance improvement (Muralidharan, 2015).

However, organizations need SSM as

- Marketing and sales professionals and quality professionals both focus the value of the customer, thereby uniting a common platform for quality and productivity improvement.
- Quality professionals help their company to do more of what adds value for customers, thereby committing to the quality function deployment.
- Marketing and sales professionals make customers aware of that value, guide them to purchase it, and then deliver as much of that value as possible to as many customers as possible.

The benefit of integrating Six Sigma into marketing processes includes better information (management by fact) to make better decisions. This kind of robust approach reduces the uncertainty inherent in marketing and thereby create a creative, dynamic discipline in the marketing. A marketing methodology should also facilitate the customer-product-financial linkages. This requirement seeks a comprehensive scope of marketing's responsibilities from offering inception, through offering development, to the customer experience. This comprehensive scope encompasses a business's strategic, tactical, and operational aspects (Creveling et al., 2007).

1.4 Rationale of the study

Literatures available in Six Sigma Marketing (SSM) focus on integrating two fields Six Sigma and marketing based on tactics. That is proposing different ways and means to integrate between Six Sigma and Marketing based on practices. What is lacking in SSM studies so far is thorough understanding of both the fields based on their philosophical insights. To propose integration between two fields it is important to understand their building blocks. None of the study so far has addressed integration between Six Sigma and Marketing from a customer's productivity point of view.

Providing historical explanation of both the fields helps practitioners to understand tenets of current phase of Six Sigma and Marketing. This intern provides them great zeal to recognize opportunity to integrate these two fields – Six Sigma and Marketing. Managing marketing function based on perceived customer value is the key to success in today's market. Keeping in mind this changing marketing scenario and need of improving marketing effectiveness, this study also propose value based marketing model with reference to digital scenario. Therefore, we experiment a case study (see chapter 7) of a company and apply SSM tools and provide the critical parameters involved in improving the organizational productivity and efficiency.

SSM academic studies are largely based on sound theoretical arguments but lagging behind making connection with practice. Along with sound theoretical arguments, this study also includes empirical study to support its argument. Hence, this chain of historical view of concepts-contemporary practices-empirical case study makes this work enriching for

academicians as well. Hence, we feel that the contribution of this study will be an add-on to the existing literature.

1.5 Research objectives

The objective of this thesis is to scientifically ground the methodological aspects of Six Sigma Marketing. Proposing this methodological aspect of Six Sigma Marketing is further divided into following research questions:

- Integration between two different fields should propose value addition to the practitioners as well as researchers from both the fields. Any integration should have practical relevance without losing sight of thorough understanding of both the fields. To address this objective this thesis proposes continuous thread of review from philosophical to tactic level of understanding of both the fields.
- Proposing integration between two fields requires thorough understanding of elements constituting these fields and how they can contribute to possible integration between two fields. This objective has been addressed through examining building blocks of Six Sigma and marketing thoroughly in this thesis.
- To make study functional for academicians as well as practitioners it is important to provide theory-practice linkage. With reference to this objective this study is proposing empirical case study based on theoretical grounding and most recent marketing practices.

1.6 Organization of the study

Whole study is divided into ten chapters based on the following scheme:

Chapter 1 is a detailed introduction of the study with importance of expanding application of Six Sigma to transactional functions like marketing and sales. An extensive literature survey is done to get holistic perspective of Six Sigma and marketing fields. Different perspectives of Six Sigma definitions like metric approach, methodological approach and philosophical approach are discussed. Marketing too is discussed with reference to transactional approach, relationship approach and total customer experience approach. Based on extensive literature

review and based on our perspectives the objectives of the study are prepared and will be embarked in the successive chapters one by one.

In **Chapter 2** general perspectives of Six Sigma Marketing are discussed. Criteria for effective Six Sigma project selection with effective model proposition are discussed in this chapter. Two interconnected approaches namely probability model and regression model are discussed to explore causal system projected by Six Sigma philosophy. Critical evaluation of Six Sigma projects through different methods like Program Evaluation and Review Technique (PERT), Critical Path Method (CPM), Matrix based methods and system dynamics etc are discussed. Output of this chapter is published in Muralidharan and Raval (2013).

Chapter 3 discusses about 1.5σ shift, which is an important part of metric based Six Sigma definition. The 3.4 DPMO in Six Sigma definition is based on long term sigma level of the process. Also estimation of process standard deviation is the important part of understanding sigma shift. Hence, different methods to estimate process standard deviation are also discussed. Finally we discussed the necessity of marketing sigma level of the process. Output of this chapter is published in Muralidharan and Raval (2012) and Raval and Muralidharan (2016).

Chapter 4 discusses different components for successful implementation of Six Sigma and marketing. Components contributing significantly to the existing fields of Six Sigma and marketing are discussed in this chapter. Based on these components integrating factors between two fields has been identified with reference to current digital era. Considering contemporary environment of digital marketing, a SSM model with unique phases is proposed in this chapter. Output of this chapter is sent for publication (Muralidharan and Raval, (2016), Raval, Neha, and ,Muralidharan, K. (2017a)).

Chapter 5 of this thesis highlight productivity improvement through SSM. This chapter guide marketing professionals to look at marketing problem with reference to phase based methodology. DMAIC methodology for SSM is explained in this chapter. Managing each phase of DMAIC methodology through different types of metrics is explained in this chapter. Output of this chapter is published in Muralidharan and Raval (2017).

Chapter 6 discusses Lean Six Sigma (LSS) approach as a combination of Lean and Six Sigma approaches. Improving effectiveness of marketing through Six Sigma approach and

efficiency through Lean approach is discussed with reference to current environment sustainability crisis. Implications of LSS approach with reference to green perspective are discussed in this chapter. Contribution of LSS in attaining environmental sustainability is the major focus of this chapter. Output of this chapter is published in Muralidharan and Raval (2015) and an article is communicated for publication Muralidharan and Raval (2017a) .

SSM model proposed in Chapter 5 is backed by empirical case study in **chapter 7**. An empirical case study of India based travelling company – Divine Voyage Club (DVC) is demonstrated in this chapter. How the company used SSM model to leverage their marketing efforts through data based Six Sigma approach is explained in detail in this chapter. Unique matrices based on digital environment to manage marketing activity are demonstrated in this chapter. Output of this chapter is communicated for publication Muralidharan and Raval (2017b)

Some promotional issues related to SSM are discussed in **chapter 8.** Success of any marketing efforts is based on their effective promotional strategy. How to target right customer with right type of promotion based on SSM approach is discussed in this chapter.

Based on aspects discussed in previous chapters **chapter 9** propose some quality guideline to marketing professionals. Major ingredients of successful integration between these two fields are detailed in this chapter. Some prescription to manage quality of marketing efforts is propose to the marketing professionals. An article is communicated for publication (Muralidharan and Raval, 2017d)

Chapter 10 propose concluding remark and a discussion based on whole study. Take away for Six Sigma and marketing professionals from this study is discussed in this chapter. Limitations and further research questions are proposed in this chapter.