

# SIX SIGMA - LITERATURE REVIEW AND IMPLICATIONS FOR FUTURE RESEARCH

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**Abstract** - Since its inception at Motorola, Six Sigma has been widely adopted by many different types of organizations. The effectiveness of Six Sigma is well supported by evidence. However, academic research on Six Sigma is still in its early stage. This paper first reviewed the current literature on Six Sigma, and then performed a critical analysis of Six Sigma in light of the management literature. The review and analysis suggested that Six Sigma is best defined as a new approach to quality management. Consequently, Six Sigma provides an interesting context for a number of research questions. This study laid a foundation for future research on Six Sigma.

**Key Words** - Six Sigma, literature review, future research

## 1. INTRODUCTION

Six Sigma is a statistical concept that measures a process in terms of defects. Achieving "Six Sigma" means your processes are delivering only 3.4 defects per million opportunities (DPMO) - in other words, they are working nearly perfectly. Sigma (the Greek letter  $\sigma$ ) is a term in statistics that measures standard deviation. In its business use, it indicates defects in the outputs of a process, and helps us to understand how far the process deviates from perfection. The central idea of Six Sigma management is that if you can measure the defects in a process, you can systematically figure out ways to eliminate them to approach a quality level of zero defects.

### 1.1 History of six sigma

Six Sigma was invented at Motorola in the 1980s. The invention was motivated by the high cost of poor quality discovered at Motorola. Like many companies at that time, it was as high as 15% to 20% of the sales revenue. The production processes had low capability. A large portion of the products failed to meet customer requirement. This led to scrap, rework, field service, or return or recall if the product has been already shipped to the customers. Obviously, if Motorola can improve its process so that very few defective products are produced, the cost of poor quality can be reduced significantly. This will directly contribute to Motorola's bottom line. Motorola engineers hence proposed the concept of Six Sigma, which means achieving a quality standard of less than 3.4 defects per million opportunities. Motorola enjoyed the success brought by Six Sigma. Consequently, Six Sigma was promoted to many Fortune 500 companies in the 1990s where it also helped them achieve

significant results. At the same time, Six Sigma also went through significant evolution.

## 2. PREAMBLE TO LITERATURE REVIEW

The authors have reviewed various research papers from various international journals and have made both hard copies search in established libraries and electronic search in World Wide Web. During classification the papers in various categories, authors have found that, few papers were representing more than one category.

### 2.1 Objective of literature review

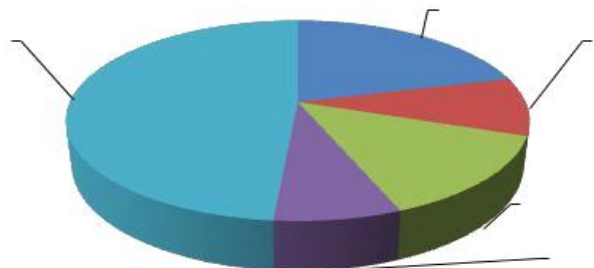
To update the database and to ensure that it contains literature as current as possible, Arranging the publications in an orderly manner to enable easy and quick search, Classification of literature based on Research methodology, content, journal, year and further sub classification, Scrutiny of the outcome of the papers, Identifying gaps and providing hint for future research.

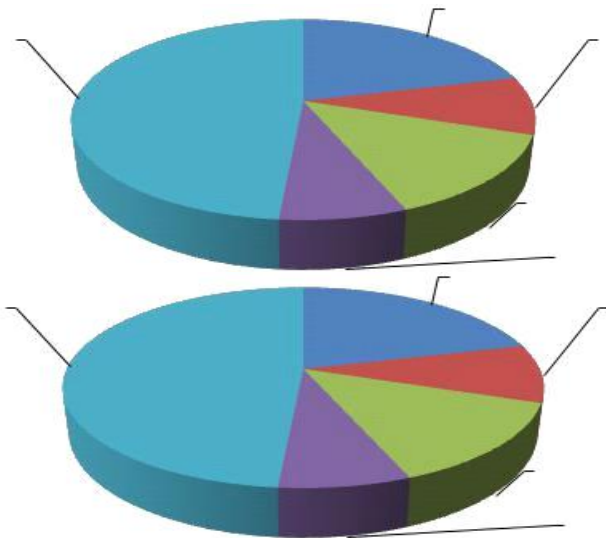
## 3. CLASSIFICATION OF SIX SIGMA LITERATURE

The classification scheme proposed in this paper includes a categorization of publications that highlights the growth of literature from time to time. The authors have classified Six Sigma literature based on the criteria of research methodology as well as research contents.

### 3.1 Classification Of Literature Based On Research Methodology

Based on research methodology Six Sigma papers have been classified in five categories as case studies, conceptual papers, literature review, general review and research papers (fig.1)





Literature 7%

### 3.2 Classification of Six Sigma literature based on research contents

Based on research methodology, Six Sigma papers have been classified into six types – six sigma general aspects and fundamental, six Sigma applications in manufacturing organizations, Six Sigma applications in service organizations and Six Sigma project selection & implementation strategies and Six Sigma linkage with other quantity.

### 4. CONCLUSION AND AREAS FOR FUTURE RESEARCH

The objective of review was to understand the status of Six Sigma as on yesterday, today and tomorrow. Six Sigma research has scattered in a wide range across various journals domains and fields has attracted the attention of academics and practitioner. During last decade, Six Sigma has achieved a reasonable maturity and there has been substantial contribution made in Six Sigma framework to extend application from manufacturing to services context.

Based on the literature review presented in the paper, we identify following directions of future research:

1. There has been a considerable research on Six Sigma fundamentals in last decade. Instead of discussing much about the Six Sigma basics and comparison of Six Sigma with other quality initiatives, more focus should be on how to integrate other quality efforts in to Six Sigma to achieve quantum gains.
2. There is a need to have more case studies clearly presenting the application of Six Sigma within each domain in a proposed framework.

3. More research is to be conducted on user experiences reflecting pros and cons of Six Sigma in such context.

4. There is great potential for research on Six Sigma and its linkages with other initiatives, Six Sigma and Statistical thinking, Six Sigma in Supply Chain Management.

### 5. REFERENCES

1. Antony, J., Kumar, M., Tiwari, M.K. An application of Six Sigma methodology to reduce engine - overheating problem in an automotive company, Proceedings of the Institution of Mechanical Engineers.
2. Awad, M.I., Ewing, A., Sedlak, G., Yi, T., Shanshal, Y. Track roller and idler design improvement using DFSS. *Int. J. of Six sigma and Competitive Advantage*, (2009). 5(1):29-4