Chapter 13
Software Quality Initiatives: An Empirical Study of Indian SMEs in the IT Sector

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ABSTRACT
Through extensive research into the area of quality management practices, such as ISO (International Standard Organization), Six Sigma has been observed within small and medium-sized enterprises (SMEs). Few empirical studies have reported the application of Six Sigma in SMEs, especially in software developing SMEs. The reasons can be attributed to complex issues associated with Six Sigma, as well as cost and time constraints. This paper assesses the current status of quality management practices in software developing SMEs. A survey-based approach was used to understand the conventional quality management practices in software SMEs. The data was collected from 230 respondents in 23 software developing SMEs in National Capital Region (NCR) of India. The respondents involved all three managerial levels and statistical results reflect the non-realization of quality management practices in software development. The SMEs under study were aware of the importance of quality management practices but had not implemented the same in the organization which is one of the basic requirements for the success of any software.

1. INTRODUCTION
This research work investigates the application of Six Sigma in software developing small and medium-sized enterprises (SMEs) in India. There are several models for software quality assurance, such as the Capability Maturity model Integrated (CMMI), the Software Process Improvement and Capability dEtermination (SPICE) and the ISO 9000 norms from the International Standardization Organization, TickIT, and Six Sigma. Unfortunately, the successful implementation of such models is usually not feasible.

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Developing software to meet practical needs with satisfactory levels of quality, within given time period and budget is target of every organization engaged in software development. Software quality may be described as a paradigm that comprises several concepts (McManus, 2000). The first of these concepts relates to defining the software process to be improved. Defining the process means that all the activities to be performed have to be clearly stated, including the order in which they are to be performed and when they are considered complete. The second concept relates to using software processes – to improve the quality of a process it needs to be used on many projects. Quality comes with experience. The third concept is that of metrics, which should be collected to determine if changes incorporated into the process, are really improving. Most of the software development organizations follow best practices of software development, i.e., CMM (CMMI), Six Sigma, ISO 9001, and TickIT.

Six Sigma is more of a philosophy than a model. It concentrates on measuring product quality and improving process engineering. Six Sigma methodology suggests Define, Measure, Analyze, Improve and Control (DMAIC) as the basic steps to process improvement. The model is applicable across the industries. It has also been adopted in software industry and shown encouraging results.

However, it is assumed that the poor adoption of quality management initiatives in SMEs is due to multiple and complex reasons, not just the often stated impediments of cost, time and relative impacts (Gome, 1996). There is also evidence to put forward that quality management programs are not being taken up by SMEs for several reasons, as cited in literature (Husband & Mandal, 1999; Yusof & Aspinwall, 1999; Thomas & Webb, 2003; Antony et al., 2008).

- SMEs find it difficult to distinguish between different quality programs like Six Sigma TQM, ISO and the system that go well with their needs.
- SMEs, due to lack of knowledge, are imprecise about the advantages that one quality initiative has over the other.
- There is misunderstanding that Six Sigma involves voluminous data.

Six Sigma approach of quality improvement identifies and removes defects. This approach has many success stories in large organizations which has grossly improved the performance, quality of products and customer loyalty (Antony et al., 2005, 2008; Kumar et al., 2006). However, continuous quality improvement initiatives like Six Sigma is not properly understood by SMEs thus the reason SMEs are yet to implement Six Sigma and hence devoid of the benefits of Six Sigma (Kumar, 2007). It is observed that there are many reasons of non-implementation of Six Sigma in SMEs as cost, time, poor knowledge about the advantage of Six Sigma, better understanding of ISO standards and less evidence of success stories in Six Sigma in SMEs.

The research aims at the study of awareness and implementation of Six Sigma as quality management initiative in software developing SMEs in IT (Information Technology) industry. The Indian IT industry is segmented into IT Services, ITeS-BPO (Information Enabled Services-Business Process Outsourcing), Engineering Services and R&D, Software Products and Hardware. The overall growth rate of these segments is 27.8%. Table 1 shows segregated view of revenue of each segment of IT industry, from 2004-2010. According to NASSCOM (National Association of Software & Services Companies) strategic review 2007, 2008, 2009, 2010, the Indian IT-BPO industry would grow at a CAGR (Compound Annual Growth Rate) of 25% and exports of about US $88.1 billion by 2011.

For the research this industry has been chosen because SMEs accounts for more than 15% of India’s GDP (Gross Domestic Product), 35% of India’s total exports, 95% of total industrial units, 40% of India’s industrial output and provides...

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