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Six Sigma programs: An implementation model

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ABSTRACT

Despite the pervasiveness of Six Sigma program implementations, there is increasing concern about implementation failures. One reason many Six Sigma programs fail is because an implementation model on how to effectively guide the implementation of these programs is lacking. Using a successful Six Sigma program in a Network Technology company, the purpose of this research is to develop an effective implementation model which consists of six steps. The first step is to perform strategic analysis driven by the market and the customer. The second step is to establish a high-level, cross-functional team to drive the improvement initiative. The third step is to identify overall improvement tools. The fourth step is to perform high-level process mapping and to prioritize improvement opportunities. The fifth step is to develop a detailed plan for low-level improvement teams, and the sixth step is to implement, document, and revise as needed. Important for both practitioners and academicians, implications of our implementation experience along with directions for future research are provided.

1. Introduction

Many characterize Six Sigma programs as the latest management fad of improvement tools and techniques (e.g., Watson, 2006). It is well known that Six Sigma programs involve a host of critical decisions and many researchers have contributed to the existing literature. For example, Schroeder et al. (2008) have identified many critical decisions or elements of Six Sigma programs such as management involvement, improvement specialists, performance metrics, a systematic procedure, and project selection and prioritization. Six Sigma programs improve operational performance in order to enhance customer satisfaction with a company's products and services (Rajagopalan et al., 2004). Over the years, many companies, such as General Electric, Allied Signal, Raytheon, and Delphi Automotive have implemented Six Sigma programs (Treichler et al., 2002), and claimed that these programs have transformed their organizations. Six Sigma programs are heavily promoted in practitioners' books on Six Sigma (e.g., Harry and Schroeder, 2000), and in academicians' books on Operations Management (e.g., Jacobs and Chase, 2008). The American Society of Quality[1] offers Six Sigma certifications; major corporations (e.g., General Electric Company, 2005) provide Six Sigma training, and a plethora of websites[2] advertise Six Sigma solutions.

Despite the immense popularity and the wide-spread adoption of Six Sigma, there is an increasing concern across industries regarding the failure of Six Sigma programs. One reason many Six Sigma programs fails is because an implementation model detailing the sequence of Six Sigma elements/activities is not available. The existing literature identifies many elements of Six Sigma

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[1] www.asq.org.
[2] www.isixsigma.com.

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which does enhance our understanding of Six Sigma programs. However, the success of Six Sigma programs hinges on the sequence of many Six Sigma elements/activities or a model for implementation. To put it differently, it is well known that one needs many ingredients for Chicken Curry. However, in order to cook a delicious Chicken Curry, according to Jaffery (2003), the recipe requires a sequence of ingredients/activities (e.g., heat oil, fry onion and garlic, add Indian spices, put in chicken, pour water, and let it simmer). Any unreasonable deviation from the recipe will lead to less than positive experience. In the absence of a recipe or a model, it is not surprising that many implementations of Six Sigma programs have failed. A survey of aerospace companies concluded that less that 50% of the respondents were satisfied with their Six Sigma programs (Zimmerman and Weiss, 2005). Another survey of healthcare companies revealed that 54% do not intend to embrace Six Sigma programs (Feng and Manuel, 2007). Companies such as 3M and Home Depot were not satisfied with their implementation of Six Sigma programs (Hindo, 2007; Hindo and Grow, 2007). Considering this, many authors question the return on investment of Six Sigma programs (e.g., Gupta, 2008). The real question is not whether Six Sigma programs have value, but why do so many Six Sigma programs fail? One reason many Six Sigma programs fail is because we lack a model on how to effectively guide the implementation of these programs (Wurtzel, 2008).

Using a successful Six Sigma program in a Network Technology company, the purpose of this research is to develop a model to effectively guide the implementation of these programs. In the next section, we provide the theoretical underpinnings of a Six Sigma implementation model. Following a description of our research methodology, we present our Six Sigma implementation experience. Then, we provide implications of our implementation experience including directions for future research. Finally, we provide the conclusion of our research.

2. Literature review

2.1. Six Sigma

Over the years, many researchers have studied Six Sigma programs and identified many critical decisions of these programs. For example, see the previous research of Antony and Banuelas (2002), Coronado and Antony (2002), Lakhavani (2003), Lynch et al. (2003), Mcadam and Evans (2004), Gijo and Rao (2005), Szeto and Tsang (2005), Ladani et al. (2006), Savolainen and Haikonen (2007), and Davison and Al-Shaghana (2007). Recently, Zu et al. (2008) studied the evolving theory of quality management and the role of Six Sigma. While defining Six Sigma programs and uncovering the underlying theory, Schroeder et al. (2008) identified five elements of these programs. First is management's involvement in performing many Six Sigma functions, such as selecting improvement specialists, identifying project selection, and facilitating Six Sigma implementation (Gitlow and Levine, 2005; Snee and Hoerl, 2003). Antony et al. (2007) emphasize management's involvement in on-going projects for sustainability of Six Sigma programs. Second, improvement specialists are trained or hired at different Sig Sigma competency levels (e.g., Black Belt or Green Belt). Their primary responsibility is to provide technical expertize and leadership in facilitating a specific Six Sigma implementation (Pyzdek, 2003). Third, as Keller (2005) points out, Six Sigma programs have performance metrics and measurements based on cost, quality, and schedules. Fourth, Six Sigma implementation uses a systematic procedure; a five-step DMAIC (Define, Measure, Analyze, Improve, and Control) methodology. A detailed description of DMAIC methodology can be found in Pyzdek (2003) or Keller (2005). Fifth, project selection and prioritization is an important element of Six Sigma programs. The prioritization of projects is determined by many criteria, such as a cost benefit analysis or the Pareto priority index (Banuelas et al., 2006).

While we are familiar with many elements of Six Sigma programs, we lack an understanding of the sequence of these elements/activities, or a model for effectively guiding the implementation of these programs. Because there is no implementation model, practitioners have encountered tremendous difficulty in implementing these programs, and there are reports of wide-spread Six Sigma failures. Zimmerman and Weiss (2005) found that less than 50% of the survey respondents from aerospace companies expressed satisfaction with their Six Sigma programs. Mullavey (2005) described the top 10 reasons why Six Sigma implementations fail. Berg (2006) reported that their Six Sigma program was expensive and did not yield expected results. Concerned about Six Sigma's problems, Sutton (2006) described nine ways to get the best out of Six Sigma programs. A national survey of Six Sigma programs in healthcare companies revealed that 54% do not intend to embrace Six Sigma programs (Feng and Manuel, 2007). At 3M, a Six Sigma program that was not correctly implemented almost stifled their creativity and innovation (Hindo, 2007). Home Depot's Six Sigma program negatively affected employee performance, and yielded Home Depot's worst Consumer Satisfaction Index ranking (Hindo and Grow, 2007). Angel and Pritchard (2008, p. 41) reported that "nearly 60% of all corporate Six Sigma initiatives fail to yield desired results…". According to Gupta (2008, p. 22), at times, Six Sigma "…improvement programs cost more than the improvement they drive because of incorrect application…". While reporting cash flow problems of Six Sigma programs in small companies, Foster (2007, p. 19) claims that if these programs are not "skillfully implemented; the benefits of Six Sigma may be marginal". According to Chandra (2008), one reason Six Sigma programs fail is because these programs are not correctly implemented.

2.2. Implementation model

As discussed before, a model for effectively guiding the implementation of Six Sigma programs is not available.