The Road towards Lean Six Sigma: Sustainable Success Factors in Service Industry

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ABSTRACT

It has been widely investigated that the application of operations management techniques is not only based on technical factors, but it is mainly associated with organisational factors such as culture, previous polices and procedures, etc. A prime example of promising operations practices is Lean Six Sigma (L6σ). The main research question for L6σ is related to its liabilities and constraints regarding its implementation. Therefore, this paper aims to explore the critical factors related to the application L6σ. The context of the analysis is service industry since it seems that it has been neglected from the literature that mainly focuses on manufacturing. The methodology was based on the qualitative exploration of three case studies from the service industry. Secondary data were collected through an analysis of companies’ documents, written procedures and quality assurance policies and primary data were collected through a number of in-depth face-to-face interviews with managers and quality experts. The findings show that there are ten (10) particular factors that influence the implementation of L6σ in service organizations.

Keywords: Lean Six Sigma, Sustainable Success Factors, Managers, Case-studies, Service Industry
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1.0 Introduction

Traditional management tools and mentalities cannot cope effectively and efficiently with current business demands (Itkin, 2008; Chee, 2008). This is the reason that large industrial entities continuously develop and implement management tools and systems (Saravanan, 2006; Chang, 2006). However, whether organizations in different sectors and different places with different cultures can really adopt promising quality management practices is still under investigation. A prime example of such promising practices is Lean Six Sigma (L6σ) which is a synthesis of Six Sigma and Lean Manufacturing/Management. Similar to other management tools, the main question for L6σ is related to its liabilities and/or constrains regarding its implementation in different organizational and sector contexts. It has been widely investigated that the application of operations management techniques is not only based on technical factors, but it is mainly associated with organisational factors such as culture, previous polices and procedures, etc (Hope and Mühlemann, 2001; Noronha, 2003; Ayoob, et al., 2003; Psychogios & Wilkinson, 2007).

In this respect the purpose of this paper is to explore the critical factors related to the application of Lean Six Sigma (L6σ). The context of the analysis is service industry since it seems that it has been neglected from literature of L6σ that mainly focusing on manufacturing industry (Psychogios et al, 2012).
2.0 Literature Review

Lean Manufacturing (LM) involves the speed of the process and how products can be delivered quicker to customers by eliminating waste and also by using fewer materials in the actual assembly of the products (Cooper, 2008; Lane, 2008). Additionally, Six Sigma ($6\sigma$) is a quality improvement method that seeks to eliminate variations in the production process that can be measured, controlled and improved by applying statistical process control (Chang-Tseh, 2007). Beyond the positive results that can be achieved, LM cannot bring a process under statistical control, while $6\sigma$ alone cannot dramatically improve the speed of the production process and reduce invested capital (Carreira, 2005). A combination between the two methods is required. The two concepts are complementary (Ferguson, 2007). In this respect, L6$\sigma$ concept emerged as a balanced approach between the two concepts, attempting to create a synergy between their functionalities (Arnheiter et al, 2005; Ferguson, 2007) and create extra value to organizations. In other words, L6$\sigma$ integrates $6\sigma$ and LM processes, where lean aims on cycle time and waste elimination while $6\sigma$ seeks to eliminate defects and reduce variation (Lubowe and Blitz, 2008).

L6$\sigma$ methodology is not a standardized procedure so it can be used in various sectors. Also, according to the literature (Pande, et al. 2000; Cross, 2007; Druechslin, 2007) there are variety of methods used in order to apply the L6$\sigma$. Also, There are several sectors and industries where L6$\sigma$ has been applied. However, most of the examples are coming from the manufacturing, although there are some cases from the service industry as well (Naslund, 2008; Byrne et al, 2007; Brett and Queen, 2005).

Beyond the above evidence, there is a growing literature attempting to investigate the factors that influence the application of this practice. In particular, according to Psychogios et al (2012) there are both institutional and contextual factors. Also, these factors could be categorized into generic that applied in all types of organizations and sectors, as well as in organisational-specific (corporate culture, national mentality and working habits, particular PMS, quality system) and in industry-specific (services or manufacturing). Finally, the factors that that have a positive impact on the implementation of L6$\sigma$ are the facilitators, while the ones that present barriers to successful implementation are the inhibitors (Psychogios et. al, 2012). Another, classification can be emerged from the distinguish of these factors into management-oriented and people-oriented (Psychogios and Tsironis, 2012). In particular, management-oriented factors include the integrating L6$\sigma$ with business strategy (Lubowe and Blitz, 2008; Fornari and Maszle, 2004; Antony et al., 2007; Kamensky, 2008), selection and management of the right project (Antony et al., 2004; Laosirihongthong et al, 2006; Ladhar, 2007; Breyfogle, 2008), and customer satisfaction (Antony et al, 2003; Antony et al., 2007; Andel 2007; Lubowe and Blitz, 2008). The people-oriented factors include Committed leadership (Laosirihongthong et al., 2006; Maleyeff, 2007; Stuenkel and Faulknner, 2009; Carleysmith et al., 2009; Ladhar, 2007), Quality-driven Organizational Culture (Furterer and Elshennawy, 2005; Maleyeff, 2007; Lubowe and Blitz, 2008; Koning et al., 2006; Koning et al., 2008; O’Rourke, 2005), training (Anthony et al., 2003; Ladhar, 2007; Caldwell, 2006; Antony et al., 2004; Delgado et al., 2010), teamwork (Neuhaus and Guarraia, 2007), and Supportive Technical systems (Kamensky, 2008).

In short, there is some literature that suggests factors like leadership, strategic orientation, teamwork, technical approaches (metrics-systems), and training will probably affect L6$\sigma$ application. All the above are complemented by a strong organizational culture which emphasises on quality improvement and customer satisfaction. However, the in-depth exploration of the interrelationship of these factors seems to be neglected by the literature. In other words, there is not yet an attempt to develop an integrated framework that can contribute to our understanding regarding the implementation phase of L6$\sigma$. Also, the majority of the above factors have emerged from studies conducted mainly in manufacturing industry, while service industry seems to have neglected. Therefore, there is a need to explore further the application of the above factors in service context. In this respect, the present study attempts to expand our understanding regarding the factors influencing the application of L6$\sigma$. 
3.0 Research Methodology

A multiple case-study research approach was adopted as the most appropriate methodology for the exploratory nature of the study (Voss et al., 2002; Nonthaleerak and Hendry, 2008). In particular, a multiple case-study deployed comparison of events and data across cases mitigates usual case research risks, augments external validity and provides opportunity for bringing more generic conclusions (Voss et al., 2002; Nonthaleerak and Hendry, 2008). Furthermore, a qualitative approach was adopted since it is more suitable for capturing complex relationships (Delgado et al., 2010), for exploring the impact of different institutional and contextual factors on operations management tools and techniques (Psychogios and Priporas, 2007) and reconciles complexity, details and context (Mangen, 1999).

In particular, three companies operating in general service industry have been picked. Company A operates in telecommunication industry, Company B operates in airline industry and Company C operates in Insurance industry. All of the companies have deployed L6σ. Primary data were collected by conducting face-to-face in-depth interviews with managers that involved in the L6σ application process. The interview questionnaire was a semi-structured one with open-ended questions since it provides more value, quality, depth and efficiency (Palmerino, 1999). The sample within the cases was based on the position that respondents held in the organization and their functional involvement in the implementation process. Managers from a variety of business areas (administration, quality assurance, human resources, sales, marketing, operations, and IT) were interviewed. All of them were directly involved in coordinating, providing and managing resources for the implementation process of L6σ. Also, some of the managers interviewed were experts in 6σ (Black Belts and Green Belts). In total 47 interviews were conducted, 15 in Company A (telecommunication) 18 in Company B (airline) and 14 in Company C (insurance). A digital voice recorder after prior approval from the interviewees was used during sessions. Company’s documentation related to quality programs, such as procedures and quality management policies were used as secondary data. The analysis of the secondary data contributed to the design of the interview questionnaire. A content analysis of data was performed by designing a matrix table from the interview questions and respondents’ answers.

4.0 Findings

The analysis of qualitative data gathered through in-depth interviews with managers in all three cases resulted in the emergence of ten (10) sustainable success factors regarding L6σ implementation in service industry. These factors are summarized in table 1.

Table 1: 10 Sustainable Success Factors of L6σ Application in Service Industry

| 1. Top management commitment, involvement & support |
| 2. Quality-driven organizational culture |
| 3. Quality-driven training |
| 4. Teamwork in problem solving |
| 5. Direct link between L6σ and Customer satisfaction |
| 6. Strategic orientation of L6σ |
| 7. Supportive technical systems (Tools & Techniques) |
| 8. Clear Selection of L6σ projects |
| 9. Prior implementation of other quality improvement programs |
| 10. Supportive performance management system |
Also, Table 2 shows in which of the three cases the above factors emerge after the interviews with managers. As it can be seen the great majority of the factors have been identified in all three cases. Moreover the analysis shows that there are two categories of factors emerged. The first category refers to factors that have been underlined by other studies while the second category refers to two new factors emerged only in the current study.

Table 2: 10 Sustainable Success Factors of L6σ across Cases

<table>
<thead>
<tr>
<th>8 Sustainable success factors of L6σ identified in other studies</th>
<th>Company A Telecommunication</th>
<th>Company B Airline</th>
<th>Company C Insurance</th>
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<td>1. Top management commitment, involvement &amp; support</td>
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<td>2. Quality-driven organizational culture</td>
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<td>7. Supportive Technical systems (Tools, Techniques &amp; IT)</td>
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<td>8. Clear Selection of L6σ projects</td>
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<td>2 Sustainable success factors of L6σ identified in the current study</td>
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<td>9. Prior implementation of other quality improvement programs</td>
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<td>10. Supportive performance management system</td>
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4.1 Factors identified in other studies

Top management involvement & support was identified as a factor that facilitates the process. This finding seems to be in line with findings from previous studies (Lubowe and Blitz, 2008; Antony et al., 2003; Carleysmith et al, 2009). Quality-driven organizational culture seems to facilitate the process of overcoming barriers for successful implementation, which is aligned with the suggestion that quality management systems demand organizational culture change (Furterer and Elshennawy 2005; Maleyeff, 2007). Continues training is also critical for L6σ application, and especially this training related to project management tools and development of soft skills. Previous studies seem to support similar arguments (Antony et al, 2003; Caldwell, 2006; Ladhar, 2007). Moreover, the emphasis on teamwork in problem solving and collective decision-making process, seems to be substantial in L6σ, at least for the two out of the three cases explored. This again supports similar findings by Neuhaus and Guarraia (2007). Direct link between L6σ and customer satisfaction is considered to be the guiding principle for implementation of L6σ. This is in line with literature (Antony et al., 2003; Antony et al., 2007; and Lubowe and Blitz; 2008). L6σ projects need to start with the translation of Voice of Customer (VoC) to Voice of Process (VoP) and the correlation between VoC and Voice of Business (VoB) (Psychogios, et, al 2012). In addition, strategic orientation of quality improvement initiatives has been proved as another important element of the successful application of L6σ. The interviewees’ arguments show that a strong relation between the two facilitates the L6σ process, which seems to be also supported by the current literature (Lubowe and Blitz, 2008; Fornari and Maszle, 2004; Antony et al., 2007; Kamensky, 2008). Moreover, supportive Technical systems like appropriate tools, techniques as well as supportive IT systems, have
been considered as extremely substantial in the proper application of L6σ, at least for the two industries investigated, namely telecommunication and airline. This finding seems to support similar findings by Kamensky, (2008), that argues in favor of an appropriate infrastructure with technical approaches that can facilitate L6σ. Finally, clear selection of L6σ projects is confirmed in the two out of three cases as important aspect of L6σ implementation, which is also confirms existing literature (Antony et al., 2004; Laosirihongthong et al, 2006; Ladhar, 2007; Breyfogle, 2008).

4.2 Factors identified by this study

Nevertheless, this study identified two other factors that seem to be equally significant in L6σ implementation. The first is referred to prior implementation of other quality management initiatives, such as ISO, EFQM, etc. This provides the necessary experience for the employees regarding quality management. Also the documentation of all the processes, required by prior systems, such as ISO, seem to facilitate L6σ. Therefore, it seems that this experience provides the appropriate knowledge and expertise for L6σ application. It is interesting to mention that most of the interviewees suggested that it would have been better first to deploy L6σ in the organization and then ISO standards, because in that case ISO standards implementation would have been more formal. In other words, prior deployment of quality management practices seems to facilitate L6σ implementation. Similarly, almost all interviewees from the three companies agreed that integration of L6σ with the performance management system can facilitate the implementation process of the former. This integration motivates managers and employees to increase the level of commitment and involvement. For instance, a group of interviewees pointed out that the integration is necessary in order to minimize subjective performance evaluation of individuals that leads to wrong results.

5.0 Conclusions

This study has four major advantages. Firstly, it expands our understanding regarding the implementation of L6σ in three different service industries, in which the application of management models is more complex and problematic. Secondly, it focuses on the responses of managers, who always play the most significant role in the adoption of such techniques. Thirdly, supports current literature on the sustainable success factors of L6σ application. Finally, it contributes two more factors that need to be considered in L6σ process. The main limitation of the study is the fact that in all three cases only managers and top-administrators were approached. Frontline employees who are also directly involved in L6σ approach, may offer a more clear view on issues related to the impact of critical factors on L6σ application. Therefore, it is critical future studies to investigate first-line employees that always play an equally substantial role in the application of integrated quality management initiatives like L6σ (Psychogios et al. 2009).

References


Authors’ Backgrounds

Dr. Fotis Vouzas is an Assistant Professor in the Department of Business Administration in the University of Macedonia, Greece. Studies include BA in Management (Greece), MBA in Management and Organizational Behaviour, MSc in Technology Management (USA) and Doctorate from the University of Macedonia (Greece). Senior Researcher at Lancaster University (UK) in part of the European Union Research Project Human Capital and Mobility Programme. Participant in various European Union projects ADAPT, TEMPUS specialised in TQM related issues. Current research interests on TQM-HR relationship, Quality Assurance, Logistics, Business Excellence and Managerial Effectiveness. Research work published on domestic and international journals and in a collective book, participation in a number of conferences and seminars.

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