Editorial

1. Lean Six Sigma in public sector organisations: editors' introduction

1.1 Introduction

Research related to Lean Six Sigma in the private sector is thriving. Literature reviews undertaken in the field report that Lean Six Sigma has become very visible as an effective way of reducing waste and enhancing productivity, leading to better profits for private sector organisations, especially those in manufacturing (Muraliraj *et al.*, 2018). Some other studies found that applications and implementations of Lean Six Sigma have become major streams in the academic literature in this field, with several interesting applications being reported from different industries and different geographies (Laureani and Antony, 2016). But, most of these applications associate with private sector organisations. Academic literature related to Lean Six Sigma in the public sector is still at its infancy. This special issue aims at addressing this research gap by encouraging research on Lean Six Sigma in public sector so as to develop a repository of research articles related to both empirical research and theory development.

Implementing continuous improvement approaches such as Lean Six Sigma in public sector organisations presents unique challenges (Elias and Davis, 2018). Experts have reported that there is a clear misconception across many public sector organisations that Lean Six Sigma can only be applied to manufacturing companies and it cannot be transferred to public sector entities. (Antony *et al.*, 2012). In addition, some researchers argue that the differences between public and private sector organisations are so huge that business practices should not be transferred to public sector; others dispute that it is difficult to even prove publicness hypotheses such as public organisations are more bureaucratic and public managers are less materialistic and have weaker organisational commitment than their private counterparts (Boyne, 2002). Research on Lean Six Sigma in public sector could unravel some of these challenges.

This special issue will focus on Lean Six Sigma in public sector organisations, and this introduction is intended to provide an overview. It begins with a brief review of literature to establish the state of art of Lean Six Sigma in public sector, followed by a brief discussion of the five articles presented in this special issue. It concludes by highlighting some future directions for further research in the area of Lean Six Sigma in public sector.

2. Overview of literature on "Lean Six Sigma in public sector"

Lean Six Sigma has been applied across numerous industries (Sreedharan and Roju, 2016), but its transferability and efficacy within the public sector has been explored far less than in private companies. However, recognition and application is building across the sector, with researchers reporting various insights, particularly within health care (Proudlove *et al.*, 2008; Duffy *et al.*, 2010) and also across higher education and local government. Comparisons have been drawn with the origins of lean within the manufacturing sector. Sunder (2016) provides one such comparison between higher education and manufacturing, presenting a case study to highlight the potential impact and opportunities for organisational culture and productivity resulting from the adoption of Lean Six Sigma.

Over the past decade, the application of Lean Six Sigma in government has gained traction, as discussed in the work of Radnor and Walley (2008). Earlier research by Furterer and Elshennawy (2005) reported efficiency gains such as reductions in processing times between 40 and 90 per cent. In a more recent government-based study, Elias (2016) explores

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some of the challenges and critical success factors, for example, the importance of stakeholder analysis early on within a Lean Six Sigma project and its role in providing a systematic and inclusive approach that can help develop unit capabilities.

Equally, research within the higher education sector is beginning to build a critical mass, including reflection from Antony *et al.* (2012) and Albliwi *et al.* (2014) on the barriers and critical success factors in this context, namely, effective communication and resourcing and top down management support and, conversely, a lack of systems thinking (Elias *et al.*, 2001) and appropriate prioritisation of projects. Hess and Benjamin (2015) focussed on the impact of culture, specifically the cultural changes necessary within a university setting, to ensure long-term viability of Lean Six Sigma. Pedersen and Huniche (2011, p. 416) conclude that such findings are "very much in accordance with some of the insights from the general change management literature".

Of interest and concern to both academics and practitioners, Antony *et al.* (2016, p. 995) bring attention to the "widespread but fragmented application" of Lean Six Sigma in the UK public sector, with findings suggesting that more comprehensive, holistic approaches should be considered for successful implementation. Radnor and Boaden (2008) draw our attention to the fact that lean is both a panacea and a paradox, suggesting that whilst Lean and Six Sigma can make positive improvements, organisations must fully understand the approach, as well as the nuances and traits, of the public sector. Similarly, Lemos de Almeida *et al.* (2017) emphasise the importance of identifying and acknowledging the local organisational culture and improvement needs before embarking on a Lean Six Sigma initiative.

3. Overview of the articles in the special issue

The five articles selected for this special edition present a variety of case studies from an international range of public sector organisations, along with modelling of Lean Six Sigma implementation based on extensive literature reviews.

In the first article, the authors emphasise the importance of a strategic fit between the objectives of the introduction of a Lean Six Sigma programme and the objectives of the organisation. The authors also noted a common shortcoming – the inability of the organisation to embed Lean Six Sigma practices in the everyday operations of the organisation. This may have been due to Lean Six Sigma being imposed upon this local government organisation by their state authority, rather than it being adopted independent of other pressures.

The second paper examines health-care microsystems rather than the broader, entire organisational analysis undertaken in the first. These are investigated through the reported experiences of practitioner managers. Here, the investigation is of the effects of individual contextual factors on the success of Lean Six Sigma implementation, with the finding that highly functional teamwork was the critical contextual factor necessary for project success.

The context of the third paper lies midway between the first two – Lean Six Sigma projects executed by students within a local government municipality. This paper further investigated the success of individual Lean Six Sigma projects rather than the organisation-wide adoption of a Lean Six Sigma methodology and confirms the importance of project selection and project leadership to obtain successful outcomes.

The fourth paper draws on an extensive literature review, with its findings confirmed by focus groups of Lean Six Sigma and supply chain practitioners, to develop a predictive model for green Lean Six Sigma implementation. The developed model points to the importance of non-value adding activities to the success of implementation.

The final paper in this special edition draws on the experiences of public sector officials to outline how public sector municipalities can best use the Lean Six Sigma methodology. The study found the critical importance of establishing a belief in the Lean Six Sigma process to be implemented – the need to establish a case for change – to create shared ownership of the Lean Six Sigma objectives with the teams involved.

The characteristics of these papers are presented in Table I.

It can be seen in each of the above studies that the essential component for the successful implementation of Lean Six Sigma has been the building of a shared understanding and acceptance of the project's objectives. These "soft" capabilities were found to be critical success factors for Lean Six Sigma implementation and were more important than a thorough understanding of the Lean Six Sigma methodology. These studies, as with the majority of research in Lean Six Sigma, have focussed on the experiences of managers and project leaders, and it would be informative for future researchers to investigate the opinions of participants, other than project leaders, in Lean Six Sigma activities.

4. Future directions for research

Prior to recommending where future researchers should concentrate their efforts in Lean Six Sigma studies, it is prudent to summarise the present works in this area. To date, Lean Six Sigma research has concentrated on the critical success factors for the implementation of Lean Six Sigma endeavours, either on an individual project basis or at the organisational level. To date, researchers have concentrated on the reporting of case studies or surveys limited to a particular niche area, as is reported in the second paper of this special issue. There is a distinct lack of industry- or sector-wide analysis of the Lean Six Sigma methodology. Along with this limitation in scope, the vast majority of published research has reported on "snapshots" taken at a single point in time, whereas less longitudinal research has been published on the mechanisms required to maintain Lean Six Sigma as an organisational priority.

Similarly, much research has used the managers or "champions" of Lean Six Sigma projects as their informants. Little has been reported of the experiences or opinions of organisational members who have been participants, as opposed to leaders in Lean Six Sigma projects. These reports of empirical research (prior studies) have also concentrated on Lean Six Sigma implementation alone rather than comparing the introduction of Lean Six Sigma with other quality improvement techniques. To date, there have been few comparative studies; either theoretical studies comparing the stated objectives of Lean Six Sigma with other quality improvement methodologies or empirical studies undertaking similar comparisons of the engagement of participants.

In a similar vein, researchers have not explored the particular characteristics of the public sector, as opposed to private sector organisations, and how their unique organisational objectives and limitations may influence the nature and success of Lean Six Sigma implementation. A closer investigation of these characteristics may be informative, as for many public sector organisations, the central objective of Lean Six Sigma – waste minimisation – may not be a priority in determining their ongoing existence.

In this context, the following five future research directions are recommended:

(1) *Deeper investigations about the public sector context*: The public sector context has to be thoroughly understood while planning and executing Lean Six Sigma initiatives. It is important to understand the unique characteristics of public sector that can influence Lean Six Sigma projects during their initiation, planning,

Authors	Paper 1 – Price, Pepper and Stewart	Paper 2 – Wilson, Jayamaha and Frater	Paper 3 – Kregel	Paper 4 – Sreedharan, Sandhya and Raju	Paper 5 – Fletcher
Geographic location	Australia	New Zealand	Germany	< Literature Review >	USA
Study context	Local Government	Health care Clinical microsystems	Local Government		Local Government
Methodology	Case study – documentary analysis and interviews	Survey	Action research on project implementation	Confirmatory focus group study	Interviews and observations
Participants	Managers	Managers	Quality improvement practitioners		Managers
Findings	Importance of strategic fit between Lean Six Sigma and organisational objectives	Importance of highly functional teams	Project choice and the project leader are critical to Lean Six Sigma project success		Importance of shared objectives for successful Lean Six Sigma implementation

Table I.
Comparison of articles

execution and closing. Such deeper, further investigations to comprehend the public context are necessary to develop strategies for the successful implementation of Lean Six Sigma initiatives in the public sector.

(2) *Theory development*: One of the aims of this special issue was to develop theory associated with the concept of Lean Six Sigma. While some articles in this special issue contribute to theory development, there is scope for further research in this area. Lean Six Sigma in the public sector requires solid theoretical grounding, not only from its parent discipline of quality management but also from other disciplines such as human resources (e.g. employee empowerment), strategy (e.g. stakeholder management) and environmental management (e.g. corporate social responsibility).

(3) *Comparison of Lean Six Sigma with other methodologies*: Lean Six Sigma is not the only methodology used by public sector organisations to achieve operational and service excellence. More research is required to understand the effectiveness of Lean Six Sigma in the public sector in comparison to other methodologies aimed at operational and service excellence. Such research is expected to result not only in comparative studies between Lean Six Sigma and other methodologies but also in mixing methodologies appropriately.

(4) *Sustaining Lean Six Sigma in the public sector*: Many public sector organisations are finding it difficult to maintain interest and sustain commitment towards Lean Six Sigma. This issue warrants further research. Some Lean Six Sigma researchers have highlighted the need for further research on organisational culture (Pepper and Spedding, 2010), and some such research needs to focus on public sector organisations.

(5) *Holistic approach*: Experts have already highlighted the issue of fragmented application of Lean Six Sigma (Antony *et al.*, 2016). Many studies stop with the identification of critical success factors, at an individual project or organisational level, by using data collected at a single point in time. Clearly, there is scope for a more systems approach (Elias, 2016) focussing on the whole rather than the parts. Such studies could include industry- or sector-wide analysis, linking the critical systems factors to develop a systems model that captures the underlying structure, and development of successful strategies for implementing Lean Six Sigma in the public sector.

Overall, the field of Lean Six Sigma in public sector requires more in-depth, targeted empirical research that will result in the development of solid theoretical foundations in the field.

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Further reading

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