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Can lean management practices in the operations of the universities lead to sustainability?

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Abstract

Sustainability in the educational curriculum of the higher education providers like universities has received considerable attention due to its importance in practice in most of the industry sectors. However, when it comes to having a sustainable operation in universities, limited evidence is found in both theory and practice. The few research papers that addressed the issue, did not quite address the underlying barriers by proposing effective solutions. This research aims to propose solutions to this problem by examining if lean practices would be able to facilitate environmental sustainability in the universities' operation in the UK.

Key Words: Sustainable University, Lean Management, Barriers to Sustainability

Introduction

Sustainability has been a buzzword in practice for the last couple of decades. It has also been a matter of academic interest to most of the universities in modern times. There has been a considerable shift in sustainable development in the last two three decades due to the increasing importance of policies to promote sustainability (Jorge et al., 2015). Yet, the universities often struggle to manage their sustainability targets in their own operations especially in the case of environmental sustainability. This has been documented in several studies from different parts of the world including studies in Portugal (Aleixo et al., 2018), in the UK (Robinson et al., 2018), in Poland (Kogcielniak, 2013), in Lithuania (Dagiliute and Liobikiene, 2015). The present study focuses on the UK higher education providers and to the issues on the environmental sustainability of the triple bottom line framework. The rationale for this is the documented concerns regarding the performance of many of the university's environmental sustainability issues based on People and Planet League table. Following the Data Energy Certificate release in 2017, a study was followed to identify the potential savings opportunities in the UK higher education sector. A potential £15.6 million savings opportunity was identified (Hawkins, 2017). In a report published in the Guardian (2016), only 25% of the UK based university campuses are on course to meet the carbon reduction targets by 2020 (Lightfoot, 2016). The author further mentioned- "*UK universities are helping lead the world on environmental research – but when it comes to their own back yard they appear to be falling behind.*"

This leads to the question of why the higher education sector falls behind their environmental performance. This has been mentioned in the literature including Disterheft et al. (2012), Netaji and Netaji (2013), Kogcielniak, (2014), Berchin et al. (2017), and Akins et al. (2019) where the authors highlighted the presence of certain challenges/barriers to sustainable approaches in the form some case studies. These studies highlighted the importance of cultural change, but these studies did not highlight the type of change required and the stages involved in operational improvements to achieve those changes. Some authors tried some assessment tools to offer some practical insight regarding assessment and reporting of sustainability performances, but these have limitations in terms of addressing some of the basic barriers including awareness (Lauder et al., 2015). Moreover, there has been limited evidence on how to address those challenges against achieving those sustainability targets in the university set up by improving the universities' operations. Adoption of some of the continuous improvement techniques from operations management such as lean management has been found to be improving the sustainable operations in practice in many sectors including manufacturing (Piercy and Rich, 2015). Yet, limited evidence is available when it comes to operations in universities. On this backdrop, *“this research aims at exploring and examination” if lean management principles can be implemented in universities operations to facilitate the sustainability targets to be achieved by addressing the barriers. This research will focus on the operations of the universities in Scotland in the first phase with an extension to the UK wide research in the subsequent phase. The objectives are*

Objective 1. To examine the barriers to achieving sustainability goals in universities operations in the UK.

Objective 2. To examine if the lean management principles can be applied to address those barriers and improve performance.

Literature review/Research backdrop

There is a growing body of literature on sustainability in the universities and other higher education institutions. This section presents an appraisal of extant literature considered relevant to this study, highlighting key themes and theoretical propositions for this research. A conceptual framework is also presented.

Sustainability Tools

A literature review shows some of the themes in the research involving sustainability issues such as tools used for sustainability measures (Li et al., 2018; Marrone et al., 2018; Algamdi et al., 2017; Berzosa 2017; Jorge et al., 2015; Lozano, 2011; Lozano, 2006), application of environmental management system (EMS) (Disterheft et al., 2012; Clarke and Kouri, 2009). Research in presenting the tools used for sustainability performance reporting has been considerably popular in the last 10-15 years. Lauder et al. (2015) presented a review of the Green Metric of the university ranking that is used for sustainability reporting in the university. In early research, Lozano (2006) presented a comparative study among the different tools used to assess and report the sustainability efforts by the universities along with some proposed modification in some of the tools such as Global Reporting Initiative (GRI), and Graphical Assessment of Sustainability in Universities (GASU). The author further extended the study to incorporate the GASU to compare the performance of the 12 universities' sustainability performance (Lozano, 2011). Townsend and Barrett (2015) used Environmentally Extended Input Output Analysis (EEIOA) in their empirical study based on the University of Leeds. The authors found this tool to be allowing the performance

comparision between the universities. Jorge et al. (2015) proposed a multi-item quantitative tool which can be used for cross-university comparison. Alghamdi et al. (2017) examined 12 tools in sustainability in universities. Berzosa et al. (2017) conducted a comparative study with the application and application of multiple tools of sustainability applied for universities. Li et al. (2018) used the Analytical Hierarchy Process approach to propose prioritisation of the sustainability indicators in an Australian University. Marone et al. (2018) analysed and investigated the strengths and weaknesses of one of the popularly used index, the green metric index. Leon (2018) used Neighbourhood Evaluation for Sustainable Territories (NEST) tools for the environmental assessments of the University of the Basque County. Alshuwaikhat et al. (2018) proposed a model using the application of Geographical Information (GIS) tools to evaluate the sustainability related performance at the King Fahd University of Petroleum and Mineral. Alba-Hidalgo et al. (2018) proposed the definition/scope of environmental sustainability in the context of universities. The authors highlighted some of the characteristics of the tools that are used for this purpose such as STARS, SAQ (ULSF), AISHE, GASU, Green Report card, CSAF, AUA, STAUNCH, UI Green Metrics, CRUE, and USAT (MESA).

Alongside the sustainability performance reporting, the research on the application of Environmental Management System (EMS) has also been the topic of discussion in the literature. Clarke and Kouri (2009) discussed different campus EMS frameworks, their characteristics, and the drivers of implementation. Disterheft et al. (2012) conducted an empirical study on EMS development and implementation in universities across Europe. Velazquez et al. (2013) conducted a study on Sustainability Management System (SMS) implementation at the University of Sonora in Mexico to reduce the waste of water. Lo-Iacono-Ferreira et al. (2016) emphasized the importance of having an EMS for Ecological Footprint Assessment using Life Cycle Assessment. In a recent work by Omrecen et al. (2018), the authors presented a case study based on the implementation of climate strategy at the University of Gothenburg by the effective use of EMS. However, a limited insight was offered in these studies on the perceptions of the staffs and students. A study by Sammalisto et al. (2015) addressed this issue in a case study of a Swedish university. The authors addressed the perceptions of the staff members of the university on ISO14001 implementation. Other tools found such as Sustainability Management System.

Perception of Sustainability

Sammalisto et al. (2013) addressed the perceptions of the staff members by proposing a conceptual model. The author concluded with some insightful findings including variety in staff perceptions, and the importance of top management's encouragement. The importance of top management support was also highlighted in the studies of Wright (2010), Wright and Horst (2013). Nejati and Nejati (2013) proposed a scale for capturing the student perception on sustainability in the universities. Sylvestre et al. (2014) conducted an empirical study to address the perceptions of the professors of Dalhousie University by the implementation of Q-method.

Barriers to Sustainability

Despite a considerable amount of research in sustainability reporting and the tools used for sustainability in the universities, the efforts to achieve sustainability in the universities often fall short. This is mainly due to the existence of some of the barriers. This has been highlighted in few studies including Wright (2009), Wright and Horst (2013), Kogcielniak (2014), Robinson et al. (2015), Disterheft et al. (2015), Dagiliute

and Liobikiene (2015), Leal Filho et al. (2017), Alexio et al. (2018), and Akins et al. (2019). The issues identified as barriers includes financial predicament (Wright, 2009; Wright and Horst, 2013; Aleixo et al., 2018), lack of awareness/weak acknowledgement (Wright, 2009; Dagiliute and Liobikiene, 2015; Leal Filho et al., 2017; Alba-Hidalgo et al., 2018; Akins et al, 2019), resistance to change (Wright, 2009), lack of leadership/management support (Wright and Horst, 2013; Kogcielniak, 2014; Leal Filho et al, 2017), type of approach adopted by policy makers/lack of support from policy makers (including Government) (Kogcielniak, 2014; Dagiliute and Liobikiene, 2015; Robinson et al., 2015; Leal Filho et al., 2017; Aleixo et al., 2018). In addition, authors including Vieira et al. (2018) discussed barriers to the EMS implementation in the university set up. Vieira et al. (2018) conducted the study in the Brazilian higher education sector.

One of the key internal issues has been identified as the barrier was the lack of top management support in some of the above studies in the last paragraph. A top-down approach to entail the goals and objectives of the sustainability has been recommended as a proposed requirement in the studies including Wright and Horst (2009), and Kogcielniak (2014). However, some counterintuitive evidence has also been documented such as Dagiliute and Liobikiene (2015) the existence of a top-down approach in their study in the Lithuanian universities. The authors extended this as a possibly due to external barriers including government support and frequent policy changes. This has been highlighted in some other studies such as well to be having a significant impact on the clarity on the sustainability goals at the workplace among the higher education providers (Kogcielniak, 2014; Robinson et al., 2015; Leal Filho et al., 2017; Aleixo et al., 2018). In fact in the study by Robinson et al. (2015), the authors identified a need for setting a realistic and achievable carbon reduction target to be set in place.

There are certain limitations are in existence in the above studies such as

- Many of the studies were conducted in specific geographic locations such as Canadian universities (Wright, 2009), Portuguese universities (Aleixo et al., 2018), Polish universities (Kogcielniak, 2014), Lithuanian universities (Dagiliute and Liobikiene, 2015), Brazilian universities (Vieira et al., 2018). Li et al. (2018) highlighted the geographical differences may have implications on the results to be changing from case to case.
- A need for a more exploratory investigation with a different group of stakeholders (Wright and horst, 2013; Disterheft et al., 2015; Leal Filho et al., 2017);
- A need for identifying solutions/ways to overcome the barriers (Filho et al., 2018).

Earlier, this research highlighted the importance of the problems of poor environmental performance and related flak being drawn towards the universities in the UK. This has motivated the present research to aim at conducting an exploratory study and identifying if any proposed solution can be offered to address some of the barriers.

Problems of environmental sustainability can be improved by improving the practices of operations within the organisation. Some well known continuous improvement practices such as Lean operational practices have been identified as one of the key facilitators towards environmental sustainability in manufacturing sector in some early researches by Florida, (1996), and Corbett and Klassen (2005): “lean is green”. In fact, this mantra was the theme of a literature review of Garza-Reyes (2015). Authors including Hughes et al. (2012) highlighted the importance of lean practice with the focus on “doing more with less being used/spent”. Simpson and Power (2005) found the similarity between the practices that support lean manufacturing and environmental performance. This type of overlap between lean and sustainable practices has been

identified in the study of Cabral et al. (2012) where the author found the environmental waste reduction from lean tool implementation. According to Piercy and Rich (2015), one of the key limitations of the majority of these previous research topics was the focus on the relationship between lean practice and environmental sustainability only. In their research, the authors showed far stretching benefits that could be derived from lean practice towards sustainability in the UK based manufacturing sector. In recent research by Halldosson et al. (2018) reiterated the potential for integrating the principles of lean management and sustainability initiatives. The authors further supported the findings of Piercy and Rich (2015) on the need for exploring the potential benefits of lean practices beyond environmental sustainability to other forms of sustainability that can be derived from the triple bottom line.

Despite its proven success in many other sectors including manufacturing, the application of lean management practice in higher education's own operation has been quite limited. Thomas et al. (2015) argued that higher education institutions (HEI) in the UK are quite slower to adopt the lean practice and derive the necessary benefits. Balzer et al. (2014) highlighted some of the factors as a facilitator including institutional readiness, leadership, awareness, understanding, support, and a favourable culture or the associated changes towards it. Similar was the finding by Anthony et al. (2012) where the authors highlighted some additional critical success factors of successful implementation of lean six-sigma such as support from top management, effective communication, strategic and visionary leadership, and a favourable culture. This research has identified some of the similar key facilitators/success factors in the case of achieving sustainability by the universities. In fact, Balzer et al. (2014) highlighted based on some previous research by Balzer (2010), the amount of paper cost reduction up to 92% in facilities and management work orders in University of Central Oklahoma. Based on these observations and the growing concern in terms of league table performance and the follow up implications, our research focuses on the aim highlighted in the introduction section.

Design/Methodology/Approach

The objectives of this research aimed to understand the barriers of sustainability in the operations of the higher education sector in the UK. This was followed with the exploration and examination of some of the solutions using the concepts of continuous improvement such as lean management techniques. According to Creswell (1998), when the phenomenon of interest is its early stage with a lack of understanding around the theories, qualitative exploration is more appropriate. On the contrary, the well defined phenomenon may render a need for the quantitative investigation. The research methods adopted in similar research are quite diverse including qualitative methods such as in-depth interviews (Wright, 2009; Wright and Horst, 2013), semi-structured interviews (Disterheft et al. 2015; Aleixo et al., 2018), and qualitative case study (Akins et al., 2019). In the study of Leal Filho et al. (2017) used survey methods to gather qualitative and quantitative data in respective phases to conduct a mixed method research study. Secondary data based research was also found in some literature including Robinson et al. (2015). To select an effective methodology for this study, a set of literature on methodological discussion in operations management and related fields such as supply chain management were referred including Meredith et al. (1989), Craighead et al. (2007), Boyer and Swink (2008), and Golicic and Davies (2012). The framework proposed by Meredith et al. (1989) (Please see fig 1.) was found to be the appropriate starting point for this research as it allowed the current research to cater the three elements of research paradigm: Ontology, Epistemology, and Methodology

(Denzina and Lincon, 1994, Frankel et al., 2005). The vertical dimension of the framework represents the epistemological elements where as the other dimension explains how the reality exists (Meredith et al., 1989).

Although, the concepts of sustainability are not new, given the present research context, the concepts are relatively in its early days (Jorge et al, 2015). The objectives of this research require an understanding of the way people perceive, behave and react to the changes that are brought about by the incorporation of the principles/strategies required to achieve sustainable goals. Thus, this research adopted qualitative methods. The intension of the researcher of the present research is to interpret people’s perception. Considering these elements, this research adopted semi-structured interviews with the university academics/non-academic staff members and the policy makers including the top management. In phase 1 of this study, the interviews will be conducted with the above mentioned participants from Scottish Universities. Then a preliminary analysis will be conducted. This is expected to be followed by the UK wide sampling.

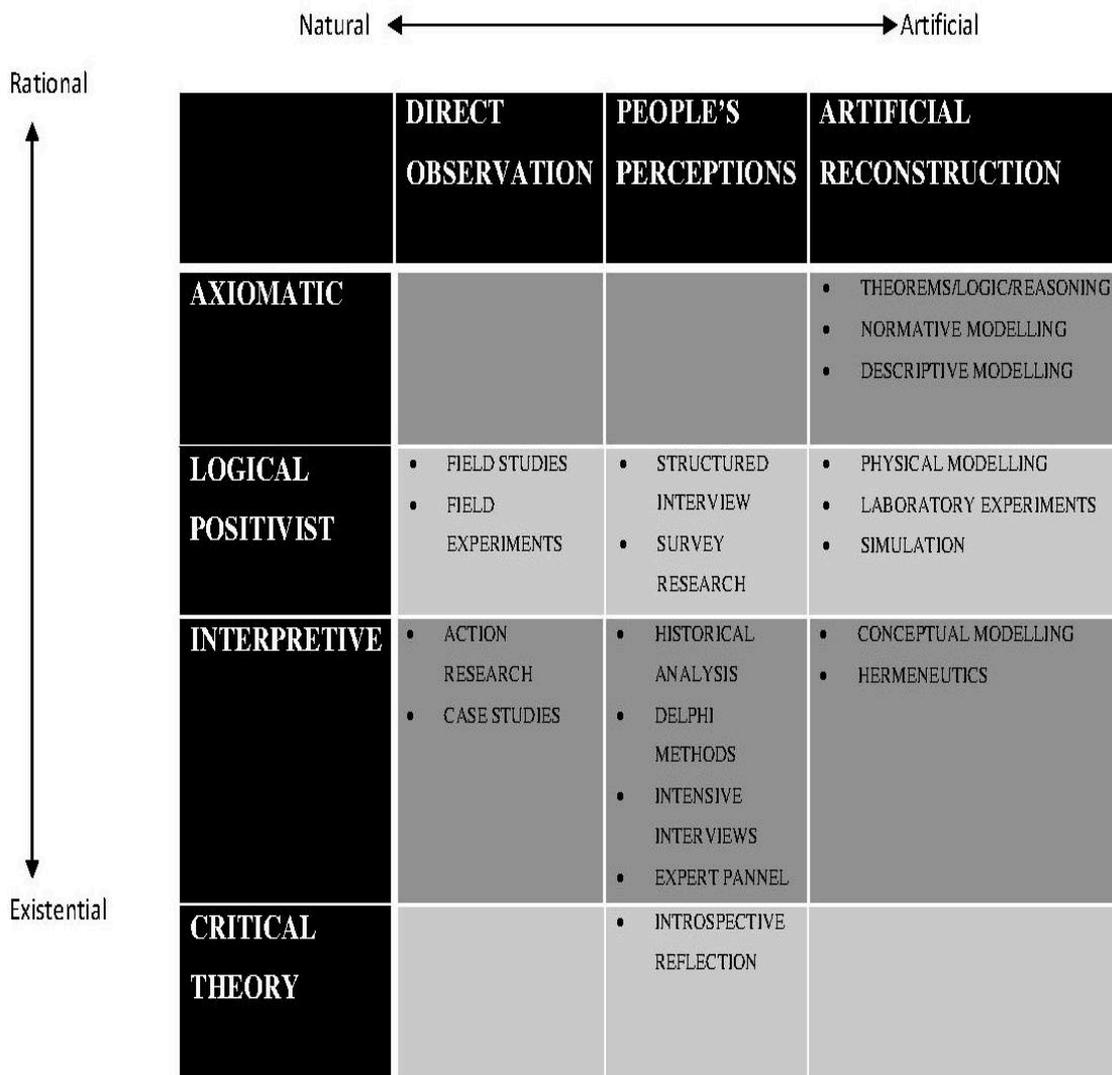


Figure 1 – Framework for research method (Source: Meredith et al. (1989))

Relevance/Contribution

The literature review section of this research highlighted how the research about sustainability and lean management in the operation of the higher education sector is in

their early stage. Similar is the case in practice as well as highlighted in the form of documented problems with certain league table performance in the UK higher education sector. On this backdrop, the present research is expected to contribute to the theoretical knowledge especially identifying the barriers of achieving environmental sustainability and proposing some conceptual solutions with the help of lean management principles. Recent trends including plastic free society, requirements of less energy consumption in public sector premises, and less consumption of paper are some of the modern day challenges modern day universities face including the Scottish universities. Moreover, wider issues including challenges including a change in geopolitical changes, tighter budget, societal changes including poverty, and increasing tuition fee are also posing challenges in terms of the sustainable performance of the universities in the UK. However, often the universities do struggle to set out an optimal policy with respect to sustainability performance. Hence, the present research is expected to contribute to the generation of ideas to have an effective policy by having a more efficient operation in the universities for Scotland with a further expectation to generate future research ideas for UK wide.

Discussions and Conclusions

This research is expecting to find a similar set of barriers including lack of awareness, financial constraints, lack of stakeholder engagement, and resistance to changes. It is expected to be found that the lean management principles to be having a positive impact on achieving the sustainability targets of the university by addressing the barriers. There are some counter-intuitive results were shown in an earlier study by Rothenberg et al. (2001) in manufacturing set up where the authors found some negative relation between the lean practices and sustainability in certain particular cases. However, this research has shown a great deal of literature has found a positive relation between the implementation of lean practices and achieving sustainability in manufacturing. In fact, the authors including Anthony et al. (2012) even argued that the non-applicability of lean practices in a non-manufacturing sector like higher education is a misconception. Thus, this research is expecting to generate new ideas as a solution to overcome some of the barriers toward achieving environmental sustainability in the higher education sector in the UK.

A possible limitation would be some of the barriers of sustainability would be quite external in nature and proposing a solution would either require a longitudinal study over time. Another possible limitation that would emerge would be the applicability within the specific geographical situation. This problem has been highlighted in some of the research papers cited in the literature review. This study is expected to set the basic foundation solution approaches/concepts which could be extended in future research to offer more generalisable solutions. In addition, future research could also take into consideration the other dimensions triple bottom line i.e. social and economical sustainability.

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