

From Manufacturing to Public Service Organisations: Lean as an Effective Approach to Achieve Sustainable Environmental Performance

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Abstract. The increasing global focus on sustainability developed the need to integrate sustainable practices among all sectors of the economy, including the public sector, which faces pressure from the governments to improve their organisational performance. This study explores the opportunities of Lean implementation as an effective approach to achieving sustainability in public service organisations in the context of environmentally sustainable development goals (SDGs). Through a literature review, the authors explored how Lean applications and practices could be borrowed from the manufacturing industry and implemented in the service sector. They examined the various practices employed by service organisations to integrate sustainability into their operations to enhance their environmental performance. Initial findings indicate that Lean methodologies can potentially enhance environmental performance in public service organisations by reducing non-value-added activities, waste, and environmental impact. This implementation requires adapting and customising Lean methodology to align with the unique characteristics of these organisations.

Keywords. Public Service Organisations, Lean Manufacturing, Sustainable Development Goals (SDGs), Environmental Sustainability.

1. Introduction

With sustainability being a global concern, the urgency to overcome sustainability challenges has required leaders worldwide to address these challenges in their national visions and strategies and act toward maintaining a better planet for future generations while ensuring present developments [1]. In the present study, the authors focus on the environmental pillar of sustainability and how the integration of Lean and Green methodologies can lead to improving sustainable environmental performance in the public service sector, associated with the efficient use of natural resources, and the implementation of sustainable practices and reporting [2]. Due to the public sector size and its involvement in the national economy and how they exist for social and environmental purposes, new approaches could be implemented in public organisations,

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such as Lean techniques, which were long used in the private sector [3]. The success of Lean production in automobiles has spread its application to many other manufacturing and services industries because of its ability to increase quality for lower costs. [4]. The findings contribute to the authors' research that aims to explore the Lean approach and how its integration with green and sustainability strategies in public service organisations can lead to transform their performance toward achieving environmental sustainability.

2. Literature Review

2.1. Public Service Sector

The public sector can be defined as the government activities or the economy's sector supported financially by the government, which is considered the largest employer in any country, stating the importance of the public sector in all economies [5]. Public organisations strategies are directly affected and controlled by the government's policies and the need to offer affordable services to compete for the government's overall budget by using it effectively and efficiently [5]. In addition to being controlled by the government, public service organisations face the challenge of meeting internal and external goals, demands, policies, specific rules, and regulations that are usually more strict than private organisations [6]. Moreover, public service organisations face the need to meet governments' agendas, adapt to new leadership and technologies, meet internal and external performance indicators, and increase efficiency with limited resources [7]. As a result, public organisations developed a growing need and focus on adopting new management methodologies and practices from the private sector such as, Lean and Six Sigma [6] [7].

2.2. Sustainability in the Public Service Sector

Sustainability can be viewed as the attention to economic, social, and environmental issues and attempting to establish a balance between them, which built the need among different stakeholders to embed it into their organisations' strategies [8]. Integrating sustainable development into decision-making, formulating strategies, and operations at all levels and sectors is crucial to achieve sustainable development in the public sector [9]. In 2005, "the Global Reporting Initiative (GRI) published Sector Supplement for Public Agencies: Pilot Version 1.0.", noted that public sector sustainability information tended to be scattered across a number of documents and focus on policies rather than performance information, in addition to being inconsistent, and focus on the measurement of external conditions rather than public organisations performance and impacts [10]. The increased attention by public sector organisations reflects the increased pressure to improve performance and remain viable in today's globally competitive environment, demonstrating this performance to external as well as internal stakeholders [10]. The importance of sustainable development implementation in public service organisations also aligns with maximising employment training and safety and enhancing community safety and protection. These outcomes are indicators for social sustainability, in addition to greenhouse emissions which provide environmental sustainability indicators in the public sector [10].

The evaluation of sustainability results is not easy to measure due to the complex interrelation between the indicators, the lack of consensus about the definition of

sustainability, and the choice of indicators which are subject to requirements and the opinions of the participants [1]. This raises questions about the extent to which public sector sustainability performance is managed [10], and how effective are the current sustainable strategies [1].

2.3. Lean from Manufacturing to the Public Service industry

According to B. Rodgers and J. Antony [5], continuous improvement methodologies in the public sector reveal that Lean represents 60.3% of the examined methodologies in the public sector. However, most studies in the literature focus only on the short-term impact of Lean on the public service sector performance [11], and there is a need for a more holistic perspective of lean application in the public service sector, the tools used, and the long term results of this application [4]. The current use of lean in the public sector lacks the complete perspective as it is only used in limited parts of public organisations and specific processes and initiatives [12] [6]. This also raises the need to explore the challenges that face public organisations in implementing Lean methodology, which are according to [4], the need for a shared understanding of Lean among the higher management levels and employees, poor communication between them, resistance to change, and not linking Lean to the organisations strategies [5]. Moreover, in order to apply Lean successfully in the public service sector, a clear planning and readiness within public organisations are critical [5].

Lean is characterized by five principles: value, value stream mapping, flow, pull, and continuous improvement [13]. In order to implement Lean in any organisation, they should first define the concept of value for their customers, outline their processes through Value Stream Mapping (VSM), eliminate non-value-added activities, and lastly, focus on continuous improvement [14]. It is no difference from public service organisations standpoint in their Lean implementation process [15]. This raises the need for a clear definition of the concept of value for public service organisations' customers and the aim to implement Lean as a philosophy focusing on achieving continuous improvement and long-term goals [14]. Embedding Lean as an organisational culture is also critical by engaging employees in the early stages of Lean implementation to create a need for change at all organisational levels and a culture of continuous improvement [12] besides linking Lean application to the organisations' visions, strategies as a complete and more sustained system approach [5] [12].

Several studies showed that aligning Lean practices with environmental, social, and economic concerns and strategic goals can improve the organisations performance [16] [12]. [16] emphasized the need to incorporate Lean and sustainability to provide a more comprehensive measure to evaluate organisations as they have a mutual positive impact on each other. That is because Lean implementation can lead to optimising resource consumption and increase environmental, operational, and economic efficacy [16], which serve both private and public sectors need to comply with the environmental policies [14]. A common drive for Lean implementation is to optimise the use and benefits of resources, improve the processes and customer's benefits, while reducing loss caused by waste, variability, and inflexibility [3].

Although the primary goal of Lean is to create value-added activities and reduce waste to improve organisations productivity [14], the literature review revealed a

difference in Lean implementation between public service organisations and private organisations, such as manufacturing, in the use of lean tools [12]. While manufacturing organisations focus on using a set of lean tools and techniques, service organisations usually use fewer tools, such as value stream [12] though emphasis on designing Lean services through eliminating non-added-value activities [17] due to the broader ranges of processes and customer demands in services, who is also considered as the co-creator of these services [12]. Researchers also argue that the limited use of Lean tools in service organisations is due to the need to understand the concept of value for its customers and how to adapt the Lean tools and techniques to the public service processes [12]. This raises the need to study why specific tools work better for the service sector and how they differ from other sectors [17].

3. Leans applications to achieve sustainable environmental performance

In order to link the Lean approach to green practices and sustainability, the US Environmental Protection Agency (EPA) has described environmental waste as “any unnecessary use of resources and/or substances released into the air, water, or land that could harm human health and/or the environment” [18], this definition act as a guideline to extend Lean to include green production and practices [19]. EPA also has set environmental performance indicators for organisations adopting Lean, which are air emissions, energy use, solid waste, water pollution, hazardous chemicals use, water use, and materials use [13]. These indicators set a complete waste reduction approach for organisations implementing the Lean and Green integration [20]. Researchers agree that this integration helps organisations progress toward sustainability against the triple bottom-line economic, environmental, and social pillars of an organisation production system [21]. In the context of public service organisations, Lean Green can be implemented as an approach to improve their environmental performance [19]. In order to successfully implement Lean Green, several success factors have been found. Frist is through driving people at all organisational levels toward Lean philosophy, and involving them in the planning, designing, implementation and evaluation stages of the Lean approach [22] by ensuring management commitment and support, focusing on the complete understanding of the principles of Lean in order to develop a Lean culture based on continuous improvement and people respect, and effective communication on all organizational levels from management to employees [23]. Developing a Lean culture will contribute to the sustainable performance progress of these organisations [20].

In the context of our study, environmental sustainability in organisations appeared from the concept of green production, which aims to improve the processes to “prevent pollution, reduce waste, and minimize risks to humans and other species” [13], which is usually related to organisations waste generation, energy consumption, emissions, and any environmental practices [24]. Focusing on the environmental sustainable development goals (SDGs), the authors highlight environmental wastes, which, while does not add any value to the customer, its cost affects both the organisations and the society [18]. To connect how eliminating environmental waste can result in achieving environmental sustainable performance, the first question should be how lean is connected to ecological or environmental sustainability. [18]. Several studies showed that Lean leads organisations directly or indirectly to sustainable practices [21] and greener production and practices [25]. Moving toward green practices and complying

with environmental regulations resulted in organisations need to implement new strategies [21], such as Lean methodology. However, authors argue that Lean alone does not significantly impact environmental performance [25]. Nevertheless, the integration of Lean and green practices benefits organisations in their progress toward environmental performance as they have common goals of reducing waste and increasing process and resources efficiency [13], which prevent pollution and emissions [26].

4. Conclusion and future research directions

Through literature, the authors explored the adoption of the Lean methodology borrowed from manufacturing to public service organisations and the need to adapt it to suit the public sector's unique characteristics. The findings suggest that Lean and Green integration can offer a successful approach and strategies toward achieving sustainable environmental performance in public service organisations. This approach is initiated by how Lean methodology supports the successful implementation of Green practices [21] due to the similarities of their approach in minimising waste, eliminating non-value-added processes, and optimising resources [14][25]. The authors established a need for a comprehensive approach to implementing Lean Green as a philosophy in public service organisations rather than limiting the implementation to a few Lean tools, maintained by several success factors to ensure continuous improvement.

Future studies could focus more thoroughly on exploring and better understanding the different Lean tools applications in the public service sector, whether specific tools or combinations of tools are more effective than others, and their impact on the environmental, economic, and social pillars of sustainability.

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2023-09-08

IOS Press

<https://doi.org/10.3233/ATDE230893>

Aljuwaied M, Litos L, Salonitis K. (2023) From manufacturing to public service organisations: lean as an effective approach to achieve sustainable environmental performance. In: Advances in Transdisciplinary Engineering, Volume 44: Advances in Manufacturing Technology XXXVI, pp. 16-21