



Feasibility of Implementing Lean Six Sigma Leadership to Enhance Public Sector Budgeting Efficiency: A Structural Equation Modeling Approach

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Type of Article: **Research**

10.22126/pse.2025.12864.1215

Received: 24 September 2025; Accepted: 01 November 2025

pp. 625-654

Abstract

This study explores the potential of Lean Six Sigma leadership as a tool to improve the efficiency of Iran's public sector budgeting system. Iran's budgeting process faces significant challenges, such as bureaucratic complexity, lack of transparency, and inefficient resource allocation, underscoring the need for innovative leadership approaches. This research analyzes budget experts' perceptions of the compatibility, applicability, barriers, and outcomes of adopting Lean Six Sigma leadership. This approach, which emphasizes process standardization, continuous improvement, and data-driven decision-making, can enhance transparency and operational effectiveness. Data were gathered in 2025 from 249 budget experts using a Likert-scale questionnaire. The study employed a descriptive-correlational design, with data analyzed using SPSS 28 and AMOS 26 through structural equation modeling. Findings show that the four main constructs—compatibility, applicability, barriers, and outcomes—account for 65.4% of the variance in the feasibility of Lean Six Sigma leadership. Second-order confirmatory factor analysis revealed that the “compatibility” construct, with a factor loading of 0.823, exhibits the strongest correlation with the feasibility of implementing Lean Six Sigma leadership, while the “outcomes” construct, with a factor loading of 0.319, shows the weakest correlation. This leadership style is indirectly associated with increased transparency, improved budget forecasting accuracy, and enhanced employee participation through process standardization, continuous improvement, and data-driven analysis. Identified key barriers, including organizational bureaucracy, resistance to change, and lack of expertise, are correlated with the need for robust managerial support, ongoing training, and the development of technological infrastructure. The “outcomes” construct is associated with potential benefits such as reduced financial corruption, increased public trust, and improved accountability in the public sector. This study provides a theoretical-practical framework for reforming public sector budgeting, which can serve as a guide for policymakers and public sector managers.

Keywords: Lean Six Sigma Leadership Style, Public Budgeting, Budget Efficiency, Financial Transparency, Implementation Barriers.

JEL Classification: D73, G38, H61, M48.

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Citations: Nazaripour, M., & Lotfihagh, A. (2026). “Feasibility of Implementing Lean Six Sigma Leadership to Enhance Public Sector Budgeting Efficiency: A Structural Equation Modeling Approach”. *Public Sector Economics Studies*, 4(14), 625-654.

Homepage of this Article: https://pse.razi.ac.ir/article_4032.html?lang=en

1. Introduction

The government budget is the cornerstone of public financial management. It not only allocates resources but also signals policy priorities, underpins sustainable development, and promotes transparency and accountability. As a central policy instrument, the budget shapes economic, social, and administrative decisions, making its design and execution critical to national performance. Yet Iran's budgeting system continues to face deep-rooted challenges. Heavy reliance on oil revenues, complex bureaucratic procedures, limited transparency, and the absence of an integrated information platform slow decision-making and create opportunities for inefficiency and corruption. Tax receipts have historically contributed less than half of total government income, highlighting the fragility of sustainable fiscal resources.

A SWOT analysis shows that Iran's budgeting framework does possess notable strengths, including policy alignment and an emerging shift toward performance-based budgeting. However, entrenched weaknesses—especially oil dependence and transparency deficits—erode efficiency and perpetuate corruption. International experience indicates that aligning fiscal practices with global standards and undertaking comprehensive reforms can markedly improve productivity, yet external pressures such as economic sanctions constrain this process.

Despite abundant research on budget deficits and weak internal controls, modern leadership approaches remain underexplored. Lean Six Sigma leadership—combining lean waste-reduction principles with Six Sigma's data-driven quality improvement—offers a promising avenue for enhancing transparency and operational efficiency. While widely adopted in private organizations, empirical evidence of its application to public budgeting is scarce. This study therefore evaluates the feasibility of implementing Lean Six Sigma leadership within Iran's public budgeting system, considering institutional fit, practical constraints, and expected benefits such as improved efficiency and greater transparency.

2. Theoretical Framework

This study develops a theory-driven model to evaluate the feasibility of Lean Six Sigma leadership in Iran's public budgeting. The framework integrates four key dimensions: compatibility with institutional culture, practical applicability in financial planning, barriers such as bureaucratic resistance, weak data systems, and skill gaps, and expected outcomes including transparency, accountability, and waste reduction. Grounded in the DMAIC cycle and supported by factor analysis, it explains how Lean Six Sigma can address entrenched inefficiencies. By linking leadership principles to budgeting practice, the model offers a structured pathway for improving efficiency and transparency in Iran's public finance system.

3. Methodology

This study adopted a descriptive–correlational design and applied structural equation modeling (SEM) to examine Lean Six Sigma leadership in public budgeting. The target population comprised budget specialists from the Plan and Budget Organization, Ministry of Economic Affairs and Finance, and Ministry of Industry, Mine, and Trade. Using simple random sampling in the first half of 2025, 249 respondents were selected. Data were collected via a five-point Likert questionnaire containing four demographic items and 20 measures covering compatibility, applicability, barriers, and outcomes. Content and face validity were established, and reliability was confirmed with a Cronbach’s alpha of 0.892. Data analysis included exploratory factor analysis in SPSS 28 and confirmatory factor analysis in Amos 26. Model fit was evaluated with CFI, IFI, GFI, and RMSEA indices, and variables were ranked according to their relative impact within the SEM model.

4. Discussion

This study investigated the feasibility of applying lean six sigma leadership in Iran’s public sector budgeting through exploratory and confirmatory factor analyses across four constructs: compatibility, usability, barriers, and outcomes. The first-order measurement model (Tables 5-8) demonstrates that items for these constructs explain 65.4% of the variance in feasibility, with factor loadings of 0.671–0.821 for compatibility, 0.768–0.800 for usability, 0.673–0.812 for barriers, and 0.756–0.835 for outcomes. In contrast, the second-order structural model (Table 12, Figure 2) reveals the relationships between these constructs and the overall feasibility construct, with compatibility showing the strongest correlation (0.823), followed by barriers (0.692), usability (0.432), and outcomes (0.319). Compatibility is associated with aligning Lean six sigma with existing structures, regulations, and organizational culture, correlating with enhanced transparency and efficiency via standardized, data-driven processes (Antony et al., 2017). Usability reflects practical feasibility, associated with optimized resource allocation and employee participation (Lu et al., 2017).

The barriers construct highlights challenges such as bureaucratic inertia and inadequate technological infrastructure, correlating with the need for specialized training and robust data systems (Rosa et al., 2024). The outcomes construct, with the lowest second-order factor loading (0.319), suggests a weaker correlation with feasibility, likely reflecting budget experts’ focus on operational aspects like compatibility and barriers over long-term outcomes such as reduced corruption or increased public trust (Table 12). This practical orientation may stem from skepticism about achieving long-term outcomes in Iran’s context, marked by bureaucratic complexities and sanctions (Turki & Mazaheri, 2022; Kordestani, 2019). Gootjes and De Haan (2022) note that public trust relies on factors beyond managerial tools.

These findings, consistent with prior studies, confirm inefficiencies and transparency deficits in Iran's budgeting system, with bureaucratic barriers being prominent (Antony et al., 2017). Policymakers should prioritize training and data infrastructure, while future mixed-methods research could explore long-term impacts.

5. Conclusion and Suggestions

This study shows that lean six sigma leadership, through data-driven analysis and process standardization, can markedly improve the efficiency, transparency, and accountability of public budgeting. Its high compatibility with existing structures strengthens budget processes, deepens understanding of resource allocation, and supports a culture of operational excellence. Anticipated outcomes include enhanced transparency, reduced corruption, and greater public trust.

However, bureaucratic resistance and weak data infrastructure remain major obstacles. Overcoming these barriers calls for targeted measures such as specialized training, investment in technological infrastructure, and sustained efforts to embed continuous improvement. By combining theoretical insight with practical guidance, this research enriches public financial management and offers policymakers a roadmap for modernization. Future studies should employ mixed-methods and longitudinal data to assess long-term impacts.

6. Ethical Consideration

6.1. Compliance with ethical guidelines

This study adheres to established ethical standards in research. Any unauthorized reproduction or plagiarism of this work will be subject to legal prosecution.

6.2. Funding

This research received no financial support from any organization, institution, or individual.

6.3. Authors' Contributions

All authors contributed equally to the conceptualization, methodology, analysis, and writing of this manuscript.

6.4. Conflict of interest

The authors declare no conflicts of interest related to this research.

6.5. Acknowledgments

This study was conducted as independent research. The authors extend their sincere gratitude to all participants for their valuable contributions.