

Applying Lean Management to Enhance Operational Efficiency and Reduce Costs in Academic Administration: A Case Study of Minimizing Logistics Costs

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Abstract

This research aims to reduce the costs associated with inviting external examiners for graduate examinations at the Institute of Engineering, Suranaree University of Technology. By applying Lean thinking, the study identifies inefficiencies and streamlines examination processes to enhance operational performance. The research began with an analysis of expenditure data from the past five years, covering honoraria, travel expenses, accommodation, and related costs. Preliminary findings revealed that onsite examinations were the primary cost driver, accounting for 48% of total expenditures. This created a significant budgetary burden and hindered administrative flexibility. Using Lean principles as a framework, the current workflow was mapped to identify "waste" or non-value-added activities. A redesigned process was implemented, transitioning from onsite to online examinations. This shift eliminated travel and lodging requirements while maintaining academic standards through structured video conferencing and digital documentation systems. Results demonstrate that the Lean-based transition to online platforms reduced total costs by 51.24%. Significant savings were achieved in logistics, leaving honoraria as the primary remaining expense. This study confirms that Lean applications in higher education can effectively minimize waste and optimize resource utilization without compromising quality. These findings serve as a strategic model for academic institutions seeking sustainable cost-reduction and operational excellence.

Keywords

Lean Thinking, Cost Reduction, Graduate Examination, Online Examination, Process Improvement

1. Introduction

Graduate education plays a crucial role in developing personnel with advanced knowledge, competencies, and academic skills. The thesis defense and independent study examination processes are considered essential stages for evaluating the quality and readiness of graduate students prior to graduation. In general, higher education institutions

invite external experts to serve as examination committee members in order to enhance the credibility, transparency, and academic standards of the evaluation process.

However, organizing examinations in an onsite format, where committee members must travel to the examination venue, results in substantial expenses. These costs include honoraria for committee members, travel expenses, accommodation costs, and other related expenditures. Consequently, the responsible departments have continuously faced increasing financial burdens.

An analysis of the expenses associated with inviting external examiners at the Institute of Engineering, Suranaree University of Technology, during the fiscal years **2019–2024** revealed that the onsite examination format is a major factor contributing to high operational costs. In particular, travel and accommodation expenses for external committee members represent significant costs that could potentially be reduced by improving the operational format in accordance with current technological contexts.

This issue highlights the need to improve administrative processes in order to enhance operational efficiency, particularly by reducing non-value-added activities within the process. Lean Management is an approach that focuses on increasing value within operational processes while simultaneously eliminating waste within the system. This concept has been widely applied across various sectors, including industrial organizations, service sectors, and educational institutions, to improve process efficiency.

Therefore, applying Lean principles to the graduate examination process represents a potential approach to reducing unnecessary steps, minimizing operational costs, and enhancing administrative flexibility. Accordingly, this research aims to improve the graduate examination management process through the application of Lean concepts. The study analyzes the existing workflow, identifies sources of waste within the system, and proposes improvement strategies for the examination process. In particular, the study emphasizes the transition from onsite examinations to an online examination format. This approach can significantly reduce expenses related to travel and accommodation for external examiners while maintaining the academic standards and quality of the examination process. The objective of this study is to enhance the efficiency of the graduate examination management process and reduce operational costs for the institution. The findings of this research can serve as a guideline for improving administrative processes in higher education institutions to achieve greater efficiency in the future.

1.1 Objectives

- 1.1.1 To improve the graduate examination management process through the application of Lean principles.
- 1.1.2 To reduce the operational costs of the graduate examination process.

2. Literature Review

Process improvement in modern organizations focuses on enhancing operational efficiency and reducing waste in resource utilization. Lean Management has been widely adopted in both industrial and service sectors, including educational institutions, as it emphasizes the elimination of non-value-added activities and the improvement of operational processes.

Jankaew (2017) studied the application of Lean concepts to improve the registration and academic record services in a public university. The results indicated that the implementation of Lean principles significantly reduced processing time, eliminated redundant steps, and improved service satisfaction among users. Similarly, Sangthong (2020) examined the application of Lean concepts in academic support operations within a university faculty. The findings showed that Lean implementation helped personnel better understand the overall workflow, reduce task redundancy, and improve coordination efficiency among departments.

In addition to the application of Lean principles, process improvement can also contribute to cost reduction within organizations. Phanphong (2018) conducted a study on process mapping to improve operational procedures in a public educational organization. The results demonstrated that eliminating unnecessary steps and restructuring workflows could effectively reduce time-related costs and human resource utilization. Likewise, Suksawat (2019) investigated

cost management in government agencies and found that analyzing cost structures and improving work processes could reduce unnecessary expenditures and enhance resource utilization efficiency within organizations.

Regarding the use of digital technology to support educational administration, Boonchuay (2020) studied the implementation of information systems for educational management in universities. The findings revealed that online systems could reduce documentation costs, minimize travel requirements, and improve data accuracy. Similarly, Pongsri (2021) examined online teaching and assessment management during the COVID-19 pandemic and found that online platforms enabled effective learning management while providing greater flexibility in educational administration.

Furthermore, Jittawong (2022) investigated the management of online examinations in higher education and found that online examination systems could reduce costs related to physical facilities and other associated resources while also increasing convenience and flexibility in examination administration.

Another important tool for analyzing operational problems is the Fishbone Diagram, which is used to systematically identify the root causes of problems. Thongin (2017) studied the use of fishbone diagrams in analyzing service process problems and found that the tool helped personnel identify systemic causes and develop clear improvement strategies. Similarly, Srisuwan (2019) applied fishbone diagrams together with the Why-Why analysis technique to investigate high operational costs in a government agency. The results showed that in-depth root cause analysis could lead to more accurate and effective problem-solving approaches.

Based on the review of related literature, it can be concluded that Lean concepts, process analysis, and the use of digital technologies can be effectively applied to improve administrative processes in educational institutions. Therefore, this study applies Lean principles together with process analysis and fishbone diagram techniques to identify the root causes of problems in the graduate examination management process. The study aims to improve operational efficiency and reduce the costs associated with the graduate examination process.

3. Methods

This study adopts a Research and Development (R&D) methodology. Lean concepts are applied as the main framework to analyze and improve the graduate examination management process. Process analysis and quality management tools, including the Fishbone Diagram, are employed to systematically identify the root causes of high operational costs in the examination process (Figure 1).

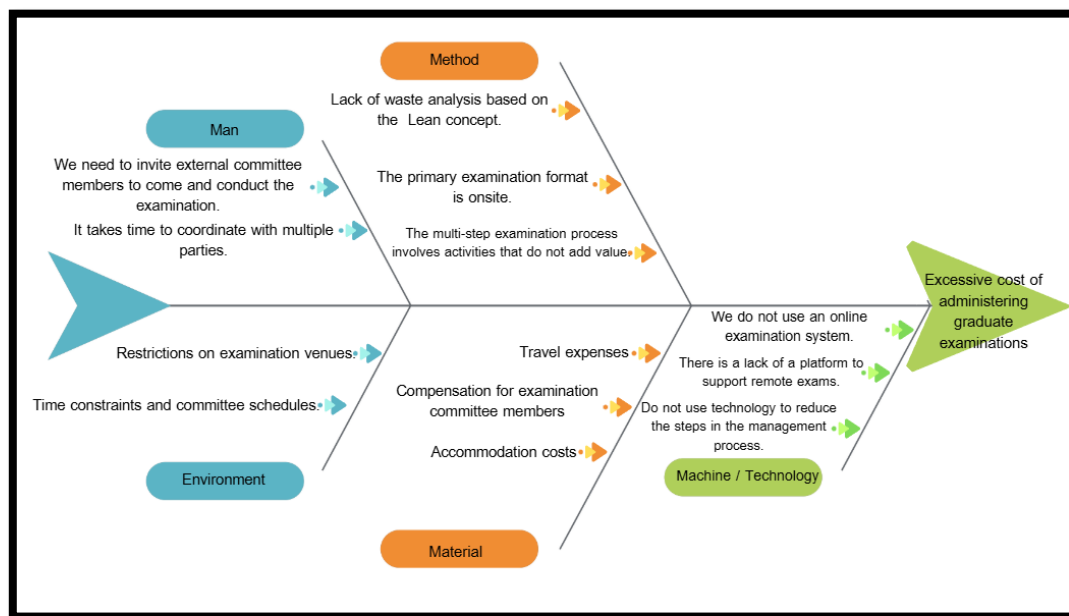


Figure 1. Fishbone Diagram for Root Cause Analysis

Expense data related to inviting external examination committee members from the Institute of Engineering, Suranaree University of Technology, during the fiscal years 2019–2024 were collected for this study. The data include costs associated with the examination process, such as examiner honoraria, travel expenses, accommodation costs, and other related expenditures. The research instruments used in this study consist of the following:

1. Examination Expense Recording Form

A data recording and summary form was used to collect information on the expenses incurred from inviting external examination committee members in each fiscal year.

2. Microsoft Excel Program

Microsoft Excel was used for automatic calculations, data storage and analysis, generation of summary reports using Pivot Tables, and the creation of graphs and charts for data presentation.

Step 1: Study of the Current Examination Process

The existing examination process in the onsite format was examined (Table 1: Onsite Examination Process). The analysis covered all operational steps, including inviting examination committee members, coordination, preparation of examination venues, travel arrangements, and document management. The purpose of this analysis was to identify wasteful steps and non-value-added activities within the process. Based on the analysis of the overall examination expenses, examiner honoraria accounted for the highest cost, totaling 772,054 Baht (Figure 2: Pareto Analysis of Examination Expenses in the Institute of Engineering).

Table 1. Workflow of the Onsite Examination Process

The onsite examination process is carried out through the following steps:	
No.	Process Description
1	The academic advisor proposes the names of examination committee members to the Head of the Program.
2	The list of proposed examiners is submitted to the Institute of Engineering Committee for qualification review.
3	Official announcement of the appointment of examination committee members.
4	The examination date is scheduled by the academic advisor.
5	Request for approval of examination-related expenses, including examiner honoraria, travel expenses, accommodation, and other related costs.
6	Preparation and submission of official invitation letters to the examination committee members.
7	Conduct the examination on the scheduled date and time in onsite format .
8	Summarize and record the examination results.
9	Process the payment of examiner honoraria, travel expenses, and accommodation costs.
10	Submit the project/thesis approval request form and the thesis examination evaluation form.
11	Request approval of the examination results from the Institute of Engineering Committee.

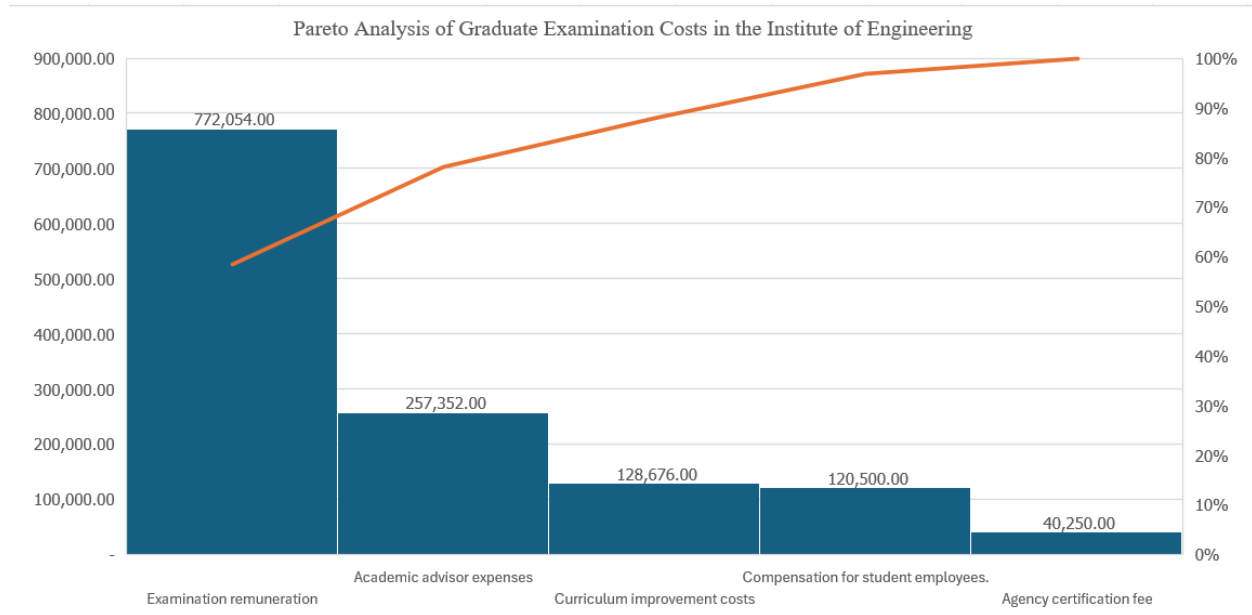


Figure 2. Pareto Analysis of Graduate Examination Costs in the Institute of Engineering

Step 2: Analysis of the Causes of the Problem

A Fishbone Diagram (Figure 3) was used to analyze the causes of high examination costs. The diagram was applied to systematically identify the root causes contributing to the high operational costs of the examination process. The causes were categorized into several groups to facilitate a structured analysis of the problem (Table 2).

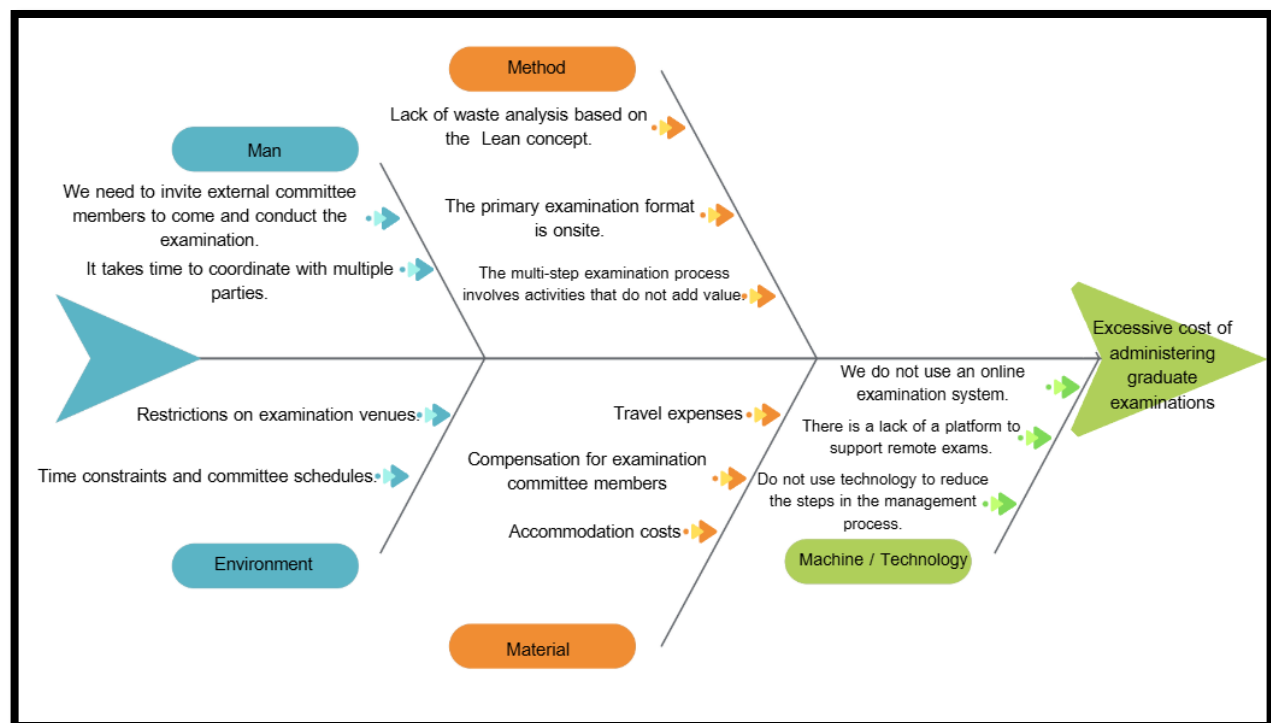


Figure 3. Fishbone Diagram for Root Cause Analysis of High Examination Costs

Table 2. Summary of Root Causes from the Fishbone Diagram Analysis

No.	Category	Root Causes
1	Man	External examiners are required to travel to the examination venue.
		Coordination among multiple parties requires considerable time.
2	Method	Lack of waste analysis based on Lean principles.
		The examination is primarily conducted in an onsite format.
		Several steps in the examination process involve non-value-added activities.
3	Machine / Technology	Lack of technology utilization to reduce management steps.
		Absence of a platform to support remote examinations.
		Online examination systems are not utilized.
4	Material	Examiner honoraria.
		Travel expenses.
		Accommodation costs.
5	Environment	Limitations related to examination venues.
		Constraints related to time and examiner scheduling.

Step 3: Design and Improvement of the Examination Process

After analyzing the causes of the problem, a new examination management process was designed by applying Lean principles. The examination format was changed from onsite to online (Table 3: Online Examination Process). In addition, examination-related documents were integrated into a digital system, and online meeting platforms were utilized to conduct the examination process.

This improvement helped reduce activities related to travel, accommodation arrangements, and the use of unnecessary resources. As a result, the examiner honoraria expenses were reduced to 395,630 Baht: Improvement in Examiner Honoraria Costs).

The data were analyzed using descriptive analysis, comparing the total examination expenses before and after the process improvement. The analysis also examined the proportion of expenses in each cost category and summarized the cost reduction achieved by changing the examination format from onsite to online (Table 3: Workflow of the Online Examination Process).

Table 3. Workflow of the Online Examination Process

No.	Process Description
1	The academic advisor proposes the names of examination committee members to the Head of the Program.
2	The list of proposed examiners is submitted to the Institute of Engineering Committee for qualification review.
3	Official announcement of the appointment of examination committee members.
4	The examination date is scheduled by the academic advisor.
5	Request for approval of examination-related expenses, including examiner honoraria.
6	Preparation and submission of official invitation letters to the examination committee members.
7	Conduct the examination on the scheduled date and time in online format.
8	Summarize and record the examination results.
9	Process the payment of examiner honoraria.
10	Submit the project/thesis approval request form and the thesis examination evaluation form.
11	Request approval of the examination results from the Institute of Engineering Committee.



Figure 3. Reduction in Examiner Honoraria Costs After Process Improvement

4. Data Collection

This research aims to study cost reduction in inviting external examiners for graduate examinations at the Institute of Engineering, Suranaree University of Technology, by applying Lean principles to improve the efficiency of the examination management process.

The study began with an analysis of historical expense data related to inviting external examination committee members during the fiscal years 2019–2024. The data covered various cost categories, including examiner honoraria,

travel expenses, accommodation costs, and other related expenditures. The preliminary analysis indicated that conducting examinations in an onsite format was a major factor contributing to high operational costs. Specifically, expenses related to onsite examinations accounted for approximately 48% of the total examination costs, resulting in a significant financial burden for the Institute of Engineering and reducing flexibility in managing the examination process.

This research applied Lean principles as the main framework for analyzing the operational workflow. The study began by examining the current examination process to identify steps that generated waste or involved non-value-added activities. Subsequently, a new process was designed by transforming the examination format from onsite to online, which helped reduce activities related to travel, accommodation arrangements, venue preparation, and the use of unnecessary resources. Despite these changes, the academic standards and quality of the examination process were maintained by utilizing online meeting platforms together with systematically managed digital examination documents.

The data used in this study consist of expense records related to inviting external examiners at the Institute of Engineering, Suranaree University of Technology, during the fiscal years 2019–2024. These data include costs associated with the examination process, such as examiner honoraria, travel expenses, accommodation costs, and other related expenses.

The research instruments used in this study include the following:

1. **Examination Expense Recording and Summary Form**
This form was used to collect and record the expenses incurred from inviting external examiners in each fiscal year.
2. **Microsoft Excel**
Microsoft Excel was used for automatic calculations, data storage and analysis, generation of summary reports using **Pivot Tables**, and the creation of graphs and charts for data presentation.

5. Results and Discussion

Based on the analysis of expenses related to inviting external examiners at the Institute of Engineering, Suranaree University of Technology, during the fiscal years 2019–2024, the results indicated that conducting examinations in the onsite format resulted in a total cost of 772,054 Baht. The major cost components included examiner honoraria, travel expenses, accommodation costs, and other related expenditures. Among these, travel and accommodation expenses accounted for a relatively large proportion of the total costs.

After applying Lean management principles to improve the examination management process by changing the examination format from onsite to online, the total cost was reduced to 376,424 Baht. This resulted in a cost reduction of 395,630 Baht, representing 51.24% of the total expenses. These results demonstrate that the proposed process improvement can significantly reduce operational costs associated with the graduate examination process.

6. Conclusion

This study aims to improve the efficiency of the graduate examination management process and reduce the costs associated with inviting external examiners at the Institute of Engineering, Suranaree University of Technology, by applying Lean management principles. The research began with an analysis of historical expense data related to inviting external examiners during the fiscal years 2019–2024. The analysis revealed that external examiner honoraria for onsite examinations accounted for a high proportion of the total expenses, representing approximately 48% of the overall costs.

The findings indicated that conducting examinations in an onsite format resulted in high operational costs, particularly due to travel and accommodation expenses, which constituted a significant portion of the total expenditures. To eliminate waste within the process, the examination format was improved by transitioning from onsite to online examinations, utilizing online meeting platforms together with digital examination documents while maintaining the academic standards and quality of the examination process.

The results showed that the total examination expenses decreased from 772,054 Baht to 376,424 Baht, resulting in a cost reduction of 395,630 Baht, or 51.24% of the total expenses. These findings demonstrate that the application of

Lean principles can effectively reduce operational costs and improve the efficiency of academic administrative processes.

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