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Factors influencing cost overruns in publicly funded hospital projects

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KEYWORDS

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ABSTRACT

In the context of Vietnam's strong economic development and increasing demand for healthcare, enhancing healthcare infrastructure and addressing the issue of overcrowding in public hospitals has become a crucial government objective. This study focuses on identifying the factors influencing cost escalation in public hospital construction projects funded by public investment. The research applies a non-probability sampling method, using convenient sampling and Referral/Snowball sampling techniques. A total of 120 individuals participated in the study, including investors, project managers, design and construction contractors, subcontractors, and relevant suppliers. The study's findings have identified and ranked the ten most significant factors affecting cost escalation in public hospital projects. These factors include inadequate functional design, inadequate functional design, delay in disbursing public investment capital, unforeseeable events, design errors leading to repetitive construction, impact of exchange rate fluctuations on imported medical equipment, unfavorable weather conditions during construction, delay in providing adjusted contract prices or approving adjusted investment amounts, complex geological conditions, and use of estimated quantity estimates in bidding when design is incomplete. The results of this research contribute significantly to the management of construction costs in public hospitals, particularly in the context of public investment funding.

1. Introduction

In recent years, the Vietnamese economy has experienced significant development, alongside an increasing demand for healthcare and health protection for the population. However, the issue of overcrowding in public hospitals has become a concerning problem in the healthcare sector of our country. This issue is particularly prevalent in central hospitals and large cities, where the number of patients exceeds the designed capacity. This overload situation poses the hidden risk of diminishing fairness and effectiveness in healthcare for the population.

According to statistics from the Ministry of Health, with a system of around 1300 hospitals distributed throughout the country as of the end of 2018, of which about 85% are public hospitals, Vietnam has strived to increase the number of hospital beds to 28 beds per 10,000 people by August 2020. However, this number is still low. Therefore, the government has set a target to achieve 30.5 beds per 10,000 people by 2025 to improve this situation.

Regrettably, most of the current public hospitals were built nearly two decades ago, with outdated infrastructure, and the need for renovation and the construction of new public hospitals is an urgent issue, garnering special attention from the government and society. In order to better meet the healthcare needs of people in all provinces, the government has outlined new construction and renovation directions for public hospital projects through decisions such as Decision 122/QD-TTg (2013) [1] on the national strategy for protection, care, and enhancement of people's health during the 2011-2020 period, and Decision 648/QD-TTg (2020) [2] on the network planning of healthcare facilities for the period 2021-2030.

Facing the current overcrowding situation in hospitals and poor hygiene conditions in some provinces, the investment in building new Grade I hospitals in provinces or final-tier hospitals in major cities is being prioritized in the allocation of public investment capital. This not only brings social benefits and alleviates pressure on the healthcare system but also modernizes healthcare infrastructure. However, the issue of cost escalation and procurement expenses exceeding the total investment budget for hospital construction projects is becoming a challenge for Vietnam's constrained public investment budget.

Due to the variability and impact of numerous factors in the construction industry, controlling cost escalation is always a concern and a subject of assessment research for many government agencies, construction companies, project investors, and universities within and outside the country. Therefore, this study will focus on identifying the factors influencing cost escalation in public investment-funded hospital projects.

2. Literature review

In the research focusing on the factors influencing cost escalation in publicly funded hospital projects, numerous studies have been

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conducted to understand and evaluate the causes of cost overruns in the healthcare sector. Kim et al. [3] conducted a study on cost escalation factors in hospital projects in Vietnam. The research identified key factors influencing cost escalation in hospital projects and proposed a reasonable cost management approach for hospital projects in Vietnam. Nam [4] assessed the correlation between cost escalation and disputes in construction in Vietnam. This study aimed to identify the main causes of cost escalation and required changes in construction projects in Vietnam. They also proposed a change management process to minimize dispute situations. Balali et al. [5] conducted a study on the factors influencing cost increases in large hospital construction using the Delphi-Swara method. The study focused on identifying the key factors causing cost escalation in large hospitals in Iran and evaluated the impact of these factors on construction quality. De Marco et al. [6] conducted a study on hospital BOT (Build-Operate-Transfer) projects in Italy. They analyzed the factors influencing the financial aspects of healthcare-related BOT projects in Italy and evaluated the importance of public investment for scarce PPP (Public-Private Partnership) projects. Asiedu and Adaku [7] studied cost overruns in public projects in developing countries. This research focused on identifying the main causes of cost escalation in public projects and provided solutions to address these issues. Lộc [8] analyzed financial risks related to the emergency hospital construction project in Bảo Lộc city, Lâm Đồng province. This study concentrated on analyzing financial risks affecting hospital construction projects using the EFA (Exploratory Factor Analysis) method and proposed coping strategies. Rahman et al. [9] studied a causal model of cost overruns. This research used Partial Least Square-SEM to analyze and evaluate the causes and factors leading to cost escalation in construction projects in Pakistan, particularly from the contractor's perspective. Cheng [10] conducted an analysis of factors influencing costs in construction projects. This study used the Delphi analysis method to identify 16 key factors divided into 4 groups related to contract scope, cost control and contract, contributing to assessment and determination of factors affecting cost escalation in construction projects. Endut et al. [11] conducted a study on cost and schedule overruns in projects in Malaysia. This research provided an analysis of the relationship between cost overruns and schedule delays in projects in Malaysia. The study also compared cost and schedule overruns in private and public sectors, offering solutions for controlling project costs and schedules. From these previous studies, we gain a comprehensive view of the factors influencing cost escalation in construction projects. These factors encompass technical, managerial, financial, and even risk-related elements. However, there remain limitations in research data for hospital projects, such as the absence of some stakeholders to clarify the practical causes of cost overruns in hospital projects. Therefore, this study aims to approach real-world data from stakeholders to identify key factors influencing cost overruns in publicly funded hospital projects.

3. Methodology

The research methodology employed in this study is the non-probability sampling method, specifically utilizing the Convenience Sampling technique and the Referral/Snowball method. This approach was chosen to gather information from experts and individuals with experience in the field of public hospital construction in the southern region during the period 2010-2020. The process of designing the survey questionnaire is illustrated in Figure 1.

The target population for the study includes project owners/management boards, design and construction contractors, construction suppliers, and supervisory consultants related to public hospital construction projects. A total of 120 individuals within the population have been identified.

The sample size is determined based on the estimate of contacts accessible to the author. The author selected a sample of 120 individuals from the population, including 9 departments/committees/agencies, 13 project owners/management boards, 30 supervisory and project development consultants, as well as 68 construction contractors/suppliers. The sample is chosen by directly contacting and proposing collaboration to individuals within the population.

Data collection is carried out through the distribution of survey questionnaires both in person and via email. In the case of direct distribution, individuals who have participated in previous public hospital projects will receive the survey questionnaire. Similarly, when using email, individuals who were previously contacted by phone or email will be invited to participate. Participants who agree will receive a link to the online questionnaire and provide their responses. Reconfirming information regarding their previous involvement in public hospital projects ensures the accuracy of the collected data.

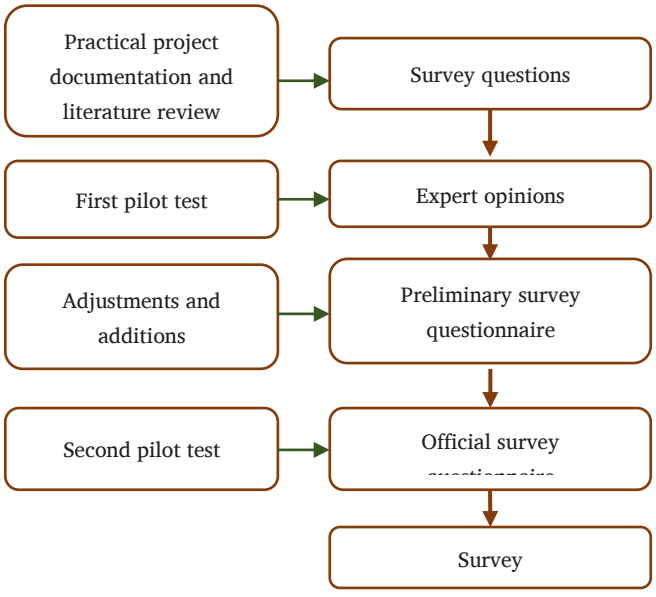

Figure 1. The process of designing a survey questionnaire.

In total, 120 survey questionnaires were collected, including 78 in-person surveys and 44 online surveys. Project owners, management boards, supervisory consultants, design and construction contractors, as well as construction suppliers are the key participants in the survey and provide the data.

In conclusion, the chosen research method has fulfilled the objective of gathering data from experienced experts in the field of public hospital construction. This approach ensures the accuracy and reliability of the collected data for analysis and evaluation of the factors influencing cost escalation in publicly funded hospital projects.

4. Results and discussions

After conducting surveys and collecting data from all 120 individuals representing various departments, project owners/management boards, supervisory and project development consultants, as well as construction contractors/suppliers in the field of public hospital construction in the southern region during the period 2010-2020, the study identified and ranked the factors with the most significant impact on cost overruns in publicly funded hospital projects.

Below is the ranking table of the top 10 factors with the most significant impact on cost overruns in public hospital projects (Table 1), along with the average evaluation scores on the Likert scale ranging from 1 to 5.

Table 1. Ranking of factors influencing cost overruns in publicly funded hospital projects

Rank	Factors	Mean
1	Slow review of design and technical estimate	4.21
2	Inadequate functional design	4.18
3	Delay in disbursing public investment capital	4.17
4	Unforeseeable events	4.13
5	Design errors leading to repetitive construction	4.13
6	Impact of exchange rate fluctuations on imported medical equipment	4.12
7	Unfavorable weather conditions during construction	4.10
8	Delay in providing adjusted contract prices or approving adjusted investment amounts	4.10
9	Complex geological conditions	4.09
10	Use of estimated quantity estimates in bidding when design is incomplete	4.08

The research results reveal significant factors contributing to cost overruns in publicly funded hospital projects in the southern region. The leading factors on the list include delayed design review and technical estimation, inadequate functional design, and slow disbursement of public investment funds. These factors directly impact the construction and project management processes, thereby escalating costs and prolonging project timelines. A significant delay in design review and estimation can result in increased costs due to extended deployment or necessary alterations to initial plans. Inadequate functional design that fails to meet actual hospital requirements can lead to additional costs arising from post-construction adjustments or modifications. Delays in disbursing public investment funds on schedule can create funding shortages during project implementation, resulting in increased costs due to loan interest, temporary operational expenses, and extended timelines. Furthermore, factors like unforeseen events and design errors leading to repetitive construction cycles significantly contribute to the substantial cost overruns in the building process. These factors are often difficult to control and complicate project planning and execution. The results also highlight the impact of exchange rate fluctuations on the importation of medical equipment from abroad, unfavorable weather conditions for construction, delays in issuing price adjustments or approving revised investment amounts, complex geological conditions, and the use of estimated quantity budgets in bidding when design details are incomplete, all of which substantially contribute to cost overruns in public hospital projects. Exchange rate fluctuations can escalate the costs of imported medical equipment and introduce instability into the project's cost structure. Harsh weather conditions can cause delays or disruptions in construction timelines, leading to increased costs. Slow approval of adjusted investment amounts can result in funding shortages and project cost increases. Difficult geological conditions may necessitate more expensive technologies and materials to ensure the safety and stability of the structure, leading to cost escalation. The inaccurate use of estimated quantity budgets can lead to unreasonable bidding, elevating the risk of exceeding the planned budget. This research outcome provides crucial insights into the factors that require attention and control during the execution of publicly funded hospital projects. These findings can support effective cost planning and management decisions, ensuring success and efficiency in improving the healthcare system and providing better health care for citizens in the future.

5. Conclusion

The research findings have identified and analyzed the top 10 factors with the most significant impact on cost overruns in publicly funded hospital projects. These factors include inadequate functional

design, inadequate functional design, delay in disbursing public investment capital, unforeseeable events, design errors leading to repetitive construction, impact of exchange rate fluctuations on imported medical equipment, unfavorable weather conditions during construction, delay in providing adjusted contract prices or approving adjusted investment amounts, complex geological conditions, and use of estimated quantity estimates in bidding when design is incomplete.

The results of this study provide valuable contributions to the field of cost management in public hospital construction, particularly in the context of public investment funding. Project owners and managers can utilize this information to gain a better understanding of risks and challenges during project implementation, enabling them to implement measures that limit and prevent cost escalations while ensuring effective and cost-efficient construction processes.

However, the research also has some limitations worth noting. The non-probability sampling method may not fully represent the entire population, which could limit the generalizability of the results when applied to different regions or stages of development in public hospital projects. Therefore, further research and the use of various sampling methods are necessary to provide more detailed insights into the factors influencing construction costs in public hospital projects.

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