Ranking Key Performance Factors in Public Building Construction: Evidence from Gaidakot Municipality, Nepal

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ABSTRACT

Cost overruns and delays remain major barriers to the successful completion of building construction projects, particularly in developing nations like Nepal. This study explores the root causes of performance variance in public building construction projects in Nepal, specifically within the Gaindakot Municipality, a region noted for its developing infrastructure. Through a strict mixed-methods research approach, the methodology integrates intensive case studies with large questionnaire surveys across a broad cross-section of stakeholders, including contractors, engineers, and local government officials.

55 performance-influencing factors were identified through stakeholder consultation and literature review. They were quantified and ranked in order methodically through use of the Relative Importance Index (RII) based on participant judgment of their influence on project outcomes. The results indicate that contractor inefficiencies such as excessive work slowdowns and site administration inefficiency, economic uncertainty, and administrative delay, are among the most significant drivers of project time and cost variability.

The findings provide evidence-based suggestions for improved project management. The study provides actionable suggestions for policymakers and municipal authorities towards directing particular interventions for guaranteeing improved efficiency, timely completion, and cost-effective implementation of projects. Additionally, the implications are beyond Gaindakot, as valuable lessons are transferred to other similar urban settings in other parts of Nepal and developing countries at large, pursuing sustainable development of infrastructure.

1. INTRODUCTION

The construction industry of buildings is among the most significant determinants of economic growth and infrastructure construction, and it is an important engine of economic prosperity and social progress globally [1]. In Nepal, and especially in fast-developing cities such as Gaindakot Municipality, there has been a huge increase in building construction activities. These projects are intended to build elementary infrastructure, ranging from public structures to residential and commercial houses, in pursuit of long-term goals to meet the rising demands of an expanding population and local growth [2]. However, despite their significance, project delivery within needed timelines, budgeted costs, and desired quality remains a crucial and universal issue on the planet, one highly aromatic in emerging economies [3]. Construction activities are inherently complex, with unique characteristics in the site, massive resources required, massive capital investments, and many uncertainties. These complexities most frequently take the form of unexpected delays, insufficient resources, and fluctuating regulatory conditions, which in turn lead to recurrent claims and conflicts, particularly for massive civil engineering projects [4]. These delays have implications far more serious than the mere failure of a project, such as heavy economic loss, loss of public confidence, and slowing down of the overall socio-economic development [5].

While universally accepted causes of construction delays are well-justified in literature, the expression thereof, as well as interrelations and real ranking of these causes in individual local environments, especially urbanizing municipal territories like Gaindakot, represent an important research gap. This gap is bridged in this paper by exclusively addressing time and cost performance differences of completed building construction projects in the Gaindakot Municipality. It aims to recognize the most critical issues particular to this local context, evaluate the impact of available measures toward project management, and produce context-related, empirically derived suggestions. The research aims to understand the complexity of such local projects, taking into consideration their inherent difficulties and interaction among various causes of delay, including those of local administration, contractor ability, and economic uncertainty. Lastly, through a key identification and ranking of the most significant determinants of delay, the research provides actionable outcomes essential in the facilitation of timely, cost-effective, and efficient delivery of municipal infrastructure, thereby securing

improved governance and sustainable urbanization in Gaindakot and other locations.

2. LITERATURE REVIEW: FACTORS AFFECTING PUBLIC BUILDING CONSTRUCTION PERFORMANCE

Delay and cost overrun in construction projects have been studied in various geographical and economic settings. The literature consistently points to various and frequently recurring reasons that cause schedule and cost deviations from planned schedules and costs. The causes are entirely classified into client-related, contractor-related, consultant-related, and external [6].

Client issues are mostly embedded in insufficient budgeting, uncertainty in making decisions regarding changes or revisions to the design, untimely approval of the drawing and materials, and lack of experience in implementing complex construction projects [7].

Client project scope changes during construction are also among the top contributing factors to the ensuing significant delays and costs because they necessitate redesigns, re-procurement, and, in most instances, rework [8]. Aside from that, client delay in payment to the contractor is a catastrophic eventuality that may include contractor demobilization of equipment and, hence, lead to subsequent project slowdown [9]. Factors involving contractors are typically cited as causes for suboptimal project performance.

These include inadequate planning and scheduling, low labor productivity, inadequate supervision and site control, and lack of necessary appropriate equipment or effective man-power [10]. Contractors' financial difficulties, for instance, low cash flows or inability to obtain necessary credit, can initiate work stoppage or a decline in work effort. Miscommunication and coordination errors among the contractor's crew, or between the contractor and others, can serve to elevate miscommunication and inefficiencies in operations [11]. Delayed costs caused by consultants are generally associated with defective or incomplete drawings and specifications, a lack of familiarity with local materials, and communication breakdown between the consultant and other stakeholders in a project. Procrastination by the designer in accepting designs, inactive replies to queries by contractors, and absence of monitoring on the consultant front can directly hinder construction activity [12].

The quality of submission of design and documentation by the consultants is most important; any deviation or lack of it can lead to large-scale rework and major cost implications [13].

Moreover, external factors like inflation, adverse weather conditions, political instability, and bureaucratic formalities can significantly contribute to cost overruns and delays in projects [14]. Volatility in construction labor and material costs, possibly due to worldwide economic forces or domestic supply chain disruptions, can quickly exceed initial estimates and increase the cost of a project. Natural disasters, site surprises, and government policy or regulatory changes also come with uncontrollable issues that tend to fall outside of a project's stakeholders' domain [15].

Administrative delays, e.g., slow release of permits and inefficient administrative practices in public bureaus, are most prevalent in developing economies and contribute most to project delay [16].

A study in Jordan by Al-Momani (2000) pinpointed the significant contribution of design changes and poor scheduling in public construction works, ascribing common managerial failures. At the same time, a study in a Nepalese context by Adhikari (2017) pinpointed slow decision-making, inefficiency of the contractors, and inflation as the major obstacles to a successful project. Such findings have also been supported by evidence in other neighboring South Asian economies, for instance, India and Bangladesh, showing the reproducibility of the identified impediments in similar developing economies with corresponding market structures and institutional settings [17, 18]. The literature also shows that accountability for performance drifts would traditionally overlap among stakeholders and, therefore, coordination and accountability [19]. Though these studies have given a review of the causes of delay, a detailed examination of their cumulative interaction within the unique administrative, economic, as well as cultural context of rapidly changing municipalities like Gaindakot, Nepal, has not been exhaustively examined.

Therefore, ranking and identification of these factors in this specific local context is called for to offer exact, evidence-informed interventions towards reform.

3. METHODOLOGY

The current research was conducted with an exploratory and descriptive research design with mixed methodology to establish the reasons for delays in building municipal structures in depth. Both qualitative and quantitative sources of data were utilized by the strategy to achieve a complete and triangulated analysis of the issue.

3.1 Study Area and Project Selection

The study was conducted in Gaindakot Municipality, Gandaki Province, Nepal. Eleven completed building construction projects were chosen to be analyzed with care. The projects were selected considering the following criteria:

- Contract value over NRs. 5 million
- Obtained via National Competitive Bidding (NCB)
- Carried out with federal and provincial grants
- Fully accomplished and documented in the local Annual Plan

3.2 Data Collection Methods

Two types of data were collected:

- **Primary Data:** Stakeholders, including engineers, monitoring officers, contractors, consultants, and elected representatives, were interviewed using a structured questionnaire survey and key informant interviews. 55 valid responses were received.
- **Secondary Data:** Contract agreements, variation orders, completion reports, and official correspondence from the municipality archives were used that were project documents.

3.3 Questionnaire Design and Validation

The questionnaire had 55 literature and local project experience-based potential delay reasons. The respondent rated every reason using a five-point Likert scale ranging from "No Impact" to "Extreme Impact." Reasons were categorized based on responsibility: Client, Contractor, Consultant, Elected Official, and External.

To ensure validity and reliability:

- A pilot survey was conducted on a sample of professionals
- Expert reviews helped in content validity
- Cronbach's Alpha reliability coefficient of 0.945 showed excellent internal consistency when reliability was tested.

Cronbach's Alpha	Interpretation
0.90 - 1.00	Excellent
0.80 - 0.89	Good
0.70 - 0.79	Acceptable
0.60 - 0.69	Questionable
Below 0.60	Poor

The Cronbach's alpha coefficients are used to measure the internal consistency that was, how closely related a set of items is as a group. Cronbach's alpha is the most common measure of internal consistency. The general rule of thumb is that a Cronbach's alpha of 0.70 and above is good, 0.80 and above is better, and 0.90 and above is best. The SPSS tool was used to calculate Cronbach's Alpha. Commonly used interpretations for Cronbach's Alpha [20].

Cronbach's alpha (α) = k/(k-1)(1-($\sum 1_k$=1 σ2/σ2x)……eq (1)

Where,

σi = sum of item variance Where k = number of questionnaires

σ x =Variance of total score

The validation of a questionnaire is fundamental in ensuring the accuracy and reliability of research outcomes. This section elucidates the methods utilized to validate the questionnaire employed in this thesis, which encompasses the test-retest method, content validity assessment, and a pilot survey.

3.4 Data Analysis Techniques

Data were analyzed using Microsoft Excel and SPSS. The Relative Importance Index (RII) was calculated for each factor to quantify its perceived impact on project delays. RII enabled ranking and prioritization of the most significant causes across stakeholder groups. The formula for calculating the Relative Importance Index (RII) is as follows:

$$RII = \sum W/(A \times N)$$

Where:
W = weighting given to each factor by the respondents (ranging from 1 to 5)
A = highest weight (i.e., 5 in this study)
N = total number of respondents (i.e., 55 in this study)

This structured and triangulated approach ensured robust data collection and analysis, laying the foundation for evidence-based conclusions and recommendations.

4. RESULTS AND DISCUSSION: IDENTIFYING AND RANKING KEY PERFORMANCE FACTORS

The next section elaborates on empirical findings from the stakeholders' survey where top delay drivers are ranked and determined with the use of the Relative Importance Index (RII). The research provides fact-based information about the most critical challenges for building construction projects in the Gaindakot Municipality.

Based on stakeholder input, the Relative Importance Index (RII) of all 55 causes had been calculated to establish their estimated effects on project cost and time performance. The 15 highest-priority causes in decreasing order of RII are as follows in Table 1 below:

Rank	Delay Factor	RII
1	Suspension of work by the contractor	0.873
2	Poor site management and supervision by the contractor	0.822
3	Inflation	0.822
4	Poor communication by the contractor	0.789

5	Delay in decision-making on variations	0.789
6	Weak monitoring and supervision system	0.782
7	Lack of the consultant's knowledge of available materials and equipment	0.782
8	Change of CAO/Project Manager	0.778
9	Delay in updating the new design	0.778
10	Frequent changes in government	0.775
11	Suspension of work by the owner	0.775
12	Faulty design	0.775
13	Communication gaps by the consultant	0.775
14	Lengthy contract award process	0.771
15	Budget allocation problems	0.764

The research firmly demonstrates that causes on the contractor's side are accountable for delays, with the most critical among them being suspension of work and site administration. Economic causes like inflation, and inefficiencies on client- and consultant-side like foot-dragging over modifications to design and communication failures, contribute significantly to variations in performance.

Such a ranking provides an obvious direction for municipal project managers to understand where the intervention is much needed to avert upcoming delays and cost overruns. In particular, the high RII of 'Suspension of work by contractor' (Rank 1) and 'Poor site management and supervision by contractor' (Rank 2) indicates the key necessity for better contractor supervision and capacity building in line with [10, 11] evidence. Inflation (Rank 3) is among the notable external economic risks, a proxy for broader macroeconomic uncertainty around project expenditures [14]. Administrative and client inefficiencies are also prominent.

'**Delay in decision on variations**' (RII = 0.789) and 'Delay in updating new design' (RII = 0.778) reflect client approval process and design management delays that will halt work and lead to rework at cost [8].

Municipal administration leadership instability is shown in the 'Change of CAO/Project Manager' (RII = 0.778), which causes institutional memory loss, decision rethinking, and general slowdowns. Additionally, "Communication gaps by consultant" (RII = 0.775) and "Weak monitoring and supervision system" (RII = 0.782) point to the necessity of improved monitoring systems and improved communication from consulting companies, both of which are essential for their early detection and resolution [12, 19]. Slow and lengthy contract award process' (RII = 0.771) and 'Budget allocation issues' (RII = 0.764) are systematic bureaucratic bottlenecks and public expenditure mismanagement in the public procurement machinery, characteristic of developing worlds, which hamper project initiation and continuity [16]. The above ranking provides municipal project managers with clear guidance on where interventions are most essential to avoid delays and cost overruns in the future. The findings robustly support general South Asian construction industry trends, where contractor capability, administrative processes, and economic stability were cited as the most frequent references of success determinants [17, 18].

Gaindakot Municipality can make certain specific steps to enhance project efficiency, ensure cost-effective and timely completion, and contribute to sustainable infrastructure development in the long run by addressing these highest-priority factors.

5. CONCLUSION

The major causes of delay and cost overrun in the Gaindakot Municipality municipal building construction works were identified and prioritized by this research. The research came up with several key issues, such as inefficiency on the part of contractors, poor control, inflation, and delayed decision-making quantitatively by the use of stakeholder inputs and the Relative Importance Index (RII).

These findings provide an unambiguous way to improve regional construction management procedures. The findings not only for Gaindakot but also for other municipalities facing the same delivery issues of infrastructure extend. The findings apart from providing useful information for Gaindakot provide a model that can be replicated for other developing countries like Nepal where similar municipalities are subjected to the same administrative arrangement, contractor capability, and budget restrictions in infrastructure delivery.

6. RECOMMENDATIONS

Strategic measures must target the underlying cause of the delay in the project and cost overruns. Suspension of work and site management could be eliminated by improving the contractor selection process by taking into account workload areas, financial capacity, and performance history. In the same way, improving the supervision of the project by using competent human resources and regular monitoring would improve control on-site.

Mid-project disruption can be minimized through improved planning and documentation procedures, such as rigorous design review and reliable cost estimating. To avoid delays, administrative activities such as contract award and variation acceptance should be expedited.

Finally, more coordinated and timely decisions will be obtained through enabling the coordination and communication among customers, consultants, contractors, and authorities. Results of projects can be enhanced altogether through these measures, encouraging the effective infrastructure construction of the municipality.

7. LIMITATIONS AND FUTURE WORK

This research was focused on a single municipality and may limit the external validity of its results. Future research would make it worth comparing causes of delays across different municipalities or extending to road, bridge, and utility construction projects. Additional research on computer project management software, such as Building Information Modeling (BIM) or integrated project management software, as the solution for information flow and coordination inefficiencies is also recommended.

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