ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 11| Issue: 7| July 2025|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2025: 8.691 || ISI Value: 1.188

# CHALLENGES OF CONSTRUCTING LARGE-SCALE INFRASTRUCTURE: A CASE STUDY ON THE CANDON CITY AIRPORT DEVELOPMENT PROJECT

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**Article DOI:** https://doi.org/10.36713/epra23062
**DOI No: 10.36713/epra23062**

## ABSTRACT
*This case study investigates the multifaceted challenges encountered during the construction of the Candon City Airport, a significant infrastructure project in Ilocos Sur, Philippines. Using a qualitative case study design, data were gathered through structured interviews with First Northway Development and Construction Corporation engineers. The study categorizes the challenges into six key areas: financial, technical, regulatory, logistical, environmental, and stakeholder-related. Among these, logistical constraints and stakeholder management issues emerged as the most persistent and disruptive throughout the project's development. The findings highlight the importance of proactive planning, stakeholder engagement, and adaptive project management strategies. The study concludes by offering sustainable solutions and evidence-based recommendations to enhance the implementation of future large-scale infrastructure projects in similar regional settings.*

**KEYWORDS:** *Candon City Airport, Philippines, Construction Challenges, Large-Scale Infrastructure, Infrastructure Development, Logistical Issues, Stakeholder Management*

## 1. INTRODUCTION
Infrastructure development is a critical driver of regional economic growth and enhanced connectivity. Large-scale projects such as airports are particularly complex among various forms of infrastructure, often encountering multidimensional challenges that encompass regulatory compliance, environmental sustainability, financing mechanisms, and coordination among diverse stakeholders.

While the scope and complexity of these projects vary, existing literature identifies recurring challenges in technical implementation, legal and regulatory frameworks, financial constraints, stakeholder management, and environmental considerations. Chief among these are regulatory and legal hurdles, frequently emerging as significant impediments to infrastructure development. The intricacy is heightened in global or semi-global settings, where adherence to both local and international standards often lead to delays and inflated project costs.

Airport construction, in particular, represents one of the most intricate infrastructure undertakings. These ventures require the cooperation of numerous major stakeholders, including government agencies, private contractors, and local communities. Airports improve transportation efficiency and serve as catalysts for economic development by enhancing domestic and international connectivity. For instance, air transport drastically reduces travel time; a flight from Manila to Cebu takes approximately one hour compared to a 24-hour ferry ride (Badladz, 2021).

Jin and Doloi (2021) emphasize that airport projects often encounter implementation difficulties stemming from ambiguous regulatory policies and insufficient government support. Their research suggests that lacking a clear and transparent legal framework can stall progress, particularly when projects span multiple jurisdictions or require inter-agency collaboration.

In November 2023, Candon City Mayor Eric Singson publicly announced the development of a new airport project designed to invigorate the local economy and stimulate broader regional growth across Ilocos. This strategically planned initiative incorporates feasibility studies and environmental impact assessments to align the airport's construction with Candon City's long-term development agenda. Supported by House Deputy Speaker Kristine Singson-Meehan, the project secured a budget of P270 million from the 2022 General Appropriations Act, earmarked for runway construction, project management, and security infrastructure. The Department of Public Works and Highways (DPWH) also allocated P70 million to construct the airport terminal.
The closest airport to Candon City is Laoag International Airport, located approximately 109.2 kilometers away. Other nearby facilities include the Tuguegarao Domestic Airport, around 140

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kilometers from the city. Initially envisioned as a community airport, the Candon City Airport is expected to evolve into a regional hub offering domestic and eventually international services, depending on future demand.

This airport initiative forms part of a broader infrastructure strategy that includes projects such as the Candon City Arena, the Ilocos Sur Medical Center, and the development of ecotourism zones. These ventures are projected to enhance tourism, decrease travel time from central regions, and contribute significantly to local and regional economic development. The airport's groundbreaking ceremony, which was attended by local government officials and Department of Transportation Director Eduardo D.J. Mangalili, marks a pivotal moment in Candon City's transformation into a key regional economic hub (Lazaro, 2024).

The Candon City Airport Development Project exemplifies a large-scale infrastructure initiative to improve air mobility and foster regional prosperity. However, like similar undertakings, it has its share of challenges. This study presents a case analysis of the problems encountered during the construction phase and the mitigation measures implemented. By focusing on aspects of developmental planning and construction management, this research aims to generate insights to guide future infrastructure projects in the Philippines and other similarly situated regions.

## 2. OBJECTIVES

This study aims to analyze the specific challenges encountered during the construction of the Candon City Airport and to derive insights that may inform the planning and execution of similar infrastructure projects in the future. Specifically, it seeks to determine the timeline of the airport's construction, identify the activities that have been carried out to date, and examine the major obstacles faced across six key dimensions: financial, technical, regulatory, logistical, environmental, and stakeholder management. Furthermore, the study aims to propose sustainable and practical solutions that can be adopted to enhance the effectiveness and resilience of future airport development initiatives.

## 3. METHODOLOGY

**Research Design**

This study employed a qualitative case study design, an approach well-suited for investigating complex, real-world phenomena such as large-scale infrastructure construction. By focusing on a single case—the Candon City Airport project—this method facilitated a rich, contextualized understanding of the multifaceted challenges encountered during implementation. The case study approach also enabled the exploration of various stakeholder perspectives, allowing for a comprehensive analysis of project-specific issues.

## 4. PARTICIPANTS AND DATA COLLECTION

The participants in this study comprised seven licensed engineers from the First Northway Development and Construction Corporation (FNDCC), the primary contractor responsible for the airport's development. This group included two construction project engineers and five site/project-in-charge engineers, all of whom were directly involved in different stages of the project. Data were gathered through semi-structured interviews, allowing for both guided inquiry and flexibility in responses. Interviews were conducted onsite at the FNDCC engineering office located in Barangay San Agustin, Candon City, Ilocos Sur, providing a setting conducive to open and informed discussion.

## 5. INSTRUMENTATION

A carefully designed interview guide served as the primary data collection instrument. The guide was structured to ensure both consistency and depth across all interviews. It included open-ended questions that addressed each category of challenge—financial, technical, regulatory, logistical, environmental, and stakeholder management—while also encouraging participants to share relevant insights based on their professional experiences.

## 6. ETHICAL CONSIDERATIONS

This study adhered strictly to ethical research standards. Informed consent was obtained from all participants prior to the interviews. Anonymity and confidentiality were upheld throughout the research process, ensuring that individual identities and sensitive information were protected. Additionally, ethical clearance was secured through formal endorsement letters from appropriate authorities and regular consultations with the research adviser, thereby validating the study's ethical compliance.

## 7. RESULTS

**Challenges Faced During the Construction of the Candon City Airport Development Project**

### 7.1 Financial Challenges

The project encountered minimal financial issues. However, a notable case of cost overrun arose due to discrepancies between the initial design and the actual terminal dimensions and scope of work. This issue is expected to be addressed in the next contract phase. While limited in scope, such budget deviations underscore the importance of clear design validation and cost forecasting.

### 7.2 Technical Challenges

Significant technical delays stemmed from the absence of finalized plans and surveys before project execution. Critical adjustments had to be made to address conflicts with existing NGCP transmission lines and elevation mismatches on-site. These challenges reveal the consequence of poor pre-construction planning and the absence of integrated site data, both of which delayed mobilization and contributed to design revisions.

### 7.3 Regulatory Challenges

The timely acquisition of permits, particularly for quarrying and sourcing of embankment materials, was problematic. Extended processing times disrupted the delivery of key construction inputs, thereby delaying site works. This reflects a lack of regulatory streamlining and coordination between government agencies and project implementers.

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### 7.4 Logistical Challenges

Logistics posed significant issues, including scarcity of embankment materials, lack of machinery, poor access roads, and inefficient worker performance. Additionally, the reassignment of skilled labor to other concurrent projects exacerbated delays. These findings point to inadequate resource planning and poor supply chain coordination.

### 7.5 Environmental Challenges

Weather-related disruptions and hefty rainfall rendered the site muddy and inaccessible, leading to the suspension of excavation, hauling, and embankment activities. The lack of adaptive scheduling strategies and infrastructure for adverse weather conditions exposed the project's vulnerability to climatic factors.

### 7.6 Stakeholder Management Challenges

Coordination issues among the LGU, the Department of Transportation (DOTr), and the contractor led to inconsistent directives. Resistance from local landowners—related to unpaid compensation and ongoing crop harvesting—further hindered progress and access. These conflicts reveal weak stakeholder engagement strategies and insufficient conflict resolution mechanisms.

## 8. DISCUSSION

The challenges encountered in the Candon City Airport project reflect those commonly experienced in large-scale infrastructure developments, particularly in developing countries. Among the various issues examined, logistical, stakeholder management, and technical challenges were found to be the most disruptive, significantly affecting the project's timeline and operational efficiency.

Although financial issues were relatively minimal, the single case of cost overrun—resulting from discrepancies in terminal dimensions and scope—highlights the need for rigorous design validation and more accurate cost forecasting. This aligns with Flyvbjerg's (2010) assertion that even minor financial miscalculations, if unaddressed, can escalate and undermine project delivery in complex undertakings.

Technical and logistical issues proved particularly detrimental. The lack of finalized pre-construction plans and surveys, combined with on-site conflicts such as transmission line obstructions and elevation mismatches, led to significant project delays. Jin and Doloi (2021) emphasize that insufficient design integration and poor coordination at early stages are common pitfalls in infrastructure projects, especially in emerging economies. In addition, the project's logistical difficulties—ranging from material shortages and inaccessible terrain to equipment insufficiency and labor mismanagement—mirror the findings of Kumar and Gardiner (2017), who argue that fragmented supply chains and inadequate contractor coordination often cause performance inefficiencies in megaprojects. These results point to the need for comprehensive site-specific planning and logistical readiness before project rollout.

Delays in securing permits, particularly for quarrying and material sourcing, reveal another layer of complexity involving government regulatory systems. This observation supports the findings of Ofori (2012), who noted that cumbersome bureaucratic procedures continue to hinder infrastructure progress in the Global South. Improved inter-agency coordination and simplified permitting processes could play a critical role in preventing similar delays in future projects.

Environmental conditions, especially persistent rainfall that led to muddy terrain and halted work activities, demonstrate how vulnerable construction timelines are to climatic factors. Without adaptive scheduling and proper weather-contingency plans, progress is easily stalled. These challenges affirm the World Bank's (2019) recommendation that infrastructure projects must incorporate climate risk assessments and resilience strategies into their planning and execution phases. Integrating real-time weather data and creating flexible work schedules could enhance site productivity, especially in tropical regions prone to seasonal disruptions.

Equally pressing were the stakeholder management issues observed throughout the project. Miscommunication between implementing agencies—including the Department of Transportation, local government units, and the contractor—created confusion and inconsistent directives. Moreover, landowner resistance due to unresolved compensation concerns and ongoing land use contributed to further delays. These outcomes echo Li et al. (2013), who identified weak stakeholder relationships as a significant cause of disruption in public infrastructure projects. Establishing clear lines of communication, early engagement with affected communities, and transparent compensation mechanisms are essential strategies to minimize conflict and foster collaboration.

The study reinforces that early technical preparation, inclusive stakeholder engagement, and sound logistical planning are critical foundations for success in infrastructure megaprojects. These findings offer actionable insights for engineers, project managers, and policymakers tasked with implementing similar airport development initiatives in the Philippines and beyond.

## 9. CONCLUSION

This study concludes that although financial and regulatory issues in the Candon City Airport project were relatively manageable, the most critical obstacles lay in technical planning, logistical execution, and stakeholder coordination. The absence of finalized plans and surveys before implementation and challenges in resource mobilization and coordination among involved agencies and local stakeholders significantly impacted the project's timeline and overall efficiency. These findings underscore the need for more comprehensive pre-construction planning, integrated project management, and proactive community engagement. Future infrastructure initiatives, particularly in developing regions, must draw on the lessons from this case to improve project preparedness, align stakeholder interests early, and establish adaptive strategies to overcome environmental and

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operational uncertainties. By addressing these areas, future developments can achieve greater resilience, timeliness, and sustainability in execution.

## 10. RECOMMENDATIONS

Based on the findings of this study, several key recommendations are put forward to improve the planning and implementation of future infrastructure projects. In terms of financial management, it is essential to strengthen pre-construction cost estimation processes and include adequate contingency allowances to accommodate variation orders and unforeseen expenses, thereby preventing budget overruns. On the technical front, all detailed engineering plans, surveys, and technical designs should be completed, validated, and approved before issuing the notice to proceed, ensuring a solid foundation for execution. Logistical preparedness can be enhanced by identifying and securing reliable sources of construction materials early in the project timeline, along with prioritizing the timely procurement and mobilization of critical equipment and machinery.

Regulatory processes should be streamlined by fostering close coordination with relevant government agencies and adopting a proactive permitting schedule to avoid delays in project execution. To address environmental challenges, construction activities must be scheduled with consideration for seasonal weather patterns, and essential materials should be stockpiled in advance to reduce downtime during adverse conditions. Finally, effective stakeholder management requires early and continuous engagement with all involved parties. Aligning expectations through consultations and resolving landowner compensation issues before site mobilization is crucial to maintaining smooth project operations. Collectively, these recommendations aim to foster more resilient, efficient, and inclusive infrastructure development in future endeavors.

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