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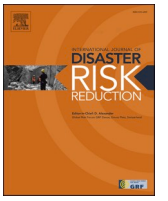

Contracting challenges in post-disaster reconstruction in developing countries: Evidence from Nepal reconstruction

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ABSTRACT

This study aims to identify the challenges of procuring and contracting post-disaster reconstruction projects in developing countries using conventional construction contracts, with Nepal as a case study. After the 7.6 Mw Gorkha Earthquake in 2015, Nepal embarked on extensive reconstruction efforts supported by various foreign governments and agencies. While these efforts were generally hailed as successful, large-scale non-residential reconstruction projects encountered significant challenges. This issue is common globally due to the lack of attention from researchers on large-scale non-residential reconstruction, leading to overlooked issues and the continuous failure of these projects to meet their objectives. One key issue in such projects is using conventional construction contracts not designed for post-disaster scenarios. This study used a qualitative research design that included semi-structured interviews to collect data and thematic analysis to gain insights from individuals involved in Nepal's reconstruction. Fifteen interviews with experts involved in managing construction contracts during the reconstruction were conducted and analysed using Nvivo 14 software. Upon analysis, two main themes emerged: procurement and bureaucratic, and contract-related, each further divided into sub-categories. These themes highlight how Procurement Act and conventional contracts used in reconstruction in Nepal failed to address post-disaster needs. The findings emphasise the necessity for pre-disaster evaluations and updates to procurement laws and contracts to establish more suitable approaches for reconstruction. Aligning contracts with the specific requirements of post-disaster contexts can significantly enhance the efficiency and effectiveness of reconstruction efforts. Future research should focus on developing disaster-focused contracts to enhance global reconstruction practices.

1. Introduction

Disasters, whether from natural hazards or human-caused events, severely impact the built environment and cause socio-economic consequences worldwide [1]. Addressing these effects has become a global priority, prompting increased investments in disaster resilience and post-disaster research. Improved awareness and communication have spurred greater government focus and funding for disaster-related studies. As a result, there has been a notable surge in post-disaster reconstruction (PDR) research in recent years. Yi and

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Yang [2] noted a fivefold increase in PDR publications between 2000 and 2012, with a sixfold growth in construction-focused PDR research.

Due to its vulnerability to disasters, Asia receives the most research attention, although many developing countries in Asia and Africa remain underrepresented [2]. Developed countries lead in PDR research, focusing on sustainability, resilience, and governance, yet often overlook practical implementation challenges and lessons from past projects [2,3]. The infrequency of major disasters in a single location contributes to this oversight, as governments often fail to capture critical knowledge when reconstruction authorities and other key players are phased out [4].

PDR literature also tends to focus on housing and short-term recovery, focusing less on large-scale non-residential reconstruction. Balancing long-term plans with immediate needs is a key challenge in reconstruction [5], especially in developing countries that rely on loans and grants for reconstruction [1]. Housing reconstruction often takes priority, leaving infrastructure projects underfunded despite their critical role in long-term recovery [6]. Development banks, major funders of reconstruction, usually prefer to support long-term projects that promote economic growth and development rather than emergency response and housing needs [7]. Freeman also highlights a growing trend in lending for housing reconstruction to meet the needs of developing countries, a shift that, according to the World Bank, has limited its ability to fund essential infrastructure projects.

This study focuses on large-scale non-residential reconstruction, which refers to both infrastructure and non-residential buildings. Infrastructure typically damaged in disasters includes transportation, telecommunications, and water and wastewater systems. Non-residential buildings include schools, healthcare facilities, public and private buildings, and heritage sites. All these built environments can suffer major damage during a disaster. After the 2004 Indian Ocean tsunami, infrastructure losses accounted for 19.7 % of total damages in Aceh, while in Sri Lanka, road and transportation needs alone made up 22 % [8]. The overall impact was even higher when considering all non-residential reconstruction efforts. Similarly, in Nepal, damage and losses in these sectors exceeded 25 % of the total losses from the 2015 earthquake [3,9].

Despite the scale of damage, research on these issues remains limited. Yi and Yang [2] identified eight overarching themes in PDR research, with nearly half of all studies focusing on stakeholder analysis and reconstruction approaches, while infrastructure-related issues account for just 5 %. Puri et al. [10] note that most research in infrastructure reconstruction has been focused primarily on transportation. Other researched topics include critical success factors and project success indicators [11–13]; infrastructure prioritisation and reconstruction frameworks [14–16]; stakeholder analysis [17]; and resourcing [18,19]. However, challenges in actual implementation have been largely overlooked, making it difficult to capture lessons learned and improve preparedness for future disasters [10].

Long-term reconstruction projects are essential for reducing future risks and vulnerabilities, aligning with the Sendai Framework's goals [5]. Research shows that investments in infrastructure can drive long-term economic growth, as seen in Italian provinces that used reconstruction aid to enhance transportation systems [20]. Infrastructure systems' interconnected and complex nature also means their timely restoration is essential to avoid delays in overall reconstruction [4].

Despite the evident benefits, non-residential reconstruction remains underexplored in existing PDR literature. This gap hampers the ability of researchers and practitioners to learn from past projects and risks undermining future efforts. Consequently, more research is needed on large-scale non-residential projects to identify effective strategies and address unique challenges. A key challenge lies in managing the complex dynamics of these projects, which involve substantial funding and multiple stakeholders, making them particularly vulnerable to external influences. Such influences often result in political interference [21,22], financial mismanagement [23], and corruption [24,25]. These issues contribute to delays, cost overruns, and reduced project quality, further complicating implementation and contract management.

Given the broad scope of non-residential reconstruction projects, this study narrows its focus to the procurement and contracting challenges in large-scale non-residential PDR projects in developing countries, using Nepal's post-2015 Gorkha Earthquake reconstruction as a case study. Nepal serves as an ideal case due to its high disaster vulnerability, recent reconstruction experience following the 2015 earthquake, and its distinctive legal and institutional framework as a developing nation.

Puri et al. [26], in their critical literature review, noted that the lack of research has led to the continued reliance on standard forms of construction contracts (SFCCs) and procurement methods from regular construction in post-disaster projects. These methods, however, are ill-suited to the unique challenges of post-disaster contexts. Despite being criticised for issues like poor readability [27], ambiguity and misinterpretations [28,29], and the need for modifications that worsen readability [30], SFCCs remain widely used. According to Puri et al. [26], this adoption is largely due to their easy accessibility, recognition by government and stakeholders, cost-effectiveness, and the perception that they fairly distribute risks among the parties involved. Consequently, Puri et al. [26] called for targeted research to better understand the unique challenges faced in real-world reconstruction projects and develop better-suited solutions. This research is essential to moving beyond the limitations of SFCCs and ensuring that construction contracts in post-disaster contexts are better aligned with the realities and requirements of reconstruction efforts.

In line with the recommendations of Puri et al. [26] and Puri et al. [10], this study uses qualitative analysis of interviews with construction experts involved in Nepal's reconstruction to explore contractual and procurement-related challenges in depth. The findings aim to pave the way for future research into simpler, more effective reconstruction contracts and improved strategies for disaster-prone regions worldwide.

The remainder of this paper is structured as follows: Section 2 examines how reconstruction efforts are prioritised in developing nations and provides an overview of Nepal's post-earthquake context and reconstruction initiatives. Section 3 outlines the research methodology employed in this study. Sections 4 and 5 present the results and discussion, respectively. Finally, Section 6 concludes the study, summarising key findings and implications.

2. Post-disaster reconstruction priorities in developing countries

Different communities recover from similar disasters at varying rates due to differences in pre- and post-disaster conditions [65]. The gap is especially wide between developing and developed nations. For instance, a 6.5 Mw earthquake in California in 2003 caused only two deaths despite occurring in a densely populated area, while a similar 6.6 Mw earthquake in Iran the same year resulted in over 40,000 fatalities [31]. This disparity can be attributed to two main factors. First is the disproportionate impact of disasters on poorer countries [32,33]. While developing countries experience lower economic losses during disasters, tragically, most disaster-related fatalities occur in these less affluent nations [67]. Second is inadequate planning, legislative gaps, inefficient management, failure of critical infrastructures, and weak disaster management systems in developing countries [31,32,34].

Developing countries often rely on foreign aid and loans for reconstruction. While the influx of foreign aid has positive economic impacts on these countries, it can also create challenges. One such challenge is referred to as the "Samaritan's dilemma." According to Raschky and Schwindt [35], in poor developing countries with weaker democratic systems, foreign aid can foster dependency and undermine self-sufficiency, perpetuating vulnerabilities and recurrent cycles of disasters despite significant investment in recovery and reconstruction. Despite this challenge, restoring normalcy drives foreign governments and agencies to assist with recovery, categorised by urgency into short-, medium-, and long-term plans.

Short-term plans focus on immediate needs such as rescue operations, debris removal, emergency relief, safety, and critical infrastructure repairs [36]. Medium-term efforts include livelihood support, training for officials and organisations, community programs, and integrating disaster risk reduction into rebuilding efforts [37]. Long-term initiatives prioritise comprehensive housing reconstruction, large-scale infrastructure projects, and public buildings while enhancing disaster preparedness through capacity-building and hazard-reduction measures [37,38].

After a disaster, government and aid agencies typically prioritise immediate relief efforts, such as temporary humanitarian assistance. However, this initial recovery phase can be prolonged, creating a significant gap between relief efforts and subsequent reconstruction [24,39]. Medium-to long-term reconstruction efforts face challenges initially due to their substantial funding requirements. Available funding is mostly front-loaded and short-term focused, making it difficult to swiftly transition from relief to long-term reconstruction and recovery [31]. As a result, longer-term recovery suffers delays caused by inadequate planning, poor coordination, and insufficient funds.

In long-term reconstruction efforts, housing reconstruction takes priority in developing countries due to factors like the lack of disaster insurance and low-income levels among citizens [36]. Without insurance and limited financial resources, individuals rely heavily on government and aid organisations to rebuild their homes, placing significant pressure on these entities to fund and expedite housing projects. Consequently, significant reconstruction funds are directed towards housing, with agencies prioritising and accelerating housing delivery efforts [40].

Infrastructure and non-residential public buildings often become a lower priority and are not an immediate focus in post-disaster recovery efforts [10,26]. Their reconstruction gets delayed for years and is treated with a business-as-usual attitude rather than urgency. However, restoring infrastructure like roads, bridges, utilities, and public buildings is key to speeding up recovery, delivering aid, and reviving economic activity. Neglecting infrastructure can slow long-term recovery and hurt developing economies. A balanced approach prioritising housing and infrastructure is crucial for faster recovery, resilience, and sustainable development in disaster-affected regions.

2.1. Overview of the 2015 Gorkha Earthquake reconstruction

Nepal's unique location on the boundary of the Indian and Eurasian Plates creates a diverse geophysical condition across its narrow 250-km width. At this continental boundary, the Indian Plate subducts under the Eurasian Plate at a rate of 2 cm *per* year [41], resulting in frequent earthquakes that make Nepal the 11th most earthquake-prone country globally [42]. Additionally, Nepal faces various natural hazards, including landslides, floods, and avalanches, ranking as the 20th most vulnerable country to multiple hazards and the 30th to flood disasters [66]. Over 60 % of its districts and 80 % of its population are exposed to severe hazards, reflecting patterns in many developing nations where poor planning, rapid population growth, and insufficient infrastructure contribute to risk [43].

Nepal frequently experiences seismic activity but had not faced a major earthquake for 81 years, from 1934 Nepal-Bihar Earthquake until the 2015 Gorkha Earthquake [44,45]. On April 25, 2015, a magnitude 7.6 M_l earthquake struck Nepal, causing extensive damage across 32 of 77 districts and resulting in 8790 deaths, 22,300 injuries, and USD 7 billion in damages [9,46]. The earthquake was followed by over 300 aftershocks exceeding 4 Mw, including a 7.3 M_w event on May 12, 2015, which caused further damages [47].

Despite its disaster-prone nature, Nepal lacked a planned system for reconstruction after a major disaster like the 2015 Gorkha Earthquake [3]. As a developing country, Nepal lacked the means and resources to rebuild independently. In June 2015, following a Post Disaster Needs Assessment (PDNA), Nepal held an International Conference on Reconstruction, securing pledges of USD 4.1 billion for recovery, comprising of USD 1.97 billion in grants and USD 2.1 billion in loans [48]. This commitment enabled Nepal to plan its reconstruction efforts.

By late 2015, Nepal began developing its reconstruction policy guided by the Build Back Better (BBB) principle, supported by the United Nations Development Programme. Key BBB elements include improved stakeholder management and legislative support for reconstruction. Effective stakeholder management is crucial in avoiding duplicative efforts and promoting collaboration. Additionally, enacting post-disaster legislation to support recovery and reconstruction is a common practice in the post-disaster context. Reconstruction authorities are essential for coordinating efforts and preventing duplication [43]. Similar authorities were successfully

employed in India after the 2001 Gujarat Earthquake and in Pakistan after the 2005 Kashmir Earthquake [3]. Nepal adopted this approach, drawing on successful examples from these similarly affected neighbouring regions.

2.1.1. Reconstruction Act and the National Reconstruction Authority

Nepal's parliament passed the Reconstruction Act on December 16, 2015, leading to the establishment of the National Reconstruction Authority (NRA) on December 25, 2015, as a special-purpose entity with exceptional authority [48]. The NRA developed the Post-Disaster Recovery Framework (PDRF) 2016–20, outlining its vision, mission, and goals to complete all reconstruction within five years, with an option for a one-year extension [49].

The NRA collaborated with line ministries to establish project implementation units. By decentralising NRA roles to the local level, these units helped achieve one of the NRA's strategic objectives: building local capacity. The goal was to strengthen local capacity in terms of decision-making and implementation, creating resilient communities for the future. This decentralisation also facilitated the sharing of institutional knowledge and lessons learned [49]. However, a lack of resources and confusion over roles later caused collaboration challenges between the NRA and local officials [50].

The Reconstruction Act established a National Reconstruction Fund, allowing the NRA to manage reconstruction spending on behalf of the Government of Nepal (GoN). Unlike typical government allocations, unspent money from the fund was permitted to be carried over to the next year, which is very important in a slow and complex reconstruction process. Additional funds, including the Multi-Donor Trust Fund for rural housing, the Dharahara Reconstruction Fund, and the Heritage Fund, were also created to support specific reconstruction needs [48].

These funds were allocated according to the priorities set in the PDRF to ensure effective and efficient resource use. The specific sector priorities from the PDRF are outlined below.

2.1.1.1. Sector prioritisation. Similar to reconstruction efforts in other developing countries, housing assistance was the GoN's primary focus during Nepal's reconstruction. Table 1 illustrates the financing needs and sector priorities established by the NRA in the PDRF, ranked by estimated financial requirements.

Housing secured over double the funding of the second-highest priority, education. However, spending on education was significantly underestimated, with 2021 distributions nearly tripling initial estimates [51]. Critical infrastructure sectors, including transport, water, and energy, ranked lower in funding priorities. This common tendency to prioritise housing over infrastructure often leads to delays in vital infrastructure projects, hindering the overall reconstruction process.

2.1.1.2. Procurement of reconstruction projects. The PDRF stipulates that reconstruction procurement funded by the GoN must adhere to government guidelines and specific regulations from the Reconstruction Act and NRA. In contrast, donor-funded projects can opt for either GoN procurement systems or alternative methods [48]. This flexibility led to varied reconstruction approaches: Chinese grants were implemented as turn-key projects with limited NRA involvement, while the USA and UK used their own procedures to engage local partners, and India routed its loans through the GoN [52].

To streamline procurement, the NRA introduced measures such as granting delegated authority for bids and change approvals, increasing thresholds for direct procurement, and reducing response times for pre-qualifications and bidding [48]. Training sessions were also held for Ministries and NRA officials to familiarise them with the revised regulations and donor procurement procedures.

The NRA's procurement strategies for different projects include.

Table 1
Financial Needs Estimates and Sector Prioritisation as reported in National Reconstruction Authority (2016).

Item	Sector Description	Financing Requirements (Millions)	Remarks
1	Housing	NPR 376,119.00	Rural Housing: NPR 286,060 Millions Urban Housing: NPR 90,059 Millions
2	Education	NPR 180,628.10	
3	Cultural Heritage	NPR 33,800.00	
4	Government Buildings	NPR 29,778.00	
5	Environment and Forestry	NPR 28,451.20	
6	Agriculture, Livestock Development and Irrigation	NPR 26,894.40	
7	Transport	NPR 24,925.00	Transport (Strategic Road Network): NPR 6749 Millions Transport (Local Road Network): NPR 18,176 Millions
8	Water, Sanitation and Hygiene	NPR 21,246.60	
9	Health	NPR 17,493.00	
10	Electricity and Renewable Energy	NPR 15,028.90	
11	Employment and Livelihood	NPR 9066.00	
12	Social Protection	NPR 7758.00	
13	Nutrition	NPR 7461.00	
14	Gender Equality and Social Inclusion	NPR 4641.50	
15	Disaster Risk Reduction	NPR 4247.80	
16	Governance	NPR 3065.00	
17	Tourism	NPR 917.30	
	Total	NPR 791,520.80	

Note: As of April 2015, the exchange rate was 100 NPR = 1 USD [3].

A. Homes: Implemented through an owner-driven approach, providing homeowners NPR 200,000 (approx. USD 1500) in three instalments.
B. Small-scale rural infrastructures: Managed by local authorities *per* national regulations.
C. Other recovery and infrastructure activities: Overseen by the NRA and central-level project implementation units (CLPIU), with specific management for:
a. Educational institutions: Local committees handle reconstruction, with larger projects contracted through CLPIU-Education.
b. Infrastructure: Managed by line ministries and planning authorities, with budgeting and procurement overseen by CLPIU.

2.1.1.3. Reconstruction status during NRA phase-out. In December 2021, at the close of its sixth year, the NRA hosted an international conference to share experiences and lessons from Nepal's reconstruction efforts. The NRA reported that reconstruction significantly boosted Nepal's economy, driving an average annual growth of 5 % between 2015 and 2020, with the construction sector growing by 7.48 %. Additionally, the reconstruction initiatives helped train 100,000 local workers during that period [49]. By 2022, reconstruction efforts generated 400 million workdays of employment for 1.1 million workers [53].

Despite progress, some projects remained unfinished by the end of the sixth year. By June 2021, housing reconstruction was 84.8 % complete, with 703,307 homes built. Other projects also faced delays, with 94 % of government buildings, 88 % of schools, 86 % of roads, and 63 % of health facilities completed [51]. Some reconstruction projects are still ongoing as of the writing of this paper.

Please refer to Table 2 for a target versus achieved numbers breakdown across different construction categories.

Delays in reconstruction were attributed to different factors including institutional gaps, political instability, poor coordination, weak governance, resource shortages, and socio-cultural disasters [54]. Nepal Reconstruction Authority (2021) identified frequent disasters, logistical challenges during the COVID-19 pandemic, and internal management issues as additional causes of delays in school construction. Shrestha [51] noted that procurement methods, particularly reliance on lowest bid awards combined with inadequate contractor performance, also contributed.

Following the Steering Committee's meeting on December 22, 2021, all unfinished NRA projects, assets, and liabilities were transferred to the National Disaster Risk Reduction and Management Authority the following day. Established in early 2020 under the Disaster Risk Reduction and Management Act of 2017, this authority aims to serve as an entity for permanent disaster risk governance in Nepal [55]. While the NRA focused on post-Gorkha Earthquake reconstruction, the new authority addresses the broader challenges posed by frequent disasters, ensuring a comprehensive framework and accountability for disaster risk management.

3. Research methodology and methods

3.1. Research question

This study seeks to address the following research question.

1. What are the key challenges associated with traditional procurement mechanisms and contracts in post-disaster reconstruction projects in Nepal?

3.2. Theoretical framework and study design

This study uses a qualitative research design, using semi-structured interviews as primary data collection method and thematic analysis as the analysis technique. Document analysis of relevant reports supplements the primary data.

An interpretivist approach, similar to Leppold et al. [56], has been used in the study. This philosophical approach acknowledges that within the same context, individuals may perceive reality differently, as their interpretations are shaped by their unique perspectives and life experiences [57]. Given the possibility of multiple interpretations, interpretive thinking inherently introduces an element of subjectivity. For instance, someone new to a subject (naïve) might perceive it differently from someone with prior experience in the phenomenon under study [58]. Striking a balance between presenting phenomena as they are and situating interpretations within their specific contexts is, therefore, essential. In line with this, the study narrates participants' experiences by carefully contextualising interpretations. This ensures that the participants' sense-making processes are thoughtfully considered while incorporating the researcher's own "experientially-informed lens" [59].

Table 2
Reconstruction status reported by Nepal Reconstruction Authority (2021).

Item	Description	Target	Actuals			Remarks
			Completed	Under Construction	Total Actuals	
1	Education facilities	7553	6647	936	7583	More construction than the target.
2	Health facilities	1197	751	354	1105	Less constructed than the target.
3	Heritages	920	606	288	894	Less constructed than the target.
4	Public buildings	415	388	20	408	Less constructed than the target.
5	Security buildings (through NRA)	216	216	0	216	Targeted works completed.

3.3. Recruitment and data collection

Semi-structured interview was selected as a research instrument for its flexibility, allowing researchers to adapt question formats, content, and sequencing to facilitate natural conversation [60]. Ethical research considerations required approval from the educational institution's ethics committee before data collection.

Between December 2023 and January 2024, 15 in-person interviews were conducted with stakeholders engaged in post-2015 Gorkha Earthquake reconstruction. Special emphasis was placed on selecting experts with experience in managing construction contracts for non-residential projects during the reconstruction phase to ensure high-quality information. Participants were required to have at least five years of experience, have worked on at least one non-residential reconstruction project in Nepal, and possess practical knowledge of construction contracts in these projects.

All interviews were audio-recorded with participant consent and subsequently transcribed for analysis. Participant names and organisational details have been anonymised and coded for privacy.

Table 3 presents the participants' profiles, including educational backgrounds, years of experience, and project types handled. The participants had extensive experience with reconstruction in various earthquake-affected districts in Nepal. This enabled them to provide a comprehensive range of insights into the challenges of managing construction contracts across different regions of the country, beyond the capital city of Kathmandu.

3.4. Data analysis

Nvivo 14 software was used to manage and analyse the data. Audio recordings were transcribed and imported into the software for thematic analysis, following the six-step process by Ahmed and McDonnell [61]: data familiarisation, coding, generating themes, reviewing themes, defining and naming themes, and writing up.

During the familiarisation phase, the main author thoroughly reviewed the verbatim transcripts, reading them multiple times and taking detailed notes to identify key observations for initial coding. All 15 transcripts were then imported into Nvivo 14 and analysed using an inductive coding method. The main author conducted the initial coding, but co-authors were regularly consulted to review the coded excerpts to ensure a thorough and unbiased analysis. Together, they reviewed the initial codes and combined related ones. For example, "insufficient clauses" and "incompatible clauses" were initially coded separately but later merged into the broader code, "inadequate contract clauses".

All the quotes referred for the analysis in the study have been reported in italics with a pseudonym given to each participant for confidentiality. The final themes are presented and discussed in this paper.

Table 3
Interview participants' profile.

Participant	Position/Organisation	Years of Experience	Education Level	Non-residential Reconstruction Experience	Reconstruction Experience by Districts
P1	Director (Contractor)	21–25	Masters	Schools, health facilities, and dormitories	Makawanpur
P2	Project Director (Government)	21–25	PhD	Schools and health facilities	Throughout Nepal
P3	Associate Programme Manager (Aid Organisation)	11–15	Masters	Schools	Throughout Nepal
P4	Deputy Project Director (Government)	>30 years	Masters	Schools	Throughout Nepal
P5	Monitoring Engineer (Aid Organisation)	21–25	Masters	Schools and roads	Throughout Nepal
P6	Team Leader (Contractor)	5–10	Masters	Schools, health facilities, and historical heritage buildings	Throughout Nepal
P7	Project Controls Specialist (International Consultancy)	16–20	Masters	School and health facilities	Bhaktapur, Kathmandu, Makawanpur, and Sindhuli
P8	Director (National Consultancy)	16–20	Masters	Schools	Dolakha, Kathmandu, and Ramechhap
P9	Project Engineer (Government)	16–20	Masters	Schools and health facilities	Kathmandu and Kavre
P10	Project Management Specialist (Government)	>30 years	PhD	Schools	Kathmandu and Kavre
P11	Team Leader (Aid Organisation)	26–30	Masters	Schools	14 earthquake affected districts
P12	Deputy Project Director (Government)	16–20	Masters	Public buildings	31 earthquake affected districts
P13	Team Leader (International Consultancy)	21–25	PhD	Schools	14 earthquake affected districts
P14	Procurement and Contract Management Specialist (National Consultancy)	>30 years	Masters	Schools	Bhaktapur, Dolakha, Kathmandu, Kavre, Okhaldhunga, Ramechhap, Sindhuli, and Sindhupalchowk
P15	Project Management Specialist (Aid Organisation)	21–25	Masters	School, health facilities, and other infrastructure	Throughout Nepal

3.5. Validity

In qualitative research, it is essential to disclose the researcher's position, past experiences, assumptions, and potential biases from the outset to allow readers to critically interpret and assess the findings [62]. This transparency helps evaluate how the researcher's background may have influenced the study. The main author has four years of experience managing reconstruction projects in Nepal after the 2015 earthquake, where he frequently dealt with construction contracts.

While quantitative methods have well-established measures for validity and reliability, qualitative research requires alternative indicators: credibility, transferability, dependability, and confirmability [60]. To meet these, this study followed steps similar to Irandoost et al. [63]. Credibility was enhanced by including participants from a variety of organisations—government, aid agencies, contractors, and consultants—and diverse backgrounds. Transferability was ensured by providing detailed descriptions of the research process. Dependability was achieved through careful data management and consensus on coding and analysis. For confirmability, the findings were peer-reviewed.

4. Results

4.1. Coding framework

Two main themes were identified from the analysis. Themes and sub-themes identified are presented in Table 4 below.

4.2. Theme 1 – procurement and bureaucratic

The procurement method and processes followed during the bidding process can have a domino-effect on the subsequent contract execution phase. Additionally, the NRA's coordination with government departments meant that bureaucratic processes also affected contract implementation. Procurement and bureaucratic hurdles emerged as a strong theme, with 13 participants identifying challenges in this area. This core theme has been divided into three sub-themes, as shown in Table 5.

4.2.1. Regulatory limitations

Nepal's Public Procurement Act and Public Procurement Regulations 2007 standardise procurement practices in the country. However, they were not drafted with post-disaster reconstruction scenario in mind. A major issue highlighted by participants is the use of a single standard form of procurement document for all types of work, which may not suit special projects like reconstruction.

> "*… that was the emergency period. And we must complete the work within a short period of time. And that was not a regular, you know, type of work. You know, jobs, scope of work. That's what, you know, PPMO has to have, you know, two different sets of contract documents. One for emergency and another for regular work.*" (P4)

Moreover, the approval process for project variations is restrictive due to stringent regulations. Under Section 54 of the Procurement Act (amended July 14, 2016), gazetted chiefs can approve variations of up to 5–10 %, while variations of up to 15 % require approval from the Head of Department, and variations between 15 and 25 % need Ministry Secretary approval. Variations beyond 25 % require Cabinet approval. Participants reported that justifying variations beyond the first level of approval is difficult, leading to delays. Some even avoided requesting legitimate variations due to the negative perception surrounding such changes. This was particularly problematic for reconstruction projects, which often require significant variations. Participants P6, P8, and P11 expressed concerns that these restrictions posed major challenges during project implementation.

> "*Variations are for the works that must be done, and the cost should be covered by that contract, but sometimes it was not so easy to convince higher authorities that these were required. So, our efforts were to limit the variation to the level that the first officer can approve.*" (P11)

> "*… there are some clauses for particular 10 % amount of variation, you have to go with department head for that after 15 %, up to 15 % secretary and then for 25 % we have to go to cabinet. That was the clause in Nepalese procurement act. So, for this particular process 25 % variation in quantity means consultant or designer, they have problem. So, better to go back with consultant rather than go to cabinet. That is the main issue we are facing in Nepal.*" (P6)

Table 4
Themes and sub-themes identified.

Item	Themes	Sub-themes
Theme 1	Procurement and bureaucratic	1. Regulatory limitations 2. Bidding process and procurement systems 3. Bureaucracy
Theme 2	Contract-related	1. Inadequate contract clauses 2. Interpretation of contact clauses 3. Incompatibility with post-disaster needs 4. Cost adjustment clauses

Table 5
Sub-themes of theme 1.

Sub-theme	Participants
Regulatory limitations	P4, P5, P6, P8, P11, P14
Bidding process and procurement systems	P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14
Bureaucracy	P1, P9, P10, P12, P15

Furthermore, Section 55 of the amended Procurement Act permits price escalation and cost adjustments only for projects lasting over 12 months. This threshold was 15 months prior to the amendment, a duration commonly used in most reconstruction contracts. However, many contracts awarded for periods shorter than 15 months left contractors unable to manage significant price inflation. One contractor (P6) explained that their contract was awarded a year after bidding, with work starting the following year, forcing them to work at the original bid price from two years earlier, with no price adjustment since the project duration was only one year. This regulation also led to awarding some projects with unrealistic timeframes to avoid price escalation, penalising contractors for non-performance even though the performance periods were insufficient.

> "… *Public Procurement Act and Public Procurement Rules don't have a provision for the CPA in the contracts, which is less than 15 months … So, we are bound by the rules and regulations. So, the small size contracts generally don't have, not small size, I mean the contracts less than 15 months they cannot have CPA. But it is necessary in my view. In reconstruction*" (P14)

> "… *we got the work order only after 1 year after signing the contract. And after 1 year, we got the work order. And after getting the work order, we got the site position only after 1 year. That means 2 years ago. The project duration is 1 year. But we cannot get the site possession.*" (P6)

> "… *most of the government contracts do not want to entertain the price escalation. So that they try to make the project period … which in our procurement policy, on that time period, price escalation is not included. And from the beginning, how the plan is, we make the project for one and a half years. So, we do not need to put the price escalation. Later on, they will make the EOT and continue, which the contractor cannot afford.*" (P13)

Some sample contracts shared by participants, awarded as late as 2019 and 2020 for 18-month durations were still issued as fixed-price contracts, despite the 2016 amendment allowing for cost adjustments. This non-compliance with the Procurement Act exacerbated the difficulties contractors faced in post-disaster reconstruction projects.

4.2.2. Bidding process and procurement systems

When a large volume of reconstruction work needed to be completed quickly, the government and development partners grouped multiple facilities by geographic location into single contract packages. However, managing these dispersed sites became challenging for contractors and consulting teams. This approach also delayed processing variations and payments, as documents had to be collected from multiple locations. Despite contracts stipulating a 28-day payment period, payments were often delayed by 3–4 months.

> "… *there are so many schools, and the buildings are combined in one single package. In rural areas, 18, 19, and 20 schools are combined in one package. When we combine them in one package, it is very difficult to handle by the management team for purchasing purposes and variation … from collecting the measurement sheet and everything from 18 sites is very difficult in rural areas like Nepal. Very difficult. The bill signing and then bill processing to the client and payment procedure are extended.*" (P6)

Another challenge of grouping sites was the inconsistency in rates for different locations, all under the same contract. This created difficulties in bid comparison, payment processing, and handling variations. Additionally, the performance period was the same for contracts involving varying numbers of facilities, such as 10 schools versus 5 schools, which was problematic.

> "… *we used the slice and packaging bidding system. A number of school buildings are packaged with some location and some geographic location arrangement … but still, the document was same. So, during the implementation, we faced many challenges. Because we have the same rate or different rate at different school … we have to spend more time for estimating and comparative of bidding … difficulties in billing process and also in preparation of variation approval.*" (P9)

Participants P4 and P9 noted that procedural delays, particularly the gap between issuing letters of intent and letters of acceptance, lengthened the procurement cycle and delayed reconstruction. To expedite the process, P4 mentioned that contractors were often asked to mobilise after receiving the letter of intent, despite this being against formal rules.

> "… *before signing the contract, we have to provide a letter of intent. After issuing a letter of intent then, we have to issue a letter of acceptance. After issuing a letter of acceptance within the 15-day time frame, we have to have the contract, right? Then site process starts. But in an emergency contract, we inform the contractor that once we issue the letter of intent, we will mobilise your people at the site because you will get the job*." (P4)

> "*Because there is some procedure that takes certain time … the overall procurement cycle is long. So, it affected the total construction project afterwards*." (P9)

Section 27 of the amended Procurement Act requires awarding contracts to the lowest-cost technically qualified bidder. P10

highlighted an example where a contract was awarded to a bidder who bid 35 % below the engineer's estimate, resulting in poor performance due to unprofitability. Although Section 13(n)(1) of the amendment mandates an increased performance bond when bids are less than 15 % of the estimate, this has limited practical effect. Many Nepalese contractors bid low to win contracts, then attempt to recoup costs through variation claims, complicating project execution. Additionally, some contractors bid for remote projects without visiting the sites, exacerbating challenges.

> "*Mainly, we are following the less bidding award … but due to this problem, in our last phase of the contract, 35 % below the contractor bid like that. So, they are getting problems now. Because 35 % less cannot work in the field because it is already not profitable to them. They are in the loss. So, this kind of problem is coming.*" (P10)

Another problem arose when projects were awarded years after bidding, and the materials specified in the bill of quantities were no longer available, as companies had stopped manufacturing them. Despite this known issue, changing materials later proved difficult.

> "*… At that time, our consultant and client introduced some items in the BOQ in 2016-17. Now, the tender is awarded after 4–5 years of the estimated time. And the same thing is not manufactured at the current time phase or 1–2 years ago.*" (P6)

4.2.3. Bureaucracy

Participants highlighted significant challenges in navigating bureaucratic hurdles, both with the GoN and foreign aid missions. Delays were common due to the many layers of decision-makers involved, which slowed the approval of bank guarantees and advance payments critical to starting projects. Moreover, project managers lacked financial decision-making authority, making it difficult to secure approval for necessary changes from finance teams. Compounding these issues, the limited number of technical staff in GoN departments were often overburdened, further delaying key document approvals and negatively affecting reconstruction progress.

> "*… they may face some procedural challenges to complete the project. Mainly the decision-making process is lengthy and many people involved. There are different ideologies and philosophies to decide in the final stage what project manager thinks one thing, then there happens another thing.*" (P9)

> "*… there were few numbers of technical person in the department who look after everything. They have to look after public building, they have to look after private building and everything. So, it took time.*" (P12)

> "*… the financial control is in a different position than the project manager … the payment procedure and other part is controlled by another department or another section of the same project … then the interpretation of the project manager and the interpretation of the financial manager and the project chief is not similar in that case … and if project manager decides he is competent also, then he will face many problems.*" (P9)

> "*Yes, money was there in the mission, right? I mean, we were not too worried about whether we will get money. It is there, but to obligate and convince your management and other internal stakeholders …*" (P15)

4.3. Theme 2 – contract-related

Contract clauses should align with the distribution of rights and obligations relevant to the specific project context. When an inappropriate contract form is used, it leads to inefficiencies and ineffectiveness, as the clauses were not designed for that scenario. A prominent theme in the study was inappropriateness of contracts, with all 15 participants identifying challenges in this area. This core theme was further divided into four sub-themes, as shown in Table 6, along with the participants who mentioned them.

4.3.1. Inadequate contract clauses

Participants highlighted that certain contract clauses directly impacted performance. Initially, contractors received a 20 % mobilisation payment, but in later projects this reduced to 10 %, while keeping the repayment formula and deduction percentage unchanged. This reduction caused cash flow problems for contractors, limiting their ability to fully utilise the advance.

> "*Nowadays, we get only 10 % of mobilisation in advance payment. In two instalments, one is 5 %, and another is 5 %. Some years ago, we got 20 % mobilisation. So, we can easily handle the project during the project's duration … Currently, the mobilisation cost is reduced. 20 % to 10 %. The deduction formula is still the same.*" (P6)

Contractors need substantial upfront funds to set up resources, especially in reconstruction projects where competition for limited resources is high. Many contracts provided less advance and lacked provisions for payments upon material delivery, worsening

Table 6
Sub-themes of theme 2.

Sub-theme	Participants
Inadequate contract clauses	P1, P2, P4, P6, P7, P8, P9, P10, P11, P12, P13, P15
Interpretation of contract clauses	P1, P2, P4, P5, P6, P7, P8, P9, P11, P12, P14
Incompatibility with post-disaster needs	P1, P2, P3, P7, P9, P10, P11, P12, P13, P15
Cost adjustment clauses	P1, P3, P5, P6, P7, P8, P9, P10, P12, P13

financial strain.

> "*In every project, we need more funds at the beginning, because we have to mobilise all the resources, you know, manpower, materials and all these things, and we have to do a lot of site setups as well. So, we need the advance payment, but we do not have material delivery advance provision in both projects.*" (P1)

Some contracts allowed only a 7–14 days mobilisation period, which contractors found insufficient for post-disaster work.

> "*As far as I remember, we only had 7 days or 14 days for the mobilisation period.*" (P1)

In some cases, contractors could only submit claims when they exceeded 5 % of the contract amount, further straining cash flow from lack of periodic payment claims.

> "*… in our project … minimum running bill should be 5 percent, something like that. We are following that one, but sometimes the contractors are getting problem, then sometimes we, you know, give them the chance also to get the money. But, you know, there is one system, only this much percent running bill can be provided, something like that. We follow that system …*" (P10)

Another issue linked with clubbing of sites during procurement was the lack of provisions for sectional completion. Delays at one site triggered full liquidated damages, prompting the Federation of Nepalese Contractors to push for changes to bidding documents.

> "*… there was one project in which we had to change the tender document … but before submission it was changed because during the pre-meeting, we had one clause … sectional completion in one of those projects and due to the demands of the federation of Nepalese contractors plus the uncertainties which is prevailing in our developing market, we had to change that clause. It was not changed during the contract signing, but it was changed within the tender bidding period, but it was changed from the original thing.*" (P12)

Variations posed a significant challenge in reconstruction projects due to numerous unforeseen changes and delays in processing. Key aspects such as land development, slope protection, and road improvements were often inadequately addressed in contracts, resulting in a high volume of costly variations. Participants noted that the variation process provided in contract was complex and sometimes exploited. The requirement to obtain prior approval for variations before payment complicated the urgent need for adjustments in reconstruction.

> "*… variation clause is a must. But you know, the process is sometimes complicated. People or contracting parties sometimes misuse this system of variations. They sometimes go beyond the principle of variation. So, it is really complicated, but it is a must …*" (P5) ""

> "*Actually, in the document, the variation process is not so lengthy … it is a straightforward process. Variation means why the variation is required or why it occurred, all these things, what were the initial design and cost estimations and then what was the condition at the site at the time of variation, but the facilitation taking forward the variation for the approval and payment in Nepalese context is really lengthy.*" (P11)

> "*The clause related to change order and variation order also poses several challenges to the time-dependent operation … process was complicated and lengthy … It involved several documentation, several calculations, several measurements, several discussions and a lot of documentation from the contractor to have it executed.*" (P7)

Participants also faced challenges with variation clauses in FIDIC contracts. P7 mentioned that Type C variation wasn't applicable in Nepal, while P9 found it difficult to implement rate adjustments for quantities varying by 25 %, which was common in reconstruction projects.

> "*So, that is also a problem because in Nepal, that particularly C number clause is not being used. Only A and B in the FIDIC contract are being used. So, if that is not used, then putting that in the contract is also not relevant.*" (P7)

> "*… we mainly use the FIDIC document. But in this case, there are some difficulties in variation clauses. Some variation clauses are difficult to implement. Because the rate quoted by the contractor is one and the quantity variation may arise 25 % above the item rate. And so, it becomes some difficulties*." (P9)

Variations became even more problematic when additional work items were not included in the rate analysis and norms established by the GoN. Many essential items are missing from these norms, complicating the process of reaching rate agreements. Furthermore, when market quotations are solicited, the substantial discrepancies between rates make it difficult for clients to accept any single quote.

> "*… the variation item, if that is available in the norms, it's not a big deal … But there is a lot of items where the norms are not available …. people bring the quotation from the market. Market is so volatile in our context, and to make the negotiation is very difficult for those type of items which are not included or available in the norms. So that is most of the things we are facing problem, to make the negotiation with the contractor.*" (P13)

4.3.2. Interpretation of contract clauses

The standard contracts used in reconstruction were written in English, but participants noted that many contractors struggled to understand the complex language. Even legal advisors found some contract terms difficult to interpret.

"*But the contractors, they lack. The large contractors have the capacity, but the small contractors don't. Many contractors don't understand the contracts.*" (P14) "*language is also the other. You know, not for all, but in some cases, you know, language can also be an issue … What I feel is that most people in Nepal understand English. But not that much on the contractor side*" (P2) "*Because as we construct many infrastructures with contracting systems, many local contractors have a problem of, you know, understanding the contract clauses. So that impacted work quality and construction, even on the timely completion of works.*" (P5)

"*So, for that purpose, in big projects, there are some legal advisors too. But still, legal advisors will feel uncomfortable in many cases to exactly interpret the languages of the reading document or contract document.*" (P9)

The contracts' complexity—filled with bulky documents, cross-references, and inconsistent clauses—further complicated understanding.

"*… I would stress that there are several clauses. These clauses are looped. Even for the experts, it is very difficult to locate exactly what it means. So, there is a loop interrelated to the clauses, sub-clauses and general clauses, general condition of the contract, the specific condition of the contract. So, it is so clumsy that it is very difficult to find out …*" (P5)

"*Not much difficulty in finding them. However, some clauses clauses do not say the same thing. One clause is okay, another clause is a little bit, you know, reluctant.*" (P2) "*As an engineer or project manager, I was able to read and understand the contract, but not at one go. I have to come back and re-read again to fully understand.*" (P7)

Vague and ambiguous wording also led to multiple interpretations, causing issues during implementation.

"*… that laws and that interpretation of that language, these are quite challenging things.*" (P8)

"*… if the client interprets it as one thing and the contractor interprets it as another thing, the consultant may interpret the same thing. But by conflicting different clauses, they identify the difference … So, language should be as easy as possible.*" (P9)

"*In many contracts, it's written that the project manager should make a decision within a reasonable time. That's quite vague. Reasonable time can mean anything …*" (P14) "*Generally, the language of a contract is ambiguous in many cases.*" (P9) "*… what is actually the cost of contract. There is a term in contract called cost of contract, but no one can understand. Everybody has different opinion. Some interpret in one way, others interpret in other way.*" (P7)

4.3.3. Incompatibility with post-disaster needs

Participants raised concerns that the contracts used in reconstruction did not account for the tight timelines and resource limitations and were not adequately adapted for post-disaster needs. As a result, parties had to contextualise contract clauses, leading to non-compliance. This issue stemmed partly from treating reconstruction as routine work rather than as urgent post-disaster recovery.

"*No, we didn't. Actually, there were some changes in the particular conditions of the contract, but in terms of format, we followed the standard format.*" (P3)

"*Sometimes, we could not fully comply with each and every clause of the contract during the reconstruction project. Sometimes we have to use our experience and contextualise the clauses as per the need basis also.*" (P7)

"Reconstruction, actually, in reconstruction, there are two types of reconstruction. One is emergency reconstruction, and the other is reconstruction, but although it is a disaster or earthquake reconstruction, it is a type of normal construction …" (P11)

The contracts also required strict written communications, as mandated by the Procurement Act, which proved impractical for reconstruction projects.

"*However, the nature of these contracts they have at the beginning of the project is not flexible. They would instruct us, you know, that any verbal instruction will not be valid if that is related to the cost or any other things.*" (P1)

"*… as we discussed earlier that the clause related to time extension, the notice period that must be given by the contractor or implementing partner to the engineer for the processing of time extension and all. The clause related to change order and variation order also poses several challenges to the time-dependent operation.*" (P7)

Some donors began performance periods immediately after awarding contracts without considering logistical challenges. This created issues for contractors working in remote areas, where resource mobilisation was delayed from access challenges.

"*But, I mean, you need time to mobilise. So, it is better after the mobilisation. But ours didn't have that.*" (P15)

"*The performance period after signing the contract is a mistake. We had a project where we started the performance period from the signing of the contract, which was absolutely a mistake from the client's side. That should not happen.*" (P7)

GoN was also following regular payment processes, and the contractors were complaining about late payments leading to difficulties with cash flows. Although development partners intervened in some cases, they had limited influence since the government was the primary implementer. In some projects, hard copies were required for payments and variations, which caused delays, especially for scattered sites combined into one package.

"*… sometimes there were contractors complaining that the government had a delayed payment or something like that. Because of our arrangement, the government had to pay. But as per their own system and government practice, it took time … obviously, it is better for the reconstruction project to make payment as soon as possible. But this is entirely the government's role … if we receive that kind of complaint, we ask the government to make quick payments and expedite the project. So, we give that kind of feedback to the government side.*" (P3)

"*Mostly, the time period for the payment is as normal in most projects …*" (P9)

"*Even the email, we do not entertain that for the variation or bill forwarding, which are related with the financial … For those type of the matters, we need to have a hard copy. For the checking and other things, they will send in the soft copy. But the formal process, we do, we entertain on the hard copy.*" (P13)

Participants expressed frustration that regular contracts were used with only minimal improvisation, and there was no standard contract that suited all development partners nor was there a contract specifically drafted for reconstruction.

"*We follow that, but I don't know what would be the other options. But anyway, we improvised the bidding documents as per the context.*" (P3)

"*… yes, we had different kinds of hurdles and problems during the implementation. We did not have one organised document. Organised means that if we had one modality, one document, that satisfied all the parties …*"

"*… I think all contract documents have similar pros and cons. But mainly, using the standard type of contract creates some difficulties in reconstruction. So, using such type of standard document is somehow difficult in reconstruction.*" (P9)

4.3.4. Cost adjustment clauses

Participants expressed that while reconstruction projects in Nepal faced inevitable inflation challenges, most contracts failed to account for this reality. The Procurement Act historically prohibited cost adjustments for projects lasting less than 15 months, although this was amended to allow for price escalation beyond 12 months. However, adjustment clauses were not used as contracts were awarded for lesser durations.

"*Inflation particularly impacts during reconstruction because reconstruction is a complex and time-consuming process.*" (P7)

"*We don't have price escalation … we have not so long contract. We have a contract for one and a half years and two years, something like that. And we don't have a price escalation system …*" (P10)

"*We do not have a price escalation clause on this project, because most of the contract package is one and a half years. And price escalation makes a lot of impact.*" (P13)

This oversight is troubling, especially since many participants acknowledged that inflation is a common issue in a developing country like Nepal, which relies heavily on imported materials. Fluctuations in the international market significantly affect local material prices.

"*Inflation is there, you have to encounter it. If you live in a third world country, this is part of our life …*" (P12)

"*The price adjustment and the increase in material rate in Nepal are very high. Very high with respect to the currency increasement of international rate.*" (P6)

"*… we do not have that construction materials enough within the country. We need to bring from the outside. And because of the international market fluctuation, one is the supplies cannot be made.*" (P13)

Unfortunately, the situation was further complicated by the COVID-19 pandemic and the Russia-Ukraine war, both of which exacerbated inflationary pressures. One contractor (P9) reported halting work due to the inability to complete projects within the bid cost without a price escalation clause. Another participant (P13) described a six-month shutdown due to the unavailability and skyrocketing costs of reinforcement materials after Russia-Ukraine war.

"*… we didn't provide price adjustment. So, that in this scenario at the same time the price appreciated mostly, and the contractor stopped the work. Because they didn't feel that they cannot complete the work with their cost. So, if price adjustment is not provided in the contract order, then if the price is inflated, then the contractor will not do the work.*" (P9)

"*If you see the present scenario of Nepal, most of the contractors are protesting against government of Nepal because of inflation. They got the contract somehow when the material cost is 100 rupees, now it increases to 150 rupees.*" (P8)

"*… adding to the problem of inflation was COVID-19 as well. It blustered the inflation …*" (P12)

"*because the reinforcement bar rate is so much increased during the Ukraine war, and the contractor cannot supply the rebar in the side, and the site was stopped for more than 6 months. That is how we did that.*" (P13)

Additionally, some reconstruction contracts were awarded much later than anticipated, without any adjustments for price changes, leaving contractors to absorb the increased costs, compounded by the effects of COVID-19 and the Russia-Ukraine war.

"*… that project, 4 years ago, that was totally estimated. And we got the work order only after 1 year after signing the contract … we were working on price estimated before 2.5 years. And no price adjustment was introduced in that contract …"* (P6)

"… that project is going to arbitration or another thing for the payment of the price adjustment. Because there was no price adjustment introduced in that contract. Because only 1 year is the contract duration and we cannot claim price adjustment due to the contract agreement." (P6)

4.4. Recommendations to improve construction contract

While the interviews primarily highlighted the challenges faced by participants, they also yielded valuable recommendations for enhancing construction contracts in PDR. Participants stressed the importance of creating simpler, more understandable contracts that prioritise amicability and address genuine concerns.

Given the ongoing difficulties in contract interpretation during reconstruction, ten participants underscored the need to simplify contract language without sacrificing legal intent. They believed this approach would better suit Nepal's construction context, where proficiency can vary widely among stakeholders.

"*… a simplified version of the contract document is most necessary, for a country like ours, where the construction business is not that much proficient.*" (P13) "*Of course, it will have much value compared to the foreign practice of contract to prepare the contract in a simpler language or even local language … But that contract modality can be customised to have it more clear language, simple language and understandable language.*" (P7) "*Definition may be different in different interpretations. So, language should be as easy as possible.*" (P9)

Fourteen participants advocated for reconstruction contracts that emphasise amicable dispute resolution, ensuring that risk transfers do not unfairly penalise contractors for factors beyond their control.

"*If there is a genuine reason, of course, an extension of time is kind of justifiable. But it totally depends upon the contractor's intention and the unforeseen circumstances, genuine reason. So, the executive agency needs to check whether those factors are genuine or not.*" (P3) "*In those neutral events, due to which both parties are impacted, the effect of those events should be equally distributed.*" (P7) "*Except for the culpable delays, the contractor should be allowed to request for a time extension for all these neutral events … Since it's not the default of the contractor, the time extension should be given for all these events. However, some events may not incur costs.*" (P14)

Ten participants agreed on the inclusion of standard contractual requirements such as bank guarantees, retention, time-bar clauses, and liquidated damages. However, they emphasised the necessity of flexibility in special cases during reconstruction, allowing genuine contractor concerns to be addressed when impacted by uncontrollable factors. Some participants admitted to exercising this flexibility, even when it technically contradicted their contract.

"*Yeah, you can be a little flexible on that, right. I think we have been flexible … Of course, clauses need to be there … But, I mean, how rigid you want to be as a project manager, I mean, depends. It depends on the circumstance … I mean, they are remote, if there is no means of communication or, you know, something like that, you need to handle it differently.*" (P15)

"*We are not in a developed country where everything is perfect. Everything is developed in their own country. We depend on the equipment from outside. We depend on the material from outside. So, everything needs to be compromised a little bit, and then work as a team.*" (P2)

"*If you know a contractor who forgot something in the documentation, our job is to inform the contractor to do that one. And the process is important right. The time-barring clauses should be there. But we have to timely inform the contractor if they forget something about the documentation.*" (P4)

5. Discussion

This study employs semi-structured interviews with professionals involved in PDR projects following the 2015 Gorkha Earthquake to reveal significant challenges associated with procuring and implementing projects through conventional contracts. Many participants expressed that traditional procurement rules and contracts have created notable challenges and inefficiencies during reconstruction, with some projects still incomplete nearly a decade after the earthquake. The findings reveal two primary themes.

1. Procurement and bureaucratic: Complicated procurement procedures and bureaucratic obstacles were prevalent.
2. Contract-related: Conventional contracts proved unsuitable for disaster contexts in developing countries, often leading to inefficiencies.

This study emphasises the need for more balanced and fair contracts that facilitate amicable resolution and mutual problem-solving, rather than strictly penalising parties for delays, as is typical with traditional contracts.

Large-scale non-residential reconstruction projects often receive limited attention from governments and development partners. This leads to a "business-as-usual" approach that uses general procurement guidelines and standard construction contracts, lacking

specific policies for PDR. In Nepal, this oversight has resulted in many implementation challenges in reconstruction efforts.

The first theme reveals a lack of consideration for procurement and bidding guidelines specific to the PDR context. Despite the NRA conducting extensive planning, standard procedures in certain areas of procurement neglected the unique needs of post-disaster contracts. For instance, the NRA adhered to standard government payment procedures for infrastructure reconstruction [48]. This practice adversely affected contractors amid high inflation, resource shortages, and complications stemming from COVID-19 and the Russia-Ukraine war. A more efficient payment system could have alleviated some post-disaster challenges, but such a system was not implemented despite the NRA's substantial authority granted by the GoN.

Efforts to expedite the procurement period were hindered by unnecessary bureaucratic steps, such as issuing non-binding letters of intent that prolonged the process. Although combining multiple projects into packages appeared logical for efficiency, the challenges associated with traditional contracts were not adequately analysed, resulting in unrealistic completion timelines and contracts lacking sectional completion requirements. This imposed full liquidated damages for any site delays, which was particularly unfair to contractors, as many contracts included penalties for late completion but lacked incentives for early completion.

The GoN's Procurement Act and Regulations further complicated matters. The Act mandates awarding contracts to the lowest-priced technically feasible bidder for projects exceeding USD 4,000, a practice that has historically led to significant implementation issues. Projects have often been awarded at rates up to 60 % below estimated costs [64]. This issue has persisted in PDR projects, where contractors, recognising the unprofitability, either abandoned the work or compromised on quality. Bureaucratic constraints within the Procurement Act on approving variations have exacerbated these challenges, as even genuine changes were often not forwarded through the hierarchy for approval. These issues highlight the urgent need for a review of procurement regulations in Nepal to better address performance scenarios in PDR projects.

The second theme revolves around the misalignment of contracts with performance requirements in a post-disaster context. In Nepal's developing economy, many contractors and engineers are unfamiliar with international contract standards. When development partners employed their own contract templates, confusion arose among local stakeholders. Ambiguous language and convoluted clauses complicated interpretation, particularly given that English is not Nepal's first language. Additionally, excessive requirements for notices and written communication, combined with restrictive payment claim conditions and the absence of price adjustments, created significant financial challenges. The cumbersome variation process, along with missing items in government norms, complicated negotiations and hindered necessary changes. For example, many contracts required payments and variations to be handled in hard copy, necessitating the collection of documents from various rural sites and transferring them to Kathmandu for signatures. This process could have been streamlined through electronic means, yet such considerations were not included during contract preparation. These issues highlight the pressing need for contracts that align more closely with the specific demands of post-disaster reconstruction.

While not all highlighted issues can be fully addressed within a construction contract, a well-crafted contract tailored to the performance requirements of PDR contexts can significantly mitigate many of these problems and alleviate others. By incorporating provisions that address the unique challenges of PDR, the Procurement Act can tackle procurement inefficiencies, bureaucratic hurdles, and misaligned performance requirements. A more effective contract would streamline payment processes, incorporate flexible and realistic timelines, and ensure efficient management of variations and unforeseen challenges. For instance, integrating clauses that facilitate quicker payment systems and account for inflation and resource shortages can help mitigate some financial challenges faced by contractors during reconstruction. Additionally, including clear guidelines for managing variations and addressing unforeseen issues can prevent delays and disputes. Ensuring that contracts are drafted with a deep understanding of local contexts, including technical competencies and regulatory frameworks, will foster better compliance and performance. Although not a cure-all, aligning contracts with the specific needs of PDR can create a more supportive framework that proactively addresses many issues, thereby enhancing the overall efficiency and effectiveness of reconstruction projects.

PDR projects operate in a vastly different context compared to standard scenarios, involving diverse participants, varied funding sources, and evolving challenges that can lead to performance lapses and disputes if not managed carefully. Therefore, contracts in these settings must feature flexible terms that are easily understandable and adaptable. This study highlights the importance of collaborative and amicable relations among parties to effectively address the unique challenges of PDR, rather than rigidly adhering to traditional contract clauses. Participants valued flexibility in contract terms, such as reconsidering retention money and liquidated damages, to better accommodate genuine performance issues and prevent bureaucratic delays and disputes. Consequently, it is crucial to draft contracts that prioritise problem-solving and genuine concerns over strict penalisation to enhance performance and ensure effective reconstruction efforts.

6. Conclusion

Due to a lack of research and understanding of how SFCCs and conventional procurement processes affected reconstruction, these methods continued to be used despite being ill-suited to post-disaster contexts. This study addresses this gap by highlighting significant challenges in Nepal's reconstruction efforts following the 2015 Gorkha Earthquake, particularly the reliance on traditional contracts and procurement processes that failed to accommodate the urgency and complexity of PDR. A key issue in reconstruction is that regulations and legislation are developed reactively—only after a disaster occurs—rather than proactively as part of disaster preparedness. This reactive approach leads to implementation difficulties, delays, and inefficiencies in reconstruction efforts. To mitigate these issues, it is essential to review and revise procurement acts and contract frameworks prior to a disaster, ensuring that they are robust and well-prepared rather than hastily assembled in the aftermath. In addition to revising existing frameworks, another potential solution is developing flexible PDR construction contracts that can be tailored to varying disaster scales and contexts. These contracts

would allow for faster decision-making and streamlined approvals, better aligning with the urgency of post-disaster situations. In line with participant recommendations, such contracts should be written in clearer language to preserve legal intent while promoting amicability and cooperation. Future research should prioritise the development and testing of adaptive contract models as part of disaster preparedness initiatives, which could significantly improve reconstruction processes worldwide. Moreover, exploring how these lessons can be tailored to various regional and disaster contexts will yield valuable insights for enhancing international reconstruction practices. Finally, successful implementation of these solutions will require comprehensive stakeholder training on compliance and the use of construction contracts, supported by universities, professional bodies, and government initiatives.

7. Strength and limitations

Although the study is based on a limited sample size that may not represent all experts involved in PDR in Nepal, it used diverse participants to identify and explore common themes relevant to the research question. Another limitation is that, while the study design did not impose restrictions on project type, scale, or scope, most participants had experience primarily in building projects, with some involvement in roads and other infrastructure. Future research could expand on these findings by including experts with experience in reconstructing other types of infrastructure. Additionally, integrating quantitative data on cost overruns and project delays could further strengthen insights into the challenges of PDR.

The interviews were conducted nearly a decade after the earthquake when most reconstruction work had been completed and many implementing authorities demobilised. Consequently, the findings of this qualitative study are not generalisable to the entire population and should be validated by subsequent quantitative research. Despite these limitations, the study successfully identified two central themes consistent among experts with experience in non-residential reconstruction projects.

Additionally, during data analysis, additional themes emerged concerning the influence of the external environment and professional competency in the application of construction contracts for reconstruction. While the authors will delve deeper into these themes in future work, they fall outside the scope of this paper.

CRediT authorship contribution statement

Ayush Puri: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Naseem Ameer Ali:** Writing – review & editing, Validation, Supervision, Methodology, Conceptualization. **Mohamed Elkharboutly:** Writing – review & editing, Supervision, Methodology, Conceptualization.

Declaration of use of Generative AI

During the preparation of this work the author(s) used Grammarly and ChatGPT in order to simplify complex and hard-to-read sentences, aiming to make the overall writing clearer, more concise, and grammatically correct. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

The data that has been used is confidential.

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