Factors Affecting the Timely Construction of National Pride Projects of Nepal: A Case Study Of KTFT Road Project

Ashok Dhakal *
Sapana Pathak**

Abstract

This article provides an insight of the factors that could cause delay in the timely construction of road projects in Nepal pivoting to the Nepal's first expressway: Kathmandu-Terai/Madhesh Fast Track Road Project. The major factors considered for the study are: geographic and environmental factors, regulatory and legal factors, socioeconomic factors, technology and innovation, finance and funding factor, political and security factor. From this research survey it is concluded that the Regulatory and Legal factors is found to be the most significant factors influencing the timely construction of the road projects in Nepal including KTFT and the least importance from the survey is determined to be the geological and environmental factor. Hence, it is recommended to focus on the Legal and Regulatory part for the concerned stakeholders in order to succeed in this type of Mega Projects in Nepal.

Keywords: process, fast-track, stages of construction, environment, materials, policies

Introduction

Background of the Study

The speed of transport of goods and services along with human has exponentially grown in this twenty-first century, not only in today's world the road construction works were carried out since the ancient history of the human civilization (Kotsios & Folinas, 2020). Roadway is the easiest way and means of transport, it is constructed over the land surface. We can see various forms of road developed in Greek to Roman Civilization, medieval periods, golden and bronze ages to the industrial ages. The advancement in technology, discovery of new construction materials and the techniques to construct and design them has created a vast form of roads, and the timely construction using those methods possess challenge in current scenario (Verma, 2023). This article provides an insight of the factors that could cause delay in the timely construction of road projects. The major factors considered for the study on the road projects in Nepal are: geographic and environmental factors, regulatory and legal factors, socioeconomic factors, technology and innovation, finance and funding factor, political and security factor, and others. In Nepal, the national level planning is performed through joint coordination among the government stakeholders led by National Planning Commission (NPC, 2023).

National Planning Commission (NPC) has formulated The Fifteenth five year plan and is at the end state of its execution. At present, there are 21 numbers of national pride projects in Nepal and six among them are of road projects (NPC, 2023). Kathmandu-Terai/ Madhesh Fast Track [Expressway] Road Project is one of the national pride projects of strategic significance whose construction management job has been tasked to Nepali Army, from the decision of Council of Ministers, Government of Nepal on 4th May, 2017, using the rights as per the Constitution of Nepal-2015 (CoM-GoN, 2017). An article 267 says the role of Nepali Army is to safeguard the country's independence, sovereignty, territorial integrity, and

* Technical Major, Civil Engineer at KTFT Road Project, Nepali Army <074msene001.ashok@pcampus.edu.np>
** Masters of Arts in Rural Development, Saraswati Multiple Campus, Tribhuvan University, Nepal. <sapanapathak16@gmail.com>

national unity. Additionally, Article 267(4) says, "The Government of Nepal may, in accordance with Federal law, mobilize Nepali Army for works relating to development, disaster management and others (GoN, 2015)".

The Nepali Army has been involved in the national development since its inception. Visualizing the historical data, the Nepali Army has constructed 32 road projects of 1,411 Km and 45 Bailey Bridge of 1,911m span till end of FY 079/80, and currently Nepali Army has been working on 5 road construction projects, among them 3 are of National Pride Projects, namely: Koshi Corridor, Karnali Corridor and KTFT Road Project (KTFT, 2023). Through various media and the data archive of national planning commission on road projects of Nepal, the timely construction of the road projects of national pride has been delayed and this paper deals with the factors as discussed above focusing on KTFT Road Project alone.

Progress of KTFT till date is yet lagging the expectation. The cumulative progress of Kathmandu-Terai/Madhesh Fast Track Road Project has been shown in the Table 1 and expenditures in Table 2.

Statement of the Problem: As Nepal is a small nation with limited financial and other resources along with unstable political situation, it is very challenging to the country for infrastructural development of Nepal due to the economic condition of our country. Typically, this research focuses on finding relationships among various contributing factors and identifying the key determinants for the timely completion of KTFT projects.

Significance of the Study: Nepal is about to construct its first expressway and the timely construction of this strategically important project is being watched with curiosity from the public and the intellectual community. Giving it a high priority, Government of Nepal has also given this construction management opportunity to the glorious national security force of Nepal that is Nepali Army. At this time, the Nepali Army has been executing three national pride projects on road sector itself. Hence, it possesses a challenge to the army and the external factors influencing for its timely completion cannot be ignored. Thus, studying the involvement of the Nepali Army in the construction of the one and only first Asian Highway Standard-Primary Class A road in Nepal is imperative.

Table 1: Progress percentage of KTFT Road Project.

Total Progress FY 079/80		Cumulative Progress till FY 080/81 Baisak	
Physical Progress	Financial Progress	Physical Progress	Financial Progress
25.54 %	28.11 %	33.99 %	33.62 %

Source: (KTFT, 2024).

Table 2: Details of Financial Progress of KTFT Road Project

Particulars	FY 073/74	FY 074/75	FY 075/76	FY 076/77	FY 077/78	FY 078/79	FY 079/80	FY 080/81
Baisak 2081								
Total Budget (billion)	1.35	10.13	15.39	15.01	8.93	8.92	30.07	22.51
Revised Budget (billion)	1.35	8.60	5.97	4.46	8.93	8.92	17.94	17.98
Expenditures (billion)	1.34	7.63	5.73	1.96	8.73	8.89	14.94	12.31
Financial Progress %	99.25	95	96.43	44.04	97.34	99.61	83.27	68.46
Total expenditures (billion)	1.34	8.97	14.70	16.66	25.40	34.29	49.23	61.54

Source: KTFT Website, 2024.

Review of Literature

Project Constraints: Time, Cost, Quality and others: There are three primary stakeholders to execute the projects. They are client, contractors, and consultant. Each one have their own specific role to play for the success of the project. The road construction projects also possess the same scenario. Cost of any project is directly linked to it timely construction; hence the economic aspects is one of the major parts of the project. The government spends its large economy for the people's priority projects and the judicious use within timeframe possess a challenge in bigger prospects. These prospects have multi-dimensions on geographic, environment, socioeconomic, legal, technology and innovation, finance, political and others. And these factors affect the project cycles (Albtoush, Doh, Rahman, & Al-Momani, 2022). The construction shift or delay creates exponential impacts hurting the credibility of stakeholders involved in the project (Khan & Gul, 2017).

Various studies by project stakeholders and researchers have been conducted on KTFT road project yet factors influencing the timely construction of this KTFT road project has been covered by limited research paper. The aspects on geographic, environment, socioeconomic, legal, technology and innovation, finance, and political factors have limited research and this paper shall focus on these factors during the study.

KTFT is unique in different aspects ranging from geology to environmental, the legal bounds of Nepal from procurement process to purchasing materials, adoption of new construction technology along with innovative ideas over preoccupied mindsets, and the political turmoil over the decades has set the randomized pathway of road project construction in Nepal (Shrestha, 2023). These are some of the few facets which shall be covered in this research.

Research Methodology

The research is primarily based on the questionnaire survey conducted through google forms tools among the stakeholder's representative involved in the project construction. The secondary methods include; detailed study of published journals, books, websites, reports, online news, and other miscellaneous means. This study is based on descriptive along with some data-based survey.

Table 3: Projects Delayed in Nepal.

Project Name	Initial Completion Date	Actual/Estimated Completion Date	Delay	Reason for Delay
Melamchi Water Supply Project	2007	2021	14 years	Political instability, funding issues, natural disasters (earthquake in 2015), and contractor disputes.
Gautam Buddha International Airport	2017	2021	4 years	Slow construction progress, funding issues, and technical difficulties.
Nijgadh International Airport	2021 (initial phase)	Ongoing	Several years	Environmental concerns, legal issues, and funding challenges.
Upper Tamakoshi Hydroelectric Project	2016	2021	5 years	Earthquake in 2015, technical challenges, and delays in equipment supply.
West Seti Hydroelectric Project	2013	Indefinitely delayed	10+ years	Investment withdrawal, political instability, and environmental concerns.

Source: Field Survey

Descriptive methods will thus be used to analyze the gathered information during the course of re-search to address the objective. Thereafter, the available data are analyzed to find out the solution to the research. The Likert's Scale has been adopted to deal with the answers on the questionnaire ranging from 1 to 5. 1 being strongly disagree to 5 being strongly agree.

The dependent and independent variables have been distinguished after the completion of survey and ranking them using Relative Importance Index (RII) for those seven factors as mentioned in research gap under review of literature. The Cronbach's Coefficient (or Cronbach's Alpha) value is determined to verify the relativity level of this study.

Cronbach's Alpha (α\alphaα) is a measure of internal consistency or reliability of a set of scale or test items. It's widely used in psychology, education, and other social sciences to determine how well a set of items measures a single, unidimensional latent construct.

$$\text{Cronbach's Alpha } (\alpha) = \left(\frac{k}{k-1}\right)\left(\frac{s^2y - \Sigma s^2i}{s^2y}\right)$$

Terms and Meaning

- α: Cronbach's Alpha, the coefficient of reliability or internal consistency. It ranges from 0 to 1, where higher values indicate greater internal consistency among the items in the scale.
- k: The number of items (questions, statements, etc.) in the test or scale. This represents how many different components (e.g., questions) contribute to the overall measurement.
- s2y: The variance of the total scores of all items. This is the overall variance of the composite score, where each item score is summed up.
- ∑si2 : The sum of the variances of individual items. Each item's score variance is calculated separately, and then these variances are summed.

Data Collection

As a primary source, surveys were conducted regarding the factors contributing the timely construction of Kathmandu-Terai/Madhesh Fast Track Road Projects. For the secondary data, journals, websites, various books, archived data, articles and military publications will be referred to complete the research.

Primary Data

As a primary source, surveys were done among the stakeholders of the KTFT road project through electronic media tools, google forms (Annex-1).

Secondary Data

Analysis of the factors affecting the timely construction of national pride projects particularly in KTFT were performed using both qualitative and quantitative data collected through archived data from various directives, websites, books, journals, and publications.

Conceptual Framework

The research paper adopts the following conceptual framework.

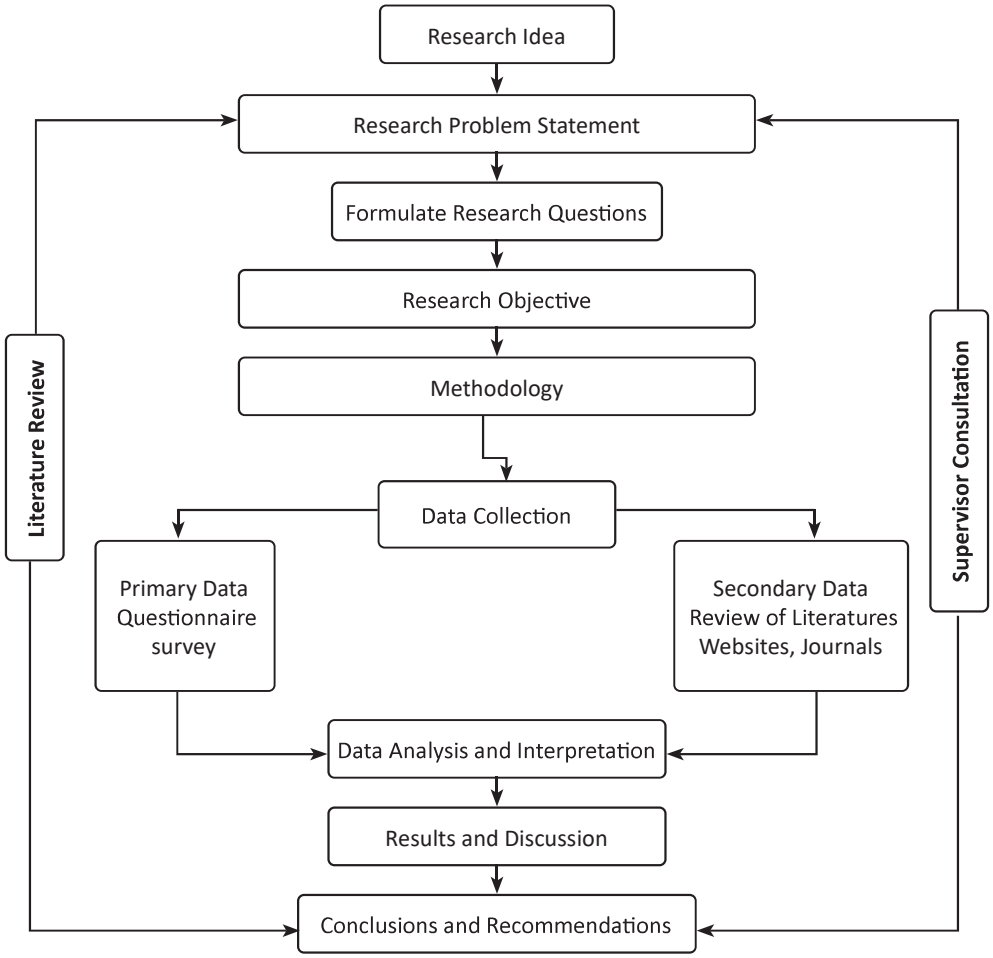

Figure 1: Conceptual Framework of the Study

Factors Affecting the Construction of Projects in Nepal

Geographic and Environmental Factors

- **Geographical Diversity:** Nepal is a country known for its diverse geographical regions, ranging from the Terai plains in the south to the towering Himalayan mountains in the north. These varying landscapes present a multitude of challenges and considerations when it comes to road construction and infrastructure development. In brief, here are some points to be noted that how the project construction is being hampered by the diverse geographical regions of Nepal.

  In southernmost terai plains, it is characterized by low-lying plains. These plains are relatively flat and fertile, making them suitable for agriculture. Yet, Road construction in the Terai is generally less challenging compared to other regions due to the flat terrain. However, it may still face issues related to flooding during the monsoon season, which can damage roads and disrupt transportation. In the Middle Hills region lying to the north of the Terai and consisting of rolling hills and valleys. Road construction in the Middle Hills can be challenging due to steep terrain and the need to navigate through numerous valleys and ridges. Landslides are a common issue, especially during the monsoon season. Similarly, In High Mountains which is the northern part of Nepal is dominated by the towering Himalayan mountains, including Mount Everest, the world's tallest peak. Here, building roads in the

high mountains is extremely challenging due to the rugged terrain, extreme altitudes, and harsh weather conditions. Landslides, avalanches, and rockfalls are constant threats. So, special engineering techniques like tunneling, rock stabilization, and the construction of suspension bridges are often required to connect remote mountain villages.

Also, River Crossings are the one of the major geographical challenges. Nepal is crisscrossed by numerous rivers originating from the Himalayas. Road construction often involves building bridges and culverts to cross these rivers. During the monsoon season, rivers can swell significantly, posing a risk to bridges and roads. Proper planning and engineering are essential to ensure these structures can withstand the seasonal flooding.

- **Climate and Weather:** In addition to that Nepal experiences a wide range of climatic conditions, from subtropical in the Terai to alpine and arctic conditions in the mountains. Temperature extremes, including freezing temperatures at high altitudes, can impact road construction materials and infrastructure. Accessibility to the Remote Areas in many regions in Nepal in such conditions are critical, making road construction and maintenance difficult. Helicopter transport and the use of pack animals are sometimes necessary to transport construction materials to these areas.

  Beside these the Nepal's diverse geography also means it is home to a rich variety of flora and fauna. Road construction projects must consider environmental conservation efforts and minimize their impact on sensitive ecosystems.

- **Natural Disasters:** Nepal is vulnerable to earthquake, landslide and flooding. Nepal lies in the Zone V of the extremely vulnerable geological region for earthquake. The fragile geology and dynamic tectonic activities trigger the landslide frequently making difficult for roadway construction. Being 2nd highest in Fresh Water resources, Flooding is routine in Terai plains.

In summary, Nepal's diverse geographical conditions and environmental regions pose unique challenges to road construction and infrastructure development. Engineers and planners must consider the specific challenges presented by each region, such as steep terrain, weather extremes, and the need for bridges and tunnels, to ensure safe and reliable transportation networks for the country's residents and visitors and infrastructural development like road projects.

Regulatory and Legal Factors

- **Government Regulations:** Nepal government has launched The Fifteenth Plan on 2019 AD which is a five years plan of Nepal adopted in periodic basis. Nepal Government has taken initiative to uplift Nepal from developing to developed country by 2050 AD (NPC, 2019). The rules and regulation for the construction of infrastructural development projects in Nepal has to go through the rigorous process. Nowadays, the standards in development sectors like building, bridges, roads etc., has been somehow set in recent year but still lack some important parameters and features which unwillingly forces us to imbibe the Indian Standard (IS) codes and above.

- **Land Ownership and Tenure:** The land acquisition process in Nepal is governed by the Land Acquisition Act of 1977 and involves several key steps. The government or an authorized agency identifies the land needed for public projects, and a preliminary notice is issued to inform landowners and the public. Following any objections, a final declaration confirms the acquisition. A Valuation Committee assesses the land's market value and other assets to determine fair compensation, which is then paid to the landowners before the land is officially transferred to the government.

  Land ownership issues, including land disputes and land acquisition process is the main problem in the construction of infrastructural projects in Nepal. Resolving land ownership issues and disputes in Nepal often requires a combination of legal, administrative, and social measures.

Improving land records, ensuring transparent land transactions, providing access to legal aid, and promoting community-based conflict resolution mechanisms are some steps that can help mitigate these challenges and overcome the problems relating to the land availability for the Government. Khokana Area has been an issue needed to be resolved in case of KTFT Road Project.

- **Environmental Regulations:** Environmental Impact Assessments (EIAs) and related regulations play a crucial role in governing construction projects in Nepal. These assessments are intended to evaluate the potential environmental consequences of a proposed project and ensure that necessary mitigation measures are in place to minimize negative impacts. Environmental impact assessments and associated regulations are essential tools for balancing development with environmental conservation in Nepal. They help ensure that construction projects are carried out responsibly, with due consideration for the natural environment and the well-being of local communities. Yet, delay in EIA Process has significantly hampered the projects of Nepal.

Socioeconomic Factors

- **Population Growth and Urbanization:** Nepal's growing population and urbanization are driving increased construction demands, affecting various sectors including housing, infrastructure, commercial spaces, and environmental considerations. Effective urban planning, sustainable construction practices, and policies that address housing affordability and quality are essential to managing these demands while ensuring the well-being and quality of life for the urban population. Urbanization often requires the development of new infrastructure, including roads, bridges, public transportation systems, water supply networks, and sewage systems. Nepal's urban areas need extensive infrastructure improvements to support the growing population and ensure basic services(NPC, 2023).

- **Labor Force:** Nepal generally has a sizable labor force available for construction projects, but there may be variations in skills and availability depending on location and other factors. Efforts to improve skills through training programs, ensure fair labor practices, and create safe working conditions can contribute to a more skilled and sustainable labor force for the construction industry in Nepal. Recent trends for abroad jobs and migration by skilled labor and scholars has also drastically impacted the labour market in Nepal.

- **Economic Factors:** Economic conditions, inflation, and exchange rates play a significant role in affecting project costs and financing for infrastructure projects like the Kathmandu-Tarai Fast Track (KTFT) Road Project in Nepal. Nepal's economy is characterized by its reliance on agriculture, remittances from Nepali workers abroad, and a growing service sector. It's important to consider the overall economic conditions when planning infrastructure projects. Economic stability and growth can positively impact project financing by attracting investments and improving the government's ability to fund projects. The KTFT Road Project is a significant infrastructure initiative in Nepal that aims to improve connectivity between Kathmandu and the Tarai region. The project is likely to require substantial financing.

  The availability of funding sources, including government budgets, foreign loans, grants, and public-private partnerships (PPPs), can be influenced by economic conditions, government policies, and international cooperation. Economic stability in Nepal can make it more attractive for both domestic and international investors to participate in financing the KTFT Road Project. Inflation can impact the cost estimates for the project, particularly if it affects the prices of construction materials, labor, and land acquisition. Exchange rate fluctuations can affect the cost of imported construction equipment and materials, especially if these are denominated in foreign currencies. Project developers may need to hedge against exchange

rate risks. In summary, economic conditions, inflation, and exchange rates are vital considerations for project costs and financing in Nepal, including the KTFT Road Project. A stable economic environment can facilitate project financing, while inflation and exchange rate fluctuations must be carefully managed to ensure project budgets are met and financial risks are minimized. Thorough financial planning, risk assessment, and contingency measures are essential for the successful implementation of infrastructure projects in Nepal.

- **Socio-Cultural Factors:** Socio-cultural factors, including cultural norms and community involvement, are essential considerations in the construction of infrastructure projects like the Kathmandu-Tarai Fast Track (KTFT) Road Project in Nepal. These factors can significantly impact project planning, implementation, and overall success. The socio-cultural factors like: Cultural Norms and Traditions, Land Ownership and Use, Conflict Resolution and Grievance Mechanisms Heritage Preservation, Local Capacity Building.

In summary, socio-cultural factors play a pivotal role in the planning and execution of construction projects in Nepal, including the KTFT Road Project. Acknowledging and respecting cultural norms, engaging with communities, and incorporating local knowledge are essential for project success and social acceptance. A culturally sensitive approach can contribute to the sustainable development of infrastructure while preserving the cultural heritage and way of life of the affected communities(KTFT, 2023).

Technology and Innovation

Technology and innovation can have a significant influence on the timely construction of the Kathmandu-Terai/Madhesh Fast Track (KTFT) Road Project. Incorporating the technological advancements and innovative approaches into the KTFT Road Project can help ensure its timely construction, reduce delays, enhance quality, and improve the overall efficiency of the project. However, it's crucial to ensure that the local workforce is adequately trained and equipped to operate and maintain the technologies to maximize their benefits.

- **Construction Technology:**
  Incorporating the modern construction methods and materials into the KTFT Road Project can help reduce construction time, improve the quality and longevity of infrastructure, enhance safety, and minimize disruptions to traffic and local communities. However, it's essential to ensure that local workers and construction teams are trained and equipped to use the new technologies effectively and efficiently.

- **Information Technology:** Adoption of construction management software and digital tools can greatly enhance the efficiency, transparency, and success of construction projects, including the KTFT Road Project. These tools enable better planning, communication, resource management, and decision-making, ultimately contributing to timely and cost-effective project delivery while ensuring compliance with quality and safety standards. Inventory system software, Smartsheet software for project progress tracing system has been implemented by KTFT Road Project.

Financial and Funding Factors

Funding construction projects in Nepal can be achieved through various sources, including loans, grants, and public-private partnerships (PPPs). These sources of funding can be essential for both public and private sector projects.

- **Project Financing:** It's important to note that the choice of funding source depends on the type, scale, and ownership structure of the construction project. Public infrastructure projects often rely on government budgets, foreign aid, and multilateral loans, while private sector projects may involve commercial loans, private investment, and PPPs. Each funding source comes with its own set of benefits, requirements, and responsibilities, and project developers need to carefully assess which option aligns best with their project goals and financial capacity. KTFT road was planned to be constructed solely from the government budget,

yet with the time the project has been receiving the IDA grants and loads for its construction.

- **Cost Escalation:** Cost overruns and delays in construction projects, including the Kathmandu-Tarai Fast Track (KTFT) Road Project, can result from various factors. Analyzing these factors is crucial for effective project management and mitigation. Some key contributors to cost escalation and project delays are:

  i. Land Acquisition and Right-of-Way Issues
  ii. Environmental Clearances and Regulations
  iii. Design Changes and Scope Creep
  iv. Inadequate Planning and Feasibility Studies
  v. Project Management and Coordination Issues
  vi. Weather and Natural Disasters
  vii. Labor Shortages and Skills Gaps
  viii. Supply Chain Disruptions
  ix. Financial Challenges and Budget Constraints
  x. Landslides and Geotechnical Issues
  xi. Social and Political Factors
  xii. Regulatory and Permitting Delays
  xiii. Unforeseen Underground Utilities

To mitigate these factors and minimize cost overruns and delays, comprehensive project planning, risk assessments, effective project management, stakeholder communication, and contingency planning are crucial. Regular monitoring and timely response to emerging issues are essential for the successful completion of construction projects like the KTFT Road Project.

Political and Security Factors

Political stability is crucial for infrastructure projects like the KTFT Road Project. It ensures continuity in decision-making, policy support, and project funding, reducing uncertainty.

- **Political Stability:** Political instability in Nepal can disrupt project timelines and funding. Frequent changes in government leadership, policy shifts, and bureaucratic hurdles can lead to delays in approvals, budget constraints, and inadequate project oversight. These challenges can hinder the project's progress, increase costs, and create an uncertain investment environment, potentially deterring private sector participation in PPPs. Political stability is vital to maintain momentum and secure long-term project success.

- **Security Concerns:** Security concerns on the Kathmandu-Terai/Madhesh Fast Track (Expressway) Road Project are influenced by various factors, including the project's geographic location, terrain, and potential risks. Addressing these concerns is critical to ensuring the safety of the project and all stakeholders involved. Addressing security concerns on the KTFT Road Project requires a multi-faceted approach that includes risk assessments, security planning, community engagement, and proactive safety measures. An integrated strategy can help safeguard both the project's assets and the well-being of those involved, ultimately ensuring the successful and safe completion of the infrastructure initiative.

Future Research

There are several areas for further research and investigation related to construction projects in Nepal, particularly in the context of the Kathmandu-Terai/Madhesh Fast Track (KTFT) Road Project. These areas can provide valuable insights for project planning, execution, and management. Some potential research areas include:

- **Impact Assessment and Mitigation:** Conduct comprehensive studies on the environmental, social, and economic impacts of the KTFT Road Project. Investigate strategies for effective impact mitigation and sustainable development.

- **Community Engagement and Stakeholder Participation:** Research methods for enhancing community engagement and stakeholder participation in the project. Examine approaches to address local concerns and build community support.

- **Risk Management and Resilience:** Analyze risk factors affecting construction projects in Nepal, with a focus on disaster resilience and preparedness. Develop risk management strategies for natural disasters like earthquakes, landslides, and floods.
- **Project Financing and Funding Models:** Investigate innovative financing mechanisms for infrastructure projects in Nepal, including alternative funding sources, private sector participation, and potential improvements in the financing of the KTFT Road Project.
- **Regulatory Framework and Policy Analysis:** Study the regulatory framework for construction projects in Nepal, exploring opportunities for streamlining approval processes, reducing bureaucratic hurdles, and ensuring compliance with environmental and safety standards.
- **Labor Force Development:** Assess the skills gap and labor force availability for construction projects. Explore strategies for workforce development, including training programs and apprenticeships.
- **Technology Adoption and Digitalization:** Investigate the adoption of modern construction methods, digital tools, and technology in Nepal's construction sector. Analyze the potential for increased efficiency, cost savings, and improved project outcomes.
- **Supply Chain Resilience:** Study the resilience of construction supply chains in Nepal, particularly regarding the timely and cost-effective availability of construction materials and equipment.
- **Innovative Materials and Sustainable Practices:** Research innovative construction materials and sustainable building practices suitable for Nepal's unique environmental and climatic conditions.
- **Project Management and Performance Metrics:** Examine project management practices and performance metrics for construction projects in Nepal. Identify areas for improvement in project planning, execution, and monitoring.
- **Cross-Border Connectivity and Trade:** Investigate the impact of the KTFT Road Project on cross-border trade and connectivity with neighboring countries, particularly India, and explore opportunities for regional economic development.
- **Long-Term Maintenance and Asset Management:** Study approaches to long-term maintenance and asset management for constructed infrastructure to ensure its sustainability and longevity.
- **Legal and Dispute Resolution Framework:** Analyze the legal framework for construction contracts and dispute resolution mechanisms in Nepal, aiming to expedite conflict resolution and avoid project delays.
- **Economic and Social Benefits:** Assess the economic and social benefits of infrastructure development, including job creation, improved transportation, and regional development, to evaluate the project's overall impact on the country.

These research areas can contribute to a deeper understanding of construction projects in Nepal, particularly the KTFT Road Project, and help in addressing critical challenges and opportunities for sustainable infrastructure development in the region.

Discussion on Findings

Findings

The demographic representation of the surveyor who took part in the research survey are as follows:

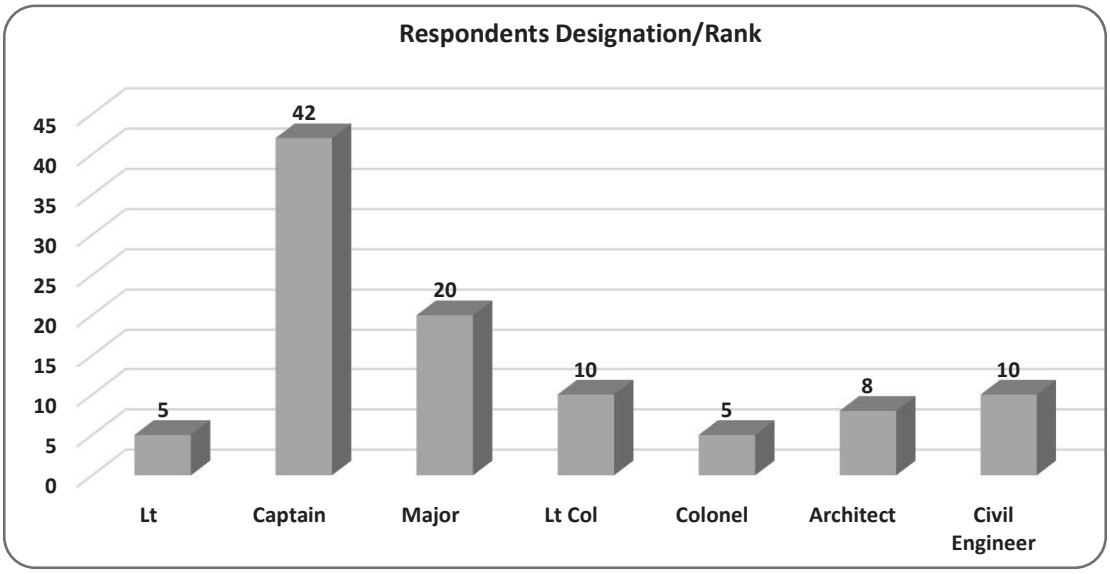

Figure 3.1: Responders Details

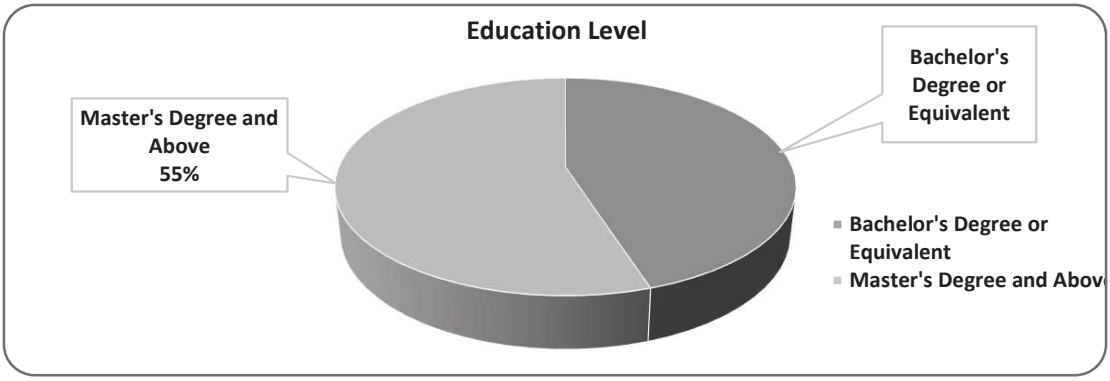

Figure 3.2: Educational Level of Respondents.

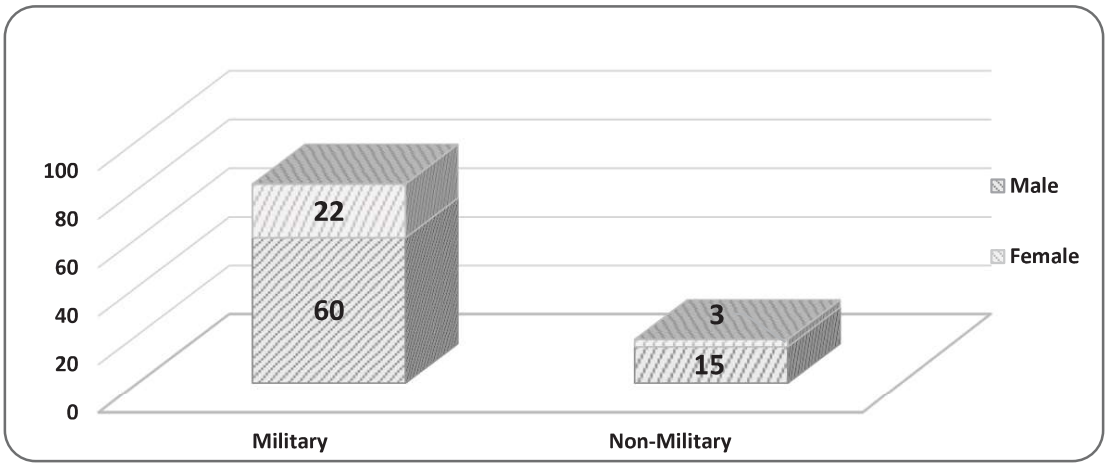

Figure 3.3: Job Nature of Respondents

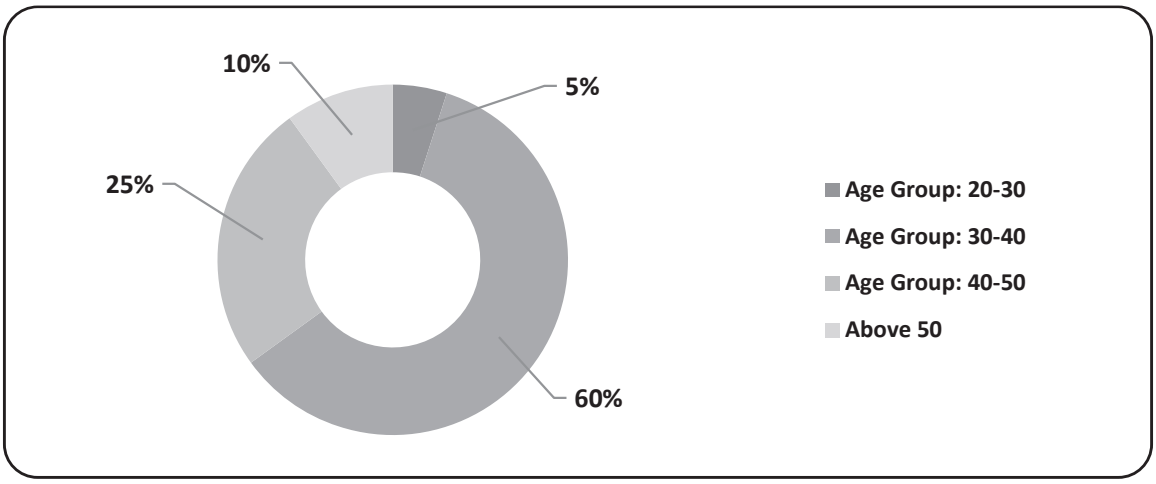

Figure 3 4: Age group of Respondents

Responses to the factors affecting timely construction of the KTFT Road Project

Considering the responders input for the factors affecting the timely construction of the KTFT road project as per questionnaire, the graphical representation is shown below:

1. Nature of Response

The relative importance index on the responses was conducted and ranked so as to identify the most significant factors listed as per questionnaire which contributes to segregate the dependent and independent variables afterwards. Figure 3.5 shows the nature of response as responded by the respondents in this survey. There were seven statements on subject as follows: geographic and environmental factors, regulatory and legal factors, socioeconomic factors, technology and innovation, finance and funding factor, political and security factor, others (explosives, equipment's, etc.).

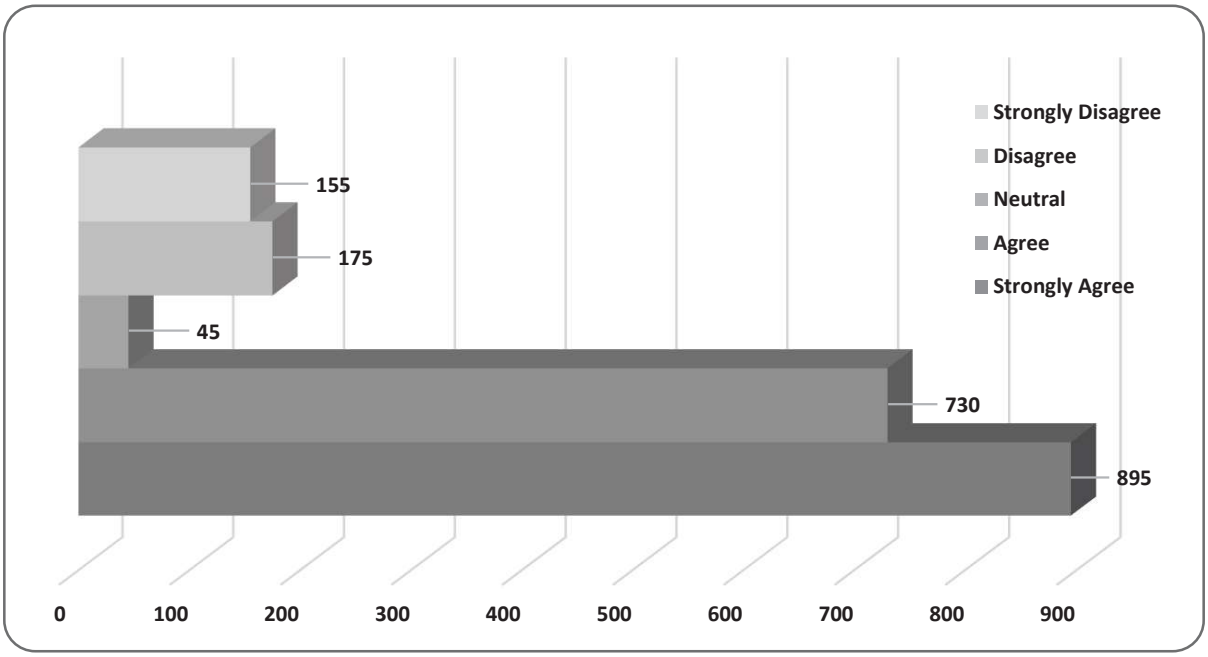

Figure 3 5: Nature of Response

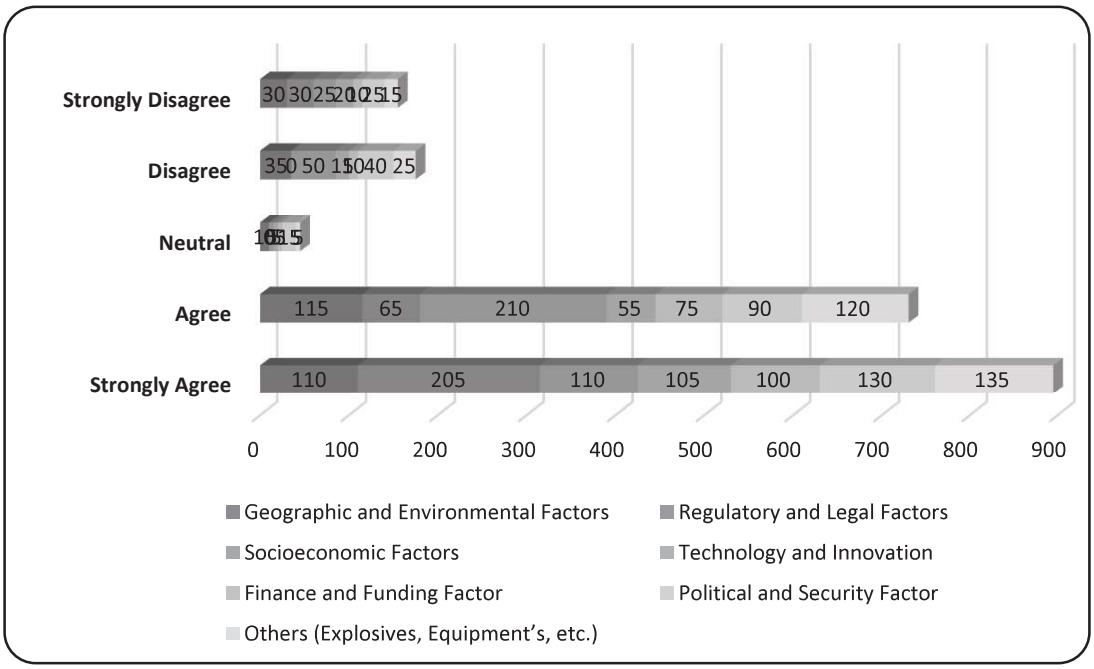

Figure 3 6: Nature of Response based on variables.

2. Nature of Response based on variables

The nature of response based on variables is shown in Figure 3.6 and it gives the clear indication that the regulatory and legal factors is the main leading factors (dependent variable) for this study. Hence, the further framing and study on this research was carried out based on this theme. All other six parameters are then taken as independent variables and regression and correlation were determined.

3. Cronbach's Alpha

The reliability level based on Cronbach's alpha value is found to be 0.93, which signifies the data and the responses are very reliable as we can see in the Figure 3.7.

Cronbach's Alpha Value	Reliability Level
0.0 – 0.20	Less Reliable
>0.20 – 0.40	Somewhat Reliable
>0.40 – 0.60	Reliable enough
>0.60 – 0.80	Reliable

Figure 3 7: Level of Reliability Based on Alpha Value

Source: Available Level of Reliability Based on Alpha Value from: https://www.researchgate.net/figure/Level-of-Reliability-Based-on-Alpha-Value_tbl3_335845222 [accessed 21 Nov, 2023]

4. Correlation

The given table shows the correlation among the variables:

		Geographic and Environmental Factors	Regulatory and Legal Factors	Socioeconomic Factors	Technology and Innovation	Finance and Funding Factor	Political and Security Factor	Others (Explosives, Equipment's, etc.)
		X1	X2	X3	X4	X5	X6	X7
Geographic and Environmental Factors	X1	1.00	0.29	0.27	0.14	0.55	0.21	0.35
Regulatory and Legal Factors	X2	0.29	1.00	0.52	0.83	0.41	0.51	0.85
Socioeconomic Factors	X3	0.27	0.52	1.00	0.52	0.65	0.73	0.41
Technology and Innovation	X4	0.14	0.83	0.52	1.00	0.50	0.56	0.87
Finance and Funding Factor	X5	0.55	0.41	0.65	0.50	1.00	0.69	0.55
Political and Security Factor	X6	0.21	0.51	0.73	0.56	0.69	1.00	0.53
Others (Explosives, Equipment's, etc.)	X7	0.35	0.85	0.41	0.87	0.55	0.53	1.00

Source: Field Survey

5. Regression

The given table shows the regression values among the variables:

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-0.15	0.28	-0.55	0.58	-0.70	0.40	-0.70	0.39
X Variable 1	0.15	0.06	2.41	0.02	0.03	0.27	0.03	0.26
X Variable 2	0.43	0.09	4.54	0.00	0.24	0.62	0.24	0.61
X Variable 3	0.23	0.10	2.31	0.02	0.03	0.42	0.03	0.42
X Variable 4	-0.45	0.09	-5.15	0.00	-0.62	-0.27	-0.62	-0.27
X Variable 5	0.03	0.08	0.42	0.67	-0.12	0.18	-0.12	0.18
X Variable 6	0.77	0.12	6.57	0.00	0.54	1.01	0.54	1.01

ANOVA

	df	SS	MS	F	Significance F
Regression	6	111.02	18.50	76.10	0.00
Residual	93	22.61	0.24		
Total	99	133.63			

Regression Statistics	
Multiple R	0.91
R Square	0.83
Adjusted R Square	0.82
Standard Error	0.49
Observations	100.00

6. Correlation Between dependent and independent variables:

The figure 3.8 shows the Correlation between Regulatory and Legal Factors vs Geographic and Environmental Factors.

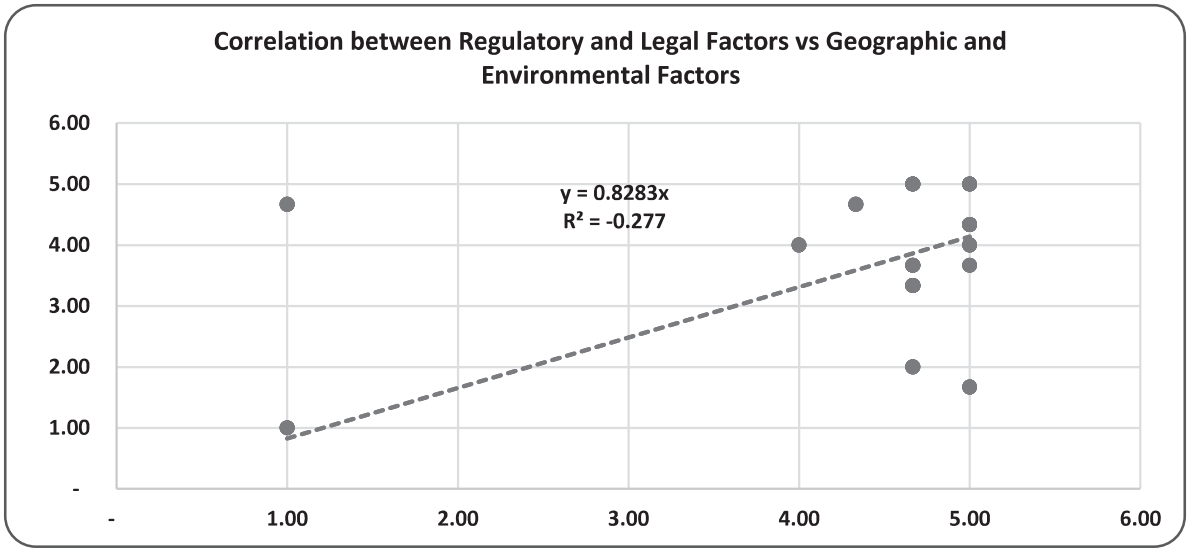

Figure 3 8: Correlation between Regulatory and Legal Factors vs Geographic and Environmental Factors

Conclusion

Following conclusion can be drawn from the research survey conducted among the respondents which includes stakeholders including civilians, military personnel, client, contractors and consultant of the KTFT road project. The data reliability for the research is valid through analysis and their correlation and regression are perfectly aligned. The Regulatory and Legal factors is found to be the most significant factors for the timely construction of the KTFT road project and the least importance from the survey is determined to be the geological and environmental factor. Also, after the analysis of the factors under seven different heading we can conclude the following results as per the responses interpreted below:

Factors for timely construction of Project

1. **Geographic and Environmental Factors:** More than 50% responders completely agree that Geographical Diversity affects the timely construction of the KTFT Road Project. The Climate and Weather contributes partially agree for 50% responders, and There is a mix review on Natural Disasters as factor hindering the timely construction of the KTFT road project.

2. **Regulatory and Legal Factors:** Above 60% responders completely agree for the all three factors under regulatory and legal factors i.e.: Government Regulations, Land Ownership and Tenure and Environmental Regulations. This depicts that government must be cautious about the rules being implemented for this national pride projects.

3. **Socioeconomic Factors:** Partial Agreement in case of Population Growth & Urbanization, Labor Force, Economic Factors and Socio-Cultural Factor are seen.

3. **Technology and Innovation:** Responders has given emphasis to the new construction technology as the determining factor for timely construction of this project. And Complete agreement has been shown by nearly 40% of the respondents for adoption of information technology.

4. **Finance and Funding Factor:** Complete Agreement for both the factors under financial heading i.e., Project Financing has been emphasized by the nearly 60% of responders.

5. **Political and Security Factor:** Complete agreement by more than 80% has been given to Political Stability. 40% complete agreement given to security concern and 50% of partial agreement has been given to IT and Cyber Security Training.

6. **Others (Explosives, Equipment's, etc.):** Partial Agreement by 50% for the Explosives availability, 45% on complete agreement for availability of Equipment's and 60% complete agreement for the leadership has been denoted by the responders.

Annex 1: Questionnaire

1. Background

Name: Sex: Age:

Designation/Appointment: Office:

Education Level:

Dependent variables

2. What could be the factors included in the construction project for its timely construction. To what extent do you agree with the following related factors for timely construction of the Infrastructural Projects?

Factors for timely construction of Project	Completely disagree	Partly disagree	Partly agree	Completely agree	Don't know
A. Geographic and Environmental Factors:	1	2	3	4	9
1. Geographical Diversity	1	2	3	4	9
2. Climate and Weather	1	2	3	4	9
3. Natural Disasters	1	2	3	4	9
B. Regulatory and Legal Factors:	1	2	3	4	9
1. Government Regulations	1	2	3	4	9
2. Land Ownership and Tenure	1	2	3	4	9
3. Environmental Regulations	1	2	3	4	9
C. Socioeconomic Factors:	1	2	3	4	9
1. Population Growth & Urbanization	1	2	3	4	9
2. Labor Force	1	2	3	4	9
3. Economic Factors	1	2	3	4	9
4. Socio-Cultural Factor	1	2	3	4	9
D. Technology and Innovation	1	2	3	4	9
1.Construction Technology	1	2	3	4	9
2. Information Technology	1	2	3	4	9
E. Finance and Funding Factor	1	2	3	4	9
1. Project Financing	1	2	3	4	9
2. Cost Escalation	1	2	3	4	9
F. Political and Security Factor	1	2	3	4	9
1. Political Stability	1	2	3	4	9
2. Security Concern	1	2	3	4	9
3. IT and Cyber Security Training,	1	2	3	4	9
G. Others (Explosives, Equipment's, etc.)	1	2	3	4	9
1. Explosives	1	2	3	4	9
2. Equipment's	1	2	3	4	9
3. Leadership	1	2	3	4	9

3. Would you like to add anything?

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