

Research Article

Analysis of National Infrastructure Integration in Ethiopia: Current State and Recommended Solutions

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Abstract

The study provides a comprehensive examination of the challenges and opportunities within Ethiopia's infrastructure sector. As the country continues to grow economically and experience rapid urbanization, the demand for efficient and well-integrated infrastructure systems has become increasingly critical. The analysis focuses on evaluating the current state of national infrastructure integration, identifying key challenges, and proposing actionable solutions to improve the planning, execution, and management of infrastructure projects across the country. The assessment reveals that Ethiopia's infrastructure sector is characterized by fragmented integration among key stakeholders, including ERA, EEU, EEP, Ethio Telecom, EAG, and IPDC, as well as various private sector contractors and service providers. This lack of cohesive collaboration has led to inefficiencies, project delays, and cost overruns, significantly affecting the overall effectiveness of infrastructure projects. Important issues identified include inefficiencies in integration mechanisms, fragmented communication and collaboration among stakeholders, bureaucratic hurdles that delay project approvals and execution, inadequate resource allocation, poor communication practices, limited stakeholder engagement, and capacity constraints that undermine the successful completion of infrastructure projects. To address these challenges, the study proposes several solutions aimed at improving national infrastructure integration. These include enforce the revised compensation proclamation at the local level, developing a comprehensive integrated infrastructure master plan, establish integrated planning and integration platforms, strengthen communication protocols, improve resource management, and invest in capacity building through training and development programs.

Keywords

National Infrastructure, Infrastructure Integration, Stakeholder Coordination, Right-of-Way, Infrastructure Planning, Sustainability

1. Introduction

Ethiopia, a nation characterized by its rapidly growing population and expanding urban centers, is at a critical juncture in its infrastructure development journey [1]. As the country continues to experience robust economic growth and accelerated urbanization, the demand for modern, efficient, and effective infrastructure systems has never been more

pressing [8]. These systems are essential not only for sustaining the momentum of economic progress but also for enhancing the quality of life for its citizens by providing the necessary foundations for sustainable development [5].

Infrastructure development in Ethiopia spans a wide array of sectors, each playing a pivotal role in the nation's overall

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growth. Key areas include transportation networks, which are vital for facilitating trade and mobility; telecommunications, which connect people and businesses in an increasingly digital world; water supply systems, which are essential for public health and agriculture; energy infrastructure, which powers industries and homes alike; and public facilities, which serve as the backbone of social services such as education and healthcare [6].

However, the effective planning, execution, and management of these infrastructure projects are often hindered by various systemic and operational challenges [9]. These challenges include inefficiencies in integration mechanisms, bureaucratic hurdles, inadequate resource allocation, communication barriers, limited stakeholder engagement, and capacity constraints [2].

Addressing these multifaceted challenges is crucial for improving the overall infrastructure development process in Ethiopia [7]. Through tackling inefficiencies in integration, simplifying bureaucratic processes, ensuring adequate resource allocation, enhancing communication, fostering greater stakeholder engagement, and building capacity, Ethiopia can significantly improve its infrastructure development outcomes [4]. These improvements are not only necessary for completing projects on time, within budget, and to the desired quality standards but also for ensuring that the infrastructure built today will meet the needs of future generations [3].

2. Study Methodology

The study methodology is designed to assess the current state of national infrastructure integration in Ethiopia, identify key challenges, and propose solutions for improving the effectiveness of integration among key stakeholders. The methodology for this document preparation includes the following components.

2.1. Target Respondents

The study focuses on key stakeholders engaged in infrastructure development, including representatives from the Ethiopian Roads Administration, Ethiopian Electric utility, Ethiopian Railways Corporation, Ethio Telecom, Industrial Parks Development Corporation, contractors, consultants, the water bureau, as well as city and woreda local administrations.

2.2. Study Instrument

A structured questionnaire was developed, consisting of both quantitative and qualitative questions. The questionnaire was designed to capture detailed information on: existing integration mechanisms among stakeholders, major challenges in infrastructure integration, the effectiveness of communication and data-sharing practices, the extent of

stakeholder engagement and collaboration, resource allocation and funding mechanisms, and perceived inefficiencies and areas for improvement.

2.3. Sampling Strategy

A purposive sampling strategy was used to select respondents from each stakeholder organization. This method ensured that individuals with direct involvement in infrastructure projects and integration and coordination activities were included in the survey.

2.4. Data Collection

Key informant interview were carried out as part of the road project supervision activities. These interviews utilized a standardized, structured questionnaire to ensure consistency in the data collected. Additionally, they provided an opportunity to delve deeper into specific issues that emerged during the discussions, enabling a more comprehensive understanding of the challenges related to the project. This approach allowed for both systematic data gathering and the flexibility to explore complex or context-specific topics in greater depth.

Focus group discussions were convened with carefully selected participants representing various stakeholder organizations, including officials from both the woreda and city administrations involved in road project supervision activities. These sessions created a collaborative platform where participants could exchange insights, share experiences, and collectively reflect on the challenges of infrastructure integration [10]. Through bringing together diverse perspectives, these discussions offered a more holistic understanding of the issues, highlighting the interconnected concerns and opportunities for improvement across different administrative and organizational levels.

Observations were conducted during road project supervision, which provided insights into how infrastructure providers and the Ethiopian Roads Authority collaborate. As part of the supervision process, efforts were made to integrate their activities, including coordinating with utility providers and local administrations to facilitate the relocation of utilities and the clearance of farmland and houses for the road project.

However, the observations revealed numerous challenges, particularly related to integration issues within the road projects. These challenges collectively highlight the broader difficulties associated with infrastructure integration [11].

3. Results and Discussions

The study results offer a comprehensive analysis of the current state of national infrastructure integration in Ethiopia. Data collected from key stakeholders, such as the Ethiopian Roads Administration, Ethiopian Electric Utility, Ethiopian Railways Corporation, Ethiopian Civil Aviation Authority, Ethio Telecom, Industrial Parks Development Corporation,

contractors, consultants, the water bureau, and city and woreda local administrations, reveal crucial insights into both the challenges and opportunities for enhancing infrastructure integration..

4. Results

4.1. Stakeholder Involvement in Infrastructure Integration

The study engaged 72 respondents, including local government administrators, consultants, contractors, and infrastructure agencies. Local government administrators formed the largest group (31.9%), emphasizing their role in project implementation. Consultants (16.7%) and ERA representatives (12.5%) also contributed significantly.

4.2. Challenges Identified

Delayed Compensation and Community Disruptions: Prolonged processes hinder project execution and create resistance from affected communities. Bureaucratic Delays: Complex approval processes slow down infrastructure development. Poor Communication Among Stakeholders: Lack of information sharing leads to misaligned project timelines and operational inefficiencies. Limited Technical Capacity: Shortages of skilled professionals negatively impact project

quality and execution. Resource Constraints: Financial limitations and shortages in essential materials delay infrastructure relocation and project completion.

4.3. Consequences of Poor Integration

Project Delays and Cost Overruns: Misalignment among stakeholders leads to construction conflicts and extended project timelines. Service Disruptions: Infrastructure providers operate in silos, resulting in operational inefficiencies and reduced service quality. Regulatory and Institutional Challenges: Weak enforcement of integration policies and a lack of centralized planning hinder effective infrastructure development. Misalignment with Development Goals: Poor integration leads to inefficient resource allocation and an inability to meet national infrastructure objectives.

4.4. Positive Developments

Formal Agreements for Stakeholder Integration: A Memorandum of Understanding (MOU) was introduced, requiring annual project plans from all stakeholders to ensure synchronized implementation. Improved Oversight and Accountability: Increased ministry supervision has enhanced transparency and project coordination. Reduction in Project Delays: Coordinated efforts between the Ministry and infrastructure providers have improved progress tracking and minimized implementation setbacks.

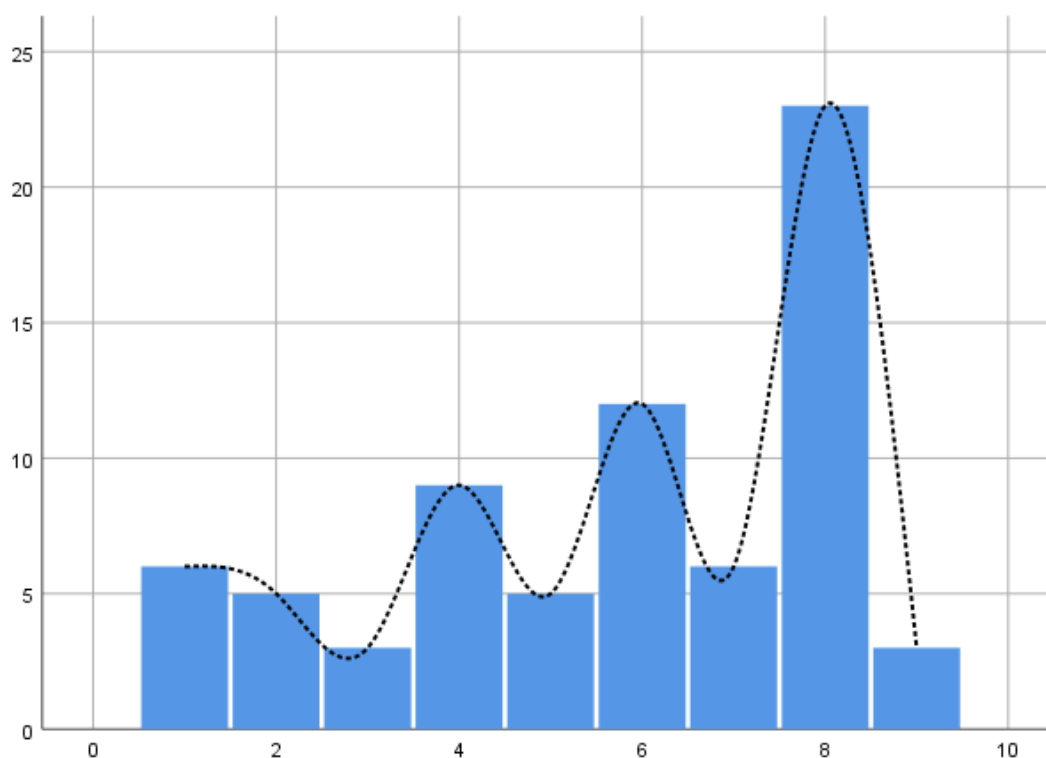


Figure 1. Stakeholder Involvement in Infrastructure Integration.

5. Discussion

5.1. Major Challenges and Issues in Infrastructure Integration in Ethiopia

Ethiopia encounters substantial challenges in achieving effective integration of its infrastructure systems, which has far-reaching consequences on the efficiency, timeliness, and cost-effectiveness of development projects. These challenges stem from a combination of fragmented planning processes, weak integration among stakeholders, and the absence of strong institutional frameworks.

The lack of integration often results in inefficiencies, where different sectors such as transportation, energy, water, and telecommunications fail to align their activities [12]. This misalignment can lead to duplicated efforts, resource wastage, and conflicting priorities, making it difficult to implement projects in a synchronized and seamless manner. For instance, a road construction project may face delays if utility lines or pipelines are not relocated on time, or if construction activities are not aligned with urban planning initiatives. Key challenges include:

5.1.1. Delayed Compensation and Community Disruptions

Unresolved compensation issues within road projects significantly hinder progress by creating delays in providing compensation to landowners, utility providers, and affected communities. When those impacted by infrastructure projects are not compensated promptly or fairly, it often leads to resistance from the community and other stakeholders. This resistance can manifest in various forms, such as protests, refusal to vacate land, or withholding cooperation, all of which stall the project timeline.

The lack of timely compensation also undermines trust between the project implementers and the affected parties. Communities and utility providers may feel neglected or exploited, resulting in strained relationships that complicate future negotiations. Furthermore, unresolved compensation disputes can escalate into legal challenges, which not only delay the project further but also increase costs due to litigation and other related expenses. Insufficient community engagement in road projects poses a significant challenge to their success. When local communities are not meaningfully involved in the planning and execution phases, it can lead to feelings of exclusion and marginalization. This lack of inclusion often results in tensions and mistrust between the communities and project implementers, creating additional barriers that disrupt project progress and hinder long-term cooperation.

These delays and conflicts disrupt project schedules and can lead to missed opportunities for economic development and infrastructure improvement. Addressing this issue requires the implementation of clear, transparent, and efficient

compensation mechanisms. This includes ensuring that all affected parties are identified early in the project, that fair compensation rates are established, and that payment processes are streamlined to avoid unnecessary delays. Proactive engagement and communication with stakeholders can also help mitigate resistance and foster cooperation, ensuring smoother progress for infrastructure projects.

5.1.2. The Revised Compensation Proclamation (1336/16)

The revised Proclamation 1336/2016 lacks clear understanding and communication among regional leaders, wereda leaders, and city mayors. This confusion causes significant delays in project implementation, particularly regarding the clearance of right-of-way issues. According to the proclamation, the ERA is responsible for paying compensation if the relevant documents are submitted to them. However, if the documents are not submitted to ERA, then the regional government is expected to cover the compensation. While this provision is clear, there are challenges when weredas complete the compensation documentation. Often, they are unsure of who is responsible for collecting and submitting these documents, as there is no clearly defined structure within the regions or weredas to manage this process. As a result, regional governments must establish a robust administrative framework that extends to the wereda and kebele levels to ensure smooth handling and timely submission of these documents. This would help avoid bottlenecks in the clearance process and facilitate faster project execution.

(i). Opportunities Arising from the Revised Proclamation

The revised proclamation presents a significant opportunity for improved project implementation, as it has encouraged regional governments to take proactive measures in facilitating road development. These measures include relocating utilities, demolishing structures such as houses and buildings, and providing clear, obstruction-free sections for road projects. For example, the Sodo-Areka road project has demonstrated this approach in action, with regional authorities ensuring a smooth process by addressing right-of-way challenges upfront.

Additionally, many cities across the country have begun incorporating corridor development into their urban planning. By aligning road projects with city structural plans, these initiatives ensure that road corridors are free from right-of-way issues, enabling infrastructure providers to relocate their lines efficiently. This practice not only streamlines current projects but also sets a precedent for future developments, fostering an environment where regional governments are committed to removing obstructions and facilitating integrated infrastructure growth.

Expanding this model across all project sites could significantly enhance the efficiency and cost-effectiveness of in-

infrastructure projects nationwide, promoting better alignment between urban planning and infrastructure development.

(ii). Challenges in Preparing Compensation Documents for Road Projects

One significant challenge for road projects lies in the preparation and approval of compensation documents. The lack of a clearly structured and designated institution responsible for managing this process creates delays and inefficiencies. These documents, which are crucial for compensating affected individuals and communities, often fail to be finalized promptly, as the approval currently falls under the jurisdiction of the Ethiopian Roads Administration.

The situation has been altered by changes to the proclamation, but regional governments have yet to implement the necessary regulations and guidelines. This lack of implementation has introduced complications, particularly regarding the compensation process. Although modifications have been made, there remains insufficient clarity and a lack of streamlined mechanisms for document preparation and approval. As a result, a bottleneck has formed, delaying the timely removal of obstructions, such as houses, farmland, and other properties, along project corridors. Without finalized and approved compensation documents, these obstructions cannot be cleared, leading to delays in project implementation and increased costs.

5.1.3. Inflated Compensation Estimate

In government institutions, there is often an inflated estimation of compensation costs, particularly when the ERA is responsible for paying compensation. Estimators tend to overstate the compensation rates by setting excessively high unit prices for each item. This overvaluation leads to a situation where the ERA refuses to approve these inflated rates, which results in a delay in the approval process. Consequently, the project suffers from prolonged inaction, with no work being done, no demolition taking place, and no relocation of infrastructure stakeholders, such as the Ethiopian Electric Utility, Ethio telecom, and water authorities. These delays hinder the timely execution of the project, as the necessary relocations and adjustments for infrastructure providers are not addressed, causing significant setbacks in the overall project timeline.

5.1.4. Bureaucratic Delays

The approval processes within infrastructure projects are often overly complex, involving multiple layers of administrative review, which significantly delays decision-making and project initiation. These bureaucratic hurdles stall progress and prolong the timeline for infrastructure projects, preventing timely implementation. For example, the process of approving unit prices for compensation documents exemplifies this challenge. It requires coordination and agreement between the ERA, utility providers such as EEU and Ethio-

telecom, as well as wereda administrations. Each entity involved often operates with its own procedures and priorities, leading to prolonged negotiations and back-and-forth communications. The lack of streamlined protocols for resolving disagreements or expediting approvals further exacerbates the delays. As a result, the time taken to finalize unit prices for individual items stretches unnecessarily, delaying compensation payments and subsequent project activities, such as the relocation of utility infrastructure. This protracted process not only hinders project initiation but also creates inefficiencies that can escalate project costs and disrupt planned schedules. Simplifying and harmonizing the approval mechanisms across all stakeholders is essential to address this bottleneck and ensure smoother and faster execution of infrastructure projects.

5.1.5. Insufficient Integration and Communication

The communication channels between key stakeholders, such as the ERA, EEU, EEP, and Ethio Telecom, are often fragmented, resulting in limited or ineffective integration. This lack of seamless communication causes misalignment between the schedules and plans of these agencies, leading to misunderstandings and delays across various phases of the project. When each agency operates in isolation without regular, clear communication, their activities may conflict, and critical tasks like infrastructure relocation or utility adjustments may not be synchronized properly. As a result, project timelines are extended, and the overall progress is hindered, causing inefficiencies that could otherwise be avoided with better inter-agency collaboration and communication strategies.

Limited information-sharing mechanisms created significant barriers to integrated planning and decision-making among various stakeholders involved in infrastructure projects [14]. When relevant data plans, and updates were not effectively shared between agencies or departments, it became difficult to coordinate efforts and align objectives. This lack of transparency often led to design conflicts, as different stakeholders were unaware of each other's plans or changes, resulting in overlapping or conflicting project designs that required costly revisions or delays. Moreover, without a centralized system for sharing information, the decision-making process was fragmented. Stakeholders made decisions based on incomplete or outdated information, which further exacerbated project delays or led to inefficient use of resources. For example, one agency might have allocated resources to an area that another was already addressing, or the timing of interventions might not have aligned, leading to wasted efforts.

Additionally, the absence of a well-established information-sharing system meant that opportunities for optimizing resource allocation were often missed. Resources like funding, labor, and materials were not distributed effectively across various project phases or departments, leading to underutilization or bottlenecks in some areas while other parts of

the project lacked sufficient support. Efficient resource management and timely project completion were significantly hindered when communication and information-sharing were not prioritized, preventing stakeholders from capitalizing on synergies and avoiding duplication of effort.

5.1.6. Misalignment of Project Timelines

Inconsistent work schedules among infrastructure providers frequently lead to misaligned timelines, complicating projects that require integrated planning, such as those involving roads, railways, and utilities. Delays in one sector can have a cascading effect, disrupting progress in others and resulting in costly setbacks and potential rework [17]. The absence of integrated approach to project timing often creates conflicts. For example, road construction projects may proceed without considering future utility relocations or necessary adjustments. This oversight not only causes disruptions but also leads to additional expenses and inefficiencies due to the need for rework to accommodate infrastructure changes.

5.1.7. Resource Constraints

The Ethiopian Roads Administration faces significant financial challenges, with compensation costs amounting to nearly 24 billion birr. This substantial financial burden creates a major constraint on project implementation. Additionally, many infrastructure providers struggle with resource shortages, including poles, cables, and pipes, which further delay the relocation and removal of obstructions critical for project progress [13]. Limited financial resources hinder effective project integration, as budgetary constraints prevent infrastructure agencies from promptly addressing project changes or unforeseen needs. The availability of skilled professionals in project management, technical roles, and planning is insufficient, negatively impacting the quality and efficiency of infrastructure integration efforts. This lack of expertise slows down critical processes, reduces the effectiveness of integration among stakeholders, and diminishes the overall quality of infrastructure projects.

5.1.8. Technical and Design Conflicts

Un integrated Infrastructure Designs in Infrastructure designs often fail to consider the needs and requirements of all stakeholders, leading to physical conflicts such as level crossings or the need for utility relocations [15]. This lack of integration results in unforeseen complications, requiring costly and time-consuming re-engineering to resolve these issues. Safety and Functional Challenges create Inadequate planning of interactions between different infrastructure systems, such as roads and railways, can lead to significant safety risks, traffic hazards, and operational inefficiencies. Poorly designed intersections or crossings can cause service interruptions and compromise functionality, necessitating expensive redesigns or retrofits to address these shortcomings and ensure both safety and effective operation.

5.1.9. Limited Central Oversight

Weak centralized planning, despite decentralization granting regions autonomy, remains a significant challenge in infrastructure project management in Ethiopia. The Ministry of Urban and Infrastructure, as the central oversight body, is responsible for integrating the efforts of various infrastructure providers and regional authorities. However, the lack of effective integration and authority within the ministry weakens its ability to oversee and enforce integration among different stakeholders. This results in a fragmented approach to project management, where different agencies may pursue conflicting priorities, leading to poorly synchronized projects. Without a strong, unified oversight mechanism, projects often face delays, inefficiencies, and increased costs, as conflicting timelines and priorities hinder smooth execution. This lack of cohesive oversight ultimately affects the success and sustainability of infrastructure development in the country.

(i). Consequences of Absence of Integrated Development

The lack of integration in infrastructure development causes many challenges that slow down progress and lead to poor results. In Ethiopia, these problems have a significant impact on infrastructure projects. Without proper coordination, different sectors and stakeholders often work separately, leading to overlapping efforts, delays, and increased costs. Resources are not used efficiently, and projects may fail to meet consistent standards, reducing their quality and long-term usefulness. Since infrastructure is essential for Ethiopia's economic growth and public services, these issues make it harder to achieve development goals. To overcome these challenges, better integration and planning are needed to ensure projects are completed on time, within budget, and meet the country's needs. The majority of the issues are outlined below:

Construction Delays: Ineffective integration between road and EEU, EEP, Ethio Telecom, and ERC causes significant delays. The road construction does not align with the timing of rail infrastructure development, or vice versa, it can lead to interruptions in both transport modes. For instance, if roadwork is scheduled without considering upcoming rail construction, it might necessitate rework or cause delays in rail services, disrupting both road and rail operations.

Design Conflicts: Without integrated planning, road and EEU, EEP, Ethio Telecom, and ERC may suffer from design conflicts. For example, when a new road is constructed across an existing or planned railway line, the design might not accommodate necessary rail infrastructure such as level crossings, overpasses, or underpasses. This can lead to safety hazards, inefficient traffic flow, and the need for costly redesigns or retrofits.

Construction Conflicts: Un integrated planning can result in conflicts between different infrastructure projects. For example, if road works and telecommunication installations

occur independently, there might be instances where newly laid telecommunication cables are damaged or require relocation due to subsequent road construction activities. Such conflicts can lead to additional costs and time spent resolving issues.

Delays in Service Deployment: When telecommunication infrastructure projects are not well-integrated with road construction or other development activities, it can lead to delays in deploying services. For instance, if roads are being upgraded or constructed without considering the placement of telecommunication cables and equipment, there may be interruptions or additional work required to lay or relocate these systems, delaying the provision of telecommunication services.

(ii). Operational Inefficiencies

Poor integration can lead to operational inefficiencies that affect the performance of the entire transportation system. For instance, if railway operations are not aligned with road networks and telecommunication systems, it can lead to delays in service, reduced efficiency in cargo handling, and disruptions in communication that affect the coordination of transport activities. Additionally, the absence of integrated planning between rail, road, and electric infrastructure can lead to power supply issues, such as insufficient power for electrified rail systems, which can hinder the expansion or reliability of transportation services.

Increased Costs: Without effective integration, resources may be used inefficiently. For example, road construction might require digging or excavation that affects telecommunication infrastructure if not planned together. This could lead to redundant work, such as re-excavating roads to install or repair telecommunication lines, increasing overall project costs. The need to resolve conflicts arising from poor integration can significantly increase the costs of infrastructure projects. For example, if railway construction needs to be halted to accommodate the relocation of telecommunication or electrical infrastructure, it can result in unplanned expenditures and project delays. These delays can cascade through the transportation system, affecting timelines for road construction, railway operations, and the rollout of telecommunication services.

Misalignment with Development Goals: When EEU, EEP, telecommunication and water authority's infrastructure is not aligned with other development projects; it can lead to misalignment with broader development goals. For example, if new residential or commercial areas are developed without simultaneous upgrades to telecommunication infrastructure, it can result in inadequate service provision, impacting the area's connectivity and economic growth. Similarly, if there is no proper planning for how telecommunications infrastructure like fiber optic cables will be integrated with road and rail networks, it can lead to interruptions in service or costly retrofitting later on.

Reduced Safety and Service Quality: Inadequate crossings and connectivity, combined with poor integration with electric

and telecommunication infrastructure, can compromise safety. For instance, the absence of coordinated traffic management systems at rail-road intersections can increase the risk of accidents. Similarly, insufficient telecommunication support can impair emergency response times or the ability to monitor and manage transport networks effectively. Service quality may also suffer due to interruptions in power or communication, leading to unreliable transportation services for passengers and freight.

Economic Impact: Inefficient transport systems resulting from lack of integration can have broader economic implications. Delays in goods transportation can affect supply chains, increase costs for businesses, and reduce overall economic productivity. Integrated planning helps optimize transport networks, supporting economic growth and trade.

5.2. The Communication and Collaboration Between Government Organizations and Stakeholders

Table 1. *The Communication and Collaboration between Government Agencies and Stakeholders.*

Respondents	Frequency	Percent
Excellent	9	18.8
Good	13	27.1
Fair	13	27.1
Poor	9	18.8
Very poor	4	8.3
Total	48	100

The communication and collaboration between government agencies and stakeholders have a significant impact on the success of infrastructure projects [16]. When communication is excellent or good, it generally leads to smoother integration, clearer objectives, and more efficient problem-solving, ultimately improving the project's overall effectiveness. These positive outcomes are reflected in the 45.9% of respondents who rate the communication as either excellent or good. However, when communication is rated as fair, there is still some integration, but it may not be as efficient or streamlined, which can lead to misunderstandings, delays, or misalignment of goals, as indicated by the 27.1% of respondents who rate it as fair. On the other hand, when communication and collaboration are rated as poor or very poor, it can result in significant setbacks, such as delays, resource wastage, and frustration among stakeholders. These issues are highlighted by the 27.1% of respondents who express dissatisfaction. Poor communication leads to confusion, lack of transparency, and fragmented decision-making, which hinders progress and may

even derail projects.

In the long term, this ineffective communication negatively impacts the efficiency of infrastructure planning and implementation, reducing the overall success and increasing the risk of project failure. Therefore, addressing the communication gaps is crucial to enhancing collaboration, ensuring clearer coordination, and ultimately improving the outcomes of government-led infrastructure projects.

6. Conclusions

Ethiopia's infrastructure integration remains a critical challenge due to fragmented planning, bureaucratic inefficiencies, and resource constraints. The study highlights that while some progress has been made through formal agreements and increased oversight; further efforts are required to institutionalize integration mechanisms. Strengthening regulatory enforcement, improving stakeholder coordination, and addressing financial and technical constraints are key to achieving a well-integrated infrastructure system that supports national development goals.

Abbreviations

EAG	Ethiopian Airports Group
EEP	Ethiopian Electric Power
EEU	Ethiopian Electric Utility
ERC	Ethiopian Railways Corporation
ERA	Ethiopian Roads Administration
IPDC	Industrial Parks Development Corporation
MOU	Memorandum of Understanding
ROW	Right off Way Agent
Ethio Telecom	Ethiopian Telecommunications Corporation

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Author Contributions

Michael Menberu is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The author declares no conflicts of interest.

References

- [1] Bitew, Misiker Negash. "The Status of Inter-Sectorial Physical Infrastructural Integration in Selected Sectors in Addis Ababa City, Ethiopia." Chhatrapati Shahu Institute of Business Education and Research (CSIBER): 17. <http://dx.doi.org/10.24294/jipd.v8i8.5956>
- [2] Worku, G., & Adugna, D. (2024). The practices of an integrated infrastructure planning in Ethiopian metropolitan cities, the case of Addis Ababa and Sheger cities. <http://dx.doi.org/10.21203/rs.3.rs-5171883/v1>
- [3] Gemeda, D. (2012). Assessing the development of Ethiopian national spatial data infrastructure. Wageningen University. <http://dx.doi.org/10.1080/00396265.2017.1420586>
- [4] Eldana, T. N. (2021). Investigation on Public-private Partnership Impleinvestigation on Public-private Partnership implementation Challenges in Ethiopian Road Infrastructure Projectmentation Challenges in Ethiopian Road Infrastructure Project (Doctoral dissertation). <http://dx.doi.org/10.1155/2022/4863210>
- [5] Bantayehu Ayalew Workineh (2017); Expropriation and Compensation Challenges for Road Construction in Yeka Sub City, Addis Ababa, Ethiopia; Int J Sci Res Publ 7(10) (ISSN: 2250-3153). <http://www.ijsrp.org/research-paper-1017.php?rp=P706894>
- [6] Mengistu, D. G., & Mahesh, G. (2020). Challenges in developing the Ethiopian construction industry. African Journal of Science, Technology, Innovation and Development, 12(4), 373-384. <http://dx.doi.org/10.1080/20421338.2019.1654252>
- [7] Destaye, Habtamu Tegegne. ALTERNATIVE AND INNOVATIVE PROJECT DELIVERY SYSTEM FOR ADDIS ABABA CITY ROAD PROJECTS. Jan. 2019, <http://dx.doi.org/10.20372/nadre:1562744548.44>
- [8] Demenge, J., Alba, R., Welle, K., Manjur, K., Addisu, A., Mehta, L., & Woldearegay, K. (2015). Multifunctional roads: the potential effects of combined roads and water harvesting infrastructure on livelihoods and poverty in Ethiopia. Journal of Infrastructure Development, 7(2), 165-180. <http://dx.doi.org/10.1177/0974930615609482>
- [9] Yilema, M. G., & Gianoli, A. (2018). Infrastructure governance: Causes for the poor sectoral coordination among infrastructure sectors of Addis Ababa. Cities, 83, 165-172. <http://dx.doi.org/10.1016/j.cities.2018.06.019>
- [10] Worku, G., & Adugna, D. (2025). Two studied metropolitan cities in Ethiopia and their current integrated infrastructure plan to enhance resilience and sustainability. Environmental and Sustainability Indicators, 26, 100668. <https://doi.org/10.1016/j.indic.2025.100668>

- [11] Ndulu, B. J. (2006). Infrastructure, regional integration and growth in Sub-Saharan Africa: Dealing with the disadvantages of geography and sovereign fragmentation. *Journal of African economies*, 15(suppl_2), 212-244.
<http://dx.doi.org/10.1093/jae/ejI033>
- [12] Edmonds, C., & Fujimura, M. (2008). Road infrastructure and regional economic integration: evidence from the Mekong. *Infrastructure and Trade in Asia*, 143(172).
<https://doi.org/10.4337/9781848442733.00015>
- [13] Saidi, S., Kattan, L., Jayasinghe, P., Hettiaratchi, P., & Taron, J. (2018). Integrated infrastructure systems—A review. *Sustainable Cities and Society*, 36, 1-11.
<https://doi.org/10.1016/j.scs.2017.09.022>
- [14] Foster, Vivien; Morella, Elvira. 2010. Ethiopia's Infrastructure: A Continental Perspective. © World Bank.
<http://hdl.handle.net/10986/27761>
- [15] Nuru, Seid, 'Infrastructure and Economic Transformation in Ethiopia', in Fantu Cheru, Christopher Cramer, and Arkebe Oqubay (eds), *The Oxford Handbook of the Ethiopian Economy*, Oxford Handbooks (2019; online edn, Oxford Academic, 11 Feb. 2019),
<https://doi.org/10.1093/oxfordhb/9780198814986.013.11>
- [16] Geremew Worku, Dagnachew Adugna, Two studied metropolitan cities in Ethiopia and their current integrated infrastructure plan to enhance resilience and sustainability, *Environmental and Sustainability Indicators*, Volume 26, 2025, 100668, ISSN 2665-9727,
<https://doi.org/10.1016/j.indic.2025.100668>
- [17] Gadisa, A. B., & Zhou, H. (2019, October). A Study on Critical Factors Affecting Public Infrastructures Project Performance in Ethiopia. In 2019 International Conference on Advanced Education, Management and Humanities (AEMH 2019) (pp. 212-218). Atlantis Press.
<http://dx.doi.org/10.2991/aemh-19.2019.41>

Biography



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Research Field

Michael Menberu: Integrated Infrastructure, Housing, sustainability, urban planning and design, Architecture, construction management.