

# A REVIEW OF CAUSES OF PROJECT DELAYS IN INFRASTRUCTURE CONSTRUCTION PROJECTS

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## ABSTRACT

Construction of infrastructures is an essential factor that assists in the economic growth, industrialization, urbanization and the common good of the populace by constructing roads, bridges, railways, airports, power plants, water supply systems and other important facilities. Nevertheless, construction projects that are not completed in time are still one of the most frequent problems of the construction industry on the international level. The consequences of project delays include time overruns, cost increases, productivity loss, contractual, inefficient use of resources and delaying the anticipated social and economic benefits. The paper is a review paper that analyzes the key factors leading to the delays in the project within infrastructure construction projects, by reviewing the literature and previous research. These results indicate that bad planning and scheduling, financial issues, late payments, design alterations, labor shortages, material delivery issues, equipment failure, poor coordination, land acquisition issues, and external influence like bad weather and political instabilities are some of the most important causes of delays. The significant impacts of delays on the performance of construction are also discussed in the paper, key mechanisms of reducing timeline overruns by proper planning, financial management, communication, use of modern technologies and management of resources are also mentioned. The paper finds that infrastructure projects can only be completed on time through concerted efforts by all stakeholders as well as proactive management practices and constant monitoring.

**Keywords:** Infrastructure construction projects, project delays, time overrun, cost escalation, construction management, delay causes, mitigation strategies.

## 1. INTRODUCTION

The infrastructure construction works in the form of highways, bridges, railways, airports, power plants, water supply systems, ports, and urban development facilities are required in the economic growth and industrial progress as well as enhancement of the living standards of the people. The timely and successful completion of these projects is extremely significant since delays may lead to higher costs, less efficiency, and delay the social and economic benefits anticipated of such investments [1]. Project delay is a scenario in which the actual completion time is more than the scheduled time or as per the contract. Delays have emerged as one of the most frequent issues in the construction industry of both developed and developing countries because of the magnitude, technical nature, financial demands, and the number of stakeholders that are involved in the infrastructure projects. The causes of project delays are varied and may include poor planning and scheduling of projects, change of design, and delays in payment, unavailability of skilled labor, material supply and equipment breakdown, poor supervision, lack of communication, land acquisition, legal disputes, adverse weather conditions and slow government approvals [2]. These delays tend to lead to time overruns, cost overrun, contract disagreements, loss of productivity and inconvenience to the populace. Thus, it is important that owners, contractors, consultants and policymakers get to know the cause of project delays in order to enhance project performance and timely delivery. This review paper is aimed at reviewing the most significant reasons behind delays in infrastructure construction projects, and emphasizes the necessity of effective management measures to reduce delays.

**Table 1:** Review of Previous Studies on Causes of Project Delays in Construction Projects

S. No.	Authors & Year	Title of Study	Study Area / Focus	Major Findings
1	Durdyev, S., & Hosseini, M. R. (2020) [3]	Causes of delays on construction projects: A comprehensive list	General Construction Projects	The study identified a comprehensive range of delay factors affecting construction projects, including poor planning, financial difficulties,

				labor shortages, design changes, weak communication, material delays, and external uncertainties.
2	Mejía, G., Sánchez, O., Castañeda, K., & Pellicer, E. (2020) [4]	Delay causes in road infrastructure projects in developing countries	Road Infrastructure Projects in Developing Countries	The study found that land acquisition issues, funding shortages, poor project management, delayed approvals, contractor inefficiency, and material supply problems were major causes of delays in road projects.
3	Venkatesh, P. K., & Venkatesan, V. (2017) [5]	Delays in construction projects: A review of causes, need and scope for further research	Construction Industry Review	The study highlighted that poor scheduling, inadequate planning, payment delays, lack of skilled labor, design errors, and ineffective coordination were common causes of delays, and emphasized the need for further research.
4	Selcuk, O., Turkoglu, H., Polat, G., & Hajdu, M. (2024) [6]	An integrative literature review on the causes of delays in construction projects: Evidence from developing countries	Developing Countries	The study concluded that financial constraints, political instability, weak governance, contractor incompetence, delayed decision-making, labor productivity issues, and regulatory barriers were major delay factors in developing countries.
5	Mbala, M., Aigbaybo, C., & Aliu, J. (2018) [7]	Causes of delay in various construction projects: A literature review	Various Construction Projects	The study identified client-related delays, contractor inefficiency, consultant errors, shortage of materials, labor disputes, poor communication, and external environmental conditions as major contributors to delays.

### 1.1. Concept of Infrastructure Construction Projects

Infrastructure construction projects are defined as planning, designing, developing as well as constructing physical facilities and systems which are essential to the operation and expansion of an economy and society [8]. These projects cover transport systems (roads, highways, bridges, railways, airports, ports); utility systems (water supply, drainage, sewage treatment, electricity generation and transmission, telecommunication networks); and social infrastructure (hospitals, schools, housing developments, and government buildings). The infrastructure projects tend to be large, capital intensive, and technical in nature and demand large sums of money, lengthy construction terms and a liaison among various stakeholders such as government agencies, contractors, consultants, financiers, suppliers, and local communities. The achievement of infrastructure construction projects is essential as they form the base of industrial growth, creation of jobs, better connectivity, urbanization and better living standards. As such projects are both costly in terms of significant public and private funds, they need to be planned and implemented in an efficient way, with the aim of maximizing their return in economic and social terms.

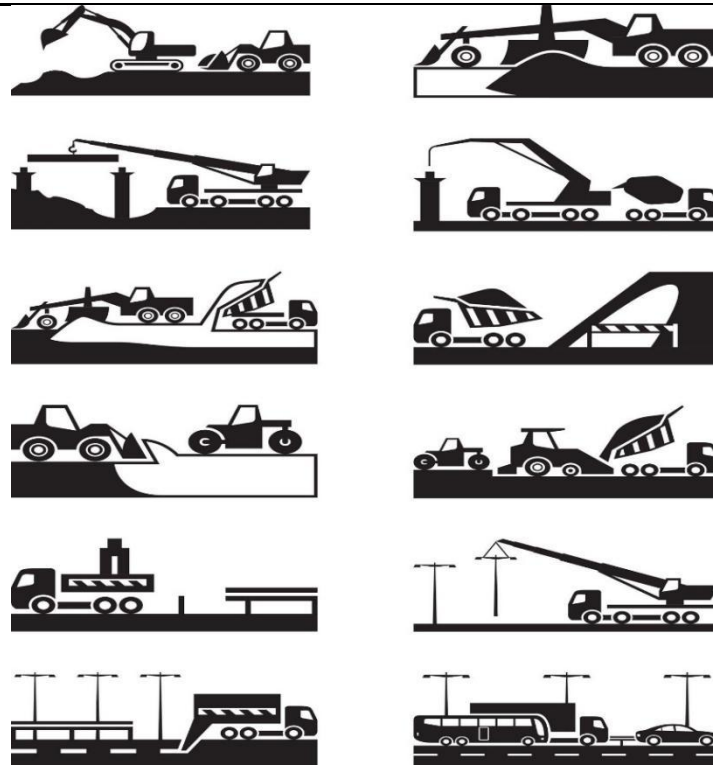


Figure 1.1: Concept of Infrastructure Construction Projects

## 1.2. Meaning of Project Delays

Project delay is a situation where a construction project is completed later than it was scheduled or the date indicated in the contract agreement [9]. Delay in simple terms is where the project activities are not achieved within the anticipated time hence leading to the project being extended. The delays can either occur to the whole project or other important activities that ultimately delay the ultimate completion. Delays in construction projects can occur because of many factors, which include but are not limited to poor planning, labor shortage, financial difficulties, design changes, delayed approvals, limited material availability, equipment failures and unexpected external events. Delays are usually grouped into excusable delays, which arise because of an uncontrollable situation such as natural disasters or regulatory changes and non-excusable delays which are caused by negligence or inadequate performance by project participants. Delays can also be compensable, in which case one party becomes liable to compensate another party due to losses incurred due to the delay. Project delays are regarded as one of the gravest problems in the construction sector since they have direct impacts on cost, productivity, profitability and the relationship between stakeholders in the project.

## 1.3. Importance of Timely Project Completion

**Ensures Delivery of Intended Benefits:** By ensuring timely completion, infrastructure projects are able to deliver scheduled benefits like enhanced transportation, energy supply, public services, and economic development on time.

**Controls Project Costs:** On time project completion will save extra costs arising due to inflation, rising labor costs, rising material costs, equipment rent and long administrative costs.

**Enhances Reputation of Stakeholders:** Timely delivery of the project enhances the credibility and professional image of the contractors, consultants, and the owners of the project as it is a manifestation of proper planning and management.

**Reduces Public Inconvenience:** On public infrastructure projects, the time taken to construct the infrastructures will reduce congestion, disruption to the services, and inconvenience caused to the citizens during the construction process.

**Promotes Economic Growth and Investment:** On time and successful project delivery will boost investor confidence, future investments and will add value to national productivity and competitiveness.

## 2. MAJOR CAUSES OF PROJECT DELAYS IN INFRASTRUCTURE CONSTRUCTION PROJECTS

Delay in the construction of infrastructure projects is as a result of a combination of managerial, financial, technical, human resource and external factors. Given that infrastructure projects are usually large in nature, capital intensive and have different stakeholders involved, even the slightest of problems can have a great impact on project schedules [10]. Delays can be made during any part of the project such as planning, design, procurement, execution and final handover. It is crucial to understand the key reasons behind the delays and enhance the project performance and reduce time overrun. The most prevalent reasons of project delays in infrastructure construction projects include:

- **Poor Planning, Scheduling, and Site Management**

Poor scheduling and planning are key reasons behind the delay in infrastructure projects. Work progress is sluggish and chaotic when the project activities are not well sequenced and when the timelines are unrealistic. Inefficiency and slowing down of the work is further caused by poor site management, inadequate supervision, and poor communication between the engineers, the supervisors and the workers.

- **Financial Problems and Payment Delays**

Lack of funds, inability to manage the cash flows and late payments by the project owners tend to delay the execution of the projects. Contractors need recurring funds to acquire materials, labor remuneration, and upkeep of the machinery. A lack of finances can also cause work stoppages, decreased efficiency, and failure to proceed with construction without difficulties.

- **Design Issues, Technical Errors, and Approval Delays**

Changing of designs several times once the project has started causes significant disturbances in the construction process. Unfinished drawings, technical errors, and a slow reaction of consultants or authorities can be time-consuming and must be reworked. Adequate regulatory clearances and administrative procedures also add to the schedule overruns.

- **Resource Shortages (Labor, Materials, and Equipment)**

The infrastructure projects require a labor supply, materials and machinery in time. The causes of delays are lack of skilled workers, low labor productivity, absenteeism, delays in material procurement, delays in transportation, equipment breakdowns and inadequate machine availability.

- **External Factors and Lack of Stakeholder Coordination**

The project can be disrupted due to unfavourable weather conditions, floods, storms, political instability, economic recession, pandemics, land acquisition issues, and legal conflicts. Moreover, the lack of good coordination among the owners, contractors, consultants, suppliers and government agencies usually leads to slow decision making and execution.

## 3. EFFECTS OF PROJECT DELAYS ON CONSTRUCTION PERFORMANCE

The negative effects of project delays on construction performance are immense because they influence such areas as time, cost, quality, productivity, and relationships with stakeholders. Another most prevalent impact of delays is time overrun, in which the completion of the project is late relative to the planned completion, resulting in the late start of other activities and the late use of the finished facility [11]. Escalations in costs also occur with delays since wages on labor, material costs, equipment hire costs, administration costs and inflation during the long construction time are increased. Delays: In most scenarios, long delays decrease labor productivity and cause inefficiencies since the workers and machinery stand idle or doing little. Contractors could also delay work to recoup the lost time and/or in order to cut back costs thus impacting project quality. Moreover, delays can lead to conflicts, lawsuits, and disagreement between the owners, contractors, consultants and suppliers with regard to who should be held accountable to the delay. Delays in infrastructure projects that are publicly funded are inconveniencing to the citizens because they cause them to spend a lot of time in traffic jams, lost services and slower development in the region. Generally, project delays undermine the performance of construction, diminish profitability, tarnish organizational reputation, and delay social and economic returns on infrastructure investment.

### 3.1. Time Overrun

One of the most recognizable and obvious impacts of project delays in infrastructure construction projects is time overrun. It arises when the real completion date of a project is later than the planned or agreed upon schedule in the contract. In case of a time overrun on a project, the other activities that are associated with the project are also delayed. As an illustration, roads, bridges, railways, or power plants may not be ready to be utilized by the population and industries at the appropriate time. Overruns also disrupt the future project planning as most organizations tend to allocate funds according to the anticipated timelines. Schedule extension could extend over months or even years in large infrastructure projects leading to great inefficiency and loss of projected benefits. Hence time overrun is termed as a significant pointer of poor project performance.

### 3.2. Cost Escalation

Another severe impact of project delays is cost escalation since the longer a project is postponed, the more money one will have spent. Delays also escalate labor expenses as they imply extra wages and overtime allowances. Rental costs of equipment also increase with a long period of machinery stay. During the delay period, there is a risk of inflation of the prices of materials like cement, steel, fuel, and other construction inputs. The administrative costs like office costs, supervision costs, security and utility costs also extend over a period. Cost escalation adds more burden to the budgets of the government in the case of public projects and decreases profitability in the case of private ones. Consequently, project delays tend to make projects that are financially viable to be expensive projects.

### 3.3. Disputes and Legal Claims

Delays in a project will often result in conflicts between the owners, contractors, consultants, subcontractors and suppliers. In cases of delays, the stakeholders usually differ on who is liable to the schedule overrun and who will cover the extra cost. Contractors can seek compensation on stalling payments or redesigns, whereas the owners can penalize delays. Such conflicts may turn out to be contractual, arbitration or court proceedings. Legal claims not only add to the cost of projects, but also waste time and ruin professional relationships between parties. In extreme situations, a controversy can lead to either suspension or cancellation of the agreement, causing additional time and uncertainty [12].

### 3.4. Productivity Loss

Delays directly impact the productivity of construction negatively as the inefficiencies of labor, machinery, and materials are diminished. Unless there are materials available, or approvals are slow, workers can be idle. There can also be idle machinery like the cranes, excavators, and the concrete mixers, resulting in low efficiency of operation. The constant delays and schedule alterations confuse employees and managers and lower morale and coordination. Labor productivity also reduces in other situations due to the demoralization of workers due to long-term projects. The productivity is also lowered because of rework due to design change or low quality work. Thus, the delays in projects undermine the general efficiency of construction activities.

### 3.5. Impact on Public and Economic Development

Infrastructure projects are created to serve the common good and economic development, and therefore any delay in the infrastructure projects has far reaching social and economic effects. Unfinished roads, bridges, can lead to traffic jam, increased travelling time and inconvenience to the people. The slow water supply, electricity plants or transportation systems impact the everyday life of society and industries. At the economic level, project delays put off the creation of jobs, the creation of business opportunities, and the development of the region. The governments can lose the anticipated tax income and investors can lose trust in future projects. As infrastructure is the basis of industrial and commercial development, the pace at which it is developed can have substantial implications on the productivity and the long-term development of the nation.

## 4. STRATEGIES FOR MINIMIZING PROJECT DELAYS

Reducing project delays in the construction of infrastructure projects should be a systematic and proactive endeavor that entails proper planning, good coordination, financial discipline, effective resource management and continuous monitoring. Delays are normally caused by many interrelated factors hence stakeholders should embrace preventive measures in the early planning phases up to the final project delivery. Detailed project planning and realistic

scheduling is among other strategies that are vital as activities are sequenced well, risks identified beforehand and realistic schedules are set [13].

**Table 2:** Major Causes of Project Delays, Their Effects, and Mitigation Strategies

S. No.	Major Cause of Delay	Impact on Project Performance	Suggested Mitigation Strategy
1	Poor Planning and Scheduling	Time overrun, resource conflicts, slow progress	Detailed planning, CPM/PERT scheduling, regular monitoring
2	Financial Problems and Delayed Payments	Work stoppage, reduced productivity, contractor stress	Timely fund release, proper budgeting, cash flow management
3	Design Changes and Technical Errors	Rework, additional time, higher cost	Finalize design before execution, quick approvals, design review
4	Labor Shortage and Low Productivity	Slow progress, missed deadlines	Skilled workforce training, proper supervision, incentives
5	Material Supply Delays	Idle labor, interruption of activities	Advance procurement planning, supplier management
6	Equipment Breakdown	Reduced efficiency, stoppage of work	Preventive maintenance, backup machinery
7	Poor Communication and Coordination	Misunderstandings, decision delays	Regular meetings, digital reporting systems
8	Government Approval Delays	Project suspension, schedule extension	Faster approvals, better regulatory coordination
9	Land Acquisition and Legal Issues	Delayed commencement, disputes	Early land clearance, legal compliance
10	External Factors (Weather, Pandemic, Political Issues)	Work interruption, uncertainty	Risk management planning, contingency reserves

Project management tools like CPM, PERT, Primavera and MS project can be used to monitor progress and determine the most important tasks. Proper financial planning is also necessary so as to provide funds in time, flow of money, and payments of contractors, suppliers and workers on time [14]. The choice of experienced contractors and qualified consultants also helps in the quality of execution and minimizes mistakes in management. It requires effective communication and collaboration between the owners, contractors, consultants, suppliers, and government agencies to make swift decisions and resolve problems. The availability of materials on time, equipment in good condition and skilled labor also contribute to continuous development. Adoption of modern technologies such as Building Information Modeling (BIM), drones, digital reporting systems, and automation can enhance accuracy, transparency, and productivity. The role of government support, in terms of quicker approvals, easier regulations, and effective land acquisition procedures also contribute towards preventing delays. To control schedule deviation, regular monitoring, performance reviews and corrective actions when executing the project are required. Hence, the only way to minimize project delays is to involve all stakeholders with emphasis on planning, coordination, technology, and accountability.

#### 4.1. Effective Planning and Scheduling

One of the most critical measures to reduce delays in the construction of infrastructures projects is proper planning and scheduling. Effective planning assists in setting out a proper roadmap on how to carry out the project and also makes sure that all processes are systematically planned at the onset. It enables project managers to efficiently allocate resources, coordinate activities and track progress as per stipulated schedules.

- **Clear Definition of Project Objectives and Scope**

The planning process is initiated by having a clear vision of the project goals and scope of work, the results to be achieved and the roles of the stakeholders. With the right definition of project goals, confusion and scope change during the execution can be reduced. An established scope is also useful in estimating costs, time and man power requirements.

- **Logical Sequencing of Activities**

Scheduling refers to how activities in projects are organized in the right sequence to guarantee smooth running of the construction work without delays. All tasks should be connected with the activities that come before and after to prevent conflicts and waste of time. The correct sequencing of materials, labor and equipment will make sure that these are available when needed.

- **Identification of Critical Activities**

A good schedule will determine the critical path activities which have a direct influence on the project date of completion. Any lag in such vital activities can delay the whole project. With such activities given attention, managers can give priority to resources and also preventive measures taken where delays are expected at any particular time.

- **Preparation of Realistic Timelines**

Project schedules must be realistic and pragmatic as opposed to being over-optimistic. The schedules should take into account the real-life situations of the site, weather changes, workforce efficiency, material delivery, equipment accessibility, and technicalities. Realistic planning minimizes the chances of the schedule failure in implementation.

- **Use of Planning and Monitoring Tools**

Classical planning systems like CPM (Critical Path Method), PERT (Program Evaluation and Review Technique), Primavera, and MS Project are popular to plan and control the progress. These tools assist project managers to monitor the work that has been done, the actual progress and the planned progress and detect the deviations early.

- **Regular Review and Corrective Measures**

Planning is not a one-time task, schedules must be checked and revised on a regular basis during the execution of the project. In case of delays, some corrective actions like reallocation of resources, overtime employment, or re-sequencing of work ought to be taken to reclaim some time.

#### **4.2. Improved Financial Management**

One of the most crucial strategies of reducing delays in infrastructure construction projects is better financial management since chances of achieving success of construction activities in any project mainly rely on the availability of funds at all times. Delays are common in many projects due to insufficient financing, ineffective budget planning, slow payment releases and poor management of cash flows. Lack of proper financial resources arranged by the owners of the project prior to commencement of construction may result in contractors struggling to sustain normal operations on the site. The availability of funds is required in time to buy construction materials, pay labor wages, contract subcontractors, maintain the equipment and meet other costs of operation. Contractors can slow down work pace, halt some operations or even experience loss of productivity in case of delayed payments because of resource shortage [15]. Thus, project owners need to have a clear financial plan and make sure that there is sufficient capital at each stage of the project lifecycle. Contractors are to also embrace appropriate budgeting, cost estimation and expenditure control measures to optimize resources. Financial stress can be prevented by having contingency funds to take care of unforeseen expenses like inflation, design variations or emergency repairs when implementing a project. Frequent checking of project spending and comparing it with the planned budgeting will make it possible to detect excessive spending early and make appropriate corrective measures. Clarity and transparency in billing practices, proper documentation, and invoice payment are other aspects of enhanced trust and coordinating activities among owners, contractors, suppliers, and consultants. Moreover, digital accounting and financial management software can be used to increase the accuracy, speed, and transparency of project financial management. Thus, effective financial management does not only avoid unnecessary delays of projects but also enhances cost control, operational stability and overall profitability of infrastructure construction projects.

### 4.3. Efficient Communication and Coordination

Infrastructure construction projects require effective communication and coordination to ensure that these projects are completed in a timely manner since these projects involve the involvement of various stakeholders such as the owners of the project, the contractors, consultants, subcontractors, suppliers, financiers and the government. Considering that each party holds various responsibilities, these parties need to communicate effectively to ensure effective coordination of all activities of the project and that all project activities are completed in time. Lack of proper communication usually causes misunderstanding, procrastination in decision making, redundancy, technical mistakes, and interpersonal conflicts among stakeholders, which are some of the causes of project delays. Hence, it is very important to set good communication channels at the outset of the project.

Periodic meetings, review of progress, and coordination meetings assist the stakeholders to be updated on the project status, work done, and work to be done, as well as the prevailing challenges. Sharing of drawings, design changes, approvals, instructions, and technical clarifications in time helps the site activities to proceed without a hitch. Delays in information or incomprehensible information will mean that workers and supervisors will be left waiting until decisions are made or instructions are re-defined. Effective coordination also provides appropriate synchronization of the deployment of labor, delivery of material, use of equipment, and activities of subcontractors in such a way that when they are needed in a particular place and at a given time, the resources are there.

The information exchange is further accelerated and made more transparent with the help of modern digital communication tools like email systems, project management software, cloud-based document-sharing systems, and real-time reporting applications. Such systems eliminate delays in paperwork and enable quicker response to site problems. Good coordination also aids in the rapid resolution of disputes and the preservation of good working relations among the the project participants. Thus, effective communication and coordination are significant factors that minimize uncertainty, enhance teamwork, speed the process of decision making and help to oversee the successful and punctual completion of infrastructure construction projects.

### 4.4. Use Of Modern Construction Technologies

- **Improved Planning and Design Accuracy**

Technologies like Building Information Modeling (BIM) are used in the modern world to assist project teams in developing detailed online models of the project prior to the commencement of construction. This enhances the accuracy of the design, determines discrepancies among systems, and minimizes mistakes that could lead to delays during implementation.

- **Better Project Monitoring and Progress Tracking**

Management software like Primavera P6 and Microsoft Project allows the managers to keep track of schedules, the work done, compare actual performance against the planned one and identify delays at an early age to take corrective measures.

- **Higher Productivity Through Automation and Prefabrication**

Prefabrication, modular construction, and automated equipment are some of the technologies that save time on-site construction and enhance efficiency. Ready-to-use components can be put together fast resulting in time savings on the projects and less reliance on labor.

- **Enhanced Site Inspection and Resource Management**

The use of drones, GPS, and IoT devices assists with site surveying, safety inspection, equipment tracking, and managing the materials. Such technologies enhance control of operations and minimize wastage, theft and unjustifiable downtime.

- **Faster Communication and Decision-Making**

Projects Digital reporting systems, cloud-based platforms, and mobile applications permit real-time sharing of project updates, drawings, approvals and site reports between stakeholders. This enhances coordination, accelerates decision making and assists in reducing the delays in the projects of building infrastructure.

## 5. CONCLUSION

One of the gravest issues that impact infrastructure building projects in developed and developing nations is project delays. Infrastructure projects are very susceptible to delays which occur due to managerial, financial, technical,

resource related, and external factors because they entail huge investments, technical complexity, have many stakeholders, and have prolonged implementation times. This review paper has determined that ineffective planning and schedule, late payment, design changes, lack of skilled labor, limitation of materials and tools, ineffective communication, regulatory approvals, land acquisition problems, and unfavorable external environments are the key factors that lead to project delays. Such delays have major adverse effects including time overruns, cost increases, low productivity, legal tussles, inconvenience by the people and slow economic growth. Thus, to reduce delays in project, there should be systematic approach on the basis of realistic planning, good financial discipline, good coordination, decision making timely, modern construction technologies, and good management of workforce and resources. Infrastructure projects should be completed successfully and in a timely manner through effective cooperation of the owners, contractors, consultants, suppliers and government agencies. Through these approaches, the construction industry will be able to enhance performance of a project, minimize losses, and have the economic and social advantages of infrastructure investments maximized.

## REFERENCES

1. Durdyev, S., & Hosseini, M. R. (2020). Causes of delays on construction projects: a comprehensive list. *International journal of managing projects in business*, 13(1), 20-46.
2. Mejía, G., Sánchez, O., Castañeda, K., & Pellicer, E. (2020). Delay causes in road infrastructure projects in developing countries. *Revista de la Construcción*, 19(2), 220-234.
3. Venkatesh, P. K., & Venkatesan, V. (2017). Delays in construction projects: A review of causes, need and scope for further research. *Malaysian Construction Research Journal*, 23(3), 89-113.
4. Selcuk, O., Turkoglu, H., Polat, G., & Hajdu, M. (2024). An integrative literature review on the causes of delays in construction projects: evidence from developing countries. *International Journal of Construction Management*, 24(6), 610-622.
5. Mbala, M., Aigbavboa, C., & Aliu, J. (2018, June). Causes of delay in various construction projects: a literature review. In *International conference on applied human factors and ergonomics* (pp. 489-495). Cham: Springer International Publishing.
6. Kumar, M., & Kumari, S. (2025). Causes of delays in road construction projects: a systematic review. *Journal of Financial Management of Property and Construction*, 30(2), 256-294.
7. Daba, D. D., & Pitroda, J. (2018). A critical literature review on main cause of delay in construction projects. *International Research Journal of Engineering and Technology*, 5(1), 612-615.
8. Bhattarai, M. (2023). Causes of delay in construction projects in Nepal. *Saudi Journal of Engineering and Technology*, 8(06), 108-114.
9. Viles, E., Rudeli, N. C., & Santilli, A. (2020). Causes of delay in construction projects: a quantitative analysis. *Engineering, Construction and Architectural Management*, 27(4), 917-935.
10. Nisar, S., & Asif, R. (2023). Factors leading to failures of infrastructure development projects in Pakistan: A systematic literature review. *Management Science Letters*, 13(1), 11-22.
11. Muhammed, A. O., Yakubu, H. A., Aboh, M. E., Abubakar, A. A. A., & Muhammed, A. A. (2022, August). A critical literature review on the factors causing delays, failures and abandonments of construction infrastructure projects. In *ICSET: International Conference on Sustainable Engineering and Technology* (Vol. 1, No. 1, pp. 195-204).
12. Siddiqui, M. A. W., & Faheem, M. I. (2021). A Review on Schedule Delays in Infrastructure Projects. *International Journal of Innovative Research in Technology*, 7, 237-243.
13. Ajuwon, O. (2017). Effects of infrastructure project cost overruns and schedule delays in sub-saharan Africa. *European Journal of Interdisciplinary Studies*.
14. Islam, M. S., & Trigunaryyah, B. (2017). Construction delays in developing countries: a review. *Journal of construction engineering and project management*, 7(1), 1-12.
15. Adam, A., Josephson, P. E. B., & Lindahl, G. (2017). Aggregation of factors causing cost overruns and time delays in large public construction projects: Trends and implications. *Engineering, construction and architectural management*, 24(3), 393-406.