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Aleksandar Đorđević[1], Nenad Stojković[2], Biljana Matejević-Nikolić[2], Nikola Velimirović[2], Jelena Dimitrijević[2], Lazar Živković[2]

# THE ROLE OF FINANCING AVAILABILITY AND TIMING IN CONSTRUCTION PROJECT PERFORMANCE

**Summary:** The construction sector plays an important role in economic development but is highly sensitive to financial constraints during project implementation. While existing studies mainly focus on the sources of financing, less attention has been paid to the availability and timing of financial flows throughout the project lifecycle. Delays in financial disbursements and irregular payment schedules can disrupt construction activities, affect contractor liquidity, and lead to project delays and cost overruns. This paper provides a review of theoretical and empirical studies examining the connection between financing availability, payment timing, and construction project performance. By synthesizing insights from construction management, project finance, and public investment literature, the study highlights key mechanisms through which financing inefficiencies influence project delivery and identifies major gaps for future research.

**Keywords:** project financing, financing availability, financing timing, project performance, cash flow management, construction projects

# ULOGA DOSTUPNOSTI I PRAVOVREMENOG FINANSIRANJA U USPEŠNOSTI REALIZACIJE GRAĐEVINSKIH PROJEKATA

**Rezime:** Građevinski sektor ima značajnu ulogu u ekonomskom razvoju, ali je istovremeno veoma osetljiv na finansijska ograničenja tokom realizacije projekata. Dok se postojeća istraživanja pretežno fokusiraju na izvore finansiranja, znatno manje pažnje posvećeno je dostupnosti finansijskih sredstava i vremenskom usklađivanju novčanih tokova tokom životnog ciklusa projekta. Kašnjenja u isplati finansijskih sredstava i neredovna dinamika plaćanja mogu dovesti do poremećaja u izvođenju građevinskih radova, ugroziti likvidnost izvođača i prouzrokovati kašnjenja u realizaciji projekata, kao i povećanje troškova. U radu je dat pregled teorijskih i empirijskih istraživanja koja razmatraju povezanost između dostupnosti finansiranja, dinamike finansijskih tokova i uspešnosti realizacije građevinskih projekata. Sintetizovanjem saznanja iz oblasti upravljanja građevinskim projektima, projektnog finansiranja i javnih investicija, identifikovani su ključni mehanizmi putem kojih neefikasnosti u finansiranju utiču na realizaciju projekata, kao i najznačajnije istraživačke praznine koje predstavljaju osnov za buduća istraživanja

**Ključne reči:** finansiranje projekata, dostupnost finansiranja, pravovremenost finansiranja, uspešnost projekta, upravljanje novčanim tokovima, građevinski projekti

[1] Faculty of Civil Engineering and Architecture, University of Niš, aleksandar.djordjevic@gaf.ni.ac.rs
[2] Faculty of Civil Engineering and Architecture, University of Niš

## 1. INTRODUCTION

The construction industry plays a critical role in economic development, infrastructure expansion, and employment generation worldwide. Due to the capital-intensive nature of construction projects, effective financial management represents one of the key determinants of project success. Among the various financial factors influencing project performance, the availability of financing and the timing of payments have been repeatedly identified as crucial elements affecting project delivery, cost efficiency, productivity, and stakeholder relationships.

Unlike many other industries, construction projects involve complex contractual arrangements and extended project durations, requiring continuous cash flow throughout the execution phase. Contractors and subcontractors typically rely on periodic progress payments to finance labour costs, material procurement, equipment utilization, and other operational expenses. Consequently, disruptions in payment flows can significantly affect project performance and create adverse consequences across the entire project delivery chain.

Previous studies have shown that payment delays remain one of the most common challenges within the construction industry. Delayed payments may originate from financial difficulties of project owners, administrative inefficiencies, lengthy certification procedures, disputes regarding completed work, or deficiencies in contract management. Such delays frequently result in cash-flow shortages, reduced productivity, work interruptions, disputes among project participants, cost overruns, and schedule delays. In severe cases, prolonged payment delays may contribute to contractor insolvency and project abandonment.

Research has further demonstrated that the effects of delayed payments extend beyond individual project participants. Since construction projects operate through interconnected payment chains involving owners, contractors, subcontractors, suppliers, and service providers, financial disturbances at one level often propagate throughout the entire project network. As a result, the timing of payments becomes not only a financial issue but also a critical project management concern directly influencing project outcomes.

In addition to the availability of financial resources, the efficiency of payment processes plays an important role in determining whether funds reach project participants in a timely manner. The construction payment process typically includes multiple stages such as work valuation, certification, approval, invoicing, and payment execution. Delays occurring within any of these stages may significantly affect overall project performance even when adequate funding is available. Therefore, understanding payment-related challenges requires analysis of both financing capacity and payment process efficiency.

Recent technological developments have introduced new opportunities for improving construction payment systems. Digital project management platforms, Building Information Modelling (BIM), blockchain technology, and smart contracts offer the potential to increase transparency, automate payment procedures, reduce administrative burdens, and minimize payment disputes. These innovations may contribute to more reliable payment mechanisms and improved project performance in increasingly complex construction environments.

The aim of this paper is to examine the relationship between financing availability, payment timing, and construction project performance through a review of existing literature and contemporary industry practices. Particular attention is given to the causes and consequences of payment delays, the role of payment process efficiency, and emerging digital solutions that may enhance financial management in construction projects. The findings provide insights into how effective payment management can contribute to improved project delivery, reduced risks, and stronger collaboration among project stakeholders.

This paper is based on a narrative literature review and conceptual synthesis. The selected literature was analysed according to its relevance to financing availability, payment timing, contractor cash flow, payment delays and construction project performance. International peer-reviewed journal articles were used as the primary source of theoretical and empirical findings,

while domestic doctoral dissertations and professional studies were included to contextualize the Serbian and regional construction environment. The paper does not aim to provide a systematic bibliometric review, but rather to integrate fragmented findings from construction management, project finance and payment process literature into a coherent conceptual framework for future empirical research. Unlike previous review papers that typically examine financing sources or payment delays separately, this study integrates financing availability, payment timing, payment process efficiency, and construction project performance within a single conceptual framework.

## 2. LITERATURE REVIEW

### 2.1. FINANCING AVAILABILITY AND CASH FLOW IN CONSTRUCTION PROJECTS

Construction projects are highly dependent on the continuous availability of financial resources throughout the project lifecycle. Due to their capital-intensive nature, long duration, and involvement of multiple participants, construction projects require stable cash inflows in order to support labour costs, material procurement, equipment use, subcontractor payments, and other operational expenses. In this context, cash flow does not represent only an accounting category, but one of the key preconditions for maintaining construction continuity and achieving planned project performance [1].

Previous studies have shown that cash flow problems in construction projects are commonly associated with delayed payments, difficulties in obtaining financial support, inadequate budgetary control, and poor financial planning. Omopariola et al. found that positive cash flow contributes to adequate project planning and execution, while negative cash flow can lead to delayed completion, reduced profit margins and, in more severe cases, project abandonment [1]. Similarly, Abdul-Rahman et al. classified the main financial-related causes of project delays into four groups: late payment, poor cash flow management, insufficient financial resources, and financial market instability [2].

The availability of financing is therefore closely linked to the contractor's ability to maintain operational stability during project execution. When contractors do not have sufficient internal funds or access to external financing, even temporary payment interruptions may create serious liquidity pressure. This is particularly relevant in projects where contractors are expected to pre-finance materials, labour and equipment before receiving interim payments. Recent research by Qasem further confirms the importance of financing schemes and cash availability, showing that project financing schemes represent one of the most influential factors affecting contractors' cash flow in the context of change orders and financial risk management [3].

### 2.2. PAYMENT TIMING AND PAYMENT DELAYS

In addition to the availability of financing, the timing of financial flows has a significant influence on construction project performance. Even when the total amount of financing is sufficient, delays in payment approval or disbursement may disrupt the sequence of construction activities. This makes payment timing a critical operational issue, especially in projects that rely on periodic progress payments and tightly coordinated work schedules [4].

Construction payments are usually organized through a hierarchical payment chain. Funds flow from the client or project owner to the main contractor, and then from the main contractor to subcontractors, suppliers and service providers. Xie et al. emphasize that payment delays at one level of the payment chain can be transmitted to other levels, creating cumulative effects on project progress and stakeholder performance [4]. This is particularly important because subcontractors and suppliers often have weaker financial capacity than main contractors and are therefore more vulnerable to delayed payments. The transmission mechanism of payment delays can be observed through the structure of the construction payment chain. In most construction

projects, payments move from the owner or client to the main contractor, and subsequently from the main contractor to subcontractors, suppliers and workers. Therefore, a delay at one level of the chain may generate liquidity pressure at the next level and gradually transform a financial disruption into an operational problem. This mechanism is conceptually presented in Figure 1.

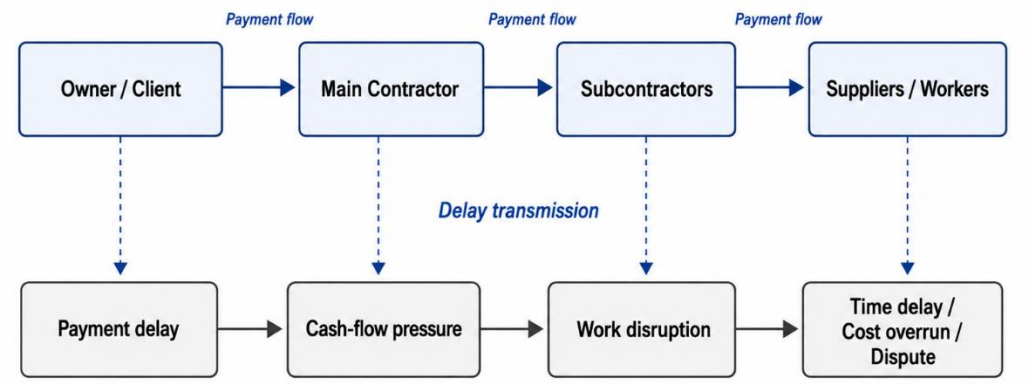


*Figure 1: Payment chain and transmission of payment delays in construction projects (source: Authors' elaboration based on Xie et al. (2019) and authors' conceptualization)*

As shown in Figure 1, payment delays do not remain isolated financial events. Once delayed payments create cash-flow pressure, contractors and subcontractors may face difficulties in financing labour, materials, equipment and ongoing site activities. These liquidity constraints may then lead to work disruption, lower productivity, project delays, cost overruns and disputes among project participants. This confirms that payment timing should be treated not only as a financial management issue, but also as an important determinant of construction project performance [4–6].

The causes of payment delays are diverse. They may arise from insufficient funds on the client side, disputes over the value of completed works, disagreements regarding variation orders, intentional withholding of payments, or lengthy administrative procedures. Wu et al. note that construction payment requests often require verification and approval by multiple parties before a disbursement certificate can be issued, which increases the probability of procedural delays [5]. This supports the view that payment delays are not always the result of a lack of money, but may also result from inefficient payment administration and weak coordination among project participants.

Payment process inefficiencies are therefore an important part of the problem. The payment process normally includes submission of payment applications, measurement and valuation of completed works, certification, approval, invoicing and final disbursement. Delays in any of these stages can postpone the inflow of funds and create uncertainty for contractors. Ekweani argues that payment process modelling can help reduce delayed payments by clarifying responsibilities and improving the structure of payment procedures [6]. This is especially relevant for construction projects where financial flows depend not only on contractual obligations, but also on the accuracy, speed and transparency of administrative procedures.

## 2.3. IMPLICATIONS FOR CONSTRUCTION PROJECT PERFORMANCE

The performance of construction projects is commonly evaluated through time, cost and quality indicators. Financing problems can affect all three dimensions. Delayed payments and irregular cash flows may slow down construction activities, reduce productivity, increase overhead costs, and generate disputes between project participants. In this sense, financing availability and payment timing are directly connected to project delays and cost overruns [1,2].

Cost and time control remain major challenges in construction project management. Olawale and Sun found that, despite the availability of project control techniques and software, many construction projects still fail to meet their cost and time objectives [7]. Their findings show that factors such as design changes, risks and uncertainties, inaccurate evaluation of project duration, complexity of works, non-performance of subcontractors, and financing and payment for completed works may inhibit effective project control [7]. This confirms that financial factors should not be observed separately from broader project management issues.

Change orders further complicate the relationship between financing and project performance. They may alter the scope, timing and cost structure of a project, thereby increasing financial pressure on contractors. Qasem's study highlights that the timing and value of change orders, as well as owner payments and cash availability, have an important impact on contractors' cash flow [3]. This is relevant because change orders often require additional work before the financial consequences are fully approved and compensated, which may worsen the contractor's liquidity position during project execution.

The consequences of financing disruptions are particularly severe for subcontractors and smaller firms. Since they usually operate with limited financial reserves, payment delays from the main contractor may reduce their ability to pay workers, procure materials, and continue activities according to schedule. As a result, financial disruptions can quickly become operational disruptions, creating a chain reaction that affects the entire project delivery system [4,5].

## 2.4. DOMESTIC AND REGIONAL CONTEXT

In the Serbian and regional context, research on construction project performance has mostly focused on broader causes of project failure, delays, budget overruns and claims. Čulić examined the causes of delays and budget problems in construction projects in Serbia, Montenegro and Bosnia and Herzegovina, emphasizing that project failures are influenced by the complex interaction of contractors, investors, designers and supervisory bodies [8]. However, the specific relationship between payment timing, contractor liquidity and project performance remains less developed in domestic literature.

Stojadinović also points to the importance of integrated project management in domestic construction practice, especially through better information flows between design and construction phases, early detection of problems, and improved planning of project budget, duration and financial flows [9]. This is important for the present study because it suggests that financial planning should be integrated with technical and organizational project planning, rather than treated as a separate administrative activity.

Domestic studies on urban development financing further show that infrastructure and construction-related development in Serbia depends on a combination of financing instruments, including local revenues, transfers, borrowing, public-private partnerships, donor programmes and other sources [10]. The Study of urban development financing of the City of Čačak prepared by the Institute of Economic Sciences, explicitly structures urban development financing through own and assigned revenues, earmarked and non-earmarked revenues, borrowing, public-private partnerships and donor programmes. However, these studies mainly address sources and instruments of financing, while the operational issue of whether funds arrive on time during project implementation remains insufficiently explored.

## 2.5. RESEARCH GAP

The reviewed literature confirms that financing availability, payment timing and cash flow management are important determinants of construction project performance. Existing studies provide valuable insights into cash flow problems, delayed payments, payment chains, change orders and cost/time control in construction projects [1–7]. However, much of the literature

examines these issues separately: some studies focus on sources of financing, others on cash flow, while another group addresses delays, cost overruns or payment disputes.

A clear research gap can therefore be identified. There is still a need for an integrated review that connects financing availability, payment timing, payment process efficiency and construction project performance within a single analytical framework. This gap is particularly relevant for countries such as Serbia and other transition economies, where domestic research has recognized delays and budget overruns as important project problems, but has paid limited attention to the timing of financial flows as a specific mechanism influencing project delivery [8–10]. Therefore, this paper aims to contribute by synthesizing insights from construction management, project finance and payment process literature in order to explain how financing inefficiencies affect construction project performance.

## 3. CONCEPTUAL FRAMEWORK: LINKING FINANCING AVAILABILITY, PAYMENT TIMING AND PROJECT PERFORMANCE

The reviewed literature indicates that financing availability and payment timing influence construction project performance through several interconnected mechanisms. These mechanisms are not limited to the formal existence of financial resources, but also include the ability of project participants to access funds when they are operationally needed. Therefore, the financial dimension of construction project performance should be analyzed through both the quantity and timing of available funds [1–4].

The first mechanism refers to the relationship between financing availability and contractor liquidity. Construction contractors usually incur significant expenses before receiving payment for completed works. These expenses include labour costs, procurement of materials, equipment engagement, subcontractor payments and site overheads. When financing is unavailable or insufficient, contractors may be forced to slow down activities, postpone procurement, delay payments to subcontractors or rely on short-term borrowing. In such circumstances, financial constraints directly affect the contractor's ability to maintain the planned pace of construction works [1–3].

The second mechanism is related to payment timing. Even when project financing is formally secured, delays in certification, approval or disbursement can create temporary liquidity shortages. This is particularly important in projects based on interim payments, where contractors expect regular inflows according to completed work. If payments do not arrive within the expected timeframe, the contractor's cash-flow planning becomes unreliable. As a result, payment timing becomes an operational risk factor, not merely a financial-administrative issue [4–6].

The third mechanism concerns the transmission of financial disruptions through the construction payment chain. A delay in payment from the owner to the main contractor may lead to delayed payments from the main contractor to subcontractors and suppliers. Since subcontractors and smaller firms often have limited financial reserves, they are usually more exposed to liquidity shocks. Consequently, one delayed payment can produce a chain reaction, affecting labour availability, material supply, productivity and the continuity of site operations [4,5].

The fourth mechanism connects financial disruptions with traditional project performance indicators. Cash-flow pressure may lead to work interruptions, lower productivity, slower material procurement, disputes, claims and increased overhead costs. These effects are reflected in the most common project performance problems: time delays, cost overruns and reduced quality of project delivery [1,2,7]. Therefore, financing inefficiencies should be understood as one of the underlying drivers of broader project management problems.

Change orders can further intensify these mechanisms. When changes occur during project execution, they may require additional work, additional materials or changes in construction

sequencing before the financial consequences are fully approved and paid. If compensation for change orders is delayed, contractors may experience additional pressure on cash flow. This is especially problematic when change orders occur at later stages of the project, when flexibility is lower and the financial consequences are more difficult to absorb [3].

Based on these mechanisms, this paper proposes that construction project performance is influenced not only by the source of financing, but also by the interaction between financing availability, payment timing and payment process efficiency. A project may have an appropriate financing source, but still experience performance problems if payment procedures are slow, unclear or administratively inefficient. For this reason, financial management in construction should not be limited to securing funds at the beginning of the project, but should also include continuous monitoring of payment flows during implementation.

In this framework, public-private partnerships may be observed as one possible institutional and financial arrangement that can contribute to more structured allocation of financial responsibilities, risk sharing and payment obligations. However, PPP arrangements do not automatically eliminate financing and payment risks. Their effectiveness depends on contract design, institutional capacity, performance-based payment mechanisms and the ability of public and private partners to fulfil their obligations throughout the project lifecycle [9,10].

Finally, digital solutions such as blockchain-based smart contracts and digital payment platforms may offer opportunities to improve payment transparency and reduce procedural delays. By linking payment execution to verified project milestones, such technologies could reduce uncertainty, shorten approval procedures and improve trust among project participants [5]. However, their implementation requires adequate legal, institutional and technical readiness, which means that digital payment systems should be viewed as a promising direction rather than an immediate universal solution.

This conceptual framework provides the basis for the following discussion of practical implications and future research directions. It suggests that improving construction project performance requires a broader understanding of financial management, one that integrates financing availability, timely payments, efficient payment procedures and transparent coordination among project stakeholders.

Based on the reviewed literature, financing-related disruptions may be understood through several interconnected mechanisms: insufficient financing availability, delayed payment timing, payment chain effects, payment process inefficiency and change orders. These mechanisms show that project performance is affected not only by the formal source of financing, but also by the ability of funds to reach project participants in a timely and predictable manner. Therefore, improving construction project performance requires the integration of financing decisions, cash-flow planning, payment monitoring and operational project control.

## 4. DISCUSSION AND PRACTICAL IMPLICATIONS

The previous sections indicate that financing availability and payment timing should be treated as integral components of construction project management. Although project financing is often discussed primarily in terms of financing sources, the reviewed literature suggests that the operational availability of funds during project execution is equally important. A project may have an approved budget or formally secured financing, but still face performance problems if payments are delayed, administratively blocked or poorly synchronized with the actual progress of works.

From a practical perspective, this means that financial planning should not end once the project budget has been approved. Instead, it should continue throughout the implementation phase through the monitoring of expected inflows and outflows, payment certificates, subcontractor obligations, procurement schedules and potential liquidity gaps. Contractors and project managers should therefore integrate cash-flow planning with time scheduling and cost

control systems. Such integration can improve early detection of financial stress and reduce the probability that a temporary payment disruption becomes a broader project delay.

A particularly important implication concerns the payment process itself. Payment delays are not always caused by the lack of available funds. They may also result from slow administrative procedures, unclear responsibilities, disputes regarding completed works, delayed certification or inefficient communication among project participants. For this reason, improving the payment process may represent one of the most direct ways to reduce financing-related risks in construction projects. Clearer payment procedures, shorter approval chains, transparent documentation and standardized certification practices may help reduce uncertainty and improve trust among stakeholders.

The findings also suggest that subcontractors and suppliers require special attention in payment management. Since they often operate with limited financial reserves, delayed payments may quickly affect their ability to procure materials, pay workers and continue works according to schedule. Therefore, payment delays should not be viewed only as a bilateral problem between the owner and the main contractor. In complex construction projects, delayed payments may spread through the entire project supply chain and generate cumulative effects on project performance.

Another practical implication relates to change orders. Changes during project implementation are common, but their financial consequences are not always approved and paid in a timely manner. When additional works are performed before compensation is formally resolved, contractors may experience additional liquidity pressure. This confirms the need for more efficient procedures for evaluating, approving and financing change orders. The timing of change orders is also important, since late-stage changes usually create stronger financial and operational disruptions than changes introduced during earlier phases of the project.

Public-private partnerships may provide one possible institutional framework for improving the allocation of financial responsibilities and risks. By defining payment mechanisms, performance obligations and risk-sharing arrangements in advance, PPP models can contribute to more predictable project financing. However, PPP should not be interpreted as an automatic solution to payment and financing problems. Its effectiveness depends on contract design, institutional capacity, realistic risk allocation and the ability of both public and private partners to fulfil their obligations over the project lifecycle.

Finally, digital technologies may play an increasingly important role in improving payment reliability. Blockchain-based smart contracts, digital payment platforms and integrated project management systems can potentially reduce administrative delays by linking payment execution to verified project milestones. Such solutions may improve transparency, reduce disputes and strengthen accountability among project participants. However, their application requires legal clarity, technical readiness and acceptance by stakeholders. Therefore, digital payment solutions should be considered as a promising future direction rather than a universal short-term remedy.

Overall, the discussion confirms that the relationship between financing and construction project performance is multidimensional. It includes not only the source and amount of financing, but also liquidity, timing, administrative efficiency, contractual arrangements, payment chains and technological support. Improving project performance therefore requires a broader financial management approach that connects financing decisions with operational project control.

## 5. CONCLUSION

Construction project performance is commonly evaluated through time, cost and quality outcomes, but the findings of this paper indicate that these outcomes are strongly influenced by the financial conditions under which projects are implemented. The review has shown that

financing availability and payment timing are not merely supporting financial issues, but important determinants of project continuity, contractor liquidity and overall project delivery.

The paper emphasizes that construction financing should not be observed only through the source or total amount of funds. Even when financing is formally secured, delayed payments, slow certification procedures, unclear approval responsibilities and inefficient payment administration may create liquidity pressure during project execution. Such pressure can affect procurement, labour engagement, subcontractor payments and site productivity, ultimately contributing to project delays, cost overruns and disputes among project participants [1–6].

A key conclusion is that the timing of financial flows is as important as their availability. Payment delays can be transmitted through the construction payment chain, from owners to main contractors and further to subcontractors, suppliers and workers. As a result, a delay at one level of the project structure may generate wider operational consequences. This confirms the need to integrate cash-flow planning, payment monitoring and project control systems throughout the entire project lifecycle.

The paper also highlights the importance of payment process efficiency. Financial disruptions may arise not only from insufficient funds, but also from administrative complexity, delayed valuation, certification and approval procedures. Therefore, improving construction project performance requires clearer payment procedures, better coordination among stakeholders, more transparent documentation and stronger contractual mechanisms for managing payment obligations.

In addition, the review points to the relevance of institutional and technological solutions. Public-private partnerships may contribute to more structured allocation of financial responsibilities and risks, while digital tools, including blockchain-based smart contracts and digital payment platforms, may improve transparency and reduce procedural delays. However, both institutional and technological solutions depend on adequate contractual design, legal clarity, technical readiness and stakeholder capacity.

Finally, the paper identifies an important research gap, particularly in the Serbian and regional context. Existing domestic research has addressed construction delays, budget overruns, project risks and broader financing instruments, but the specific relationship between financing availability, payment timing, contractor cash flow and construction project performance remains insufficiently explored. Future research should therefore focus on empirical investigation of these relationships, using surveys, case studies or firm-level project data. Such research could contribute to better understanding of how financial inefficiencies affect project delivery and how payment systems can be improved in practice.

Overall, the paper concludes that successful construction project management requires a broader financial management perspective. Securing funds at the beginning of a project is not sufficient. Funds must also be available at the right time, through efficient and transparent payment mechanisms. In this sense, financing availability and timing represent essential elements of construction project performance and should be treated as an integral part of project planning, implementation and control.

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