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STUDY OF THE ROLE OF THE CONSULTING ENGINEER IN THE RISK MANAGEMENT SYSTEM IN THE IMPLEMENTATION OF CONSTRUCTION PROJECTS BASED ON FIDIC CONTRACTS

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Abstract:
The article examines the significance of the consulting engineer within the risk management system in the implementation of construction projects based on FIDIC contracts. It is established that within a risk-oriented management model, this participant performs not only the tasks of technical supervision and contract administration, but also contributes to the prevention of adverse events, the allocation of responsibilities between the parties, and the procedural resolution of emerging disagreements. Using examples of infrastructure projects, it is shown that the effectiveness of such participation depends both on the chosen contractual framework and on the degree of formalization of project procedures. The paper analyzes the powers of the consulting engineer and highlights the importance of their involvement in coordinating changes, documenting contract-relevant circumstances, and reducing the likelihood of disputes.

JEL: K12, L74, D81

Keywords: FIDIC, consulting engineer, risk management, construction projects, contract administration, dispute prevention

1. Introduction

In the context of increasing complexity of construction projects, the growing cost of errors in contract administration, and stricter requirements for compliance with deadlines, budgets, and quality standards, risk management becomes particularly important at all stages of project implementation. In international practice, FIDIC contracts represent one of the most developed instruments for allocating responsibilities and regulating risk situations in construction projects.

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The aim of this study is to analyze the role of the consulting engineer in the risk management system during the implementation of construction projects using FIDIC contracts as an example. The scientific novelty of the study lies in the fact that the functions of the consulting engineer are considered not merely as part of technical or contractual administration, but as an independent mechanism for the prevention, allocation, and mitigation of project risks within an integrated management system. This approach makes it possible to clarify the position of the consulting engineer within the interaction structure between the employer and the contractor, and to demonstrate that the engineer's activities influence not only the operational coordination of contractual obligations but also the reduction of the likelihood of disputes, schedule deviations, and financial losses in construction projects.

2. Material and Methods

The methodological framework of the study is based on comparative and structural-analytical approaches, as well as on the methods of induction, deduction, analysis, synthesis, and generalization applied to the examination of the consulting engineer's role in the risk management system of construction projects under FIDIC contracts. Data synthesis was carried out on the basis of official FIDIC documents, analytical and methodological materials of international organizations, industry reports, recent scientific publications, and project case studies reflecting the practical application of contractual mechanisms in infrastructure construction. The study examined the functions of the consulting engineer, procedures for the allocation of responsibilities between the parties, mechanisms of notification, claims review, change coordination, and dispute prevention. Particular attention was paid to the comparison of Belarusian projects financed by international institutions and U.S. contract management practices. Project cases were selected based on the use of structured contract management frameworks and the availability of documented implementation results and were analyzed through comparative evaluation of contractual procedures, risk management practices, and project governance mechanisms, which made it possible to identify both common and context-specific features of the consulting engineer's participation in project implementation.

3. Results

The results of the study are aimed at identifying the features of the functioning of the risk management system in construction projects and determining the role of the consulting engineer within this system. To achieve the research objective, the theoretical foundations of the risk-oriented nature of construction projects are examined, the position of the consulting engineer within the contractual structure of FIDIC is analyzed, and practical examples of the engineer's participation in risk management during the implementation of infrastructure projects are presented.

3.1 Risk-oriented nature of construction projects and specific features of risk allocation in FIDIC contracts

A construction project is inherently characterized by a high degree of uncertainty, as its outcomes depend on the simultaneous influence of technical, organizational, financial, legal, and external economic factors [1]. Current international evidence confirms that the combination of increasing project complexity and external environmental instability shapes the contemporary risk landscape of the construction industry. According to the **KPMG Global Construction Survey 2025/2026,** 75% of construction executives report increasing risk aversion compared with the previous year (fig. 1).

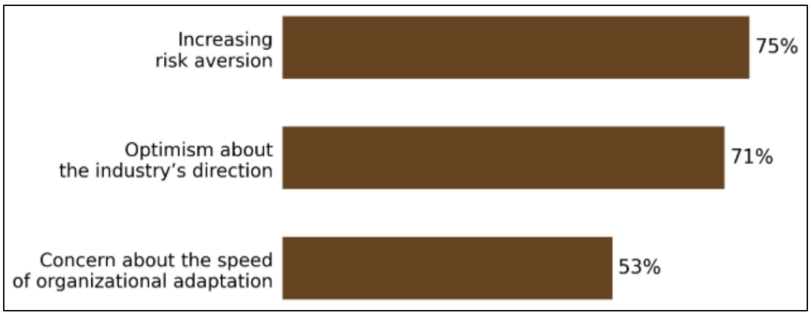

Figure 1: Key indicators of risk perception in the construction sector according to the KPMG Global Construction Survey 2025/2026 [2]

The same study identifies uncertainty in clients' investment decisions, the increasing size and complexity of projects, material and financial constraints, as well as the vulnerability of supply chains, as the main sources of pressure on project schedules and budgets. These factors are also reflected in industry indicators, demonstrating the pronounced risk-oriented nature of modern construction activity.

A comparison of the data from the RICS Global Construction Monitor shows that in Q4 2024, the global **Construction Activity Index** stood at +17, indicating moderate growth in construction activity, whereas in Q2 2025, the global dynamics were already assessed as close to stagnation, with signs of weakening momentum. This suggests that in 2025, the global construction industry remained highly dependent on external economic and organizational risk factors.

The practical implications of these risks become particularly evident in data from individual national markets, where they manifest not only through general indices but also through concrete project delays, changes in project parameters, and labor shortages. For example, in the U.S., according to the **AGC 2025 Workforce Survey,** 45% of companies reported project delays due to shortages of their own workforce or subcontractor personnel (Figure 2).

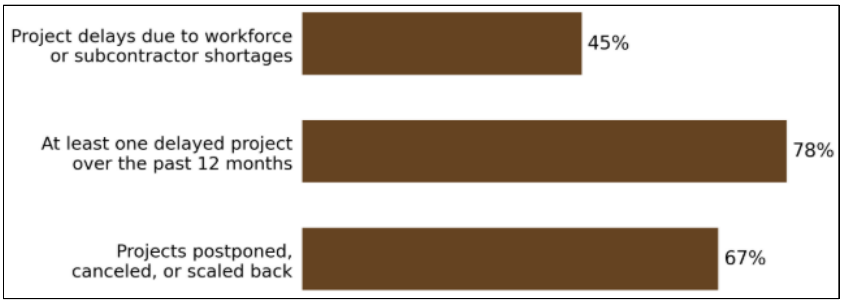

Figure 2: Key manifestations of workforce and organizational risks in construction projects in the U.S. according to the AGC 2025 Workforce Survey [3]

These data indicate that risk in construction is not episodic but structural in nature and therefore requires a formalized contractual allocation of responsibilities. An additional indicator of the high level of conflict within the risk environment is the dynamics of construction disputes. According to the **Arcadis Construction Disputes Report 2025**, in North America, the average value of a construction dispute increased by 40% in 2024, reaching $60.1 million, while the average time required to resolve a dispute decreased from 14.4 to 12.5 months [4]. The most common construction disputes arise due to ambiguities in contracts, poor management of construction projects, lack of documentation, and unexpected site conditions. Consequently, in modern construction projects, risk manifests itself not only in the probability of an adverse event but also in the high cost of procedural errors, delayed notifications, incorrect qualification of circumstances, and unclear allocation of responsibilities between the parties [5].

In this context, FIDIC contracts can be said to be of particular importance as they are based on the principle of "*balanced allocation of risks between employer and contractor*" and emphasize "*the importance of the engineer's role in the contract*" [6]. The 2017 edition has further strengthened this framework by enhancing procedural clarity, transparency, and detailed mechanisms in regard to the actions of all parties involved in the project lifecycle. The updated forms preserve the basic logic of risk allocation while providing clearer procedures for claims and determinations. As a result, risk management is transferred from discretionary decision-making to predetermined procedures in contracts, which are based on defined requirements for responsibility, documentation, notification, and evaluation of events.

Modern international evidence supports the fact that the industry is shifting towards models where risks are allocated in a more transparent and collaborative manner. According to the **KPMG Global Construction Survey 2025/2026**, only 20% of market participants believe that collaborative contracting and delivery models have already become the industry standard, while 56% expect such models to become standard within the next five years [2]. Against this background, FIDIC can be regarded as one of the most institutionally developed systems of contractual risk management, in which the allocation of schedule, cost, design, geotechnical, and procedural risks is embedded directly in the architecture of the contract [7]. Consequently, within the FIDIC framework, the risk-oriented nature of construction projects receives not only a theoretical interpretation but also a practical management mechanism through predefined procedures for notification, assessment of consequences, determination of parties' rights, and prevention of dispute escalation.

3.2 The consulting engineer as an institutional participant in the risk management system

Within the FIDIC contract framework, the consulting engineer occupies a role that goes beyond ordinary technical supervision of the works, as the engineer's functions are embedded in the mechanisms of risk prevention, allocation, and procedural resolution (Table 1).

Table 1: Main functions of the consulting engineer in the FIDIC contract system and their significance for risk management [8, 9]

Function of the consulting engineer	Content of the function in the FIDIC logic	Significance for risk management
Contract administration	Ensures the application of contract provisions and coordination between the parties.	Reduces the risk of procedural violations and uncoordinated actions.
Issuing instructions	Directs the execution of the works within contractual authority.	Allows timely response to deviations.
Control of work performance	Performs contract-based control over the progress and compliance of the works.	Reduces the risk of defects and quality-related non-conformities.
Review of variations and claims	Assesses changes, claims, and their contractual consequences.	Limits the risk of uncontrolled growth in cost and time.
Facilitation of agreement	Promotes agreement between the parties on disputed issues.	Decreases the likelihood of dispute escalation.
Making determinations	Issues determinations in the absence of agreement in accordance with the contract.	Reduces legal uncertainty.
Procedural recording of circumstances	Ensures the consideration of notices and other contractually significant facts.	Reduces the risk of procedural errors and loss of evidence.

The importance of the consulting engineer is further reinforced by the fact that many project risks in modern construction arise not only from external factors but also from insufficient coordination, weak change control, and inadequate procedural discipline. A **report by the Volpe Center** (U.S. Department of Transportation, 2025) emphasizes that the ability of project teams to make timely and well-grounded decisions directly affects the frequency and scale of change orders, while the absence of consistent management procedures leads to misalignment and project changes throughout the lifecycle [10]. In this context, the consulting engineer in the FIDIC system acts as an institutional intermediary between the contract provisions and project implementation, ensuring the contractual qualification of events and the proper management of notices and claims.

The institutional nature of the consulting engineer's role is reflected in the logic of FIDIC contracts, which emphasize balanced risk allocation between the employer and the contractor and identify the engineer as the first tier in dispute avoidance [11]. Within this framework, the consulting engineer should be viewed not merely as a contract administrator but as a key element of the risk management system. The engineer transforms project uncertainty into formalized procedures by identifying deviations, determining their contractual significance, ensuring proper documentation, and thereby reducing the likelihood that operational issues escalate into financial conflicts or disputes.

3.3 Practice of consulting engineer participation in risk management in construction projects

The practical significance of the consulting engineer's role in the risk management system is most clearly demonstrated in projects where risk is treated not as an abstract probability of adverse events but as an object of continuous contractual and organizational control [12]. However, the ways in which these mechanisms are implemented largely depend on the institutional environment of the construction industry. In this context, the application of FIDIC contracts varies across different countries.

For example, the **Minsk Vodokanal Project (Belarus),** implemented with financing from the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB), applies the FIDIC Yellow Book (Design–Build) contractual framework with the appointment of an Engineer responsible for construction supervision. Within this structure, the consulting engineer performs a systemic role by monitoring compliance of the works with contractual requirements, supporting decision-making during project implementation, and managing the documentation of changes and contractual events [13]. In this way, the engineer functions as a key element of project risk management, linking technical oversight with contract administration and thereby reducing the likelihood that technical or organizational deviations escalate into financial disputes.

A more explicit example of the risk-oriented role of engineering consultancy can be observed in the **Belarusian Regional Bridges and M3 Road Rehabilitation project**. According to the EBRD, the total project financing amounted to €259 million, including €126 million allocated to the first tranche for the rehabilitation of 12 regional bridges and €133 million for works on the M3 highway section [14]. The project included a separate consultancy contract titled Project Implementation Supervision and Advisory Services, under which the consultant was tasked with supporting timely project implementation and supervising the work of the Engineer to ensure impartiality and compliance with FIDIC provisions. This example underlines the importance of a neutral and professionally performed engineering role in a project with substantial financing risks as well as risks related to distribution, showing that effective risk management in a large infrastructure project might require additional institutional oversight of the Engineer's authority under the contract.

In U.S. practice, a comparable risk-management logic can be observed in the Washington State Department of Transportation (WSDOT). According to the 2025 **U.S. DOT Volpe Center report and WSDOT** guidance, the agency applies formal Cost Risk Assessment and Cost Estimate Validation procedures, with quantitative risk assessment required for projects valued above $25 million [15]. Within this framework, consultants participate in risk workshops, identify and assess uncertainties, prepare probabilistic cost and schedule models, and support the documentation of significant project changes. Projects using the CRA process showed an average reduction in cost growth related to change orders by 4.8% and in schedule growth by 6.7% compared with projects where this approach was not applied. This example demonstrates that the engineering-consulting function performs a systemic role by formalizing uncertainties and integrating them into project budget and schedule decisions.

A clear practical example is the **SANDAG Mid-Coast Trolley project** in California. According to SANDAG, the project added 11 new miles of light rail and nine new stations to the existing Blue Line, was completed on time, and opened for service on November 21, 2021, with a budget of approximately $2.17 billion [16]. This case illustrates that large infrastructure projects achieve greater resilience when schedule, cost, and implementation control are embedded in the project structure from the outset. In functional terms, such an approach is comparable to the role performed by the consulting engineer in FIDIC contracts, where coordinated oversight and formalized procedures help reduce the risk of dispute escalation.

Thus, a comparison of Belarusian FIDIC projects and U.S. contracting practices reveals a consistent pattern: projects demonstrate greater resilience to schedule, cost, and organizational risks when the engineering-consulting function is institutionalized rather than limited to formal supervision. In Belarus this is achieved through the direct integration of the Engineer within the FIDIC project structure, while in the U.S. similar effects are provided by risk registers, formalized risk assessment procedures, change control mechanisms, and structured coordination among project participants. These findings indicate that the consulting engineer plays a key role in early risk identification and the prevention of dispute escalation in construction projects.

4. Discussion

The analysis shows that the consulting engineer in FIDIC contract forms that provide for the Engineer can indeed be considered a key institutional element of risk management. However, the effectiveness of this model depends on several conditions. International evidence indicates that modern construction projects operate in an environment of high uncertainty, where dispute costs, project delays, and design changes remain significant. At the same time, the formal allocation of the engineer’s powers in the contract does not automatically reduce risks. In practice, vulnerabilities often arise from unclear contract documentation, incomplete initial data, delayed notifications of risk events, insufficient documentation of deviations, and differences between the requirement of fair determination and the employer's practical expectations [17]. This creates a central tension within the model: the engineer must be integrated into the project delivery structure while maintaining sufficient professional independence to make fair and objective determinations, even though in practice this role may be influenced by organizational and economic pressures.

An additional consideration is that the application of the FIDIC approach may vary across different legal and organizational environments [18]. Projects in Belarus financed by international institutions demonstrate the direct integration of the Engineer within the FIDIC contractual framework, while in the U.S., similar functions are often implemented through alternative contractual arrangements such as risk registers, change control procedures, CM/GC, CMAR, and independent advisory support. This comparison suggests that the effectiveness of FIDIC largely depends on its adaptation to national legal systems, contractual practices, and the maturity of project management processes. Therefore, the development of risk-oriented management in construction projects requires not only the use of FIDIC contracts but also a context-sensitive interpretation of the consulting engineer's role and the institutional mechanisms that support transparent and consistent decision-making.

5. Conclusion

The study shows that within FIDIC contract forms that provide for the Engineer, particularly the Red and Yellow Books, the consulting engineer should be regarded not merely as a technical coordinator or contract administrator but as an important element of the project risk management system. The value of this role is seen in the early identification of deviations, documentation of risk events, qualifying changes through contractual means, and the avoidance of operational issues escalating into dispute scenarios. The analysis has revealed that construction projects show greater resilience when the engineering consulting role is included in the project management structure from the beginning, with risk allocation, notification, decision-making, and documentation clearly defined.

From a practical perspective, improving risk management in construction projects requires strengthening the institutional role of the consulting engineer through several mechanisms. These include clearly defining the boundaries of the engineer's independence, implementing standardized procedures for notifications, claims management, and documentation, and adapting FIDIC-based practices to national legal and organizational environments. Consequently, effective risk mitigation in construction projects depends not only on the quality of the contract itself but also on the consistent and professional functioning of the consulting engineer as a key participant in risk identification and dispute avoidance.

Conflict of Interest Statement
The author declares no conflicts of interest.

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