

THE MEDIATING ROLE OF PROJECT PERFORMANCE IN THE EFFECT OF LEAN  
TECHNIQUES AND ORGANISATIONAL CULTURE ON RISK MANAGEMENT  
UNDERSTANDING IN CHINESE PROJECTS FOR ENGINEERING.

Li Hao Yang, Mrutyunjay Sisugoswami

<sup>1</sup> Lincoln University College, Petaling Jaya, Malaysia.

**ABSTRACT**

The amount and quality of the information that is provided, as well as the degree to which companies employ lean methods, are the key independent factors that are researched within the scope of this study. Additionally, the research also investigates the degree to which businesses utilise lean techniques. The organisation conducts research on these factors by using technology in order to determine the influence that these factors have on the accomplishments of the company. In order to be more explicit, the purpose of the research is to shed light on the complex interrelationships that exist within China's non-financial sector. When this is taken into consideration, the conceptual web that links invention to information exchange, lean methodologies, innovation, and the success of businesses is illuminated even more. In the event that they have a better understanding of data sharing, quality, and lean processes, experts, lawmakers, and company leaders may be able to make more informed decisions. Consequently, this will lead to an increase in growth that is driven by innovation as well as the success of organisations. When compared to previous studies, this one stands out due to the fact that it takes a holistic approach to evaluating the relationship between innovation, lean processes, information exchange, and the accomplishment of business objectives. As contrast to previous studies that looked at each of these components separately, this study includes all of these components into a holistic framework, which makes it a useful addition to the field and has the ability to affect company operations.

**Keywords:** Project performance, risk understanding, construction industry in china, lean implementation, cultural influence.

**INTRODUCTION**

Problems with quality, going over budget, falling behind schedule, hazardous working conditions, and unhappy clients are common themes in reports on construction project performance. To guarantee a successful construction project, it is crucial to identify the factors that might make or break it. Several studies have been carried out throughout the years on the CSFs of building projects (Basana et

al., 2022). The success or failure of the project will be determined by the researcher's requirements. These are the most crucial success or failure markers, according to the study. According to the aforementioned literature, there are three groups of CSFs that are relevant to construction project management. One group consists of project-related factors, which revolve around the project's type, nature, complexity, and size. The second group is the external environment, which includes things like social and political issues, technological advancements, procurement methods, and project culture. In order for the organisation to reach its goals, management must have a relentless and continuous emphasis on CSF areas. Improving the performance of construction projects requires an understanding of each of these factors and an investigation of their interaction and impacts on performance results. There has been some new research on culture as a CSF of building projects, due to its importance in management (Beldiq et al., 2024). Moreover, a wide range of backgrounds and perspectives are represented among the building project managers that supervise these endeavours. Participants' attitudes and actions, especially those that are more nuanced, have a major bearing on the project's outcome. Cultural differences will prevent construction companies from communicating effectively and accomplishing their goals, according to another perspective. The success or failure of a project could be heavily impacted by cultural factors. Consequently, cultural factors have a substantial influence in project management with regard to conflict avoidance, quality improvement, and innovation encouragement. Although there is widespread agreement that company culture has a significant impact on productivity, very little research has focused on the field of construction management. Rather of focussing on project organisational culture, prior research that sought to improve project outcomes concentrated on procurement strategies and project attributes. So far as the researchers are aware, this study is among the few that have attempted to examine the impact of project culture. With this setup, disagreements are less likely to arise, communication and collaboration are better, and project goals are easier to reach (Benitez et al., 2020).

### **BACKGROUND OF THE STUDY**

The purpose of this research is to learn how factors like business culture, effective communication management, and a well-defined project scope interact with the project manager's abilities to determine whether a construction project is successful or not. The next paragraphs provide these concepts from a theoretical perspective, considering that this research aims to explain the mediating role of the project manager's abilities in the interaction. There are risks associated with China's recent leadership in massive engineering and infrastructure projects, and those risks include those pertaining to money, operations, the environment, and organisational structures (Borges et al., 2019). Consequently, any project that aspires to succeed now requires good risk management. Although organisational policies, attitudes, and performance outcomes are factors, the technological components of risk management are crucial. More and more, engineering projects are using lean

principles. Both responsiveness and production are enhanced as a result of these ideas' emphasis on efficiency, waste reduction, and continual development. Equally significant in shaping risk teams' perspectives and reactions is an organization's corporate culture, which is itself shaped by its values, practices, and leadership style. Although these effects are known to have a significant impact, little is known about how Lean methods and culture shape the perception of risk management. This study found that stakeholders' risk awareness and reactivity are mediated by project performance. Cultural dynamics and operational techniques are both part of the project's performance. Using integrated management approaches in challenging project environments may improve risk resilience and performance. This research aims to shed light on Chinese engineering ambitions by using such an approach. For a while, the "transference" concept had the Toyota model at its centre, and the term "lean" was first used in 1990 to describe it (Bu, 2024).

### **PURPOSE OF THE RESEARCH**

Project performance as a mediator between Lean methodologies and organisational culture is the focus of this article's investigation of engineering projects in China. The goal is to get a better understanding of risk management via this lens. The engineering projects in China are becoming more complicated and might have huge stakes, therefore it's important to adopt integrated methodologies to boost operational efficiency and manage project risks better. In this study, the researchers want to find out how much of an influence Lean management principles and company culture have on stakeholders' views of risk and how much of an influence project success has on these factors. For Chinese engineering firms, this research aims to provide a complete paradigm for better project delivery, risk management, and strategic alignment. This will be achieved by identifying and analysing these connections. A "risk management" plan for a construction project is one that takes into account and attempts to mitigate any possible threats. Utilising preventative discovery and backup methods is essential for accomplishing risk management objectives. Problems are less likely to occur and less severe when certain procedures are followed. Keep in mind that identifying, evaluating, and responding to different hazards in a way that helps the project reach its objectives is the aim of good risk management, not eliminating risks altogether. The upshot is a higher probability of success for the researcher's project as the researcher are able to exploit opportunities while minimising threats.

### **LITERATURE REVIEW**

As engineering projects get more intricate, it is expected that everyone involved in the project would have a greater understanding of risk management. Economically rapidly developing nations, like China's, are prime examples of this. According to the Project Management Institute, risk management is influenced by operational procedures, organisational culture, and communication, which are all cognitive and

psychological processes. Cultural norms inside an organisation are another potential influence on risk management (Buniya et al., 2023). Conversely, due to misaligned approaches and uneven stakeholder participation, many project teams fail to properly identify and manage risks. The study's results classify corporate cultures into four main groups. Collaborating, being involved, giving employees agency, and exchanging ideas are the building blocks of every group's identity. Modern success requires a unique set of skills, and the capacity to quickly adjust to changing circumstances while juggling several obligations, both at work and in the researcher's personal life, is a must (Chatterjee et al., 2022).

## **RESEARCH QUESTION**

What is the effectiveness of Risk Management Understanding in Chinese Engineering in Project Performance?

## **RESEARCH METHODOLOGY**

### **RESEARCH DESIGN**

Using SPSS version 25, the quantitative data analysis was carried out. To determine the strength and direction of the statistical association, the odds ratio and 95% confidence interval were used. A statistically significant criteria was established by the researchers at  $p < 0.05$ . To identify the most important aspects of the data, a descriptive analysis was conducted. Quantitative methods are often used to assess data collected via surveys, polls, and questionnaires, as well as data that has been altered using computing tools for statistical analysis.

### **SAMPLING**

Survey techniques were used to gather data for the research. Rao-soft software determined the sample size to be 600. A total of 775 questionnaires were issued; 662 of them were returned, and 13 were discarded due to incompleteness. There were 649 questionnaires utilised in total for the research, comprising 257 females and 392 men.

### **DATA AND MEASUREMENT**

A questionnaire survey functioned as the primary data collection method for the investigation. The survey had two sections: (A) General demographic information and (B) Responses on online and offline channel factors measured on a 5-point Likert scale. Secondary data was collected from several sources, mostly focusing on internet databases.

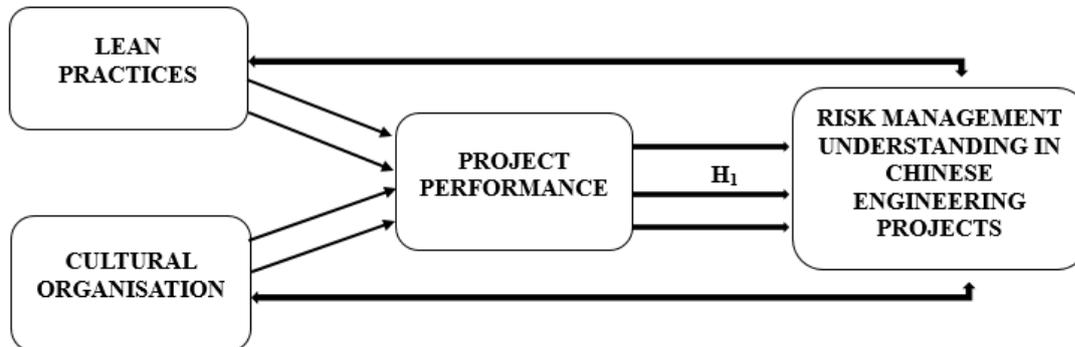
### **STATISTICAL SOFTWARE**

The statistical analysis was conducted using SPSS 25 and MS-Excel.

## STATISTICAL TOOLS

To grasp the fundamental character of the data, descriptive analysis was used. The researcher is required to analyse the data using ANOVA.

## CONCEPTUAL FRAMEWORK



## RESULTS

One typical use of Factor Analysis (FA) is to verify the existence of latent components in observable data. When there are not easily observable visual or diagnostic markers, it is common practice to utilise regression coefficients to produce ratings. In FA, models are essential for success. Finding mistakes, intrusions, and obvious connections are the aims of modelling. One way to assess datasets produced by multiple regression studies is with the use of the Kaiser-Meyer-Olkin (KMO) Test. They verify that the model and sample variables are representative. According to the numbers, there is data duplication. When the proportions are less, the data is easier to understand. For KMO, the output is a number between zero and one. If the KMO value is between 0.8 and 1, then the sample size should be enough. These are the permissible boundaries, according to Kaiser: The following are the acceptance criteria set by Kaiser:

A pitiful 0.050 to 0.059, below average 0.60 to 0.69

Middle grades often fall within the range of 0.70-0.79.

With a quality point score ranging from 0.80 to 0.89.

They marvel at the range of 0.90 to 1.00.

Testing for KMO and Bartlett's Sampling Adequacy Measured by Kaiser-Meyer-Olkin  
.958

The results of Bartlett's test of sphericity are as follows: approx. chi-square

df=190

sig.=.000

This establishes the validity of assertions made only for the purpose of sampling. To ensure the relevance of the correlation matrices, researchers used Bartlett’s Test of Sphericity. Kaiser-Meyer-Olkin states that a result of 0.958 indicates that the sample is adequate. The p-value is 0.00, as per Bartlett’s sphericity test. A favourable result from Bartlett’s sphericity test indicates that the correlation matrix is not an identity matrix.

**Table 1: KMO and Bartlett’s Test.**

<b>KMO and Bartlett's Test<sup>a</sup></b>		
<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</b>		.958
<b>Bartlett's Test of Sphericity</b>	<b>Approx. Chi-Square</b>	4950.175
	<b>df</b>	190
	<b>Sig.</b>	.000
<b>a. Based on correlations</b>		

The general significance of the correlation matrices was further validated by Bartlett’s Test of Sphericity. For Kaiser-Meyer-Olkin sampling, a value of 0.958 is suitable. By using Bartlett’s sphericity test, the researchers were able to get a p-value of 0.00. With a statistically significant result, Bartlett’s sphericity test disproved the validity of the correlation matrix.

**INDEPENDENT VARIABLE**

**Lean Practices:** The lean technique for producing value has a primary emphasis on reducing the amount of resources used as well as the amount of waste produced. In addition, the lean methodology prioritises the development of innovative ways to innovation in order to maximise value and avoid waste (Chaudhry et al., 2019). There are two things that are required for a whole. The goal of the lean approach is to optimise value in any given system or process by optimising efficiency and minimising waste and maximising efficiency. These methods, which have their origins in the Toyota Production System, focus on streamlining processes by removing unnecessary stages in an effort to achieve greater efficiency. In engineering projects that adhere to the lean approach, there is a significant improvement in efficiency, resource utilisation, and waste reduction. To put it simply, the fundamental objective of lean principles is to reduce waste by reducing operations that are not necessary, delays, excessive output, and improper management of resources. Iterative cycles of improvement are encouraged by these strategies, which include frequently analysing processes and making minor tweaks in order to increase performance. The process of value stream mapping, which is a technique that visually shows the flow of data and resources within an organisation, may be used by firms in order to identify areas of inefficiency and areas in which significant waste may be eliminated. Within the

framework of lean thinking, the client is the primary focus (Chawewong & Naipinit, 2024).

**Organisational culture:** Culture in the workplace refers to the shared assumptions, norms, and practices that shape the way employees behave and think. It influences how people act, what they buy, how they solve problems, and how they feel about their jobs in society. Most importantly, a company's culture determines its identity by dictating the official and informal actions of every employee throughout time. Risk management tactics, performance, collaboration, and communication style are significantly impacted by organisational culture in engineering and project-based businesses (Chen, 2024). In the case of engineering projects in China, this is absolutely correct. A strong and positive culture encourages accountability, innovation, and trust; a poor and dysfunctional culture may lead to ineffectiveness, friction, and resistance to change. The leadership style, past events, national culture, industry standards, and demographics of the workforce all contribute to the formation of an organization's culture. These systems uphold a number of values, including as command and control, adaptability, individual initiative, and collaboration; they are sometimes called clan, adhocracy, market cultures, or hierarchical. Contributions, enhanced performance, team loyalty, information sharing, and proactive risk management all play a role in laying the groundwork for a project's success. Understanding and effectively managing the corporate culture is crucial to achieving strategic goals and ensuring the long-term success of the firm (Christian et al., 2024).

## MEDIATING VARIABLE

**Project performance:** Consequently, project performance is the extent to which a project accomplishes its goals within the limits of scope, time, money, and quality. Assessing the project's efficacy and efficiency reveals if the outcomes correspond to the initial objectives and the expectations of stakeholders. Performance of projects is an important indicator of operational success in engineering systems, and this is particularly true in China due to the country's rapid economic development and vast infrastructure (Cusumano et al., 2021). Timely completion of the project within the allotted budget while maintaining quality standards constitute the "iron triangle" that has long been used to evaluate performance. Contrarily, contemporary evaluations include a wider range of topics, such as team output, resource utilisation, innovation, compliance with safety and environmental regulations, and delight of stakeholders. Prompt execution, adaptable leadership, and careful planning are the hallmarks of a successful project. All of these factors contribute to the smooth completion of the project and are closely linked to the company's culture, the lean methodology, and risk management. Reduced quality, cost overruns, delays, and unhappy stakeholders are all possible outcomes of poor performance. Project performance evaluations could be very useful to the

construction and engineering sectors in the long run, as they provide crucial details for growth, development, and success (De Mast et al., 2021).

## DEPENDENT VARIABLE

**Risk Management Understanding in Chinese Engineering Projects:** To achieve certain objectives in terms of risk, “risk management” means coordinating activities to steer and control the project and its processes. This continuously occurring task encompasses the whole project lifecycle. Chinese engineering projects use risk management, which is methodically identifying, assessing, and responding to potential threats to project objectives. It includes making an effort to maximise good results and minimise bad ones. Effective risk management is fundamental to project management because it determines whether or not a project will be successful (Divya Sankar et al., 2022). Risk management entails identifying, assessing, and prioritising any threats to the project’s specifications. The researcher try to find ways that could reduce or do away with these dangers. There are many applications for risk management, but perhaps the most critical is helping project managers be ready for anything. To what extent a project manager can avert setbacks like budget overruns and delays is directly proportional to how fast they act in response to threats. It is possible for project managers to improve their decision-making skills by using risk management approaches. Project managers may examine potential risks and their outcomes to see which choice has the best chance of completing the project successfully. An additional advantage of risk management is the capacity to facilitate the project’s progress towards completion (Duan, 2020).

**Relationship between Project Performance and Risk Management Understanding in Chinese Engineering Projects:** Particularly with China’s fast expanding construction and infrastructure sectors, engineering projects increasingly need to link project performance with risk management knowledge. The performance of a project reveals the extent to which it satisfies its goals in terms of time, money, quality, stakeholder satisfaction, safety, creative capacity, and so on. Conversely, risk management knowledge describes a team’s degree of awareness of, ability in spotting, evaluating, and monitoring any hazards to a project. Strong project performance builds a framework that allows more risk visibility, communication, and reaction; good risk management instantly boosts a project’s chances to reach its performance targets. These two ideas have an obvious relationship (Ekung et al., 2021). Due to the government’s strong hand, large-scale projects, and complex criteria, engineering projects in China are unpredictable par for the course. Projects can run upon difficulties like inadequate supplies, legislative changes, personnel variances, technical problems, and disturbance of the surrounding area. Under such conditions, project success shows the project’s adaptation and resilience against risk rather than just an indication of production. A well-performing project usually involves well-established planning processes, coordinated lines of communication, and proactive stakeholder involvement to help the team spot and handle any

hazards. High-performance project teams are not unusual in fast risk detection, backup preparations, or feedback loops. These instruments help to promote a growth attitude and proactive preparedness as well as to provide a more thorough knowledge of the risk environment. The performance of a project could be much influenced by project team members' degree of risk management competency. Despite China's focus on large-scale urbanisation and mega-infrastructure development, many projects in its engineering environments suffer delays or cost overruns due to inadequate expectation of hazards. From first idea to final commissioning, teams with strong knowledge of risk management are more likely to integrate risk-based thinking throughout the project life. Less needless interruption, improved decision-making, and a more seamless project path are therefore expected. Risk-aware teams under great pressure may either maintain or even improve their performance by aggressively avoiding expensive errors and constantly changing their strategies (Fadhillah et al., 2023).

On the basis of the above discussion, the researcher formulated the following hypothesis, which was analyse the relationship between Project Performance and Risk Management Understanding in Chinese Engineering Projects.

**H<sub>01</sub>: There is no significant relationship between Project Performance and Risk Management Understanding in Chinese Engineering Projects.**

**H<sub>1</sub>: There is a significant relationship Project Performance and Risk Management Understanding in Chinese Engineering Projects.**

**Table 2: H1 ANOVA Test.**

ANOVA					
Sum					
	Sum of Squares	df	Mean Square	F	Sig.
<b>Between Groups</b>	39588.620	225	5435.316	1034.510	.000
<b>Within Groups</b>	492.770	423	5.254		
<b>Total</b>	40081.390	648			

In this study, the result is significant. The value of F is 1034.510, which reaches significance with a p-value of .000 (which is less than the .05 alpha level). This means the “**H<sub>1</sub>: There is a significant relationship between Project Performance and Risk Management Understanding in Chinese Engineering Projects**” is accepted and the null hypothesis is rejected.

## DISCUSSION

In order to understand the relationships between Lean practices, organisational culture, project success, and risk management understanding in engineering projects in China, it is necessary to analyse the study's key components: Lean

management strategies aim to enhance operational efficiency by reducing waste, optimising resources, and simplifying processes. Applying lean principles to engineering projects may help improve construction methods, reduce delays, and maximise value for investors and the project team. Furthermore, risk assessment, identification, and mitigation strategies may be directly affected by the continuous development and problem-solving ethos of lean methodologies. Engineering project teams' decision-making and behaviour are shaped by their organisational culture, which consists of shared beliefs, practices, and habits. A robust company culture that prioritises collaboration, transparent communication, and a shared objective may impact risk understanding and management. Culture may have an effect on risk consciousness, risk tolerance, and the effectiveness of team risk sharing. A project's performance is a measure of how well it meets its objectives in terms of scope, time, budget, and quality. One way to measure the effectiveness of risk management is by looking at how successfully a project has been performed. If the project has gone well, it's probable that the risks have been identified and dealt with ahead of time. A team's risk management understanding is its capacity to identify, assess, and mitigate risks throughout a project's lifetime. To ensure that any risks to the project's success are adequately managed, this comprises understanding, communicating, and mitigating risks.

## **CONCLUSION**

With project culture as a moderator and efficiency as a mediator, this study set out to examine the relationship between project risk management and project efficiency. The project's culture is already well-established and does not need any kind of control. There is no moderating effect on the relationship between project quality and efficiency within the framework of Chinese organisations. Not only that, but research has shown that project efficiency mediates the link between project quality and risk management. It has been shown that project quality is greatly enhanced with risk management. In the context of China, this research aims to shed light on the relevance of project risk reduction and its potential impact on project efficiency. To comprehend the project's context, the mind-set of the managers or employees involved, and how these factors impact risk management and the connection between efficiency and quality, one must first grasp the concept of project efficiency. In order to ensure the project's success and risk-free delivery, organisations and project owners might develop strategies. Project risk management is an important part of the project, and these techniques involve doing the right things to manage risks, including identifying and fixing the most pressing problems that might derail the project. The goal of risk management is to make sure that people know what to do in order to reduce or eliminate hazards. If they follow this strategy, they should have no trouble getting the job done. The success of the project hinges on the organization's ability to effectively manage project risk and educate its staff on what to do in the event that they encounter project risk. The majority of companies fail to effectively implement risk management measures,

which may lead to project failure or, at the very least, make it extremely difficult to finish. Because it affects employee commitment to duties and responsibilities, the trend towards effective project management, and other factors, context is crucial. This chapter contains both theoretical and empirical contributions based on the literature.

## REFERENCES

1. Basana, S. R., Suprpto, W., Andreani, F., & Tarigan, Z.J.H. (2022). The impact of supply chain practice on green hotel performance through internal, upstream, and downstream integration. *Uncertain Supply Chain Management*, 10(1), 169- 180.
2. Beldiq, E. A., Callula, B., Yusuf, N. A., & Zahra, A. R. A. (2024). Unlocking Organizational Potential: Assessing the Impact of Technology through SmartPLS in Advancing Management Excellence. *APTISI Transactions on Management*, 8(1), 40-48.
3. Benitez, J., Henseler, J., Castillo, A. and Schuberth, F. (2020), “How to perform and report an impactful analysis using partial least squares: guidelines for confirmatory and explanatory IS research”, *Information and Management*, Vol. 57 No. 2, pp. 103-168.
4. Borges, G.A., Tortorella, G., Rossini, M. and Portioli-Staudacher, A. (2019), “Lean implementation in healthcare supply chain: a scoping review”, *Journal of Health Organization and Management*, Vol. 33 No. 3, pp. 304-322.
5. Bu, S. S. (2024). Recommendations and strategies for cost management control in construction projects. *Construction Workers*, 45(01), 39-42.
6. Buniya, M. K., Othman, I., Sunindijo, R. Y., Karakhan, A. A., Kineber, A. F., & Durdyev, S. (2023). Contributions of safety critical success factors and safety program elements to overall project success. *International journal of occupational safety and ergonomics*, 29(1), 129-140.
7. Chatterjee, S., Chaudhuri, R. and Vrontis, D. (2022), “Knowledge sharing in international markets for product and process innovation: moderating role of firm’s absorptive capacity”, *International Marketing Review*, Vol. 39 No. 3, pp. 706-733.
8. Chaudhry, M.S., Raziq, M.M., Saeed, A., Sajjad, A. & Borini, F.M. (2019). Management styles in a project environment: evidence from the software industry in Oman. *Leadership & Organization Development Journal*, 40(5), 600-611.
9. Chawewong, K. & Naipinit, A. (2024). Examining the influence of top management green commitment and green intellectual capital on sustainable business performance of Thailand’s thrift and credit cooperatives: The mediating role of collaboration, *Journal of Future Sustainability*, 4(2), 67-76.
10. Chen, J. (2024). Research on optimizing project communication management using cloud applications. *Enterprise Technology Development*, 2024(34), 103.

11. Christian, L., Tarigan, Z.J.H., Siagian, H., Basana, S.R. & Jie, F. (2024). The influence of supply chain integration on firm performance through lean manufacturing, green supply chain management, and risk management. *Uncertain Supply Chain Management*, 12(4), 2699-2712.
12. Cusumano, M.A., Holweg, M., Howell, J., Netland, T., Shah, R., Shook, J. and Womack, J. (2021), "Commentaries on 'the lenses of lean'", *Journal of Operations Management*, Vol. 67, pp. 627-639.
13. De Mast, J., Lameijer, B.A., Linderman, K. and Van de Ven, A. (2021), "Exploring the process of management system implementation: a case of Six Sigma", *International Journal of Operations and Production Management*, Vol. 42 No. 13, pp. 1-24.
14. Divya Sankar, S., Shashikanth, K., & Mahender, S. (2022). Risk management in construction industry. Paper presented at the Sustainable Cities and Resilience: Select Proceedings of VCDRR 2021.
15. Duan, S.X. (2020). Project management. (Twelfth Five-Year Plan Textbook). Nanjing: Nanjing University Press.
16. Ekung, S., Lashinde, A., & Adu, E. (2021). Critical Risks to Construction Cost Estimation. *Journal of Engineering, Project & Production Management*, 11(1).
17. Chen, J., De Cesari, A., Hill, P., & Ozkan, N. (2018). Initial compensation contracts for new executives and financial distress risk: An empirical investigation of UK firms. *Journal of Corporate Finance*, 48, 292-313.
18. Fadhillah, A., Sukmadilaga, C., & Farida, I. (2023). The influence of business strategy, leadership style, and effectiveness of internal control system on implementation of good government governance and its implication on organizational performance. *Decision Science Letters*, 12(3), 499-514.