

THE MEDIATOR FUNCTION OF PROJECT EFFICIENCY IN THE IMPACT OF LEAN PRACTICES AND ORGANISATIONAL CULTURE ON RISK MANAGEMENT COMPREHENSION IN CHINESE ENGINEERING PROJECTS.

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**ABSTRACT**

The adoption of lean techniques by businesses, as well as the amount and quality of information that people share with one another, are the primary independent factors that are investigated in this study. Additionally, it investigates these variables to see how they influence the performance of the organisation via the channel of technology. The objective of the research is to shed light on the complex linkages that exist between the numerous components that make up China's non-financial sector. The grasp of the conceptual web that links innovation as a mediator between information exchange, lean methodologies, innovation, and business results is enhanced as a result of this. A better understanding of data sharing, quality, and lean methodologies may help experts, politicians, and company executives make better decisions, which can lead to improvements in innovation-driven growth and corporate performance. These improvements can be reached via improved decision-making from these individuals. This study, in contrast to others that have been conducted in the past, investigates the linked nature of innovation, lean processes, information exchange, and the performance of companies from every possibility. This study, in contrast to earlier research that analysed these characteristics separately, combines them into a complete framework. As a result, the field value of this study is increased, and any possible influence it may have on company operations is also increased. The tool is considered to be of great use by a wide range of individuals, including researchers and academics, executives and workers of companies, and officials from the government.

**Keywords:** Project efficacy, organisational culture, risk mitigation, engineering initiatives, lean practices.

**INTRODUCTION**

Reports on construction project performance often emphasise concerns such as poor quality, over budget, missing deadlines, unsafe construction, and dissatisfied customers. Finding out what may make or break a construction project is essential for making sure it goes well. The CSFs of construction projects have been the subject of several studies conducted throughout the years (Adeshola et al., 2023). The researcher's specifications will determine the project's success or failure. According

to the research, these factors are the most important indicators of success or failure. The aforementioned literature organises CSFs pertinent to construction project management into three clusters: project-related factors, which centre on the project's type, nature, complexity, and size; and the external environment, which encompasses elements like economic, social, and political issues, advances in physical tools and technology, procurement approaches, and project culture. Management must maintain a constant and intense focus on CSF areas if the organisation is to achieve its objectives. Therefore, it is essential to understand each of these aspects and investigate their interplay and effects on performance outcomes if one wants to improve the performance of construction projects. Culture has recently been examined as a CSF of construction projects due to its significance in management practice. Furthermore, construction project management is overseen by a diverse group of individuals from all walks of life, each of whom brings their own viewpoint, history, and views to the table. Consequently, the individuals involved have a significant impact on the project's success, particularly if they have complicated attitudes or behaviours. Another argument is that cultural differences will make it impossible for construction businesses to communicate effectively and achieve their aims. Cultural influences may have a significant impact on a project's success or failure. Therefore, culture has a significant role in project management in avoiding disputes, improving quality, and encouraging innovation. Research on the issue of business culture and productivity has been little in the area of construction management, despite the universal consensus on the matter. Up until now, studies that attempted to enhance project results have focused on procurement tactics and project characteristics rather than project organisational culture. As a result of China's reorganisation of its construction, healthcare, and educational sectors, as well as its information technology, manufacturing, and construction industries, project management is becoming more vital to the sustainability of China's social economy. Project management in China has a long history of success, so it makes sense to compile that knowledge and use it to study and predict how the country will grow in the future (Afifa & Nguyen, 2023).

### **BACKGROUND OF THE STUDY**

Company culture, effective communication management, and a well-defined project scope are three factors that may make or break a construction project. This research seeks to understand how project manager competences moderate this relationship. Since this research is trying to understand how the project manager's abilities influence the relationship, these concepts are provided in the following paragraphs from a theoretical perspective. Recent years have seen China leading the way in massive engineering and infrastructure projects; yet, these undertakings are not immune to risks associated with money, operations, the environment, and organisational structures (Ahlstrom et al., 2021). Because of this, good risk management is now a must for every project that wants to succeed. Technology has a significant role in risk management, even if organisational policies, attitudes, and

performance outcomes are also crucial. Engineering projects are increasingly using lean principles. In the end, these ideas boost responsiveness and output by emphasising efficiency, cutting down on waste, and constantly improving. An organisation's beliefs, procedures, and leadership style come together to produce its corporate culture. This culture has a significant impact on how risk teams perceive and react to risks. However, little is known about how exactly Lean methods and culture impact the comprehension of risk management, even if these consequences are well-known. This study found that stakeholders' risk awareness and response are mediated by project performance. Both the operational methods and the cultural dynamics contribute to the project's performance. In challenging project environments, integrated management approaches may improve risk resilience and performance. By using this approach, this research hopes to provide light on China's engineering goals (Ajibike et al., 2022).

### **PURPOSE OF THE RESEARCH**

This article aims to examine engineering projects in China via the lens of project performance as a bridge between Lean methodologies and organisational culture, with the goal of gaining a better grasp of risk management. Engineering projects in China are becoming more complicated and stakes are getting higher; so, integrated approaches are necessary to increase operational efficiency and efficiently control project risks. This study aims to assess how Lean management principles and organisational culture affect stakeholders' risk perceptions and how much these factors rely on project success to function. The study's overarching goal is to provide a paradigm shift that Chinese engineering firms can use to better manage risks, coordinate their strategies, and complete projects on time. The identification and examination of these connections will allow this to be achieved. "Risk management" in the context of construction projects is looking forward, assessing the situation, and dealing with any problems that may develop. Preventive discovery and backup processes are used to accomplish the aims of risk management.

### **LITERATURE REVIEW**

It is expected that project stakeholders would have a better understanding of risk management as engineering projects get more complicated. This is particularly the case with rapidly developing economies like China's. Various factors, including operational processes, organisational culture, and communication, influence the cognitive and psychological process of risk management, according to the Project Management Institute. The company's ethos is another potential influence on risk management (Akgün, 2020). However, due to uneven stakeholder participation and contradictory techniques, many project teams fail to properly identify and manage risks. For my research, the researcher looked at Syrian manufacturing businesses to see how factors like corporate culture and employee adaptability affect the industry. There are four main types of company cultures identified by the research.

Collaboration, engagement, employee agency, and idea sharing are the cornerstones of every group's or organisation's culture (Akmal et al., 2022).

## **RESEARCH QUESTION**

- How does the influence of organisational culture can effect on risk management understanding in Chinese engineering projects?
- What is the impact of Organisational Culture on Risk Management Understanding in Chinese Engineering regarding Project Performance?

## **RESEARCH METHODOLOGY**

### **RESEARCH DESIGN**

Quantitative data analyses were performed using SPSS version 25. The researchers used the odds ratio and the 95% confidence interval to assess the strength and direction of the statistical link. The researchers set a threshold considered statistically significant at  $p < 0.05$ . A descriptive analysis revealed key characteristics of the data. Data obtained via surveys, polls, and questionnaires, together with data analysed using computational tools for statistical evaluation, are often examined using quantitative approaches.

### **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**

Research mostly made use of questionnaire surveys to gather data. Part B used a 5-point Likert scale to evaluate the importance of various channels, both online and off, while Part A requested basic demographic information. The necessary information was culled from a wide range of secondary sources, including internet databases.

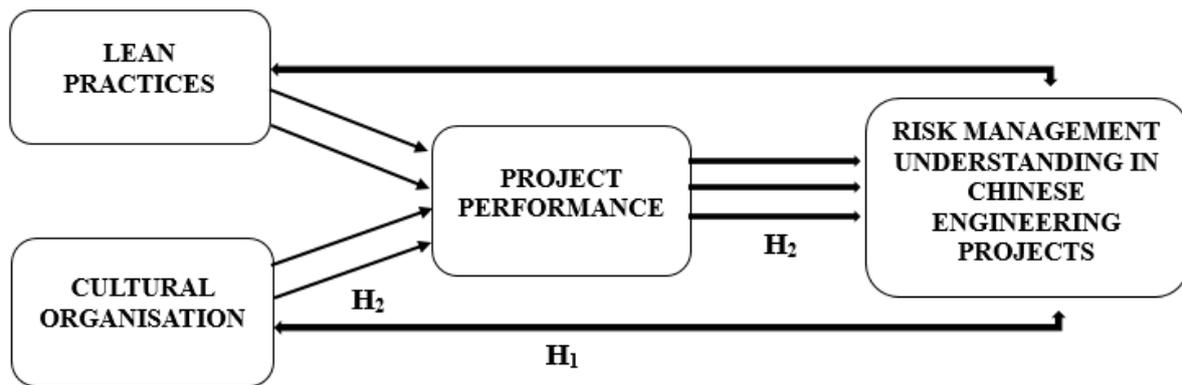
### **STATISTICAL SOFTWARE**

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.

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

Bartlett’s Test of Sphericity further confirmed the overall significance of the correlation matrices. The Kaiser-Meyer-Olkin sample adequacy value is 0.958. The researchers identified a p-value of 0.00 via Bartlett’s sphericity test. The correlation matrix was shown to not be a valid correlation matrix by a significant result from Bartlett’s sphericity test.

## INDEPENDENT VARIABLE

**Lean Practices:** Lean technique for value generation focusses on reducing resource usage and waste. On top of that, lean is an approach that is always looking for new ways to innovate in order to maximise value while minimising waste. The researchers can’t have one without the other. The goal of implementing lean techniques is to increase the value of any system or process by decreasing its waste and increasing its efficiency (Alassaf et al., 2020). These techniques, which are based on the Toyota Production System, aim to simplify operations by doing away with those that do not provide value. Engineering projects that adhere to lean principles maximise efficiency, maximise the use of available resources, and reduce the amount of time, money, and materials wasted. Waste reduction is central to lean concepts; it seeks to reduce the occurrence of unnecessary actions, delays, overproduction, and misuse of resources. Iterative cycles of improvement are fostered by these techniques via frequent process assessments and the implementation of modest improvements to enhance performance. Value stream mapping is a technique that visually depicts the flow of data and materials through a business; it may help identify inefficiencies and areas to reduce waste. In lean thinking, the client is always prioritised (Al-Dhaimesh, 2019).

**Organisational culture:** Employees’ demeanour and actions are shaped by the shared assumptions, norms, and practices that make up an organisation’s culture. As a result, it influences people’s shopping habits, problem-solving styles, and outlooks on their roles in society. Above all else, a company’s culture determines its character by dictating the expected and expected conduct of its employees, both on the job and off. Culture has a significant role in engineering and project-based businesses when it comes to risk management, performance, teamwork, and

communication (Alexander et al., 2022). This is particularly the case with engineering projects in China. In contrast to a poor culture, which may lead to inefficiency, disputes, and resistance to change, a strong and healthy culture encourages accountability, innovation, and trust. Organisational culture may be shaped by factors such as leadership style, past events, national culture, industry standards, and employee demographics. Hierarchical, adhocracy, clan, or market cultures are characterised by a lack of formal authority but a strong emphasis on collaboration, individual initiative, and responsiveness to changing circumstances (Ali et al., 2020).

### **MEDIATING VARIABLE**

**Project performance:** The extent to which a project achieves its goals within the constraints of time, money, scope, and quality is referred to as project performance. It finds out whether the outcomes are in line with stakeholder expectations and the initial objectives by assessing the project's efficacy and efficiency. Project performance is an essential indicator of operational success in engineering systems, particularly in a country like China that is experiencing rapid economic expansion and has a vast infrastructure (Alkhlaifat et al., 2019). The "iron triangle" of meeting deadlines, staying within budget, and completing the project to the requisite standards has long been used to judge performance. However, current evaluations take a broader view, including not just team performance but also resource utilisation, inventiveness, compliance with safety and environmental regulations, and stakeholder happiness. Effective decision-making, adaptable management, and comprehensive planning are shown by a project's good performance across its lifespan. The smooth completion of a project depends on all of these factors, which are in turn dependent on the company's culture, the lean methodology, and risk management. Inversely, dissatisfied stakeholders, worse quality, cost overruns, and delays may also emerge from poor performance. Because they provide crucial information for growth, success, and long-term planning, performance evaluations of their projects can end up being very helpful to the construction and engineering sectors (Al-Kuhail et al., 2021).

### **DEPENDENT VARIABLE**

**Risk Management Understanding in Chinese Engineering Projects:** Here, "risk management" means coordinating efforts to steer and control the project and its processes towards the achievement of predetermined risk objectives. This continuous process encompasses the whole project lifecycle. Risk management is an integral part of engineering projects in China. It entails identifying, assessing, and responding to potential threats to project objectives. It comprises making an effort to maximise good results and minimise bad ones. Risk management is an essential part of project management as it determines whether a project will succeed or fail. In risk management, potential threats to the project's objectives are identified,

assessed, and prioritised (Al-Kurdi et al., 2020). The next step is to look for ways to reduce or eliminate these dangers. One of the primary functions of risk management is to ensure that project managers are well-prepared for any eventuality. The capacity of a project management to avert setbacks, such as cost overruns and delays, depends on how promptly they address recognised risks. Project managers might potentially improve their decision-making skills by using risk management approaches. Looking at potential risks and their outcomes may help project managers identify which choice has the best chance of resulting in a successful project. Another advantage of risk management is that it may help the project stay on track and complete its objectives (Alvarenga et al., 2019).

**Relationship Between Organisational Culture and Risk Management Understanding in Chinese Engineering Project:** In the context of Chinese engineering projects, where the stakes are rather high, it is of the utmost necessity to develop a link between corporate culture and a knowledge of risk management. This is of the utmost importance. All of these aspects—the method in which people and teams understand risk, the manner in which they discuss it, and the manner in which they react to it are impacted by the culture of the organisation. The chance of proactively detecting and managing threats is impacted by the possibility of being blamed or interrupted because of the risk of being interrupted (Amoah & Pretorius, 2019). This is because there is a possibility that someone may interrupt the researcher or blame the researcher. The senior leadership of a team is supposed to display authority, unity, and respect for the team's elders in accordance with the cultural norms of China. The significance of this facet of Chinese culture cannot be overstated. This is especially true in the context of engineering projects, which are characterised by a high degree of power concentration at the top. It is the concepts of Confucius that serve as the impetus for this dynamic, and they are the origin of this energy. There is a possibility that those who are lower on the totem pole in the organisation may be reluctant to voice their concerns about possible dangers if there is a significant gap between them and those who hold higher positions in the organisation. The reason for this is because they are more likely to be seen as being of less significance. Because the project team could consider the risk management procedures to be just formal and procedural, it is possible that they were fail to recognise and apply them in an efficient way. This is a possibility because of the fact that they might have this perception. The situation is made even more difficult by the fact that in collectivist cultures such as China's, where there is a heavy focus on group agreement and the maintenance of one's image, it may be difficult to conduct honest risk assessments and to provide early warnings about possible problems. In the presence of a working environment that encourages and supports open communication, psychological safety, and continual learning, there is a chance that an individual's knowledge of risk management may be dramatically influenced. This is because of the connection between these three factors. Whenever it comes to circumstances such as these, there is a relationship between the potential of

teams communicating with one another, reflecting on their successes and failures, and doing risk assessments for the scenario together (Animi & Owusu-Manu, 2021).

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

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

**H<sub>1</sub>: There is a significant relationship between Organisational Culture 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>	75207.347	135	4700.459	572.417	.000
<b>Within Groups</b>	681.563	513	8.212		
<b>Total</b>	75888.910	648			

In this study, the result is significant. The value of F is 572.417, 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 Organisational Culture and Risk Management Understanding in Chinese Engineering Projects**” is accepted and the null hypothesis is rejected.

**Relationship between Organisational Culture and Risk Management Understanding in Chinese Engineering Projects through Project Performance:** With regard to the knowledge of risk management inside the company, the performance of engineering projects in China serves as a mediator between the organisational culture and the understanding of risk management. When it comes to engineering and construction projects in China, this is the situation (Anosike et al., 2021). It is feasible to describe the culture of an organisation as the collection of assumptions, values, and beliefs that are typically held by the members of the company. This culture is what determines how people act when working inside the business. The manner in which risks are perceived and dealt with inside an institution is significantly influenced by the culture of that individual or business. When it comes to risk management, the culture of a firm is a vital component that must be taken into account. It is abundantly evident that there is a relationship between the culture of the organisation and the dynamics of the team, the flow of information, and the decision-making processes that are now being taken into account. When it comes to engineering projects in China, the cultural and institutional context has a significant role in deciding whether risk management is seen as a strategic function or a procedural formality (Bahamid et al., 2022).

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

**H<sub>02</sub>: There is no significant relationship between Organisational Culture and Risk Management Understanding in Chinese Engineering Projects through Project Performance.**

**H<sub>2</sub>: There is a significant relationship between Organisational Culture and Risk Management Understanding in Chinese Engineering Projects through Project Performance.**

**Table 3: H1 ANOVA Test.**

<b>ANOVA</b>					
<b>Sum</b>					
	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
<b>Between Groups</b>	39588.620	256	5625.517	1070.711	.000
<b>Within Groups</b>	492.770	392	5.254		
<b>Total</b>	40081.390	648			

In this study, the result is significant. The value of F is 1070.711, which reaches significance with a p-value of .000 (which is less than the .05 alpha level). This means the “**H<sub>2</sub>: There is a significant relationship between Organisational Culture and Risk Management Understanding in Chinese Engineering Projects through Project Performance**” is accepted and the null hypothesis is rejected.

## **DISCUSSION**

Analysing the study’s key points is essential for learning about the relationships between Lean techniques, organisational culture, project success, and understanding risk management in engineering projects in China: Maximising operational efficiency is the goal of lean management approaches, which aim to reduce waste, optimise resources, and simplify processes. When applied to engineering projects, lean methods may improve construction procedures, reduce delays, and maximise value for the project team and investors. The continuous improvement and problem-solving ethos of lean methodologies may also influence how risks are identified, evaluated, and countered. In engineering projects, “organisational culture” refers to the shared values, norms, and practices that influence team members’ actions and decisions. Corporate cultures that prioritise teamwork, transparency, and shared objectives may help employees better understand and manage risks. Culture may influence how well a team shares risks, how much people are willing to take risks, and how much risk awareness there is. Project performance is defined as the extent to which project objectives are met in

relation to time, money, scope, and quality. It is feasible to use project performance as a measure of good risk management since projects that are well-executed are more likely to have identified and proactively dealt with potential dangers. Risk management understanding is the capacity of project teams to identify, assess, and resolve risks throughout the project lifecycle. This ensures that any potential threats to the project's success are understood, communicated, and mitigated. The Relationships between Lean Methods, Organisational Culture, and Risk Management. By putting an emphasis on process efficiency, lean techniques aim to improve the overall flow of engineering project operations while reducing waste. By focussing on reducing inefficiencies, lean has the potential to lessen the risks of delays, cost overruns, and resource shortages. Improved risk management practices are another benefit of Lean's emphasis on continuous improvement. By taking a proactive stance in identifying and mitigating risks, Lean's iterative nature allows for a deeper understanding of risk management.

## **CONCLUSION**

The purpose of this research was to investigate the connection between project risk management and project efficiency, with project culture serving as a moderator and efficiency acting as a mediator. It is not necessary to exercise any form of control over the project's culture since it has already been well-established. Within the context of Chinese organisations, there is no moderating influence on the link between the quality of the project and its efficiency. In addition to this, many studies have shown that the efficiency of a project acts as a mediator between the quality of the project and the management of risks. With proper risk management, it has been shown that the quality of a project may be significantly improved. Within the framework of China, the purpose of this study is to shed light on the significance of project risk reduction and the possible influence that it may have on the efficiency of the project. One must first have a firm grip on the notion of project efficiency in order to have a complete understanding of the context of the project, the mentality of the managers or workers who are participating, and the ways in which these elements influence risk management and the link between efficiency and quality. Developing strategies is something that companies and project owners could do in order to guarantee the success of the project and the delivery of it without any risks. These strategies include doing the right things to manage risks, including identifying and correcting the most serious issues that might potentially destroy the project. Project risk management is an essential component of the project, and these approaches entail doing the right things to manage risks. The purpose of risk management is to ensure that individuals are aware of the actions they need take in order to minimise or get rid of potential dangers. In the event that they adhere to this technique, they should have no issue completing the task at hand. The organization's capacity to properly manage project risk and educate its people on what to do in the event that they face project risk is a critical factor in determining whether or not the project will go forward successfully. The vast

majority of businesses are unable to successfully apply risk management procedures, which may result in the failure of a project or, at the absolute least, make it exceedingly challenging to complete.

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