

EFFECTIVE PROJECT MANAGEMENT PRACTICES IN CONSTRUCTION INDUSTRY: QUANTITATIVE STUDY

Rashmi Jaymin-Sanchaniya, Dany Thomson, Antra Kundzina, Ineta Geipele
Riga Technical University, Latvia
rashmi.sanchaniya@rtu.lv, ineta.geipele@rtu.lv

Abstract. This study delves into the crucial elements of project management influencing the outcomes of construction projects, focusing on risk management, stakeholder management, and people management. It underscores the importance of meticulous risk management indicators in gauging risk and designing strategic plans at the project and organisational levels. Furthermore, the study illuminates how adept project management factors, including stakeholder and people management, contribute to minimising delays, controlling costs, and increasing construction quality. The critical role of people management is highlighted in addressing the scarcity of skilled labour, thus increasing productivity and safety. Due to the large number of stakeholders and the need to identify and reduce potential risks, the research also emphasises the importance of stakeholder and risk management practices in construction projects. In this study, a quantitative method was employed. The quantitative data comprises the statistical analysis of the construction industry using graphically presented data from the analysis of the inferential statistics (mean, frequencies) of the data set obtained from survey of project managers. The study concludes with recommendations to improve project management procedures and project outcomes in construction projects, focussing on formulating stakeholder management plans, fostering open communication, nurturing relationships with stakeholders, employing stakeholder engagement tools and imparting effective stakeholder management techniques to the project team. These insights provide actionable guidance to enhance the success of construction projects in the market. The findings indicate a notable gender imbalance among project managers and highlight the importance of effective conflict management and incentives in fostering a productive environment. Stakeholder communication emerged as paramount, while risk management was identified as the most critical component for successful project outcomes. Furthermore, a negative correlation between stakeholder management and project output suggests the need for balanced strategies to mitigate adverse impacts on project efficiency. This study underscores the significance of proactive risk management and strategic stakeholder engagement in navigating the complexities of construction projects.

Keywords: construction projects, project management, stakeholder management, risk management, people management.

Introduction

Project management is the skill of finishing one or more projects while managing requirements like scope, budget, time, and quality. The project manager's primary duties include coordinating resources, carefully planning each project phase, prudently allocating budgets, serving as a liaison between the team and clients, and inspiring motivation to keep everyone focused on achieving exceptional results. [1]. However, to guarantee efficient operation, project management necessitates careful oversight of numerous operational aspects within a specific domain. This covers a broad range of tasks, such as sales, marketing, manufacturing, and other areas, that the manager oversees and improves to support the organization's success. [2].

The construction industry now has a new tool to address the gap between business objectives and results and enhance its knowledge and practice: a new conceptual framework that integrates the business case of the project, governance functions, and the business model of the design team offers all of this [3]. To attain a high degree of efficiency in construction management, including efficient project supervision, planning, and conflict resolution during construction, building information modelling is crucial [4].

To improve project coordination, it can also instruct fabricators and subcontractors to provide their input early. However, in Nigeria, its application is hampered by a lack of leadership support, inadequate communication between consultants, and a lack of knowledge about the use of building information modelling. This kind of management system provides numerous opportunities to enhance the understanding, planning, and efficiency of construction projects [5]. To ensure effective time management and competitive levels of quality, this study can serve as a guide for all parties involved in construction projects [6].

The study [7] discovered that the business trends, challenges, and variances in the construction industries of Pakistan and the UK were essentially the same, despite the two countries having different

economic systems. As a result, risk management influenced project planning and project success similarly in both economies and in a generally positive way. This research [8] provides a hierarchical risk classification based on examination of case studies and project management functions that addresses the most important risks. The most important risk factors that have the biggest influence on project goals must be identified and categorised for effective risk management in construction projects. It comes to the conclusion that risk management is essential for construction operations in order to lower losses and boost profitability. According to this study [9] the distribution of resources, efficiency, influence, and comprehension of construction project risk management (PRM) are shown in Singapore. It shows that PRM accounted for a larger portion of project budget than labour and time, and that allocating more funds did not ensure higher PRM effectiveness or greater confidence in project goals being met. It also reveals how little the survey firms knew about PRM. In this research [10] a new approach that makes use of renewable energy sources is suggested to control risks in intricate construction projects. This paper develops an innovative approach to risk measurement for construction projects with the goal of enhancing the efficacy of risk management [11].

The results shown in [12] indicate that there are a number of job characteristics, with the most important ones being task importance, work autonomy, and salary. On the other hand, [13] analyses the effects of labour skills – both positive and negative – on project performance, the current study contributes to the body of knowledge on construction project management. To help practitioners identify the labour skills required for the project successful completion, a proposed model was developed. This research [14] not only defines and classifies roles but also provides evidence of the transition in construction project management from traditional project management – which emphasises planning and control – to new project management, which places a greater emphasis on people and cooperative relationships. The study [15] recommends that appropriate and ongoing training programmes for construction projects be used to develop human resources in the industry. The investigation found that the construction industry has benefited greatly from the application of total quality management, and it recommends that workers receive regular training while taking the needs of the organisation, the employees, and technological advancements into consideration [16].

Developing a strategy for managing stakeholders can help coordinate and manage the construction project. The key elements impacting the stakeholder management process are hiring a highly qualified project manager, honestly assessing potential solutions, maintaining effective stakeholder communication, setting common goals and objectives for the project, and looking into needs and expectations [17]. The article [18] provides insightful advice and highlights the significance of implementing effective stakeholder management strategies to secure and maintain stakeholder support throughout construction projects in various health facility contexts. The result [19] is in line with the research examined in this study, indicating that improved stakeholder management techniques are required to raise the likelihood of project success. The project management team may use this study as a resource when they methodically discuss tactical approaches to stakeholder management in building projects [20].

The extensive literature review highlights three critical factors that significantly influence project management success: people management, stakeholder management, and risk management. These elements require further detailed evaluation to understand their interdependencies and the extent to which they impact the overall effectiveness of project management factors.

This research observes the effect of project management factors that significantly influence the outcomes of construction projects, with risk management emerging as the most critical factor in achieving successful results.

The purpose of this study is to investigate important project management elements that influence the management of individual construction projects. The foundation of the study is an analysis of a survey conducted among construction companies in India. Special attention is paid to the construction sector. The second section explains the process of choosing the data and sample. The empirical methodology and results are described in the third section, and a conclusion is given in the final section.

Materials and methods

The methodology employed in this study involved a survey-based approach to investigate various facets of project management within the construction industry. A sample population of project managers was selected, and data were collected using survey instruments designed to gather information on age distribution, gender demographics, project types, and management factors. Descriptive statistics, including means, percentages, standard deviations, and frequencies, were used to analyze the data, supplemented by inferential statistics such as the Kolmogorov-Smirnov test and Pearson's correlation to examine relationships between variables. Qualitative analysis was conducted to gain insights into stakeholder management, risk factors, and project outcomes. Ethical considerations regarding participant anonymity, confidentiality, and informed consent were addressed, with potential limitations of the study transparently discussed. The implications of the findings for project management practice were outlined, along with recommendations for improvement and suggestions for future research. Overall, the methodology aimed to provide transparency, reliability, and validity to the study findings and interpretations.

Inferential statistics, such as the Kolmogorov-Smirnov test and Pearson's correlation, were employed to examine relationships between variables, such as the correlation between stakeholder management and project output. These analyses allowed for identifying significant associations and patterns within the data, providing insights into factors influencing project management effectiveness.

Results and discussion

An important understanding of the age distribution of project managers in the company surveyed was made possible by the descriptive statistics. Most of the company project managers appear to be in their early twenties, based on the calculated mean age of 39.05 years. The respectable variation in the ages of the project managers, which may span a wide range of age groups, is indicated by the moderate standard deviation of 8.872 years.

The survey shows that most project managers are male (66.7%) compared to female (33.3%). Table 1 indicates a possible gender imbalance in the construction industry. However, this is just one aspect of gender diversity and does not wholly explain the overall situation. More studies are needed to understand the issue and promote inclusivity in the workplace.

Table 1

Project manager by gender (created by the authors)

Parameters		Frequency	Percent	Valid percent	Cumulative percent
Valid	Female	22	34.3	34.3	34.3
	Male	44	65.7	65.7	100.0
-	Total	66	100	100	-

It is clear from the data in Table 2 that most of the participants were working on civil projects, with commercial, medical, IT-related and various other project types following in decreasing order. These results highlight remarkable participation in various construction projects spanning various industries. This demonstrates the business extraordinary ability to operate across various industries and highlights its potential for further portfolio diversification.

Table 2

Project structure as project managers (created by the authors)

Parameters		Frequency	Percent	Valid percent	Cumulative percent
Valid	Civil	36	54.5	54.5	54.5
	Commercial	16	23.7	23.7	78.3
	IT-related	4	6.1	6.1	83.3
	Medical	6	9.1	9.1	92.4
	Other	5	7.6	7.6	100.0
	Total	66	100.0	100.0	-

The four primary components of the management of influential people are positive incentives, adverse incentives, positive conflicts, and negative conflicts. Among these, positive incentives ranked second in importance, while effective management of negative conflicts emerged as the most crucial factor. Constructive conflicts demanded the least amount of managerial attention. It is essential to efficiently address negative conflicts and implement positive incentives to cultivate a highly productive and successful project environment. This approach fosters an environment where effective resolution of conflicts and the implementation of motivational incentives contribute significantly to success.

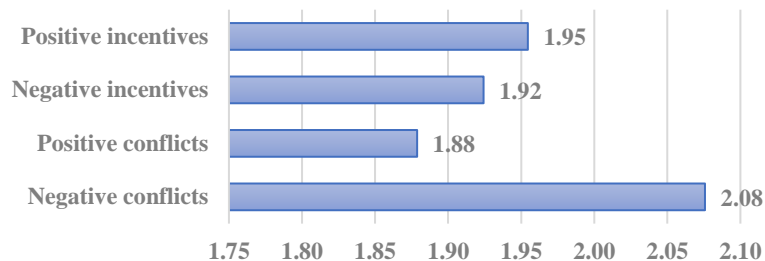


Fig. 1. Evaluation of people management factors (created by the authors)

Project managers should prioritise stakeholder communication, which received the highest evaluation score of 1.97 on a three-point scale and is crucial to the success of the company's projects. Project managers can effectively manage conflicts, address concerns, and keep stakeholders informed by communicating frequently and clearly. With a score of 1.94, building relationships with stakeholders is also essential, highlighting the importance of forming and maintaining strong bonds to improve collaboration and project results. Stakeholder engagement is crucial, but with an evaluation score of 1.85, it is rated less important than relationship building and communication. To manage stakeholder expectations and win their support, project managers must focus on developing solid relationships and effective communication.

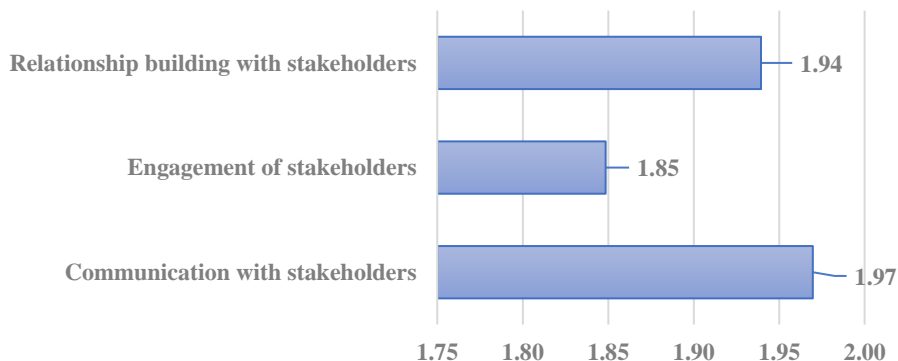


Fig. 2. Evaluation of stakeholder management factors (created by the authors)

The research conclusions highlight crucial elements that project managers must successfully manage for successful project outcomes. Component material quality is the most critical factor (evaluation score 2.11), followed by variations in labour productivity and the unpredictability of the availability of limited resources (both scores 2.08). Managing uncertainty resulting from incomplete information (score 2.03), lack of employee qualifications, flawed design and estimation, and competing interests must also be a priority for project managers. Monitoring the production process and suitability of technology and managing the risk of delayed payments are crucial (score 1.83). We should develop effective strategies to reduce risks that humans cannot control, such as natural disasters that still threaten the project. Proper techniques can address these factors, leading to project success and decreasing overall risk.

The findings of Figure 4 highlight a crucial aspect of construction projects: risk management, which most project managers believe is the most essential issue to address. This finding confirms that to guarantee successful project results, project managers must recognise the critical importance of identifying, evaluating, and successfully managing potential risks at all stages of the project life cycle.

The construction industry requires a proactive approach to risk management due to its inherent high risk and uncertainty. Implementing robust risk management procedures can significantly reduce the adverse effects of potential risks on the project. In complex and unpredictable situations, emphasising and implementing effective risk management strategies becomes essential to guide the project toward success.

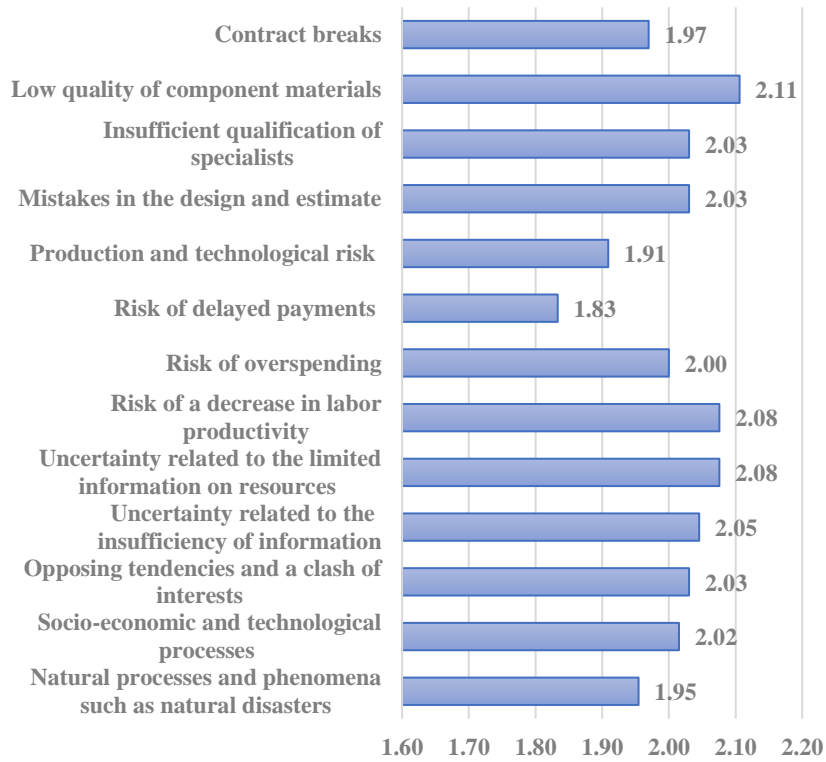


Fig. 3. Evaluation of risk management factors (created by the authors)

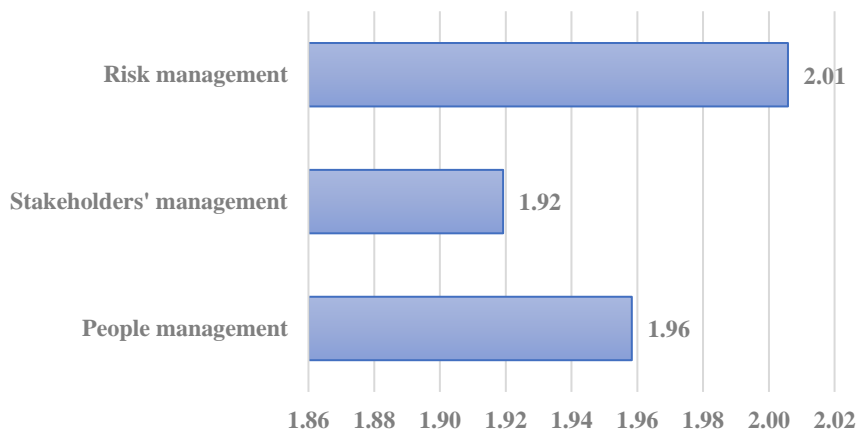


Fig. 4. Comparison of all three factors (created by the authors)

The Kolmogorov-Smirnov test with a single sample was conducted on four variables: management of personnel, management of stakeholders, management of risk, and output. Each variable mean, standard deviation, and most significant deviations from a normal distribution are shown in Table 3. The stakeholder management variable showed the p-value of 0.002 and the Kolmogorov-Smirnov Z score of 1.886, indicating a significant deviation from a normal distribution. People management, risk management, and output, with p-values of 0.082, 0.576, and 0.123, respectively, did not, however, demonstrate statistically significant departures from a normal distribution. These findings and further statistical analysis will be crucial in understanding the sample variable distribution patterns.

Table 3

One-sample Kolmogorov-Smirnov test (created by the authors)

Parameters		People M	Stakeholders M	Risk M	Output
N		66	66	66	66
Normal Parameters a, b	Mean	1.9583	1.9192	2.0070	2.1307
	Std. Deviation	0.33565	0.28681	0.22487	0.25328
Most Extreme Differences	Absolute	0.155	0.232	0.096	0.145
	Positive	0.127	0.207	0.096	0.145
	Negative	-0.155	-0.232	-0.083	-0.082
Kolmogorov-Smirnov Z		1.2	1.886	0.781	1.181
Asymp. Sig. (2-tailed)		0.082	0.002	0.576	0.123

a. The test distribution is normal.

b. Calculated from the data.

The study used Pearson's correlation to analyse the relationships between the variables if most of them had a normal distribution. As shown in Table 4, the result shows a strong inverse relationship between output and stakeholder management (correlation coefficient of -0.391, p-value of 0.001), showing that output decreases with increased stakeholder management and vice versa. With p-values ranging from 0.287 to 0.675, the correlation between people management, output and risk management and the other variables was not statistically significant. The findings show that stakeholder management reduces output, most likely because of the time and resources needed, as well as any potential obstacles that stakeholders may put up. The absence of a significant correlation could be caused by other factors that the study overlooked.

Table 4

Correlation results (created by the authors)

Parameters		People M	Stakeholders M	Risk M	Output
People M	Pearson Correlation	1	-0.155	0.031	0.133
	Sig. (2-tailed)		0.213	0.803	0.287
	N	66	66	66	66
Stakeholders M	Pearson Correlation	-0.155	1	0.131	-0.391**
	Sig. (2-tailed)	0.213		0.294	0.001
	N	66	66	66	66
Risk M	Pearson Correlation	0.031	0.131	1	-0.053
	Sig. (2-tailed)	0.803	0.294		0.675
	N	66	66	66	66
Output	Pearson Correlation	0.133	- 0.391**	-0.053	1
	Sig. (2-tailed)	0.287	0.001	0.675	
	N	66	66	66	66

**. The correlation is significant at the 0.01 level (2-tailed).

Stakeholder management and project output in projects may be negatively correlated when stakeholder interests and project objectives conflict. Stakeholder management activities are necessary to keep relationships positive and meet expectations, but they might not directly progress project goals, which could result in lower output. Project managers must carefully balance the needs of stakeholders with the goals of the project to succeed. Minimising the negative impacts of stakeholder activities on project performance requires the implementation of effective stakeholder management strategies. In order to guarantee successful project outcomes, project managers need to recognise and tackle these obstacles.

Conclusions

1. The study identified that the mean age of project managers is 39.05 years, with a moderate age variation between them. A significant gender imbalance was also observed, with men comprising 65.7% of the sample, highlighting an area for future improvement toward inclusivity in the workplace.
2. The effective management of negative conflicts was identified as crucial to foster a productive project environment. Positive incentives also play an important role, emphasizing the need for balanced people management strategies to improve the project success.
3. High priority was placed on communication with stakeholders, which is essential for the successful management of construction projects. The study suggests that effective communication and relationship building are more critical than broader stakeholder participation in achieving positive project outcomes.
4. Risk management was highlighted as the most critical component, with the need for project managers to proactively identify, evaluate, and manage potential risks throughout the project lifecycle. This proactive approach is essential in the inherently risky construction industry.
5. A significant negative correlation between stakeholder management and project output indicates that excessive stakeholder management could hinder project efficiency. This finding underscores the importance of balancing stakeholder needs with project goals to minimise negative impacts on project performance.

Author contributions

Conceptualisation, I.G., A.K.; methodology, R.J.S., D. T., A.K., and I.G.; software, R.J.S. and D.T.; validation, A.K. and I.G; formal analysis, R.J.S. and D.T.; investigation, R.J.S. and D.T.; data curation, R.J.S. and D.T.; writing – original draft preparation, R.J.S.; writing – review and editing, R.J.S.; project administration, A.K. and I.G; funding acquisition, A.K. and I.G. All authors have read and agreed to the published version of the manuscript.

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