



PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 23 ISSUE 4 (2025), Page 72 – 82

DETERMINING FACTORS DURING THE PROJECT LIFE CYCLE ON HIGH-RISE BUILDING PROJECT PERFORMANCE IN INDONESIA

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Abstract

Infrastructure is a basic human need that supports all daily activities. In order to advocate for government programs in providing quality infrastructure, it is necessary to implement projects that achieve good performance. One way to meet this objective is to focus on the project life cycle process. Currently, there are still deviations in project development management during the project life cycle phase that lead to delayed projects, losses, and so on. This study aims to find the determining factors that cause poor project performance, especially in high-rise building projects. The study used qualitative analysis to process data from various library sources. Additionally, data processing was performed using SPSS version 24.0, with a total of 18 respondents (pilot testing). The results identified 5 highest determining factors, namely incremental (incr), preparation (prep), behaviour (beha), iterative (iter), and briefing (brie) in each of the project life cycle phases.

Keywords: Project Life Cycle, Project Performance, High-rise Building Project

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INTRODUCTION

Indonesia is a well-documented country where much of the population consumes domestic goods and services, including architectural services, consulting engineers, economic consultants, building materials, financial services, legal consultants, construction equipment, and transportation and communications. These services prove the substantial contribution of the building industry across Indonesia. Accordingly, the contributions of this aspect are apparent in the total value of construction and building work, which makes up a great percentage of the total Gross Domestic Product (GDP). The Indonesian construction industry works in various sectors, such as residential and non-residential construction, as well as those that relate to agricultural or irrigation structures, infrastructure (roads, bridges, ports, electricity, gas, water, and communications), and others (Raftery et al., 2023). Nowadays, governmental projects are significant, with most of them focusing on office and housing construction (Riantini et al., 2017). The construction work on high-rise buildings is likely to be associated with three significant issues: work injuries, hazardous material exposure, and health-related complications. The possible accidents that may afflict the high-rise construction workers include: (1) falling off a ladder or scaffold or failing to wear personal protective equipment; (2) being hit by construction vehicles, such as cranes, forklifts, or backhoes; (3) being electrocuted due to undefined electrical systems with exposed cables; and (4) becoming the target of falling material in the workplace. Other critical issues, such as a lack of human resources, poor infrastructure and facilities, failure to translate academic knowledge into practice, fierce arguments between various project members, and inability to perform construction work contracts, are also of concern.

LITERATURE REVIEW

Project Life Cycle

Organizational process assets refer to documented plans, processes, policies, procedures, and knowledge bases belonging to the executing organization. Such assets may be artifacts, practices, or knowledge, including that which is common or exists in one or more of the organizations involved in the project and is useful for the purpose of executing or managing the project. These process assets are documented strategies and frameworks, plans, schedules, and other resources, including stipulations, policies, procedures, and knowledge bases tailored to and employed by the executing organization (PMI, 2017). Organizational processes and procedures for executing project work include, but are not limited to: (1) Initiation; (2) Planning; (3) Execution; (4) Control and Monitoring; and (5) Closing.

When it comes to projects related to the topic of interest, there are a lot of differences in the nature of projects and the actual way of performing the business. In simpler terms, there is no single answer that can serve as a solution

to all problems. To summarize, as can be observed in the custom solution project, it is essential to outline a project life cycle that is better suited to the project than the standard project life cycles. It is during this stage that the acronym stating all of the existing five types of methodology in circulation becomes critical, namely predictive, iterative, incremental, agile, and hybrid (PMI, 2017; Teoh et al., 2021). For example, the same custom solution that is being assessed can be transported to the end user instead of creating tens to hundreds of assessments for that purpose in the projected life cycle of a predictive project (Teoh et al., 2021).

The project life cycle is a concept of phases that are fundamental and should be successfully gone through by a project from its initiation to its closing (PMI, 2017). According to the data collected in 2008 from the Project Management Institute (PMI) of the United States and Association for Project Management (APM) of the United Kingdom, a general project life cycle commonly contains the following five phases: Initiating, Planning, Executing, Control & Monitoring, and Closing (Wang & Chen, 2023).

Project Performance

In regard to the performance aspect, each company should engage a project manager and their team with experience in performing the work appropriately, which is not limited to time performance, cost impact, and quality aspects. However, the control of health, safety, and the environment is a prescription that has to be complied with for the mastery of occupational health. In terms of enforcing regulations, which include requirements stated in the contract of work and several other regulations, the project manager's role can be instrumental in ensuring the project's successful performance (Mairizal et al., 2020; Adriadi et al., 2024).

As indicated in the study by Syamil et al. (2021), it was discovered that the majority of the Project Management practitioners in Indonesian projects are users or customers of the projects being undertaken, and that the areas of project schedule, cost, human resources, and risk management performance are variables that actually affect customer satisfaction in a significantly positive manner. Contrary to expectations, project schedule, communication, and stakeholder management performance do not significantly influence overall customer satisfaction (Yuslim et al., 2023).

According to Ladika and Sanggoro (2024), if stakeholders wish to make a direct contribution to any modelling condition, they should possess as many project interests as possible. Referring to the project analytical framework discussed earlier, it is clear that competence always has a positive impact on the results of project performance. Hence, the improvement in the competence of stakeholders, under any modelling condition, can foster positive improvement in the project performance results, without negation.

In project management, a variety of research has been conducted to identify the competency aspects that can be used or observed in successful or highly rated project managers (Sirau et al., 2024). Such research entails the collection of data from project management practitioners. In addition, although most of the reviews focus on contexts from experience and literature, occasionally it is also possible to encounter attractive papers that are rich in empirical evidence or, ideally, theoretical and model clarifications (Mairizal, 2020; Adriadi et al., 2024).

High-Rise Building

According to Adriadi et al. (2024), a high-rise building is an infrastructure that has a high structure, such as residential areas, apartments, and offices. However, a building can only be considered in this category if it meets several characteristics. These include meeting the minimum height of 23 meters, with elevators and a strong structure.

Many studies from the literature provide a distinct definition of high-rise buildings. Nonetheless, most of them only mention a single characteristic of high structures. Apart from that, even though high-rise buildings are widely discussed in terms of the design of their structural strength due to wind loads, earthquake loads, and others, there has been no accurate and definitive definition of the infrastructure (Adriadi et.al. 2024).

Furthermore, based on a study in the research by Adriadi et al. (2024), the definition of a tall building can be found in Law of the Republic of Indonesia No. 28 of 2002 concerning buildings, Article 1. Here, the definition given is the physical structure of the construction result that is closely related to the place, above and/or under the ground, and/or water, used by human beings for certain activities, placement or dwelling purposes, worship, commercial, social, cultural, and specific purposes. According to Article 1, the general function of a building is differentiated into several aspects.

Another opinion from Effendi et al. (2021) stated that high-rise buildings in big cities are very important for business, economic, educational, housing, and entertainment activities, especially in the current era. The transition from horizontal to vertical buildings occurs because of the scarcity of land in the city. This has led to the development of different types of large buildings and skyscrapers. Therefore, the issue is more than a question of meeting the need for space, but rather the search for technology in areas that underpin the construction of high-rise buildings, including structures, mechanics, electricity, and materials used. Besides, the rapid rate of innovations in the construction industry has also contributed to the development of different high-rise building architectural designs, including their functionality during operation and maintenance to meet the objectives of being eco-friendly, efficient, and effective. At present, the environmental impacts have become challenges that require a universal approach

to minimize the negative outcomes in comparison with the past. Due to these obstacles, the design of high-rise buildings has become a rather difficult process.

According to Astarini & Utomo (2020), as a concept, Performance-Based Building Design (PBBD) calls for strategic emphasis in terms of integration in building design from the viewpoint of performance specifications. PBBD gives an approach in the design process in the form of a thinking approach, more concerned with the usage of users/occupants. The first is the occupancy-related group, which includes indoor environmental quality, visual comfort, accessibility, acoustical comfort, building quality, and maintainability; the second is total management of energy loads and building sustainability and business processes; the third is integration with other design consultants and building operations; and the fourth is risk of loss, including structural safety and fire safety.

Construction management is also anticipated to assist the contractors in avoiding project delays arising from a change of design. Construction management, as a consulting company for owners, has to prepare the abilities and deliberate all of the owner's input, then oversee and enable the consultants in integrating them into the design (Kaming & Saputra, 2013; Salim & Sujana, 2020). In addition, construction management must bring the issue of convenience into play because it acts as an interface between consultants and contractors. The second factor that is considered to be the main reason for project delays is the insufficient level of planning and controlling, both of which are cognate activities in construction project management.

Project management is a form of management that deals with the coordination of a set of activities to achieve a project goal. Data from the research study established that contractor project teams in Indonesia are currently not well-equipped in construction management. Moreover, planning is affected by the time required for material acquisition, the time when workers are likely to be needed in a project, and the time when equipment must be hired. Hence, contractor project teams need to grow accustomed to preparing detailed working plans, such as risk and risk response descriptions (Salim & Sujana, 2020).

In a study, Chicoca & Utomo (2019) conclusively identified a significant correlation between cost drivers and project cost performance in Surabaya. Seven cost components were considered and classified according to their importance and potential effect. Due to its high ranking, the model postulated that the property market and construction industry play the most influential role, followed by property characteristics, socio-economic factors, and project component cost factors. The last of the seven factors that was considered, and therefore the least significant, was the regulatory factor. In terms of significance, the project stakeholder factor had the most influential impact, followed by the property market and construction industry, project characteristic factors, and project component cost factors.

Project Performance Summary

Several factors of project performance during project life cycles are discussed in Table 1.

Table 1: Several performance factors of the project life cycle

	Initiating (X1)	Planning (X2)	Executing (X3)	Control & Monitoring (X4)	Closing (X5)
PMI (2017)	predictive, iterative, incremental, agile, hybrid	predictive, iterative, incremental, agile, hybrid	predictive, iterative, incremental, agile, hybrid	predictive, iterative, incremental, agile, hybrid	predictive, iterative, incremental, agile, hybrid
Teoh et.al. (2021)	predictive, iterative, incremental, agile, hybrid	predictive, iterative, incremental, agile, hybrid	predictive, iterative, incremental, agile, hybrid	predictive, iterative, incremental, agile, hybrid	iterative, incremental,
(APM, 2019);	contextual, technical, behavioural	contextual, technical, behavioural	contextual, technical, behavioural	contextual, technical, behavioural	contextual, technical, behavioural
(Wang & Chen, 2023)	preparation, briefing	design, coordination, technical	manufacturing , construction	manufacturing , construction	handover
Mairizal et.al. (2020)	knowledge, technical, personal	knowledge, technical, personal	knowledge, technical, personal	knowledge, technical, personal	knowledge, technical, personal
Edrizal et.al. (2020)	knowledge, technical, personal	knowledge, technical, personal	knowledge, technical, personal	knowledge, technical, personal	knowledge, technical, personal
Mairizal et.al. (2023)	knowledge, technical, personal	knowledge, technical, personal	knowledge, technical, personal	knowledge, technical, personal	knowledge, technical, personal
Adriadi et.al. (2024)	knowledge, technical, personal	knowledge, technical, personal	knowledge, technical, personal	knowledge, technical, personal	knowledge, technical, personal
Syamil et.al. (2021)	project schedule, cost, human resources, risk management	project schedule, cost, human resources, risk management	project schedule, cost, human resources, risk management	project schedule, cost, human resources, risk management	project schedule, cost, human resources, risk management
Astarini & Utomo (2020)	project schedule, cost, human resources, risk management	project schedule, cost, human resources, risk management	project schedule, cost, human resources, risk management	project schedule, cost, human resources, risk management	project schedule, cost, human resources, risk management

	Initiating (X1)	Planning (X2)	Executing (X3)	Control & Monitoring (X4)	Closing (X5)
Salim & Sujana (2020)	project schedule, cost, human resources, risk management	project schedule, cost, human resources, risk management	project schedule, cost, human resources, risk management	project schedule, cost, human resources, risk management	project schedule, cost, human resources, risk management
(Ladika & Anggoro, 2024)	stakeholder, competence	stakeholder, competence	stakeholder, competence	stakeholder, competence	stakeholder, competence
Chicoca & Utomo (2019)	stakeholder, cost	stakeholder, cost	stakeholder, cost	stakeholder, cost	stakeholder, cost
Total factors	19	19	19	19	15

RESEARCH METHODOLOGY

The current study is a descriptive analysis in which the research method used was aimed at identifying variables that affect the project life cycle and, in turn, the performance of high-rise building projects in Indonesia. The methodological steps used and factors selected during the project life cycle that affected performance are presented in Figure 1 and Table 1.

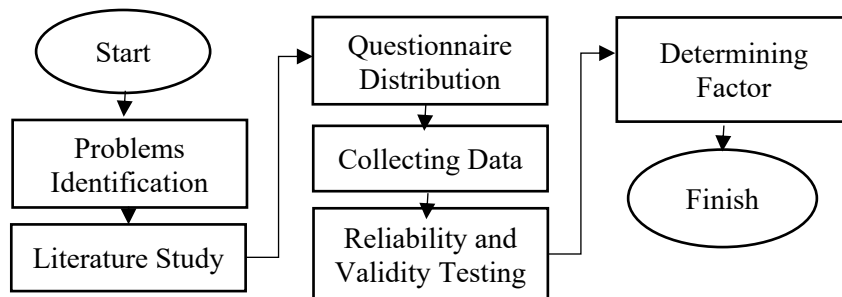


Figure 1. Research Methodology

After ratification was carried out for all factors in Table 1, a total of 17 factors in the life cycle across 5 phases were obtained from a pilot test on 18 respondents (n+1). These data were obtained from a high-rise building contractor company using the purposive sampling method.

A total of 18 professionals from the construction management field who managed high-rise building projects for more than twenty years participated in the survey. The questionnaire displayed 17 factors through descriptive and qualitative questions to the participants.

ANALYSIS AND DISCUSSION

The study started its analysis section by validating reliability scores with alpha values > 0.70 and validity standards that exceed r-table values. Pearson and coefficient characteristics: r-table = 0.4000 according to Pearson's Product Moment with a significance level of 0.05. The results of the SPSS data analysis showed a minimum r-count result = 0.348 (contextual), and the factor is deemed ineffective. For the reliability test, the Cronbach Alpha value ranged from 0.948 to 0.954 (Table 2). In addition, the highest mean calculation result was 4.5556 (incremental), and the lowest mean was 4.0000 (competence).

Table 2: Item Statistics

Sub-factors	Mean	Std. Deviation	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	N
pred	4.2222	.64676	18	.753	.951
iter	4.3333	.68599	18	.627	.953
incr	4.5556	.61570	18	.530	.954
agil	4.1111	.58298	18	.866	.949
hybr	4.1111	.75840	18	.868	.948
cont	3.5556	.78382	18	.348	.958
tech	4.1667	.61835	18	.853	.949
beha	4.3889	.77754	18	.742	.951
prep	4.5000	.70711	18	.770	.950
brie	4.3333	.97014	18	.736	.952
know	4.2778	.89479	18	.878	.948
pers	4.1667	.70711	18	.870	.949
sche	4.2778	.66911	18	.926	.948
cost	4.2222	.64676	18	.841	.949
risk	3.7778	.64676	18	.441	.956
stak	4.1111	.58298	18	.753	.951
comp	4.0000	.76696	18	.627	.953

After examining the results of the factor analysis, the 17 performance factors that determine and have an impact during the project life phase were sorted, as shown in Table 3.

Table 3: Item Statistics (ranking)

Sub-factors	Mean	Std. Deviation	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	N
incr	4.5556	.61570	18	.530	.954
prep	4.5000	.70711	18	.770	.950
beha	4.3889	.77754	18	.742	.951
brie	4.3333	.97014	18	.736	.952
iter	4.3333	.68599	18	.627	.953
know	4.2778	.89479	18	.878	.948
sche	4.2778	.66911	18	.926	.948
cost	4.2222	.64676	18	.841	.949
pred	4.2222	.64676	18	.753	.951
pers	4.1667	.70711	18	.870	.949
tech	4.1667	.61835	18	.853	.949
hybr	4.1111	.75840	18	.868	.948
agil	4.1111	.58298	18	.866	.949
stak	4.1111	.58298	18	.753	.951
comp	4.0000	.76696	18	.627	.953
risk	3.7778	.64676	18	.441	.956
cont	3.5556	.78382	18	.348	.958

According to PMI (2017), the project life cycle is a model of stages that a particular project passes through in its total life span. The project life cycle gives a general approach that can be followed while implementing the project in the management stage. It follows the basic form of the framework, which applies irrespective of the items or type of project work that is at play. Such phases may be linear, cyclic, or concurrent. All project initiatives can be placed within the framework of a generalized life cycle.

Furthermore, PMI (2017) explains that the project life cycle can be predictive or adaptive. In this regard, there is generally one phase or several phases related to the development of products, services, or results. As a whole, these phases are called the development life cycle, and it can be predictive, iterative, incremental, adaptive, or a combination of the four.

Table 3 shows the results that identify incremental (incr) as the dominant factor affecting project performance due to its first-ranking status. The preparation factor (prep) held the second position, following the first-ranking determinant. The behavioural factor (beha) held the position of the third strongest determinant according to the results. The acquisition of briefing (brie) was positioned as the fourth most important factor, and iterative (iter) stood as the fifth. High-rise construction projects must use these seventeen factors as fundamental references during their five project phases.

CONCLUSION

The results of the discussion above, if viewed as the 5 highest determining factors in sequence from the project life cycle factors, are incremental (incr), preparation (prep), behaviour (beha), briefing (brie), and iterative (iter). Due to limited writing opportunities and space, this research will be continued in a more detailed direction with more clearly visible data processing stages.

The research will proceed in detail with better visible processing stages because of restricted space and opportunity. Other researchers should investigate the project team's potential competencies, since these factors determine overall performance.

ACKNOWLEDGEMENT

The authors want to extend their sincere gratitude to every concerned institution that aided in the study's completion.

REFERENCES

- Adriadi Rustam, Mohd Norazam Yasin, Mairizal Zainuddin, Khairul Nizam Yusoff & Nurul Atiqah Kamil (2024). A Review on Dominant Factors of Project Manager Competency in Various Implementations for the Construction Industry. *IOP Conference Series: Earth and Environmental Science*, 1347, 012044.
- Ahmad Syamil, Jerry M. Samosir, & Pantri Heriyati (2021). The Impact of Project Performance on Customer Satisfaction. *Turkish Journal of Computer and Mathematics Education*, 12(No), 5658-5668.
- APM (2019). *APM Body of Knowledge* (7th edition). Association for Project Management Princes Risborough, Bucks, UK.
- Bernard Sirau, R. F. C., Zainal Abidin, M. Z., Yacob, R., & Ramli, Z. (2024). Project Management Challenges and Critical Success Factors in The Rehabilitation of Abandoned Housing Projects. *Planning Malaysia*, 22(31). <https://doi.org/10.21837/pm.v22i31.1473>
- Chin Hoong Teoh, Zuraidah Mohd Zain, and Chang Chuan Lee (2021). Manufacturing organization transformation, how customization of project life cycle and project governance for custom solution enhances the chances of success. *Asia Pacific Management Review*, 26, 226-236.
- D Chicoca and C Utomo (2019). Developers' perception of cost drivers influencing project cost performance on Surabaya high-rise residential, Indonesia. *First International Conference of Construction, Infrastructure, and Materials, IOP Conf. Series: Materials Science and Engineering*, 650, 012009.
- Edrizal, Mairizal, Alzahri and Muhd Zaimi Abd Majid (2020). The competency component needed by the Project Manager in managing the Road Project in West Sumatera, Indonesia. *IOP Conf. Series: Materials Science and Engineering*, 498, 012014.
- Effendi. M. F, Ridzqo. I. F, and Dharmatanna. S. W (2021). An Overview of High-Rise Buildings in Jakarta since 1967 to 2020. *6th International Conference on*

- Sustainable Built Environment (ICSBE), IOP Conf. Series: Earth and Environmental Science*, 933, 012001.
- Kaming, P. F., & Saputra, A. Y. (2013). Studi Konsultan Manajemen Konstruksi Pada Tahapan Proyek. *Konferensi Nasional Teknik Sipil Surakarta: Universitas Sebelas Maret* (pp. k-111-k-118).
- Ladika, & Heru Bayuaji Sanggoro (2024). The Influence Faktors on Project Performance: Interest, Competency and Contract Project. *Jurnal Manajemen*, 12(3), 274-282.
- Leni Sagita Riantini Supriadi, Yusuf Latief, Budi Susilo, Miralia Rajasa (2017). Development of risk-based standardized WBS (Work Breakdown Structure) for cost estimation of apartment's project. *International Journal of Civil Engineering and Technology*, 8(10), 822-833.
- Mairizal, Edrizal, Mohammad Ismail and Rosli Mohamad Zin (2020). Identifying of project manager competence factors in managing EPC projects in Indonesia. *IOP Conf. Series: Mat. Science and Engineering*, 849, 012003.
- Mairizal (2021). "Competence of Project Managers in Performance Evaluation of Integrated Construction Projects in Indonesia". UTM Press, Skudai, Johor, Malaysia.
- Mairizal, Rahmat Alifiardi, Gilang Ardi Pratama, Mohd Zaimi Abd Majid and Shek Poi Ngian (2023). Project managers competency on project performance of green toll road development project in Indonesia. *SINERGI*, 27(3), 333-342.
- Project Management Institute (PMI) (2012). *A Guide to the Project Management Body of Knowledge* (5th Edition). PMI, Newtown Square.
- PMI (2017). *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* (6th Edition). Project Management Institute, Inc., Newtown Square.
- Rafferty, A.E. and Ševčíková, H. (2023). Probabilistic Population Forecasting: Short to Very Long Term. *International Journal of Forecasting*, 39, 73--97.
- Sulfiah Dwi Astarini and Christiono Utomo (2020). Performance-Based Building Design of High-Rise Residential Buildings in Indonesia. *Sustainability* 2020, 12, 7103; doi:10.3390/su12177103
- Taige Wang, & Han-Mei Chen (2023). Integration of building information modeling and project management in construction project life cycle. *Automation in Construction*, 150, 104832.
- Wehandi Nobeltio Salim, and Caroline Maretha Sujana (2020). Project delay analysis of high-rise building project in Jakarta. *The 3rd International Conference on Eco Engineering Development, IOP Conf. Series: Earth and Environmental Science*, 426, 012051.
- Yuslim, S., Simanjuntak, M. R. A., & Lianto, F. (2023). Variables And Indicators to Measure the Performance of Sustainable Construction Project Management of City Park. *Planning Malaysia*, 21(25). <https://doi.org/10.21837/pm.v21i25.1242>

Received: 2nd May 2025. Accepted: 10th September 2025