Terbit online pada laman web jurnal: **http://journal.isas.or.id/index.php/JACEIT**

JOURNAL OF APPLIED CIVIL ENGINEERING AND INFRASTRUCTURE TECHNOLOGY (JACEIT)

Vol. 6 No. 1 (2025) 36 - 45 ISSN: 2723-5378 (Online-Elektronik)

Analysis of Factors Influencing Contractor Performance in Supporting Infrastructure Sovereignty in North Sulawesi

Anneke Elisabeth Rattu[1], Gerel Herke Tulungen[2], Nicolas Willem James Mandagi[3], Joni Kutu' Kampilong[4], Jendry Masinambow[5]

[1,2,3,4,5] Universitas Kristen Indonesia Tomohon

[1]annekearattu@gmail.com*, [2]gerelltulungen21@gmail.com, [3]mandaginicolas@gmail.com, [4]jonikutu@ukit.ac.id, [5]masinambowjendry@gmail.com

Abstract

This research analyzes the factors influencing contractor performance in supporting infrastructure sovereignty in North Sulawesi. The research method uses a quantitative descriptive approach by collecting primary data through questionnaires and structured interviews with contractors involved in infrastructure projects. A cluster sampling technique was used to select samples from various regions in North Sulawesi. Analysis shows that the main factors influencing contractor performance are the availability of capital, competition from similar projects, and the timeliness of client payments. The availability of adequate capital is considered crucial to ensure the smooth implementation of the project. Intense competition compels contractors to lower prices, impacting profit margins and work quality. Timeliness of payments is essential to maintain the contractor's cash flow and financial stability. Other factors, such as changes in government regulations and licensing bureaucracy, also influence performance, but with more variable effects. This research provides recommendations for contractors to strengthen financial management, adapt to competitive pressures, and improve collaboration with stakeholders to ensure the success of infrastructure projects.

Keywords: *Contractor Performance, Infrastructure, Capital Availability, North Sulawesi, Government Regulations*

Abstrak

Penelitian ini menganalisis faktor-faktor yang memengaruhi kinerja kontraktor dalam mendukung kedaulatan infrastruktur di Sulawesi Utara. Metode penelitian menggunakan pendekatan deskriptif kuantitatif dengan pengumpulan data primer melalui kuesioner dan wawancara terstruktur kepada kontraktor yang terlibat dalam proyek infrastruktur. Teknik cluster sampling digunakan untuk memilih sampel dari berbagai wilayah di Sulawesi Utara. Berdasarkan hasil analisis, faktor yang paling dominan memengaruhi kinerja kontraktor adalah ketersediaan modal, kompetisi dengan proyek serupa, dan ketepatan waktu pembayaran dari klien. Ketersediaan modal yang memadai dianggap krusial untuk memastikan kelancaran pelaksanaan proyek. Sementara itu, kompetisi yang ketat memaksa kontraktor menawarkan harga kompetitif, yang dapat berdampak pada margin keuntungan dan kualitas pekerjaan. Ketepatan waktu pembayaran penting untuk menjaga arus kas dan stabilitas finansial kontraktor. Faktor lain, seperti perubahan regulasi pemerintah dan birokrasi perizinan, juga memengaruhi kinerja, namun dengan pengaruh yang lebih variabel. Penelitian ini memberikan rekomendasi kepada kontraktor untuk memperkuat manajemen keuangan, beradaptasi dengan tekanan kompetitif, dan meningkatkan kerja sama dengan pemangku kepentingan untuk memastikan kesuksesan proyek infrastruktur.

Kata kunci: Kinerja Kontraktor, Infrastruktur, Ketersediaan Modal, Sulawesi Utara, Regulasi Pemerintah.

Diterima Redaksi : 2024-09-30 | Selesai Revisi : 2024-10-09 | Diterbitkan Online : 2025-03-03

1. Introduction

Infrastructure development is a key element in economic growth and improving the social welfare of a region. Strong and well-functioning infrastructure not only accelerates the movement of goods and services, but also creates better access to education, health, and other public services [1]. In the context of Indonesia, especially North Sulawesi, infrastructure development has a strategic role considering the geostrategic position of this region. North Sulawesi is located on an international trade route connecting Southeast Asia with countries in the Pacific, and directly borders the Philippines. This geographical advantage makes North Sulawesi an important gateway for regional trade and economic interaction [2].

Infrastructure development in North Sulawesi has experienced rapid development in recent years. This is in line with the government's program to strengthen the eastern part of Indonesia as a new growth center [3]. One of the strategic projects is the Bitung Special Economic Zone, which is designed to be an industrial and logistics center with direct access to international trade routes. However, many infrastructure projects in this region face various challenges, ranging from limited materials, geographical constraints, to complex regulations [4]. Contractor performance is one of the most crucial aspects in ensuring that projects can be completed on time with the expected quality.

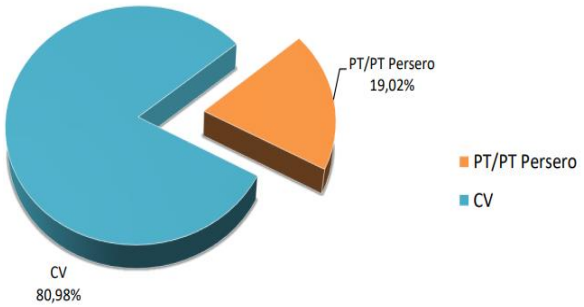

Figure 1. Number of Construction Companies/Businesses by Business Entity Form in North Sulawesi Province, 2023 [5]

North Sulawesi, as a strategic region, requires strong and quality infrastructure. If the performance of contractors handling these projects is not optimal, the impact will spread to the economic, trade, and even international relations sectors. Infrastructure that is slow to build or does not meet standards can reduce the region's competitiveness in attracting investment and developing trade potential [5]. Therefore, it is important to examine and understand in depth what factors influence contractor performance, as well as what solutions can be taken to overcome existing obstacles.

Table 1. Construction Companies of North Sulawesi Province, 2023

Regency/City	PT/PT Persero	CV	Total
Bolaang Mongondow	3	49	52
Minahasa	31	188	219
Sangihe Islands	24	128	152
Talaud Islands	7	72	79
South Minahasa	4	108	112
North Minahasa	22	64	86
North Bolaang Mongondow	1	52	53
Siau Tagulandang Biaro	0	19	19
Southeast Minahasa	3	44	47
South Bolaang Mongondow	3	23	26
East Bolaang Mongondow	0	21	21
Manado	175	327	502
Bitung	46	150	196
Tomohon	19	84	103
Kotamobagu	4	132	136
Total	343	1460	1803

In Table 1 know that the infrastructure development process, contractors play an important role as the main implementers in the field. Contractor performance determines the extent of quality, time, and cost.

Construction can be maintained according to plan. However, contractor performance is often influenced by various factors both internal and external. These factors include internal management, resource availability, government regulatory involvement, and unexpected environmental conditions [6]. In North Sulawesi, infrastructure development faces its own challenges, such as difficult to access geographical conditions and dependence on raw materials and technology from outside the region. The urgency of this research lies in the need to understand the factors that influence contractor performance in supporting infrastructure sovereignty in North Sulawesi. Currently, large projects such as the development of the Bitung Special Economic Zone and various other infrastructure initiatives require contractors who are able to work effectively and independently. By identifying the factors that influence their performance, this research is expected to provide recommendations for improving the efficiency and quality of infrastructure projects in the region.

This study aims to identify and analyze factors that influence contractor performance in supporting infrastructure sovereignty in North Sulawesi. By understanding these factors, this study is expected to provide strategic recommendations that can help contractors, the government, and other stakeholders to improve effectiveness and efficiency in infrastructure development.

DOI : https://doi.org/10.52158/jaceit.v6i1.991

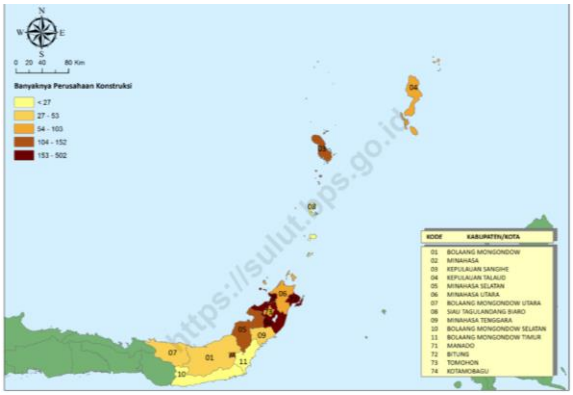

Figure 2. Construction Business by Regency/City in North Sulawesi Province, 2023 [5]

1.1 Contractor Performance

Contractor performance is one of the key factors that determines the success of an infrastructure project [7]. The contractor's ability to carry out its duties is greatly influenced by various important elements, such as managerial ability, efficient use of resources, and the ability to overcome obstacles and risks that may arise during the construction process [8]. According to Purwantoro (2018), these aspects are closely related to each other in forming optimal contractor per If project management is ineffective or if resources are not managed properly, contractor performance can decline, which in turn negatively impacts the quality and time of the project.

One of the important factors that affects contractor performance is project management. Contractors must be able to manage every stage of the project, starting from formance [9]. If management project is not effective or if resources are not managed properly, contractor performance can decline, which in turn has a negative impact on the quality and completion time of the project.

One of the important factors that affects contractor performance is project management. Contractors must be able to manage every stage of the project, from planning, budgeting, to implementation [10]. Good project management performance is characterized by the use of technology, close monitoring of project developments, and quick response to changes or problems that arise in the field. In this context, time and resource management becomes crucial so that the project can be completed according to the schedule and quality standards that have been set [11].

In addition, proper financial management is also a critical aspect that affects contractor performance. Efficient and controlled use of funds ensures that the project can run without financial obstacles [12]. Contractors who are unable to manage cash flow well tend to face problems with late payments to workers and suppliers, which can ultimately delay project completion and reduce the quality of the final result. Therefore, good financial management is an important determinant in the smooth implementation of infrastructure projects.

Another factor that determines contractor performance is human resource management. Contractors who have a team with good technical competence are better able to face challenges that arise during the construction process [13]. Effective workforce management is not only related to the availability of workers, but also to the skills, discipline, and coordination between team members. Skilled and trained workers can increase project productivity and minimize the risk of errors or work accidents [14].

No less important is the contractor's ability to manage risk. In every infrastructure project, there are always risks that must be faced, both those related to natural conditions, such as extreme weather and natural disasters, as well as technical and operational risks, such as delays in material delivery or technical problems in the field [15]. A good contractor should be able to identify these risks early on and have an effective mitigation strategy in place. Without proper risk management, a project can experience serious setbacks that result in increased costs and time to completion [16].

Contractor performance is greatly influenced by how they manage various managerial and operational aspects during the project like Table 2. Good project management, proper financial management, skilled human resources, and effective risk management are the keys to achieving successful, timely, and budgeted project outcomes [17]. In a region like North Sulawesi, where geographical and environmental challenges are significant, the contractor's ability to handle these factors becomes increasingly important to ensure the smooth and sustainable development of quality infrastructure [18].

Table 2. Contractor Performance

Performance Indicator	Description
Time Performance	Ability to complete the project according to the specified schedule.
Quality of Work	Conformity of the work results with the agreed quality standards.
Cost Performance	Ability to manage the project budget without significant cost overruns.
Safety Performance	Ability to maintain a safe working environment and minimize accidents.
Productivity	Effectiveness in using resources to complete the work.
Client Satisfaction	Client satisfaction with the results that meet expectations.
Risk Management	Ability to identify, analyze, and manage project risks.
Compliance with Regulations	Compliance with applicable rules and standards.
Resource Management	Effectiveness in using materials, labor, and equipment in the project.

DOI : https://doi.org/10.52158/jaceit.v6i1.991

1.2 Infrastructure Sovereignty

Infrastructure sovereignty is a very important concept for a country's independence in managing its strategic assets. These assets include key infrastructure such as highways, ports, airports, and energy networks, which serve as the backbone of the national economy and defense [19]. This sovereignty ensures that the state has full control over these assets, so that it is not dependent on outside parties for maintenance, management, or development. Thus, infrastructure sovereignty not only supports economic growth, but also strengthens the security and stability of the state [20].

In North Sulawesi, infrastructure sovereignty is becoming increasingly important considering the strategic position of this province as a gateway for international trade, especially with countries in the Asia Pacific region [21]. One real example of the application of this concept is the development of the Bitung Special Economic Zone (KEK), which is designed to be an industrial and logistics center in Eastern Indonesia. This project is one of the main indicators that North Sulawesi is heading towards infrastructure independence, where vital assets are managed effectively to drive regional economic growth [22]. Bitung Special Economic Zone is expected to reduce East Indonesia's dependence on other regions in terms of trade and industry, as well as strengthen North Sulawesi's position as a distribution center for goods to the Asia Pacific region.

The development of sovereign infrastructure in North Sulawesi also has a direct impact on increasing regional competitiveness. With adequate infrastructure, this province can attract more investment, both from within the country and abroad [23]. Improved accessibility through modern road, port and airport networks facilitates the flow of goods and services, which ultimately drives industrial growth and creates jobs. In addition, independent energy infrastructure such as power plants and strong distribution networks ensure stable energy availability to support industrial activities. However, the importance of infrastructure sovereignty is not only limited to the economic aspect. Full control over strategic assets also provides assurance that the infrastructure can be used for national interests in emergency or conflict situations. In the context of national security, ports, roads and energy networks that are independently managed by the state ensure that access to vital assets will not be disrupted by foreign influences, either political or economic. Thus, the development of sovereign infrastructure in North Sulawesi not only plays a role in strengthening the regional economy, but also provides strategic protection for national interests in border areas [24].

Infrastructure sovereignty in North Sulawesi is an important pillar for the long-term growth and stability of the region. Projects such as the Bitung Special Economic Zone reflect a commitment to ensuring that the infrastructure built not only meets current economic needs, but is also ready to face future challenges in the context of globalization and evolving geopolitical dynamics.

1.3 Factors Affecting Contractor Performance

Contractor performance in infrastructure projects is influenced by a number of factors that can be categorized into several important aspects. One of the main categories is financial and economic factors, which include the availability of capital, competition with similar projects, and timely payments from clients [25]. The availability of adequate capital is the main foundation for the smooth implementation of the project, because without sufficient funds, the contractor cannot obtain materials, pay labor, or continue the work smoothly. In addition, the tight competition between similar projects often forces contractors to bid low prices, which can be risky for profit margins and quality of work. On the other hand, late payments from clients can hamper the contractor's cash flow and affect the continuity of the project [26].

The next factor that greatly affects contractor performance is politics and regulations. Sudden changes in government regulations or regulatory policies can create uncertainty for contractors. For example, unexpected changes in licensing requirements or fiscal policies can cause delays or increase project costs [27]. In addition, bureaucracy in the complicated licensing process often adds to the administrative workload of contractors, thus slowing down the pace of the project. Corrupt practices that occur during the tender process or in project implementation can also damage a healthy competitive climate, affecting the quality and transparency of infrastructure development [28].

On the other hand, technical and construction factors also play an important role in determining contractor performance. The availability of materials on time and according to specifications is very important to maintain the smooth implementation of the project. Without a stable supply of materials, the project can experience significant delays. In addition, the presence of skilled and experienced workers is a major determinant in ensuring that construction work can be completed according to expected standards. Physical conditions of the field, including accessibility and technical difficulties at the project site, are also factors that can affect the productivity and operational efficiency of the contractor. Environmental factors also cannot be ignored, especially in infrastructure projects located in areas with a high risk of natural disasters. Extreme weather conditions such as heavy rain, floods, or earthquakes can temporarily stop construction work, thus affecting project timeline [29]. Even if a natural

DOI : https://doi.org/10.52158/jaceit.v6i1.991

disaster does not occur directly, the threat of these environmental risks requires contractors to plan and allocate additional resources for risk mitigation, which in turn can increase costs and extend the duration of the project. Therefore, careful planning related to environmental factors is crucial for contractors involved in infrastructure projects in disaster-prone areas [30].

Table 3. Contractor Performance Factors

Category	Factors Affecting Contractor Performance
Financial and Economic Politics and Regulation	Availability of capital
	Competition with similar projects
	Timeliness of payment from clients
Technical and Construction	Changes in government regulations
	Bureaucracy in licensing
	Corrupt practices
Environment Category Financial and Economic	Availability of materials
	Availability of skilled labor
	Physical conditions of the field
	Other technical constraints
Politics and Regulation	Natural disasters
	Extreme weather conditions

Overall like in Table 3, contractor performance is heavily influenced by a combination of interrelated factors. Understanding and managing each category of these factors well is key to successfully completing infrastructure projects on time, on budget, and with high quality.

2. Research Methods

Research Approach This research uses a quantitative descriptive approach, which aims to identify and analyze factors that influence contractor performance in supporting infrastructure sovereignty in North Sulawesi [5]. The data collected came from respondents involved in infrastructure projects, especially registered and active contractor companies in the area.

Type of Research This research combines literature studies and field data. Literature studies were conducted to obtain a theoretical overview of the factors that influence contractor performance, while field data were collected through questionnaires and live interview with contractor involved in infrastructure projects in North Sulawesi.

2.1 Data Primer

This data was obtained directly from respondents through questionnaires and structured interviews. Respondents were contractors who participated in infrastructure projects in the North Sulawesi region. The questionnaire was designed to evaluate various factors, such as financial, technical, regulatory, and environmental factors that affect their performance [31].

2.2 Secondary Data

Secondary data were collected from various literature sources, including books, journal articles, and official reports that are relevant to this study. These data sources help to understand more deeply the theories related to contractor and infrastructure performance.

Sample and Sampling Technique This study uses the Cluster Sampling technique, where population elements are divided into subgroups or clusters based on geographical location and the type of project being implemented [32]. Samples were taken from contractors who are active in various regions in North Sulawesi, especially in areas undergoing infrastructure development. Samples were taken randomly from contractors who are classified as small, medium, and large companies.

Research Instruments The instruments used for data collection were closed questionnaires and semi-structured interviews. This questionnaire contains a series of questions that measure variables such as managerial ability, financial management, technical, and regulatory constraints. Interviews were used to dig deeper into information that may not be covered in the questionnaire.

2.3 Research Sample

This research uses Cluster Sampling techniques to select research participants. This technique was chosen because it allows for dividing the population into different subgroups based on geographic location or the type of project managed. It is beneficial in regional studies such as infrastructure development. In this case, contractors involved in infrastructure projects in various regions of North Sulawesi are grouped based on their geographical location and the type of project they manage.

From a total population of 1,803 contractors registered in the region, clusters were formed based on administrative divisions, such as districts and cities. Each cluster represents contractors in certain areas, such as Manado, Bitung, and South Minahasa. Once clusters were formed, random samples were taken from each cluster, ensuring representation from various regions and project scales, including small, medium, and large construction companies.

Considering that the population in this study was 343 contractors, the reason for selecting 343 contractors was that the researchers thought that only 343 contractors with PT legal entities were deemed technically capable

DOI : https://doi.org/10.52158/jaceit.v6i1.991

of having a significant impact on infrastructure sovereignty in North Sulawesi.

To calculate the number of samples using the Cluster Sampling technique [33], use the Slovin formula with a margin of error of 5%:

$$n = \frac{N}{1+N(e)^2} \quad (1)$$

Information:
n = number of samples
N = total population (343)
e = margin of error (usually 0.05 or 5%)

If the margin of error is 5%, the calculated sample size will be around 185 contractors.

3. Result and Suggestions

3.2 Descriptive Analysis

The data obtained from the questionnaire and interviews were analyzed descriptively to describe the dominant factors that affect contractor performance. The research instrument was tested using validity and reliability tests to ensure that the data produced was reliable and actually measured the factors studied [34].

Ranking Analysis: This technique is used to identify the factors that most influence contractor performance based on the ranking of each factor given by respondents.

3.3 Validity of Research Instruments

The validity of a research instrument refers to the extent to which the measurement tool or questionnaire used in research can measure what it wants to measure. A valid instrument will ensure that the data reflects the tested reality or concept.

There are several types of validity, but the most commonly used in quantitative research are content validity, construct validity, and criterion validity. In this research, construct validity is tested, which focuses on the instrument's ability to measure the underlying concept or construct.

Data Collection Data is collected from respondents through prepared instruments (questionnaires). Each item in the questionnaire is designed to measure a specific aspect of the research construct.

Calculating Validity with Pearson Product Moment Correlation to determine the validity of the items in the questionnaire, the correlation coefficient between each item's score and the total score was calculated. The item is considered valid if the correlation coefficient is significant and positive.

$$r_{xy} \frac{N\sum XY-(\sum X)(\sum Y)}{\sqrt{[N\sum X^2-(\sum X)^2][N\sum Y^2-(N\sum Y)^2]}} \quad (2)$$

rxy = Correlation coefficient between item scores and total scores

N = Number of respondents
X = Score for each item
Y = Total Score of all items
∑XY = The Number of times the item score is multiplied by the total Score
∑X = Total item scores
∑Y = Total Score
∑X² = Sum of squares of item scores
∑Y² = Sum of squares of total scores

All the factors tested were proven valid based on the results of the research instrument validity test presented in Table 4. The validity test was carried out by comparing the count value of each factor with a stable value of 1.8596 at a significance level of 0.05. A factor is declared valid if the count value is more significant than stable.

Table 4. Instrument Validity Test

Factor	r_{count}	t_{table}	Validity
Availability of capital	2.5989	1.8596	Valid
Competition with similar projects	2.6989	1.8596	Valid
Timeliness of payment from clients	2.9878	1.8596	Valid
Changes in government regulations	2.3498	1.8596	Valid
Bureaucracy in licensing	2.8287	1.8596	Valid
Corrupt practices	2.5109	1.8596	Valid
Natural disasters	2.9824	1.8596	Valid
Extreme weather conditions	2.9091	1.8596	Valid

The Availability of capital factor shows a count value of 2.5989, which is higher than the table value, so it is declared valid. The Competition with similar projects factor is also declared valid with an account value of 2.6989, which exceeds the table. Furthermore, the Timeliness of payment from clients factor has an account value of 2.9878, the highest value among other factors, indicating that this factor is very valid.

The Changes in government regulations factor also show validity, with an account value of 2.3498, higher than the table value. The same applies to the Bureaucracy in the licensing factor, which has an account value of 2.8287, and the Corrupt practices factor, which has an account value of 2.5109.

Other factors, such as natural disasters and extreme weather conditions, have also been valid, with count

DOI : https://doi.org/10.52158/jaceit.v6i1.991

values of 2.9824 and 2.9091, respectively, more significant than the stable.

3.4 Instrument Reliability

The reliability of a research instrument refers to the extent to which a measuring instrument can produce consistent results each time it is used. Reliability tests are carried out to ensure that the instruments used have internal consistency so that the data obtained can be relied on. One method that is often used in reliability testing is Cronbach's Alpha.

In this study, reliability was tested using the Cronbach's Alpha method. The Cronbach's Alpha value shows how much the items in an instrument are related or consistent. The instrument is declared reliable if the Cronbach's Alpha value exceeds 0.70. The higher the Cronbach's Alpha value, the better the instrument's internal consistency.

The formula for calculating the Cronbach's Alpha value is as follows [35]:

$$\alpha = \frac{N}{N-1}\left(1 - \frac{\sum \sigma_1^2}{\sigma^2 total}\right) \quad (3)$$

α = Cronbach's Alpha
N = Number of items (questions) in Instrument
σ_i^2 = Variance of each item
σ_{total}^2 = Total variance of overall item scores

Table 5. Instrument Reliability

Factor	Cronbach's Alpha	r_{count}	tt_{able}	Reliability
Availability of capital	0.82	25,989	18,596	Reliable
Competition with similar projects	0.85	26,989	18,596	Reliable
Timeliness of payment from clients	0.88	29,878	18,596	Reliable
Changes in government regulations	0.8	23,498	18,596	Reliable
Bureaucracy in licensing	0.83	28,287	18,596	Reliable
Corrupt practices	0.81	25,109	18,596	Reliable
Natural disasters	0.86	29,824	18,596	Reliable
Extreme weather conditions	0.84	29,091	18,596	Reliable

Based on the results of the instrument reliability test shown in Table 5, it can be concluded that all the factors tested are highly reliable. Reliability is measured using the Cronbach's Alpha method, where the instrument is considered trustworthy if the Cronbach's Alpha value is more significant than 0.70. The count value is compared with the table value of 18,596 at a significance level 0.05.

The Availability of capital factor has a Cronbach's Alpha value of 0.82 and an account of 25.989, which is greater than the stable, so this factor is declared reliable. The competition with similar project factors also shows reliable results, with Cronbach's Alpha value of 0.85 and an account of 26.989.

The factor with the highest Cronbach's Alpha value is the Timeliness of client payment, which has a value of 0.88 and an account of 29.878. This indicates that the factor has excellent internal consistency and is reliable in measurement. Other factors, such as Changes in government regulations, have a Cronbach's Alpha value of 0.80 and count of 23,498, and the Bureaucracy in licensing factor has a Cronbach's Alpha value of 0.83 and count of 28,287, both of which are also declared reliable.

The Corrupt practices, Natural disasters, and Extreme weather conditions factors have Cronbach's Alpha values of 0.81, 0.86, and 0.84 with an account more significant than the table, so they are declared reliable.

3.5 Variance Index Test

The Variance Index Determination Test is used to determine the most influential factors in a study. The variance index describes the distribution of values for each item based on its influence on the measured construct. The lower the variance value, the more stable and dominant the item's explanation of the research variables.

The index value is calculated using a formula based on the weight the respondent gives to each item in the questionnaire [36]:

$$x = \frac{\sum fi\ X\ pi}{n} \quad (4)$$

x = Index value
fi = Frequency on scale i
pi = Weight on scale i
n = Number of respondents

Table 6. Variance Index Test

Factor	Mean	Varian	Ranking
Availability of capital	4.10	0.15	1
Competition with similar projects	4.00	0.25	2
Timeliness of payment	3.90	0.30	3
Changes in government regulations	3.80	0.40	4
Bureaucracy in licensing	3.70	0.35	5

DOI : https://doi.org/10.52158/jaceit.v6i1.991

The results of the Variance Index test shown in Table 6 suggest that the factors that influence contractor performance in infrastructure projects are ranked based on their influence and stability.

The most influential factor is the availability of capital, with the highest Mean value of 4.10 and the lowest Variance of 0.15. This shows that the availability of capital is a very dominant factor in determining the success of contractor performance. With adequate capital, contractors can run projects smoothly without experiencing significant financial constraints.

Competition with similar projects is ranked second, with a Mean value of 4.00 and a Variance of 0.25. Competition with similar projects often affects a contractor's project success, especially in terms of price bids and quality of work. Although essential, this factor's influence is slightly lower than that of capital availability.

Timeliness of payment from clients also has a significant influence, with a Mean value of 3.90 and a Variance of 0.30, which places it in third place. Timely payment is substantial in maintaining contractor cash flow. Late payments can cause project delays and other financial problems, affecting overall performance.

Changes in government regulations are ranked fourth, with a Mean value of 3.80 and a Variance of 0.40. While these factors are important, changes in government regulations tend to create more significant uncertainty, requiring contractors to be more flexible in adapting work processes to new policies.

Bureaucracy in licensing occupies the last position with a Mean value of 3.70 and a Variance of 0.35. Although licensing bureaucracy can slow project implementation, its impact is lower than other factors. However, the relatively high Variance indicates that the effects may vary depending on the specific project situation.

3.6 Dominant Factor Ranking

Based on the Variance Index test results, the most dominant factor influencing contractor performance on infrastructure projects is the Availability of capital. With a Mean value of 4.10 and the lowest Variance of 0.15, this factor shows that capital availability is an essential and stable aspect in determining project success. Sufficient capital allows contractors to carry out projects without significant financial obstacles, ensuring smooth implementation.

In second place is Competition with similar projects, with a Mean of 4.00 and a Variance of 0.25. Tight Competition with similar projects affects contractors' ability to win tenders and maintain profit margins. This factor is quite influential because it involves cost efficiency and the quality of work results.

Furthermore, the timeliness of the payment factor is third, with a mean of 3.90 and a variance of 0.30. The Timeliness of client payments greatly influences the contractor's cash flow, which is an essential key to maintaining financial stability during the project. Late payments can result in project delays, so this factor is necessary to pay attention to.

Changes in government regulations are ranked fourth, with a Mean of 3.80 and a Variance of 0.40. Although their influence is quite large, this factor is more unstable than the previous factors. Changes in government policy can significantly impact project schedules and costs, causing contractors to adapt their operations to applicable regulations.

Finally, Bureaucracy in licensing is ranked fifth, with a Mean of 3.70 and a Variance of 0.35. Although Bureaucracy in the licensing process can cause delays in project implementation, its influence is relatively smaller than that of other factors. However, this factor is still important to pay attention to, especially in the context of regulations that can slow down the project process.

Overall, Availability of capital, Competition with similar projects, and timely payment are the dominant factors that have the most significant and stable influence on contractor performance. Meanwhile, factors such as changes in government regulations and Bureaucracy in licensing are also important, but their impact on projects is more variable. Therefore, more attention needs to be paid to these dominant factors to ensure the success and efficiency of infrastructure projects.

4. Conclusion

Based on the research results, the most dominant factor influencing contractor performance in infrastructure projects is the availability of capital. Adequate capital is an important aspect that ensures smooth project implementation without significant financial obstacles. Competition with similar projects is the second most influential factor, especially in cost efficiency and work quality. The third factor that is very influential is the timeliness of client payments, which plays a significant role in maintaining the contractor's cash flow stability during project implementation.

Changes in government regulations are also quite influential but more unstable than the previous factors. Government policy changes can cause project operation adjustments that affect schedules and costs. Meanwhile, bureaucracy in the licensing process has a minor influence over other factors. However, paying attention

DOI : https://doi.org/10.52158/jaceit.v6i1.991

to administrative obstacles that can slow project implementation is still essential.

Overall, availability of capital, competition with similar projects, and timeliness of payment are the dominant factors influencing contractor performance. Other factors, such as changes in government regulations and licensing bureaucracy, are also important, but their impact is more varied. Therefore, more attention should be paid to these dominant factors to ensure the success and efficiency of infrastructure projects.

Daftar Rujukan

[1] J. Xu, "Implementing safety leading indicators in construction: Toward a proactive approach to safety management," *Saf. Sci.*, vol. 157, 2023, doi: 10.1016/j.ssci.2022.105929.

[2] A. H. Afolayan, "Performance analysis of fuzzy analytic hierarchy process multi-criteria decision support models for contractor selection," *Sci. African*, vol. 9, 2020, doi: 10.1016/j.sciaf.2020.e00471.

[3] R. J. Tumiwa, V. A. Rumate, and D. C. Rotinsulu, "Analisis Efektivitas Kredit Konstruksi (Kmk-Kontraktor) Pt. Bank Sulutgo Terhadap Pembangunan Infrastruktur Provinsi Sulawesi Utara," *J. Pembang. Ekon. DAN Keuang. Drh.*, vol. 20, no. 1, pp. 89–102, 2021.

[4] A. W. Mandey, D. C. Rotinsulu, and E. N. Walewangko, "Analisis Pengaruh Pengeluaran Pemerintah Daerah atas Infrastruktur, Pendidikan, dan Kesehatan Terhadap Pertumbuhan Ekonomi pada Kabupaten/Kota di Provinsi Sulawesi Utara," *J. Berk. Ilm. Efisiensi*, vol. 22, no. 2, 2022.

[5] P. Konstruksi and P. S. Utara, "Perusahaan konstruksi provinsi sulawesi utara 2023," 2023.

[6] Q. Chen, "Using look-ahead plans to improve material flow processes on construction projects when using BIM and RFID technologies," *Constr. Innov.*, vol. 20, no. 3, pp. 471–508, 2020, doi: 10.1108/CI-11-2019-0133.

[7] P. X. W. Zou, "Closing the building energy performance gap through component level analysis and stakeholder collaborations," *Energy Build.*, vol. 224, 2020, doi: 10.1016/j.enbuild.2020.110276.

[8] T. R. S. Marcelline, "Impact of Green Construction Procurement on Achieving Sustainable Economic Growth Influencing Green Logistic Services Management and Innovation Practices," *Front. Environ. Sci.*, vol. 9, 2022, doi: 10.3389/fenvs.2021.815928.

[9] A. Purwantoro, S. Aditama, and N. Andini, "Analisis Faktor-Faktor Risiko Pada Kontraktor Di Kota Palangka Raya Yang Menangani Proyek Pemerintah," *J. Tek. J. Teor. dan Terap. Bid. Keteknikan*, vol. 1, no. 2, pp. 114–128, 2018.

[10] O. P. M. Vitali, "Construction strategies for a NATM tunnel in São Paulo, Brazil, in residual soil," *Undergr. Sp.*, vol. 7, no. 1, pp. 1–18, 2022, doi: 10.1016/j.undsp.2021.04.002.

[11] A. Fraccica, "Permeation grouting of silt-sand mixtures," *Transp. Geotech.*, vol. 35, 2022, doi: 10.1016/j.trgeo.2022.100800.

[12] Y. Tan, "A study of sustainable practices in the sustainability leadership of international contractors," *Sustain. Dev.*, vol. 28, no. 4, pp. 697–710, 2020, doi: 10.1002/sd.2020.

[13] J. W. Zhu, "Decision simulation of construction project delivery system under the sustainable construction project management," *Sustain.*, vol. 12, no. 6, 2020, doi: 10.3390/su12062202.

[14] L. Liao, "Investigating critical non-value adding activities and their resulting wastes in BIM-based project delivery," *Sustain.*, vol. 12, no. 1, 2020, doi: 10.3390/SU12010355.

[15] W. Stefanoni, "Assessing the camelina (Camelina sativa (l.) crantz) seed harvesting using a combine harvester: A case-study on the assessment of work performance and seed loss," *Sustain.*, vol. 13, no. 1, pp. 1–11, 2021, doi: 10.3390/su13010195.

[16] L. Wentzel, "The Relationship between the Integration of CSR and Sustainable Business Performance: Perceptions of SMEs in the South African Construction Industry," *Sustain.*, vol. 14, no. 3, 2022, doi: 10.3390/su14031049.

[17] I. A. Rahman, "Structural Relationship of Causes and Effects of Construction Changes: Case of UAE Construction," *Sustain.*, vol. 14, no. 2, 2022, doi: 10.3390/su14020596.

[18] A. Purwantoro, S. Aditama, and N. Andini, "Analisis Faktor-Faktor Risiko Pada Kontraktor Di Kota Palangka Raya Yang Menangani Proyek Pemerintah," *J. Tek. J. …*, vol. 1, no. April, pp. 114–128, 2018, [Online]. Available: https://e-journal.upr.ac.id/index.php/JT/article/view/1253

[19] M. T. Andika and A. N. Aisyah, "Analisis Politik Luar Negeri Indonesia-China di Era Presiden Joko Widodo: Benturan Kepentingan Ekonomi dan Kedaulatan?," *Indones. Perspect.*, vol. 2, no. 2, pp. 161–179, 2017.

[20] S. Yuniarti and E. Herawati, "Analisis Hukum Kedaulatan Digital Indonesia," *Pandecta Res. Law J.*, vol. 15, no. 2, pp. 154–166, 2020.

[21] S. Dadang, "Mempercepat Pembangunan Infrastruktur untuk Meletakkan Fondasi Pembangunan yang Berkualitas," 2015.

[22] R. Pramoda and T. Apriliani, "Kebijakan Penetapan Bitung Sebagai Kawasan Ekonomi Khusus (KEK)," *J. Borneo Adm.*, vol. 12, no. 2, pp. 149–169, 2016.

[23] E. A. Lihiang, "Analisis Prospek Kawasan Ekonomi Khusus (KEK) Bitung," *J. Ris. Bisnis Dan Manaj.*, vol. 4, no. 1, 2016.

[24] G. E. Kandiyoh, "Faktor–Faktor Penentu Keberhasilan Kerjasama Pemerintah Dan Badan Usaha Pada Proyek Pembangunan Jalan Tol Manado Bitung," 2020, *Politeknik Negeri Manado*.

[25] A. Keegan, "Dynamism and realignment in the HR architecture: Online labor platform ecosystems and the key role of contractors," *Hum. Resour. Manage.*, vol. 62, no. 1, pp. 15–29, 2023, doi: 10.1002/hrm.22120.

[26] H. Aladağ, "The Effect of Stakeholder-Associated Risks in Mega-Engineering Projects: A Case Study of a PPP Airport Project," *IEEE Trans. Eng. Manag.*, vol. 67, no. 1, pp. 174–186, 2020, doi: 10.1109/TEM.2018.2866269.

[27] D. Ivina, "Lean construction principles and railway maintenance planning," 2020. doi: 10.24928/2020/0025.

[28] W. Zhang, "A cost evaluation model for IoT-enabled prefabricated construction supply chain management," *Ind. Manag. Data Syst.*, vol. 121, no. 12, pp. 2738–2759, 2021, doi: 10.1108/IMDS-12-2020-0735.

[29] K. Manoharan, "Assessment of critical factors influencing the performance of labour in Sri Lankan construction industry," *Int. J. Constr. Manag.*, vol. 23, no. 1, pp. 144–155, 2023, doi: 10.1080/15623599.2020.1854042.

[30] A. Kamal, "Risk factors influencing the building projects in Pakistan: from perspective of contractors, clients and consultants," *Int. J. Constr. Manag.*, vol. 22, no. 6, pp. 1141–1157, 2022, doi: 10.1080/15623599.2019.1683693.

[31] S. P. Pranata, "Examining the Profits and Losses of Medan City Roadside Ditch Scraping by the Medan City Government on MSMEs," *J. Bus. Manag. Econ. Dev.*, vol. 2, no. 02, pp. 919–927, 2024, doi: 10.59653/jbmed.v2i02.814.

[32] B. Zhong, "A blockchain-based framework for on-site construction environmental monitoring: Proof of concept," *Build. Environ.*, vol. 217, 2022, doi: 10.1016/j.buildenv.2022.109064.

[33] R. H. Henderson and T. Sundaresan, "Cluster sampling to assess immunization coverage: a review of experience with a simplified sampling method.," *Bull. World Health Organ.*, vol. 60, no. 2, p. 253, 1982.

[34] N. Khadim, "Whole building circularity indicator: A circular economy assessment framework for promoting circularity and sustainability in buildings and construction," *Build. Environ.*, vol. 241, 2023, doi:

10.1016/j.buildenv.2023.110498.
[35] B. Raza, A. Sohail, and S. A. Sair, "Examining The Contributions of Brand Image And Perceived Quality to Customer Loyalty Through Satisfaction And Trust," 2024, *Gomal University*. doi: 10.51380/gujr-40-02-02.
[36] H. K. Mendrofa and L. Sagala, "Pengaruh Pelatihan dan Penerapan Model Metode Asuhan Keperawatan Profesional (MAKP) Primary Nursing Terhadap Kualitas Asuhan Keperawatan Di Rumah Sakit Kota Medan," 2019, *Indonesian Trust Health Journal, STIKes Murni Teguh*. doi: 10.37104/ithj.v2i2.40.

DOI : https://doi.org/10.52158/jaceit.v6i1.991