Section A-Research paper
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EFFECTIVENESS PERFORMANCE CONSTRUCTION PROJECTS IN BUTON REGENCY

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Abstract
This study aims to identify the variables that can influence project performance in road construction projects, as well as their current state, the degree to which they influence project performance in construction projects, and the methods used to improve them in connection to this impact. The method used in this study is a descriptive quantitative method combined with a qualitative approach. The combined method was used to obtain more comprehensive and holistic analysis results and this research is a survey research, namely taking samples from the population and using a questionnaire as a primary data collection tool and is a quantitative research using data. Quantitative data were obtained from primary data in the form of respondents' answers to the questions posed in the questionnaire in the form of ordinal data. The main indicator affecting cost performance is the increase in material prices. The variable that has the most indicators affecting cost performance is the contractor variable, followed by materials, labor, equipment, site characteristics, construction management, owner, and external variables. The variable that has no effect on cost performance is the consultant. The contractor is the key in determining the quality of construction work, so the management skills of a contractor are indispensable.

Keywords: effectiveness; performance; construction; projects

1. Introduction

The global construction industry is currently growing at an incredibly rapid rate, which is in line with global economic expansion in both developed and developing nations. These nations are constantly working to improve the construction industry's level of innovation, efficiency, productivity, and competitiveness in order to produce high-quality, useful, and sustainable infrastructure (Seninde et al., 2021); (Tinkov et al., 2023); and (Kingsley, 2021). One of the developing nations, cannot be isolated from the growth of the global construction industry sector. The construction services sector, which contributes 0.51% to economic growth and ranks third behind the manufacturing and trade sectors, has huge potential (Sugiyanto & Kosbiamtoro, 2022).

Given that Indonesia is the largest construction market in Asean and provides more than 67% to the construction market of Asean countries, the Indonesian construction industry would entice construction service entrepreneurs from other countries to go there (Nita et al., 2018). The Indonesian construction services sector has currently grown significantly over the last three years by roughly 30%, demonstrating that trust in the industry's participants is continuing to rise (Mongina & Moronge, 2020).

The growth of a country's economy, as well as its educational, social, cultural, agricultural, and other sectors, depends on the development of its infrastructure. For the execution of sustainable infrastructure development, the government, the private sector, and the community must all take an active part (Waris et al., 2013). Developing and maintaining infrastructure, including public works infrastructure and public housing, is one of the government's responsibilities in the development of infrastructure (Abidin, Didi, et al., 2021). The State Revenue and Expenditure Budget allocates the most money to the Ministry of Public Works and Public Housing among the institutional ministries (Abidin, Ode, et al., 2021). The State Revenue and Expenditure Budget for 2020 allocated 120,217.54 billion rupiahs to the Ministry of Public Works and Public Housing.The Ministry of Public Works and Public

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Housing's budgetary allotment is used to carry out programs for managing water resources, building roads and bridges, creating settlements and housing, as well as other infrastructure development activities (Delima et al., 2016).

Regional infrastructure development and economic growth are two things that influence each other because the quality of construction work is the main thing in supporting the distribution of goods and services as the main means of economic development (growth). More than that, Mashkoor et al., (2023); and Lizarralde et al., (2013) emphasized the sustainability aspects of the benefits of infrastructure so that the economy is also sustainable. The government has established goals for the growth of the nation's road infrastructure in order to promote national economic growth and achieve interregional connectivity (Sailan & Badaruddin, 2022). Because road infrastructure has a significant impact on distribution and logistics activities, which are vital to national defense and security, politics, socioculture, and economic life. Road infrastructure also connects regions and affects Indonesia's topographical characteristics. Additionally, the transportation industry, which helps with the movement of people, accessibility between regions, and the improvement of life quality and human welfare, can be supported by road infrastructure (Ongòndo et al., 2019).

The Buton Islands region, which is part of Southeast Sulawesi Province and includes Baubau City, Buton Regency, South Buton Regency, North Buton Regency, and Central Buton Regency, is currently experiencing a very rapid expansion of its road network. This is due to the new autonomous region's expansion, particularly in the Buton Islands region. Of course, the numerous road construction projects being carried out come after development. The topography of the Buton Islands' 5 (five) cities and regencies is generally mountainous, undulating, and hilly, with a slope ranging from 2 to 40^0 (BPS Sultra, 2022). According to information from the Director (General of Highways Ministry of PUPR 2019), the Southeast Sulawesi Province's district/city roads are 10,527 km long, provincial highways are 1,009.28 km long, and national roads are 1,497.81 km long.

It is necessary to assess performance in ascertain whether there are variations from the plan during execution, whether the performance is completed within the allotted time frame, and whether the performance is what was anticipated. Because a project has constraints, good and focused management is necessary for a construction project in order to accomplish its ultimate purpose. Cost, time, and quality are the three project limitations (Deep et al., 2022). The three key components of project management. These three boundaries interact with one another inside a project and are crucial to its execution (Byaruhanga & Basheka, 2017). The key objective for businesses providing construction services is the successful completion of projects.

There are a number of factors that can delay completion of the work, including unpredictable weather, incomplete drawing documents, unstable ground conditions, and others. An unskilled workforce results in low productivity (Tumiwa, 2019). Supporting materials are readily available. It is difficult to find equipment that can be rented. The frequent occurrence of quality failures and discrepancies in the quality of building goods is another issue that arises in construction projects and is no less significant. The results of the construction work that have been agreed upon in the construction work contract are not attained in this scenario because the service provider does not fulfill the customer's expectations or the requirements set by the service user (Kusuma & Soeprapto, 2018).

In reality, a construction project has a variety of distinct features, is filled with uncertainty, is complicated, and involves a number of parties, thus it frequently results in issues that have an impact on project completion performance. The Buton Islands region differs from other cities due to its unique qualities. The supply chain system, which is considered unfavorable, the price stability of fluctuating construction materials, the condition of the ground surface, which is mountainous, undulating, and hilly, the availability of limited work support resources, changing weather conditions, and other problems are all faced by construction actors. Performance indicators in a building project are said to be affected by aspects including the economy, management, resources, and other considerations.

This study aims to identify the variables that can influence project performance in road construction projects, as well as their current state, the degree to which they influence project performance in construction projects, and the methods used to improve them in connection to this impact.

2. Literature Review

It can happen that in reports an activity in the project takes place faster than the schedule as expected (Suharto, 2005). However, it turned out that the costs incurred exceeded the budget. If control measures are not taken immediately, it may result in the project not being completed as a whole due to a lack of funds. Performance is a

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description of the level of achievement of the implementation of an activity/program/policy in realizing the goals, objectives, mission and vision of the organization contained in the strategic planning of an organization.

Performance measurement is a process of assessing the progress of work against predetermined goals and objectives including information on the efficiency of the use of resources in producing goods and services, the quality of goods and services, the results of activities compared with the intended purpose and the effectiveness of actions in achieving goals (Robertson, 2002). The cost, time, and quality, which are the basic criteria for the success of traditional approaches to evaluating project performance, are measured by three factors, namely the project and the iron triangle (Atkinson, 1999; Kagioglou et al., 2001; and Toor & Ogunlana, 2010). Several studies mention the measure of project success based on time performance, cost performance, quality, profit, customer satisfaction, and public satisfaction (Ling et al.,, 2009), and responsiveness to change (Ling et al., 2008). Project performance measurement is mostly focused on result orientation that is objective and easy to measure.

Objective measurements, among others, are seen from the aspect of time, speed of implementation, time variance, unit cost, accident rate, net present value, and environmental impact. Subjective assessment is based on quality, function, end-user satisfaction, customer satisfaction, planning team satisfaction, and contractor team satisfaction. Project performance measurement is very important as a reflection of company performance. The performance of the construction business unit is based on project performance by considering the common interests of owners, contractors, and planners.

Liu & Walker, (1998); and Suharto (2005) put forward an example where it could happen that in reports an activity in the project took place ahead of schedule as expected. However, it turned out that the costs incurred exceeded the budget. If control measures are not taken immediately, it may result in the project not being completed as a whole due to a lack of funds.

This performance requires control. Control according to R. J. Mockler as quoted by Suharto (2005) is a systematic effort to determine standards that are in accordance with planning objectives, design information systems, compare implementation with standards, analyze the possibility of deviations between implementation and standards, then take corrective actions needed so that resources are used effectively and efficiently in order to achieve the target. The control process runs throughout the project life cycle to achieve good performance at every stage.

Planning is made as reference material for the implementation of work. These reference materials will then become implementation standards for the project concerned, including technical specifications, schedules, and budgets. So to be able to control the need for planning. According to Suharto (2005) there are several differences between planning and control, namely: (1) Planning concentrates on: setting direction and goals; allocating resources; anticipating problems; and motivating participants to achieve goals; and (2) Control concentrates on: control of work towards goals; effective use of existing resources; repair/correction of problems; and rewarding achievement of objectives measure the results achieved to be compared against the original plan.

3. Research Methodology

The long process of research starts with a desire to understand a certain phenomenon and progresses to the development of concepts, hypotheses, and ideas (Mucheke, 2019). The research process entails choosing proper methodologies, gathering data, processing that data, and accumulating findings that result in novel hypotheses or ideas (Demmallino et al., 2018). The research was conducted using a positivistic approach, namely an approach that emphasizes the combination of numbers and logic (Uvarova et al., 2017). Positivity is usually used to interpret a phenomenon objectively by using precisely measurable data, obtained through surveys or questionnaires combined with statistics and expressing hypotheses (Alfakhri et al., 2018); and (Hasddin et al., 2023). In this method, a phenomenon can be examined with the goal of determining the degree of correlation between the variables under investigation as well as whether there is a relationship between two or more variables. This connection is either correlative or causative (Ayu et al., 2022).

This study's methodology combines a qualitative approach with a descriptive quantitative method. To produce results from analyses that are more thorough and complete, employ the mixed approach (mix method) (Azizah et al., 2020). This study is a survey study, meaning that it uses data from a questionnaire to collect samples from the public and conduct quantitative research. The answers provided by respondents to the questionnaire's questions in the form of ordinal data were used to generate quantitative data from the main data (Putra et al., 2021).

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The five stages of the research technique followed in this study are as follows: The first stage is the preliminary stage and includes the following steps: 1) fact observation to assess performance issues with building projects based on institutional data; 2) formulation of the issue and research goals; and 3) development of research instruments. Identifying variables and indicators, formulating frameworks and hypotheses, and reviewing pertinent prior research findings are all part of the second step, which is known as the literature review stage (Susun et al., 2019). The third stage is the research design stage, where the population and sample are determined, the questionnaire is designed, distributed, and collected. Data analysis is the fourth stage.

Variable is an attribute or trait that has variations or various values. In this study, the research variables were grouped into 2 groups, namely the independent variable group (X) was project internal and external factors and the dependent variable group (Y) was project performance (Ayni et al., 2019). The sampling technique is a way to determine the number of samples and the selection of prospective sample members, so that each sample selected in the study can represent the population (representative) both in terms of number and characteristics of the population (Kurniawan et al., 2017). There are two things to consider in determining the sample size. The first is precision (precision) and the second is confidence (confidence). Accuracy refers to how close the sample estimate is to the characteristics of the population (Girsang, 2022). Confidence is a function of the range of variability in the sampling distribution of the sample mean. The population is a grouping of things or people that the researcher has chosen to study and then make conclusions from because they share particular attributes and characteristics (Maddeppungeng et al., 2022). The complete research flowchart is presented in Figure 1. This model was constructed in relevant studies by (Sidiq & Johari, 2022).

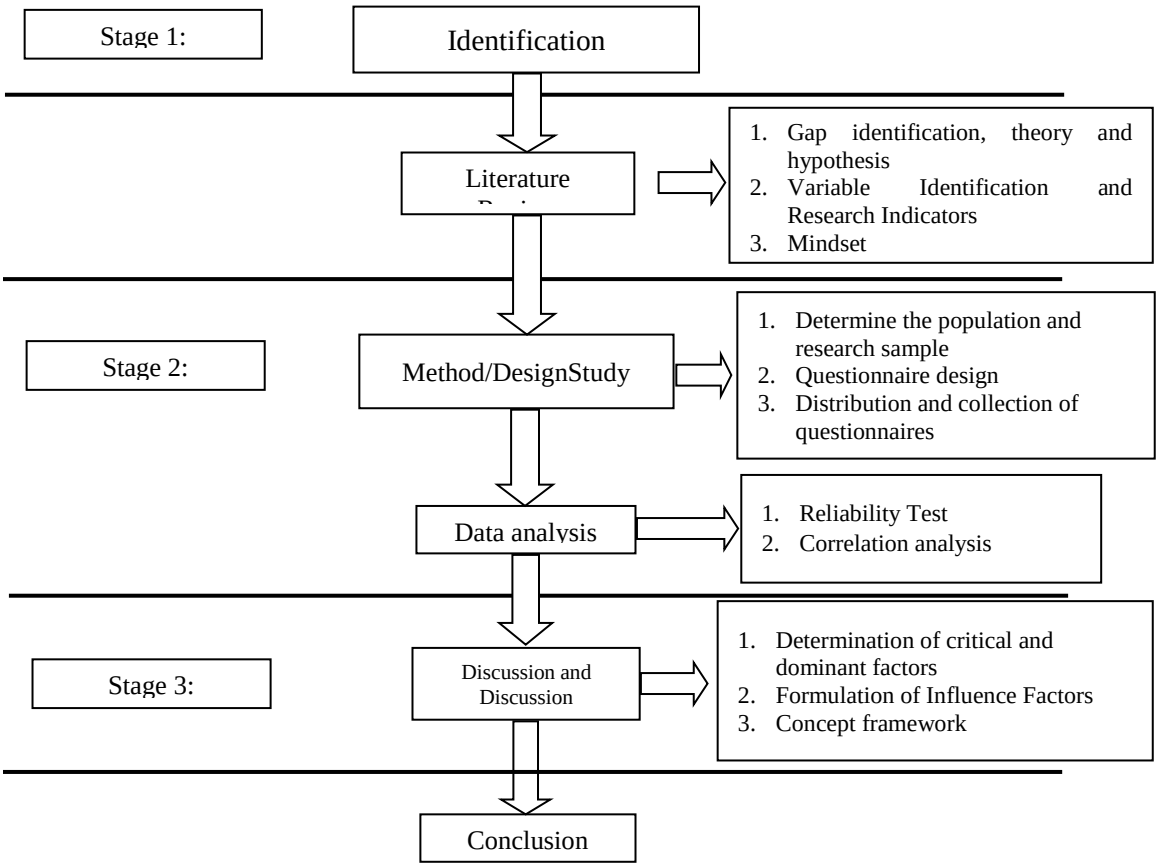

Figure 1: Research flow chart

By selecting 18 respondents, the sample in this study used a saturated sample. Data collection tools are utilized in research. Questionnaires, and observations served as the study's data collection methods. Each variable is represented by the measurement tools employed in this investigation. This indicator will be used as a questionnaire question for

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responses. The Likert scale was employed in this investigation (Rahman, 2018). This scale, which ranges from 1 to 5, is used to gauge respondents' levels of agreement with the indicator (Ulil Albab & Erizal, 2021). A score of 1 indicates that the respondent strongly disagrees with the indication, while a score of 5 indicates that they strongly agree. The illustration of the link between variables served as the foundation for the study's hypothesis (Tomigolung, 2013). The hypothesis test that was carried out for multiple regression was the F-test to determine whether the effect of the independent variables on the dependent variable was simultaneously significant or not significant. F test formula, is:

$$\text{Uji F} = \frac{(R^2)/k}{(1-R^2)(n-k-1)}$$

Information;
R^2 = Coefficient of Determination
n = Number of Samples
k = Number of Independent Variables
The statistical test hypothesis F (F-test) is formulated as follows *H0*: There is no simultaneous effect of the independent variable on the dependent variable if b1=b2=b3=0. The statistical test used to state that *H0* is accepted or *H1* is rejected is by carrying out an F-test with the following criteria, if the Fhit value ≤ Ftable or the Fhit value ≥ -Ftable. It can be said that there is no significant effect simultaneously of all independent variables on the dependent variable *H1*: There is a simultaneous independent variable effect on the dependent variable is fulfilled if b1 ≠ b2 ≠ b3 ≠ 0.

The validity of a measuring instrument is the ability of a measuring instrument to measure indicators of an object of measurement. Validity testing was carried out by using the product moment analysis technique and looking at the correlated item-total correlation value with the following criteria: if the calculated r value is greater than r table and the value is positive (at a significant level of 5 percent or 0.05), then the item or question or the indicator is said to be "valid", and vice versa (Nufah et al., 2019).

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

Information;

r_{xy}	:	Correlation coefficient between variable x and variable y
N	:	Number of Samples
$\sum XY$	:	The Number of Multiplication Between the Variables x and y
$\sum X^2$	:	The Sum of the Squared Values of x
$\sum Y^2$		The Sum of the Squared Values y
$(\sum X)^2$		The Sum of the x Values is Then Squared
$(\sum Y)^2$		The Sum of the y Values is Then Squared (Vitriani, 2016)

Reliability test is a tool used to measure the consistency of a questionnaire which is an indicator of a variable or construct. A questionnaire is said to be reliable or reliable if the respondents' answers to the questions are consistent or stable from time to time (Jalan & Bakti, 2012). Reliability test using Alpha Cronbach method by comparing the value of alpha or rcount with rtable. The value of rcount is formulated with;

$$r_{hit} = \left(\frac{n}{n-1}\right)\left(1 - \frac{\sum \sigma_t^2}{\sigma_t^2}\right)$$

Information;
r_{hit} = The Reliability You Are Looking For
n = The Number of Question Items Tested

$\sum \sigma_t^2$ = Total Variance Score of Each Item
σ_t^2 = Total variance (Pratama, 2019)

To determine whether an item is reliable or not, then:
1. If r count is positive, and $r_{count} > r_{table}$ = 0.05 df n-2 then the variable or item is reliable, and
2. If rcount is positive and $r_{count} < r_{table}$ = 0.05 df n-2 then the variable or item is not reliable.

Influential factors are made into a ranking system based on the weight of the scores given by the respondents. Weights are given in five levels using a likert scale which is used to measure attitudes, opinions and perceptions of respondents. In the research, the value of the Relative Importance Index is clustered into two parts, namely values that have a significant and insignificant effect on cost, time and material performance (Ferdian et al., 2018).

4. Result and Discussions

The results of this study's data processing were compiled from all incoming information, including up to 18 respondents. Prior to performing a comprehensive analysis of the data, take a closer look at the data based on the various factors or variables, such as the Owner, contractors, consultants, labor, materials, equipment, site characteristics, external factors, and construction management, that have an impact on the performance of costs, time, and construction materials in road works. The findings of the questionnaire's withdrawal are broken down into a number of areas, including the respondent's profile, the project's profile, the respondent's perspective, and the test of validity and reliability. The results of respondents' perceptions of the factors that affect the cost performance, time and quality of highway construction are presented (Table 1).

Table 1: Research Results on Respondents' Perceptions of Factors Affecting Cost, Time and Quality Performance

No	Variable	Code	Persepsi Responden				
			Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
1	Owner	X1.1	0	0	6	9	3
2		X1.2	0	0	7	10	1
3		X1.3	0	4	8	3	3
4		X1.4	0	0	0	15	3
5		X1.5	2	5	1	7	3
6		X1.6	1	4	4	5	4
7		X1.7	0	4	7	6	1
8		X1.8	1	1	9	2	5
9	Contractor	X2.1	0	2	5	7	4
10		X2.2	0	0	9	5	4
11		X2.3	0	4	5	5	4
12		X2.4	0	0	7	7	4
13		X2.5	0	0	6	7	5
14		X2.6	1	1	4	8	4
15		X2.7	0	0	4	7	7
16		X2.8	0	1	7	7	3
17		X2.9	0	2	8	6	2
18		X2.10	0	2	8	7	1
19		X2.11	0	0	7	5	6
20		X2.12	0	3	7	4	4
21		X2.13	0	2	6	4	6
22	Consultant	X3.1	0	0	4	12	2
23		X3.2	0	3	6	5	4
24		X3.3	0	3	7	4	4
25		X3.4	0	4	5	6	3
26		X3.5	0	3	5	8	2

27		X3.6	0	4	4	7	3
28		X3.7	0	6	9	2	1
29		X3.8	0	1	8	7	2
30		X3.9	1	1	6	9	1
31	Labor	X4.1	0	0	5	8	5
32		X4.2	0	1	6	8	3
33		X4.3	0	0	4	9	5
34		X4.4	0	1	6	7	4
35		X4.5	0	4	7	6	1
36	Material	X5.1	0	1	5	6	6
37		X5.2	0	0	11	2	5
38		X5.3	0	0	7	6	5
39		X5.4	0	4	5	2	7
40		X5.5	0	1	9	4	4
41		X5.6	0	4	6	6	2
42		X5.7	0	0	4	6	8
43	Equipment	X6.1	0	5	5	6	2
44		X6.2	0	0	6	6	6
45		X6.3	0	0	6	7	5
46		X6.4	0	3	4	6	5
47	Site Characteristics	X7.1	0	0	5	9	4
48		X7.2	0	0	6	6	6
49		X7.3	0	2	6	5	5
50		X7.4	0	1	3	11	3
51		X7.5	0	2	5	7	4
52		X7.6	0	2	9	4	3
53		X7.7	0	2	6	3	7
54		X7.8	0	4	2	7	5
55		X7.9	0	6	5	3	4
56		X7.10	1	3	4	6	4
57	External	X8.1	2	1	5	3	7
58		X8.2	0	3	5	5	5
59		X8.3	0	2	7	5	4
60		X8.4	0	2	6	3	7
61		X8.5	0	0	5	8	5
62		X8.6	0	2	7	5	4
63		X8.7	0	4	3	8	3
64		X8.8	0	3	7	3	5
65	Construction Management	X9.1	0	0	5	8	5
66		X9.2	0	0	5	9	4
67		X9.3	0	0	7	6	5
68		X9.4	0	5	4	5	4
69		X9.5	0	4	6	6	2
70		X9.6	0	4	7	3	4
71		X9.7	0	1	9	4	4

Source: Authors (2023)

An instrument (questionnaire) is said to be good if it is valid and reliable. An instrument is said to be valid if the questions or statements on the instrument are able to express something that will be measured by the instrument. The results of the validity test as shown in Table 1 show that there are 1 or 1.4% indicators on invalid cost performance, 7 indicators or 9.85% on time performance and 6 or 8.45% indicators on quality performance that are invalid.

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The relationship between indicators and cost performance shows that out of 71 indicators, 15 indicators have a significant effect on cost performance. "Increase in material prices" has the highest relative index of inequality (RII) value of all indicators, which is equal to 0.844. "System and scheduling control/control" has the smallest RII value among 15 indicators, with a value of 0.789. These results are shown in Figure 2 below,

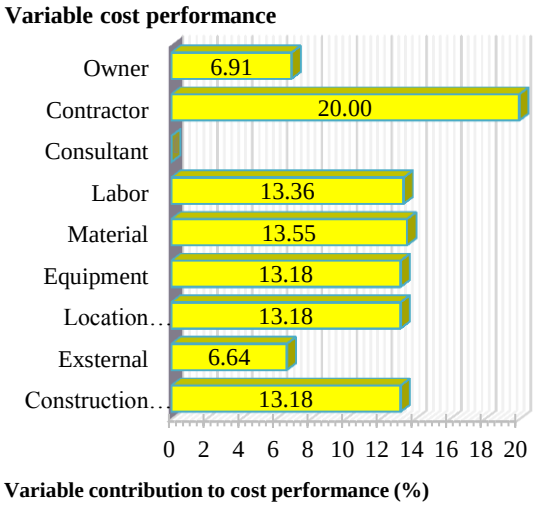

Figure 2: Variables that affect cost performance
Source: Authors (2023)

A number of variables include fifteen important indicators. The "contractor" variable has the largest number of indicators affecting cost performance (20%), and is followed by the variables of material inventory, labor, equipment, site characteristics, and construction management (13%). Three other factors, such as the owner, external factors, and consultants, each have a relatively different influence on cost performance (low below 10%).

The effect of indicators on time performance shows that out of 71 indicators, 18 indicators have a significant effect on time performance. The indicator with the highest RII value is "difficulty in project financing" with a value of 0.867. The indicator with the smallest RII (relative index of inequality) value of the 18 indicators is "System and scheduling control controls with an RII value of 0.833. There are several indicators that have the same ranking level. Two indicators are at rank 2, seven indicators are at rank 4 and eight indicators are at rank 11 (in Figure 3).

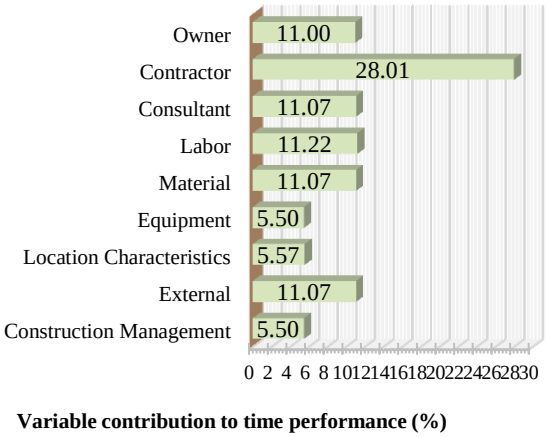

Figure 3: Variables affecting timing performance
Source: Authors (2023)

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As seen in Figure 3, that eighteen influential indicators are part of several variables. Several variables have relatively the same influence on the ranking level. The "contractor" variable has the highest effect (28%). The same thing happened from the cost performance assessment where the consultant was the highest, only here (time performance) was higher. Other variables that play a role are Labor, Consultants, materials, and external factors (about 11%); while other variables play a role below 5%.

Out of 71 indicators, 17 indicators have a substantial impact on quality performance, according to the effect of indicators on time performance. "Poor material quality" has the highest RII (relative index of inequality) value of any indication, coming in at 0.922. Out of the 17 indicators, "Effective quality assurance system (inspection, control, and evaluation of work)" has the lowest RII value (0.844). These results are shown in Figure 4 below,

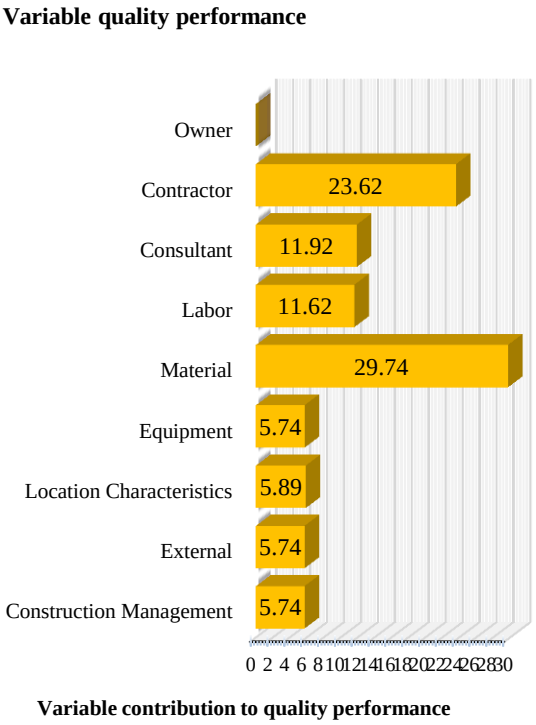

Figure 4: Variables that affect quality performance
Source: Authors (2023)

There are a number of indicators with the same level of rating. Rankings for two indicators are 3, four indicators are 6, and seven indicators are 11. The influence of consultant and workforce variables is roughly equal at 11%. Construction management, external factors, equipment, and location characteristics all have a 5.8% impact on quality performance.

Combined performance is the performance obtained by accumulating the same indicators on cost, time and quality performance. The indicators that have a significant impact on the combined performance of cost, time and quality are calculated from the value RII_{gab} mean + standard deviation of 0.800. Seventeen influential indicators are part of several variables. Variables that have the highest impact on time performance are contractor variables 35.52% then successively, materials 17.59%, labor 17.53%, location characteristics 6%, equipment 5.92%, external 5.84%, consultant 5.82% and owner 5.77%.

An important note from the findings is that the role of workers is not so significant to work results. This is in line with the results of research by Harlianto & Rudi, (2023); and Kasabreh & Tarawneh, (2021); Kog & Yaman, (2016) that employees or workers do not really affect the quality of work, because in this study there are managerial and consulting variables that are the main ones in providing supervision to workers. However, work results (satisfactory) for workers will be when there is a leadership role as found by (Suhartono et al., 2023); (Peng et al., 2022); (Ofori-Kuragu et al., 2016).

5. Conclusion

The main indicator affecting time performance (highest RII score) is difficulty in project financing. The variable that has the most influence on time performance is the contractor variable, followed by labour, consultants, materials, external, owner, site characteristics, equipment and construction management. The main indicator affecting the highest quality performance is poor material quality. The variable that has the highest influence on time performance is the "material" variable followed by contractors, consultants, workforce, site characteristics, equipment, externals and construction management. Several variables have relatively the same influence on the ranking level. Consultant and workforce variables have relatively the same effect. Equipment variables, site characteristics, external and construction management have the greatest influence on quality performance. The main indicators affecting the performance of the highest accumulated cost, time and quality are the lack of experience of the contractor. The variable that has the most influence on time performance is the contractor variable, then material, labor, site characteristics, equipment, external, consultant, and owner, respectively.

In terms of maximizing work costs, the contractor is the main key so that the management capabilities of a contractor are indispensable. Construction implementation in terms of effective and efficient time performance is determined by the contractor, then in terms of the quality of work produced it is determined by two things, namely materials or materials, and the contractor. This means that the contractor is the key in determining the quality of construction work.

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