

Analysis on reputation, competence and experience as requirements in contractor selection

Wardhani Hakim

Siti Haerani

Tamrin Sattung

Faculty of Economic and Business
Hasanuddin University, Indonesia

Keywords

Job knowledge, project performance, experience, reputations, competence, contractor selection

Abstract

In a construction project, an owner generally involving a contractor to execute its project due to unavailability of adequate internal resources. The involvement of external party in the project, on the other side, raising a risk to the project. This research aims to analyze and understand in depth the factor determining the success of construction project involving contractor. The research was conducted at PT Vale Indonesia in Sorowako, Indonesia, by taking samples of employees involved in construction projects. Data collection is done through documentation and questionnaire. Data analysis was done by factor analysis using computer software SPSS. The results show that there are three factors affecting project performance with a total cumulative variance of 61,708%. Factor I consists of conscientiousness, reputation, and cooperative relationship with eigenvalue of 3,693 and total variance of 39,930%. Factor II consists of job knowledge, job proficiency, initiative, and social skill with eigenvalue of 1,357 and total variance of 13,574%. Factor III consists of job experience, controllability, and commitment with eigenvalue of 1,120 and total variance of 11,204%. The findings of this study can be used by project owners as reference in selecting contractors.

Introduction

Problem Identification

The role of business influences the economic strength of a country. According to Zulkieflimansyah in Utomo (2004), the strength of a country in the economic field has a positive correlation with the contribution of small and medium enterprises. The development of the business world, including construction services, will spur the growth of other economic sectors which in turn will boost the economic growth.

PT Vale Indonesia, as a mining company holding the work contract, in carrying out its business activities may use the services of other appropriate companies, such as Construction Company. Figure 1 shows the type and number of projects of PT Vale in 2016 using contractor services covering various types services; IT Service, Catering Service, Delivery Service, Transportation Service, Construction Service, Consulting Service, Medical Service, Manpower Supply, Post Mine Service, Security Service and Housekeeping Service.

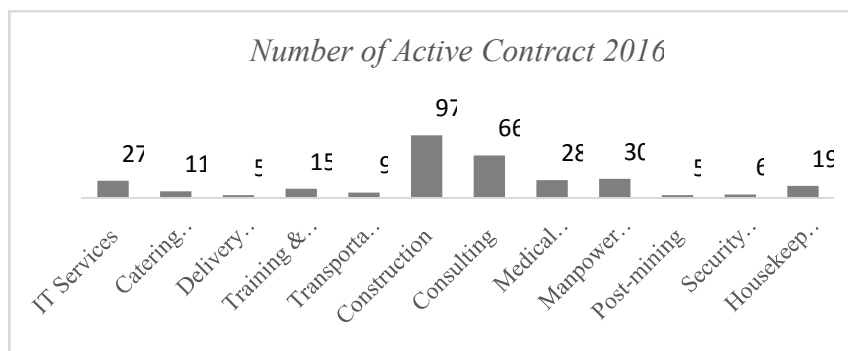


Figure 1 the number of service contracts of PT Vale in 2016 (PT Vale documentation)

The existence of the contractor as the project implementer facilitates the project owner in completing the project. The project owner can use the resources of the contractor without having to own

it. However, the use of contractor services also poses a risk to the project owner if the contractor does not implement the project according to the project owner's expectations. Figure 2 shows the number of PT Vale partners who received warning letters for not meeting the expected performance standards. In 2013 there were 365 active partners of PT Vale, 19% of whom received warning letters due to unsuitable performance. In 2014 there were 294 active partners, 21% of whom received warning letters. By 2015 there were 265 active partners, 19% of whom received warning letters. By 2016 there are 267 active partners, 44% of whom received warning letters. This indicates that the quality of project implementation by the Contractor is still not maximal.

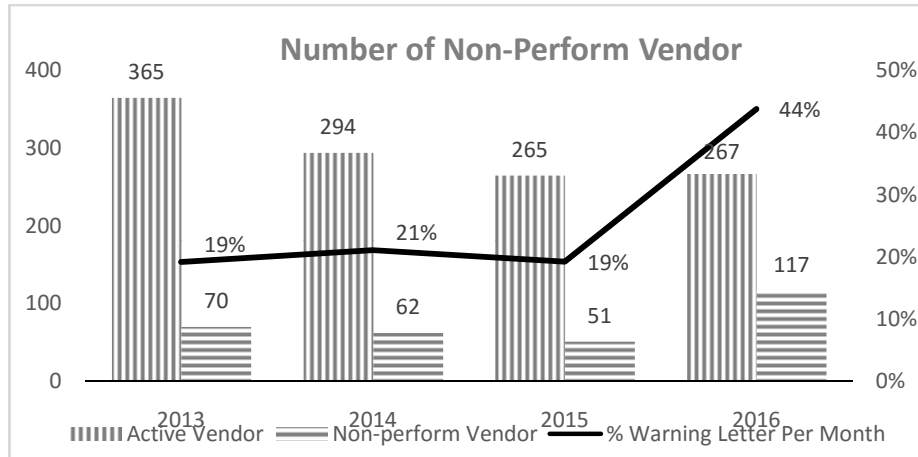


Figure 2 the number of PT Vale partners who received warning letters (PT Vale Documentation)

As a result of the inadequate quality of the contractor's work for the project owner may result in additional costs, disruption to the project owner's operations, damage to the project owner's name and so forth.

Based on the description above, the project owner needs to be careful in choosing the contractor working on their project. The project owner needs to know the factors that affect the success of the contractor in carrying out the project.

This study specifically analyzes the factors that predominantly influence the success of the contractor in implementing the project effectively and efficiently. Factors analyzed are more related to the pre-construction stage which is the stage of contractor selection. The project owner who became the object of this research is PT Vale Indonesia operating in Sorowako, South Sulawesi.

Literature Review

Project Performance

According to PMBOK (2013), project success is measured by the successful completion of the project according to the scope, time, cost, quality, resources and risk constraints agreed with the project owner. Project performance is measured by three indicators: cost, time, and quality that are the basis of criteria for project success and are iron triangles (triple constraint) (Atkinson, 1999).

A project management is said to be successful when the project objectives are met on time, at the right cost, meet the expected performance / technology, use the resources effectively and efficiently and be accepted by the project owner (Kerzner, 2009).

According to PMBOK (2013), project performance can be analyzed by Earned Value Management (EVM), a methodology that uses scope, schedule and resource measurements to assess project performance and progress. Time performance can be measured by Schedule Variance (SV) and Schedule Performance Index (SPI). Schedule Variance is the difference between the progress achieved (EV) and the planned value at a given time (PV), the positive SV signifies the project is done ahead and the negative SV signifies the project is behind schedule. SPI is the ratio between EV and PV. SPI is less than one ($SPI < 1$) indicating that the progress achieved is less than the planned value (inefficient, behind schedule). SPI is worth more than one ($SPI > 1$) indicating the value of progress achieved is greater than the planned value (efficient, ahead schedule). Cost Performance can be measured by Cost Variance (CV) and Cost Performance Index (CPI). CV is the difference between the value of progress achieved (EV) with the actual

cost that has been issued at a certain time (AC). A positive CV indicates that the progress achieved is greater than the surplus, under budget cost and the negative CV indicates an over budget project. CPI is the ratio between EV and AC. A CPI of less than one ($SPI < 1$) signifies an over-budget project. A CPI of more than one ($SPI > 1$) signifies an under budget project.

Contractor Selection

The process of selecting a contractor is a series of activities ranging from identifying the needs of the contractor services by the project owner, preparing the auction package to the signing of the contract to implement the project's physics (Iman Soeharto in Gaffar, 2004).

According to Daryatno in Gaffar (2004), the scope of construction management consists of pre-qualification, auction, project preliminary, project implementation and project delivery. According to Clough, H. Richard in Gaffar (2004) prequalification is intended to filter out bidders who are not qualified in terms of experience, capital, human resources, equipment to obtain qualified candidates / partnerships. At this stage the contractor follows the selection held by the project owner. The success of this stage is an opportunity for the contractor to be able to follow the next stage.

The auction process is a crucial stage for contractors in the construction service project process. Because at this stage the contractor must submit administrative requirements, technical proposal and price quotes so that a special strategy is needed to win the competition with other contractors. According to Presidential Decree No. 54 of 2010 states the auction process generally includes the submission of bid documents by the auction participants, evaluation by the auction committee, then proposing the winning candidate based on the order of assessment. The number of bidders is very varied. The success of a contractor to win an auction depends on the sharpness of the auction strategy.

After winning the auction, the next step is project preparation which is preparation stage by contractor. The contractor sets up a team to prepare the project implementation planning as a benchmark for project implementation. The next stage is the implementation of the project. The project team carries out project activities, controls and performs corrective actions so that the project objectives can be achieved. After the project is completed, the next step is the handover between the contractor and the project owner.

Selection Criteria

The criteria for selecting contractors are generally divided into four main factors: tasks performance (Van Scotter & Motowidlo, 1996), contextual performance (Borman & Motowidlo in Gaffar, 2004), price (Coase, 1937) and network (Granovetter, 1985).

Task performance is the skill and ability to run a specific job and differentiated between one another. The criteria used in evaluating task performance are general mental behaviour, job knowledge, job proficiency and job experience (Van Scotter & Motowidlo, 1996). There are five criteria used to evaluate the contextual performance of conscientiousness, initiative, social skills, commitment and controllability. (Borman & Motowidlo in Gaffar, 2004).

Framework

The framework of this research is seen in Figure 3.

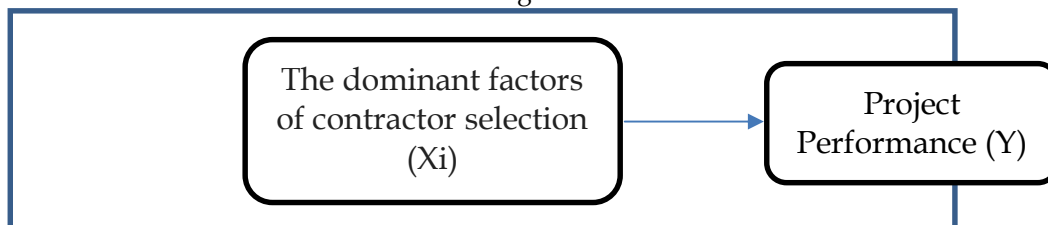


Figure 1 Framework

Based on research objectives and literature review, a research framework is created as shown in Figure 3. It is assumed that there is a dominant influence of the factors used in selecting contractors on project performance. Table 1 shows the variables used in this study.

No	Code	Independent Variables	Criteria
1	X ₁	General mental behaviour	Task performance
2	X ₂	Job knowledge	Task performance
3	X ₃	Job proficiency	Task performance
4	X ₄	Job experience	Task performance
5	X ₅	Accuracy	Contextual performance
6	X ₆	Initiative	Contextual performance
7	X ₇	Social skill	Contextual performance
8	X ₈	Controllability	Contextual performance
9	X ₉	Commitment	Contextual performance
10	X ₁₀	Price	Price
11	X ₁₁	Reputation	Network
12	X ₁₂	Cooperative relationship	Network
13	Y	Project performance	

Table1 Research Variables

Methods

Data Collection

The research was conducted at PT Vale Indonesia in Sorowako, South Sulawesi, Indonesia. The projects that are used as research objects are construction projects funded by PT Vale Indonesia capital fund.

The population in this study was PT Vale employees who handled the project and joined the procurement committee that selected the project contractor. The population includes project managers (10 people), engineers (25 people) and procurement employees (16 people). Samples used are saturated samples that is all the population sampled as many as 51 people. Data collection was done by documentation technique and questionnaire. Project data and contractor performance are obtained through PT Vale Indonesia documentation. Data of contractor selection criteria was obtained through questionnaire. Questionnaire contains closed statement with Likert scale Strongly Disagree (score 1), Disagree (score 2), Somewhat Agree (score 3), Agree (score 4) and Strongly Agree (score 5).

The data obtained is processed using MS Office Excel 2013 and SPSS (Statistical Product and Services Solution) version 22. To describe the sample characteristics used MS Office Excel. To test the validity and reliability of research instrument, the product moment test is Pearson correlation and Cronbach's alpha coefficient with SPSS program. Factor analysis was performed using SPSS assistance.

Results

Characteristic of Sample

Figure 4 shows the sample characteristics used in this study. The total respondents who are questionnaires are 41 out of 51 samples. Education level of respondents is S1 as much as 80.49%, S2 as much as 17.07% and S3 as much as 2.44%. More than 75% of respondents have work experience of more than 10 years.

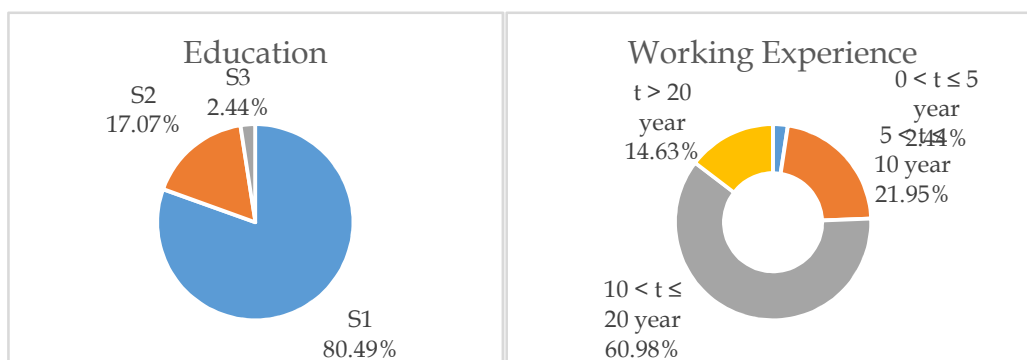


Figure2Sample characteristics

Validity and Reliability Test

Table 2 shows the result of validity test comparing the value of product moment Pearson correlation with r value of table. Known significance value of 0.05 with two-sided test and the amount of data (n) = 41, then obtained r table value of magnitude 0.308.

Code	Variable	r count	r table	Status
X1	General mental behavior	0.808 - 0.900	0.308	Valid
X2	Job knowledge	0.821 - 0.936	0.308	Valid
X3	Job proficiency	0.747 - 0.879	0.308	Valid
X4	Job experience	0.754 - 0.861	0.308	Valid
X5	Accuracy	0.799 - 0.851	0.308	Valid
X6	Initiative	0.550 - 0.828	0.308	Valid
X7	Social skill	0.788 - 0.866	0.308	Valid
X8	Controllability	0.850 - 0.936	0.308	Valid
X9	Commitment	0.802 - 0.830	0.308	Valid
X10	Price	0.504 - 0.863	0.308	Valid
X11	Reputation	0.743 - 0.772	0.308	Valid
X12	Cooperative relationship	0.575 - 0.681	0.308	Valid

Tabel2Validity test results

Reliability test results with SPSS release coefficient cronbach's alpha of 0.874 > 0.6 so it can be stated that all questions of the questionnaire are reliable.

Classic Assumption Test

Table 3 shows the results of multicollinearity test, from table 3 it is known that all variables have tolerance > 0.1 (greater than one) and VIF < 10 (less than ten) so it can be stated that all variables do not experience multicollinearity.

Code	Variable	Tolerance	VIF
X1	General mental behavior	0.481	2.081
X2	Job knowledge	0.449	2.228
X3	Job proficiency	0.358	2.794
X4	Job experience	0.615	1.625
X5	Accuracy	0.434	2.306
X6	Initiative	0.497	2.012
X7	Social skill	0.728	1.374
X8	Controllability	0.480	2.083
X9	Commitment	0.554	1.804
X10	Price	0.552	1.813
X11	Reputation	0.474	2.110
X12	Cooperative relationship	0.517	1.936

Tabel3.Hasilujimultikolinieritas

Table 4 shows the results of heteroscedasticity test by Glejser test method. The Glejser test is performed by regressing the independent variable with its residual absolute value (ABS_RES). If the significance value between the independent variable with Absolute Residual is more than 0.05 then there is no heteroscedasticity problem.

Code	Variable	Sig.	Status
X1	General mental behavior	0.84	Not experiencing heteroscedasticity
X2	Job knowledge	0.17	Not experiencing heteroscedasticity
X3	Job proficiency	0.93	Not experiencing heteroscedasticity

X4	Job experience	1.00	Not experiencing heteroscedasticity
X5	Accuracy	0.63	Not experiencing heteroscedasticity
X6	Initiative	0.88	Not experiencing heteroscedasticity
X7	Social skill	0.94	Not experiencing heteroscedasticity
X8	Controllability	0.77	Not experiencing heteroscedasticity
X9	Commitment	0.91	Not experiencing heteroscedasticity
X10	Price	0.50	Not experiencing heteroscedasticity
X11	Reputation	0.71	Not experiencing heteroscedasticity
X12	Cooperative relationship	0.92	Not experiencing heteroscedasticity

Table 4 Results of heteroscedasticity test .

From Table 4 it is known that the significance value of each variable > 0.05 so that all variables do not experience heteroscedasticity.

Result of normality test by One-Sample Kolmogorov-Smirnov (1-Sample K-S) shows significant probability value equal to $0.200 > 0.05$ hence data distribution expressed fulfill normality assumption.

Factor Analysis

Factor analysis is intended to simplify the number of large variables into smaller groups based on the same factors while retaining as much of the original information as possible. Factor analysis used in this research is principal component analysis (PCA). The analysis is used to transform the set of native variables into a smaller set of linear combinations based on most of the original set of variables (Haryawan, 2003).

The components used are then made to make each of these components vary. This is achieved by rotating the component axes using the varimax method. While the method for determining how many components will be taken is to use kaiser criteria. This criterion takes components that have an eigenvalue greater than one (Haryawan, 2003).

The value of communality shows how well each variable is represented by each group of factors formed (Santoso in Koriawan, 2003). The greater the value of a variable's communality, the more closely related to the group of factors (components) that are formed.

Code	Variable	MSA Phase I	MSA Phase II	Status	Communality
X1	General mental behavior	0,419	Not used		
X2	Job knowledge	0,622	0,663	Used	0,778
X3	Job proficiency	0,712	0,756	Used	0,713
X4	Job experience	0,676	0,759	Used	0,650
X5	Accuracy	0,772	0,788	Used	
X6	Initiative	0,628	0,790	Used	0,444
X7	Social skill	0,535	0,634	Used	0,542
X8	Controllability	0,726	0,695	Used	0,726
X9	Commitment	0,608	0,776	Used	0,439
X10	Price	0,390	Not used		
X11	Reputation	0,582	0,756	Used	0,649
X12	Cooperative relationship	0,688	0,714	Used	0,558

Table 5. MSA and communal values

Factor analysis yields KMO MSA (Kaiser-Meyer Oliver Measure of Sampling Adequacy) of $0.629 > 0.5$ and Sig. Of $0.000 < 0.05$. However, in the first phase analysis, there are two variables with MSA value < 0.5 , which are general mental behavior variable (X1) and Price variable (X10) so that these two variables are excluded from phase II analysis. In the analysis of phase II factors obtained KMO MSA value of $0.737 > 0.5$ and Sig. Of $0.000 < 0.05$ and all variables have MSA value > 0.5 (Table 5).

Factor	Eigenvalues	Total Diversity (%)	Cumulative total diversity (%)	Status
1	3,693	36,930	36,930	Used
2	1,357	13,574	50,503	Used
3	1,120	11,204	61,708	Used

Table6 Result of factor extraction

Table 6 shows the number of factors formed based on the eigenvalue > 1 that is 3 (three) factors with the cumulative total diversity value of 61.708%. Factor I has an eigenvalue of 3.693 and a total diversity of 39.930%. Factor II has an eigenvalue of 1.357 and a total diversity of 13.574%. Factor III has an eigenvalue of 1.120 and a total diversity of 11.204%.

Code	Variable	Component		
		1	2	3
X ₁₁	Reputatio	.786		
X ₅	Accuracy	.726		
X ₁₂	Cooperative relationship	.706		
X ₂	Job knowledge		.858	
X ₃	Job proficiency		.710	
X ₇	Social skill		.579	
X ₆	Initiative		.555	
X ₄	Job experience			.793
X ₈	Controllability			.739
X ₉	Commitment			.584

Table7. Rotated matrix component (loading factor)

Table 7 shows the loading factor value (the highest factor loading value for each variable in each factor group). The loading factor can explain how much the variable can measure the factors formed from each factor group (Santoso in Koriawan, 2011). The greater the value of the loading factor formed, the higher the ranking of the variable in the group of factors.

Discussion and Conclusion

Discussion

The result of instrument test with product moment pearson correlation and coefficient cronbach's alpha indicate that data obtained through questionnaire is valid and reliable. Data obtained from respondents who are 100% educated at least S1 and more than 75% have work experience more than ten years. This level of education indicates the ability of respondents in understanding the questionnaire and providing representative information.

Factor analysis conducted by Principal Component Analysis (PCA) method resulted in three groups of factors (components) that have eigenvalue > 1. The three factors formed have an influence on the performance of PT Vale Indonesia's construction project of 61.708%.

Factor I - Reputation

This factor is named the Reputation factor. Table 7 shows the Reputation (X₁₁) variables based on respondents' opinion is the most dominant factor with the largest factor loading factor on factor I, followed by the accuracy variable (X₅) and the cooperative relationship variable (X₁₂). This factor has an influence on construction project performance of 39.930%. These findings support the results of previous research conducted by Gaffar (2004) which stated that the contractor's big name affects the quality performance of the project and the results of research conducted by Mat Isa et al (2015) stating that reputation affects the performance of construction companies in the international market. Reputation is important for contractors to gain the confidence of project owners because big name contractors are usually experienced and have sufficient expertise.

Factor II - Competence

Table 7 shows the variables Job knowledge (X₂) based on respondents' opinion is the second most dominant factor with the largest factor loading factor on factor II, followed by Job proficiency (X₃), Social

skill (X7), and Initiative variables (X6). This factor is named the competence factor. This factor has an influence on the construction project performance of 13.574%. These findings support the results of previous research conducted by Gaffar (2004) which states that knowledge about the work, especially contractor knowledge about construction projects, contractor knowledge in understanding the design affect the quality performance of the project. This finding also supports the results of research conducted by Matt Isa et al (2015) which states that the knowledge owned by the company's human resources affect the performance of construction companies in the international market.

Factor III - Experience

Table 7 shows the job experience variables (X4) based on the respondents' opinion is the third most dominant factor with the largest loading factor factor III, followed by Controllability variable (X8), and Commitment variable (X9). This factor is named the experience factor. This factor has an influence on the construction project performance of 11.204%. These findings support the results of previous research conducted by Matt Isa et al (2015) who found that the company's experience affect the performance of the company. The experience gained becomes a provision to solve similar problems so much easier. The experience of contractors is one of the key successes of construction project performance (Babu and Sudhakar, 2015).

Conclusion

There are three groups of factors that influence the success of the contractor to carry out the construction project of PT Vale Indonesia with the effect of 61.708%. The dominant factors affecting the success of contractors in implementing construction projects in PT Vale Indonesia are reputation, competence and experience.

Research Limitations and Direction for Further Research

This study uses variables related to the project preliminary stage so that no factors related to the implementation phase are identified. For further research on project performance, it is advisable to add other variables related to the stage of construction, controlling, project control.

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