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Tender selection of sustainable suppliers during the tender process in the mining industry

Surya Hermawan ; Nasar Buntu Laulita[+ Author & Article Information](#)*AIP Conf. Proc.* 2680, 020147 (2023)<https://doi.org/10.1063/5.0128552>

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Supplier selection is very important in the tender process because it determines the sustainability of the project after the tender process. Inappropriate selection of suppliers will interfere with the sustainability and performance of the project after the tender. This research goals to determine the effect of implementing sustainable supplier selection. To achieve the research objectives, a quantitative method is used with the type of explanatory research through hypothesis testing from primary data. It is obtained from distributing questionnaires to employees in the mining industry and direct interviews in the field which uses SPSS 24.0. The results demonstrated that the economic aspect had a significant effect on improving supplier performance with a p-value of 0.000, but this was not the case with the environmental and social aspects which have a p-value of 0.212 and 0.954. This research also shows that the three dimensions in selecting a sustainable supplier together will have a positive and significant effect in improving supplier performance in a tender on the mining industry. They are shown by unstandardized B value is positive and the p-value is 0.000 during F test. Since the research on the application of sustainable supplier selection is still limited in Indonesia especially in the mining industry. Then it is hoped that this research will have a novelty and will be useful in improving supplier performance whose impact and will be felt by the organization directly.

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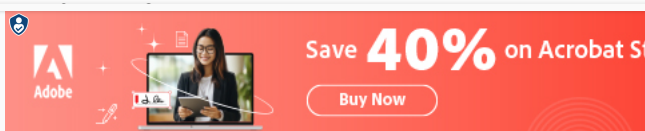
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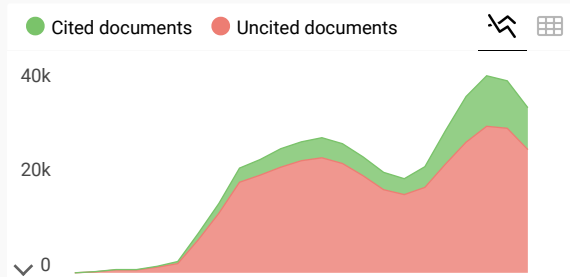
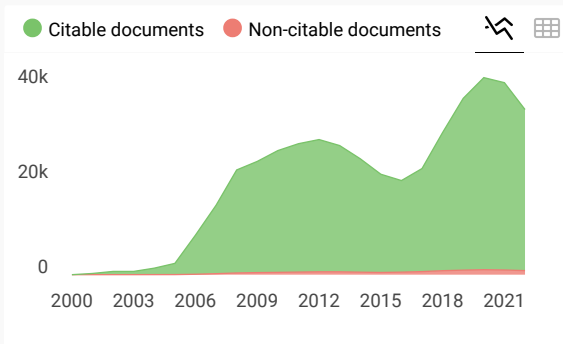
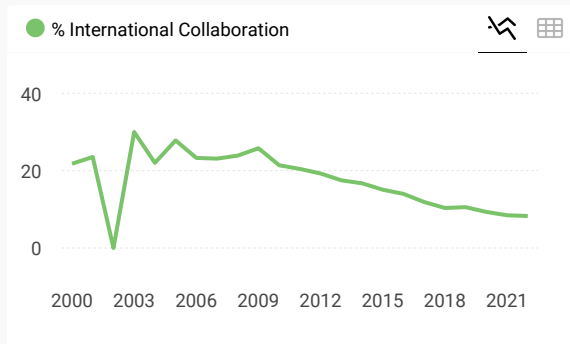
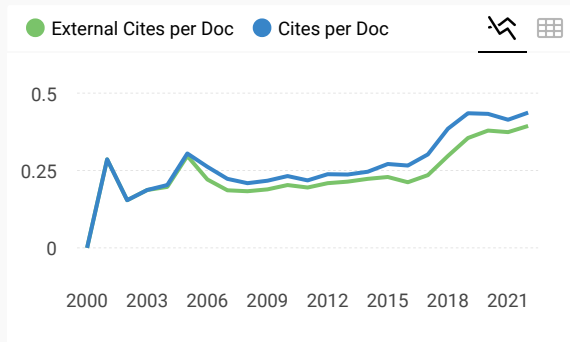
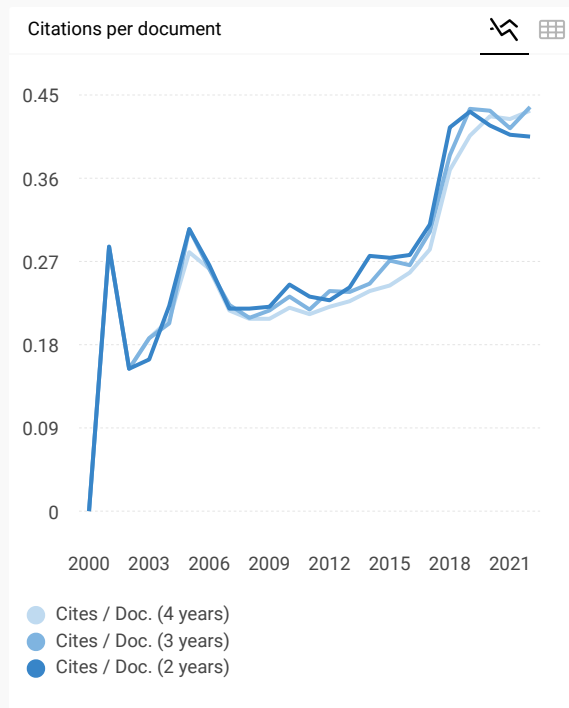
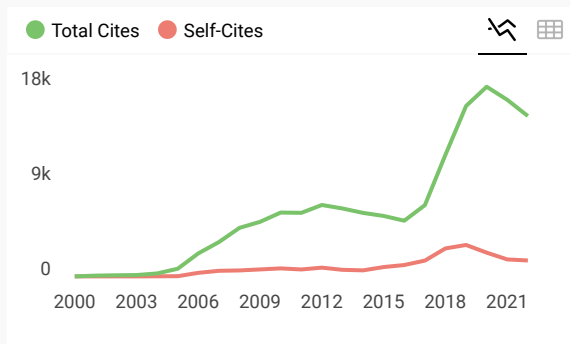
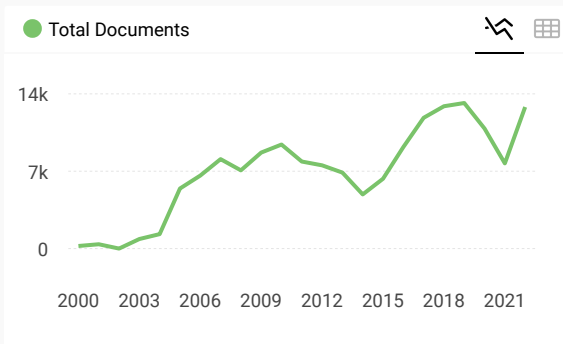
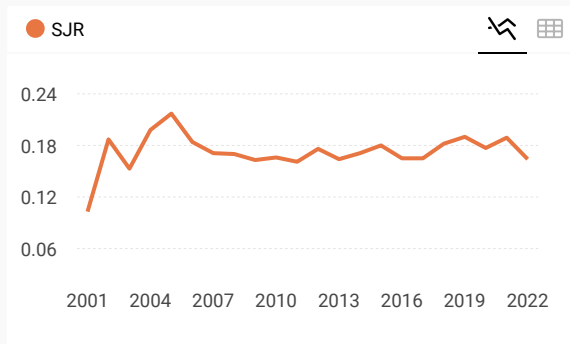
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Tender Selection Of Sustainable Suppliers During The Tender Process In The Mining Industry

Surya Hermawan^{1, 2, a)} and Nasar Buntu Laulita^{1, b)}

Author Affiliations

¹Professional Engineer Program, Petra Christian University, Siwalankerto Street No.121-131, Surabaya, East Java, Indonesia

²Civil Engineering and Planning Department, Petra Christian University, Siwalankerto Street No.121-131, Surabaya, East Java, Indonesia

Author Emails

^{a)} Corresponding author: shermawan@petra.ac.id

^{b)} nasar_bl@yahoo.com.sg

Abstract. Supplier selection is very important in the tender process because it determines the sustainability of the project after the tender process. Inappropriate selection of suppliers will interfere with the sustainability and performance of the project after the tender. This research goals to determine the effect of implementing sustainable supplier selection. To achieve the research objectives, a quantitative method is used with the type of explanatory research through hypothesis testing from primary data. It is obtained from distributing questionnaires to employees in the mining industry and direct interviews in the field which uses SPSS 24.0. The results demonstrated that the economic aspect had a significant effect on improving supplier performance with a p-value of 0.000, but this was not the case with the environmental and social aspects which have a p-value of 0.212 and 0.954. This research also shows that the three dimensions in selecting a sustainable supplier together will have a positive and significant effect in improving supplier performance in a tender on the mining industry. They are shown by unstandardized B value is positive and the p-value is 0.000 during F test. Since the research on the application of sustainable supplier selection is still limited in Indonesia especially in the mining industry. Then it is hoped that this research will have a novelty and will be useful in improving supplier performance whose impact and will be felt by the organization directly.

INTRODUCTION

Tight global competition has made most of the production functions in the supply chain very important [1], including selecting suppliers in the procurement process for a long time and requiring tenders [2]. In line with that, Yazdani [3] also explained that evaluating and selecting suppliers is a significant strategic decision to reduce operational costs and increase organizational competitiveness in developing business opportunities.

Several studies have explained the effect of supplier selection in the tender process, including [4] which explains the importance of supplier selection in anticipating uncertain prices and quality differences in tenders. Abdullahi [5] explains the need for transparency in selecting supplier selection. in the tender process by implementing e-tendering. Besides, Yazdani [3] explains the need to consider environmental factors in selecting suppliers, and Bai [6] emphasizes the need to consider social factors in addition to economic and environmental factors in evaluating and selecting suppliers.

The mining industry is one of the industries that require suppliers to procure various spare parts in the long term. Thus, the selection of sustainable suppliers is important in improving company performance in various departments, including storage management, production planning, maintenance scheduling, financial resources, and the environment [7]. The mining industry in Indonesia has not yet explained in detail the criteria for suppliers needed along with the tender process to maintain sustainability and performance. Thus, the project problems are delayed

and suffer losses due to a lack of accuracy and proper procedures in the supplier selection process. minimized. Regarding the existing problems, this research goals to examine the effect of selecting a sustainable supplier in terms of economic, environmental, and social aspects during the tender process on supplier performance in the mining industry.

LITERATURE STUDY

This research carries out by taking samples from several companies involved in the mining industry in Berau which is one of the largest coal mining locations in Indonesia. Recently, most of the research and construction projects are expected to be sustainable along with zero waste application [8,9,10,11,12]. The research is expected to contribute to determining the criteria for selecting sustainable suppliers so that it will have an impact on optimal supplier performance. Then, in general, it will also have an impact on improving the performance of mining companies in Indonesia. The research model is shown in Figure 1.

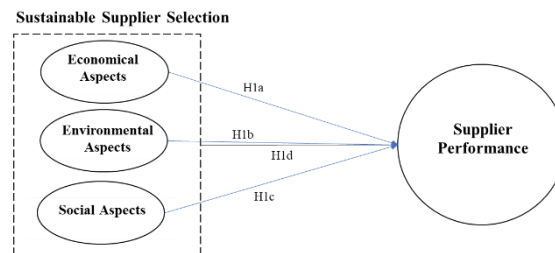


FIGURE 1. Research Model

The research hypothesis formulated from the research model above is:

H1a: Economic aspects of supplier selection have a positive effect on supplier performance

H1b: Environmental aspects in supplier selection have a positive effect on supplier performance

H1c: Social aspects in supplier selection have a positive effect on supplier performance

H1d: All aspects of supplier selection together have a positive effect on supplier performance

Sustainable Supplier Selection

Suppliers play a very important role in supply chain management and influence the organization, products, and goods, sustainable performance so that it requires rigorous evaluation and selection [13]. According to the emergence of sustainable supply chain management, several studies have shown the need to include environmental and social attributes in supplier selection decisions other than those that are still economically based according to traditional views [14].

Supplier Performance

De Felice [15] divides supplier performance measurement due to supplier selection in three dimensions, namely quality of delivery, delivery performance, and service and communication. These dimensions are very important because matters relating to suppliers directly affect supply chain performance concerning purchasing organizations which in turn have a strategic impact on reputation, good name, and customer satisfaction, finance (sales), and operational performance [16, 17, 18]. Several studies explain supplier performance parameters from the buyer side, including flexibility and innovation [16, 18], reduction in supply costs [16,18], problem-solving skills [19, 21, 18], innovative and creative [20, 18], analytical thinking skills in communication [16,18] and teamwork [16,18].

RESEARCH METHOD

In this research, to achieve the research objectives, a quantitative method is used with the type of explanatory research through hypothesis testing from primary data. It is obtained from distributing questionnaires to employees in the mining industry and direct interviews in the field which uses SPSS 24.0.

Population, Sample, and Data Collection

The research population includes employees of PT. Berau Coal, who worked in the procurement department and made decisions regarding supplier selection. The sample data were collected using an online survey method for all employees involved in supplier selection.

Measurement Variables

The dimensions of selecting a sustainable supplier have been described by several previous studies, and the supplier performance is based on research by De Felice [15]. This study adapts research that explains the dimensions of supplier selection describing in three dimensions. It including economic aspects with ten statement indicators, environmental aspects with fourteen statement indicators, and social aspects with eight question indicators. Regarding the supplier, performance is described by sixteen statement indicators in three measurement dimensions, namely the quality of delivery, delivery performance, and service along with the communication. All statement items in the questionnaire were distributed to respondents using a five-Likert scale.

Statistical Calculations

Data were analyzed using multiple regression analysis in the relationship between supplier selection and supplier performance using SPSS 24.0 software.

TABLE 1. To format a table caption, use the Microsoft Word template style: *Table Caption*. The text “**TABLE 1,**” which labels the caption, should be bold and all letters capitalized. Center this text above the Table. Tables should have top and bottom rules, and a rule separating the column heads from the rest of the table only.

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RESULTS AND DISCUSSION

From a total of 50 respondents, it is known that there are three incomplete questionnaires. Two outlier questionnaires so that 45 respondents' results were continued for data analysis. In the validity test, five invalid indicators were obtained for the dimensions of the economic aspects, one indicator that was not valid for the environmental aspects, two indicators that were not valid for the social aspects. One indicator that was invalid for the dependent variable performance of the supplier. It is indicated by the value loading factor <0.6 , and all of them are reliable as indicated by the value of Cronbach's Alpha ≥ 0.6 which refers to Hair [21].

This study uses multiple linear regression analysis to determine the influence of the aspects that influence the selection of a sustainable supplier including economic, environmental, and social aspects of supplier performance in the mining industry. A summary of the research model is shown in Table 1.

TABLE 1. Summary of Research Model

Model	R	R ²	Adj R ²	Std. Error	Durbin- Watson
1	.719 ^a	.518	.482	1.59153	1.860

a. Predictors: (Constant), AE, AL, AS

b. Dependent variable: OP

R Square is called the coefficient of determination and describes how the OP's operational performance is explained by various dimensions in the selection of a sustainable supplier, including economic (AE), environmental (AL), and social (US) aspects. The three variables can describe 51.8% of the factors that affect supplier performance represented by R2 (determinant coefficient), which means that there are other factors not examined in this study that contribute 48.2% as factors that affect supplier performance.

The F test in the ANOVA table aims to determine the effect of the independent variables simultaneously as shown in Table 2.

TABLE 2. ANOVA^a

Model		Sum ²	df	Mean ²	F	Sig.
1	Regression	111.1	3	37.131	14.66	.000 ^b
	Residual	103.8	41	2.533		
	Total	215.2	44			

a. Dependent Variable: OP

b. Predictors: (Constant), AE, AL, AS

The results of the ANOVA table show that the p-value significance value is 0.000 (less than 0.05) so that all independent variables are statistically significant in predicting supplier performance after the tender process. This outcome research meets the agreement with Nair [22] This outcomes also demonstrate that the regression model has a probability (probability) less than 0.05 to provide a wrong prediction. This means that the regression model has a confidence level above 95%.

The t-test is used to partially determine the effect of each independent variable, shown by the coefficient table in Table 3.

TABLE 3. Coefficient Results

Mo.		Uns. B	Coef. Std. Error	Std. Coef. Beta	t	Sig.	Col. Tol.	Stat. VIP
1	Con.	5.57	3.261		1.71	.09		
	AE	.662	.132	.607	5.03	.00	.808	1.24
	AL	.097	.075	.246	1.27	.21	.313	3.19
	AS	.007	.121	.011	.058	.95	.340	2.94

a. Dependent Variable: OP

From the table above, the regression equation is obtained as follows:

$$Y = 5,571 + 0.662X_1 + 0.096X_2 + 0.007X_3 + e$$

The regression equation above stipulates that if all factors including economic aspect, environmental aspect, and social aspect constant. Then the factors which affect operational performance will be 5,571. The results of the Table above also explain that by taking all other independent variables as zero, the unit increase in the economic aspect. It will lead to an increase of 0.662 from the operational performance value. Then, increasing the unit in the environmental aspect will cause an increase in the operational performance of 0.096. On the other hand, the unit increases in social aspects.

The economic aspect will lead to an increase in the operating performance score of 0.007. This concludes that the economic aspects affect operational performance the most followed by environmental aspects and social aspects. These outcomes meet the agreement with the research of Peng [23]. The results of this study also show that the economic aspects have a significant effect on operational performance as indicated by a p-value of 0.000 <0.05. While environmental aspects and social aspects do not significantly affect operational performance as indicated by p-values of 0.212 and 0.954 which are greater than 0.05.

CONCLUSION

The results of data analysis conclude that the selection of a sustainable supplier during the tender process with a focus on economic aspects has an influence coefficient of 0.662 and a p-value of 0.000. Thus it will have a positive and significant impact in improving supplier performance in the mining industry in terms of product quality, delivery performance, service, communication, price, and work safety. Different things in environmental and social aspects that do not have a significant effect on improving supplier performance are marked with a p-value of 0.212

and 0.954 (> 0.05). However, all dimensions in selecting sustainable suppliers can jointly improve supplier performance after the tender process in the industry. mining is characterized by a p-value of 0.000 (< 0.05).

This research also shows that needs to be considered in the economic aspect include quality factors, facilities, and supplier capacity, the supplier's financial capacity, on-time delivery, and supplier service which is marked by a loading factor value > 0.6 .

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