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Original Article

Investigating the Relationship Between Performance Evaluation Based on Innovation Management System Approach and Information Technology in the Spun Pile Manufacturing System to Improve Competitiveness in Indonesia

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Abstract *- The recent high demand for Indonesian infrastructure development, the usage of precast concrete has increased. Based on the Ministry of Public Works and Housing (PUPR) information, the usage of precast concrete keeps increasing from 24 million tons in 2014 to 41.82 million tons in 2019. Based on the global competitiveness index and the Information and Communication Technology (ICT) index, Indonesia is still left far behind other countries in the region. Therefore, it is still needed to develop performance evaluation based on an innovation management system ISO 56002:2019 and information technology to improve competitiveness. The results of this research are the identification of existing performance evaluation and information technology activities, dimension and indicator of performance evaluation and information technology factors that influence competitiveness, and relationship model of the variables that influence competitiveness. Research samples are taken from the precast companies that produce spun piles in Indonesia. Data gathering is collected using observation, documentation, pilot survey, questionnaire, and expert interviews. Data analysis is analysed using qualitative methods with SPSS and expert judgment. The result showed that performance evaluation based on an innovation management system ISO 56002:2019 and information technology positively affect competitiveness, and performance evaluation based on an innovation management system ISO 56002:2019 and information technology mutually influence each other. This finding could hopefully help Indonesia's precast company to improve its competitiveness.*

Keywords *- Competitiveness, Information technology, Performance evaluation, Precast concrete, Spun pile.*

1. Introduction

Indonesia's infrastructure development has been accelerated in the last decade due to Indonesian government policy [1]. Based on the Ministry of Public Works and Housing (PUPR) information, the usage of precast concrete keeps increasing from 24 million tons in 2014 to 41.82 million tons in 2019 [2]. Based on AP3I data [2], the spun pile has the highest production volume in the precast industry. In order to stay competitive with its counterparts, the precast industry in Indonesia must focus on enhancing its development. The production capacity is limited but the demand keeps increasing due to the massive infrastructure and could reach five times the available manufacturing capacity. In recent times, the execution of the plan of the ASEAN Economic Community (AEC) and the ASEAN China Free Trade Area (ACFTA) has led to intense higher competition between local Indonesian precast products and import precast products due to the free trade policy, which permits duty-free entry of imported goods to enter Indonesia [3]. Therefore, the local precast industry has to improve and innovate its business to survive the competition. On the other hand, performance evaluation and information technology have been proven in other sectors to improve productivity, effectiveness, and efficiency. The authors hope that identifying indicators and the relationship between performance evaluation based on innovation management systems and information technology could help the local precast industries prepare a suitable strategy to compete with their competitors in the market. The concept of competitiveness refers to the ability of a company to compete in the market by developing strategy and innovation in order to make the product and service better than a competitor [4].

ISO 56002 is an international standard for managing innovation management systems, including managing performance evaluation [5]. Performance evaluation can affect the indicator ability of medium- and long-term business plans, eliminate achievement's objective deviation and make priority [6], accelerate the development of growth, improve performance, assessment, and reliability to retain customers and gain competitive advantage [7]. According to Suwignjo et al., by monitoring and evaluating an innovation implementation program and using an innovation management system, a leader can evaluate the team's performance [8]. Innovation is a driving force of competitiveness and pushing business performance [5]; however, like other quality management systems, ISO 56002 lacks of tools to do innovation [9]. On the other hand, information technology can improve productivity efficiency and reduce the number of errors [1]. ISO 56002 is also a new management system in Indonesia, and only a few companies have implemented it. This study also wants to introduce the implementation in the precast industries. Based on the existing literature, both innovation management systems and information systems have been studied separately to achieve improvement. Therefore, it is a better idea to integrate both of the knowledge. The novelty of this research is investigating integration between performance evaluation based on the innovation management system ISO 56002:2019 approach and information technology to enhance competitiveness in spun pile manufacturing systems in Indonesia precast industries.

2. Literature Review

2.1. Innovation Management System

Based on ISO 56002:2019 [5] Innovation management system is a set of elements that are interrelated and interact with each other, aiming to achieve goals and objectives. The innovation management system provides a conceptual framework to develop and spread innovation capability, performance evaluation, and achieve goals. Effective implementation of this system really depends on the management commitment and leadership capability to promote and support innovation. The cycle of Plan-Do-Check-Act (PDCA), in Figure 1, can be done in the innovation management system to make improvements in order to ensure that innovation ideas are supported and managed by an organization. The cycle of PDCA has been implemented in the innovation management system as per the following step [5]. Based on ISO 56002: 2019 [5], the PDCA cycle can be summarized and described as follows:

a) Plan: Establish the objectives and determine the actions needed to address opportunities and risks (Clause 6);

b) Do: Implement what is planned in terms of support and operations (Clauses 7 and 8);

c) Check: Monitor and (where applicable) measure results against objectives (Clause 9);

d) Act: Take actions to continually improve the performance of the innovation management system (Clause 10)

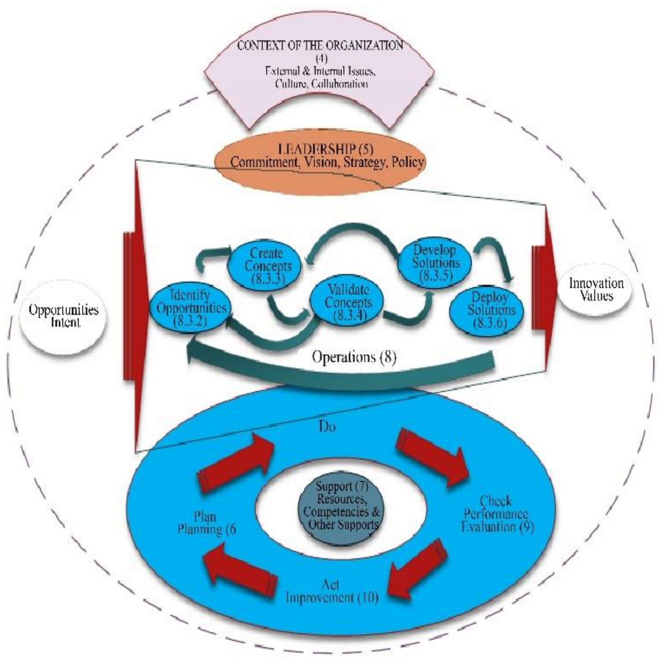

Fig. 1 Framework of the innovation management system [5]

In this paper, the research is only limited to clause 9 about performance evaluation. Based on ISO 56002: 2019 [5], the innovation process also means that all the innovation processes implemented in the system can interact and interrelate between one process with another process in the organization. This process can be within research and development, marketing, production, and others. In this existing precast manufacturing plant in Indonesia, the process is still stand alone and not connected with other processes in the factory, so it is difficult to do overall performance evaluation and make decisions. Innovation processes are illustrated in Figure 2. Based on ISO 56002: 2019, the Innovation process can be divided into five steps: identify opportunities, create concepts, validate concepts, develop solutions, and deploy solutions [5].

2.2. Performance Evaluation

Performance Evaluation has been mentioned and described in most ISO standards. In ISO 56002 [5], the performance evaluation is described in Chapter 9 and divided into several steps: monitoring and measurement, analysis and evaluation, internal audit, and management review.

2.3. Information Technology

According to ITAA [11] (Information Technology Association of America), Information Technology (IT) is a branch of knowledge learning about design, development, implementation, and information systems based on computers, which is divided into software and hardware. In this era where IT is developing fast, the dimension of IT has become more complex. In this research, the information technology variable is divided into four dimensions: hardware, software, security and brainwave.

2.3.1. Hardware

In the manufacturing industry, hardware is not only about computers but also sensors, robotics [12] and smartphones [13], and can be used to do monitoring and give real time reports about production process conditions [14].

2.3.2. Software

Based on ISO/IEC 2382, software encompasses the entire or a portion of the programs, procedures, regulations, and related documentation of an information processing system [15]. In the manufacturing industry, the software can be a program to analyze machine learning integrated with the procedure, network, Internet of Things (IoT), cloud-based server, and big data analytics [16] (Li Yang et al., 2022), Enterprise Resource Planning (ERP) (Nuttah et al., 2023) [17] dan PLC (Legat et al., 2017) [18].

2.3.3. Security

The organization has to provide security using adequate access procedures to protect research data at the institution [19] (Marlina. et al, 2022). Organizations should clearly state their digital policies because the data collected will be digital evidence. The policies should include various procedures, guidelines and standards that will drive the digital investigation within an organization. Therefore, the policies of the organization should be assessed periodically, according to Alenezi. et al., 2019 [20]. Current production processes aspire to optimize productivity and efficiency by restricting humans to refined roles to keep up with automation. Therefore, humans must define their job description in manufacturing systems, especially in the development of automation [21]. Hence, security aims to minimize risk and keep the network and information safe while providing data visibility, according to Ammar et al., 2021 [22].

2.3.4. Brainware

Brainware is someone who operates and explores the ability and usage of hardware and software. It also means that a sophisticated computer has no meaning. If no someone is operating it, the computer and software will not run. Brainware is also called a user because it refers to someone who operates the computer. The organization has to provide a sufficient number of staff to help solve operational problems in the existing system [23] (Afandy, 2022). Technicians should have enough competency and analysis skills through routine training [24] (Ching-Cheng Shen, 2022). The organization needs to focus on introducing necessary skills and providing training for its workforce to effectively tackle the human resources demand caused by integration and sustainable development within the organization [10]. The rapid development of technology has caused the production process to become more complex. Therefore, the competency of operators has also become more complex in order to do their job properly and becomes an important factor in future manufacturing [25].

This competency is often considered an obstacle to the productivity of the manufacturing industry [26]. Information technology has been important in manufacturing and can be used to collect, manipulate, and analyze information to generate insights about the manufacturing environment for automated production, and remote monitoring and control [27]. The recommended synthesis factor of information systems for manufacturing spun piles with the ISO 56002 approach and information technology is creating additional value to decrease the cost and improve quality through the innovation process, according to Ida Farida, 2022 [4]. In this research, the competitiveness is limited only for quality purposes.

3. Materials and Methods

This research utilized a combination of techniques such as literature review, observation, content construct validation, pilot survey, questionnaire surveys, and also expert interviews. The literature review was undertaken to identify the list of dimensions and indicators from performance evaluation and information technology. The findings were additionally validated by 5 knowledgeable experts in the spun pile manufacturing industry, each with a minimum of bachelor's degrees or higher, along with a work history of over ten years.

3.1. Research Frameworks

In this research, the frameworks are developed for the purposes of improving competitiveness in manufacturing spun pile in precast industries, using two different knowledge, where X1 is performance evaluation using innovation management system ISO 56002 approach and X2 is information technology. The dimension of X1 is derived based on Chapter 9 in ISO 56002, and the dimension of X2 is derived based on the literature review explained in Chapter 2 of this paper.

A questionnaire comprising 25 questions was developed based on the assessment of the performance evaluation and information technology activities, and 2 independent and one dependent risk variables were chosen for analysis. Then, the questionnaire is used to assess the influence of each indicator on competitiveness. The independent variables are performance evaluation using the ISO 56002: 2019 approach (X1) and information technology (X2), while the competitiveness indicators are quality (Y1).

A total of 130 respondents were involved in the spun pile manufacturing sector. The respondents are required to have a minimum of 5 years of working experience in the spun pile manufacturing plant, in addition to holding a high school degree as the minimum educational level. Upon the completion of the questionnaires, homogeneity and data adequacy tests were carried out before proceeding with the reliability test, correlation test, and regression analysis through SPSS 26 software.

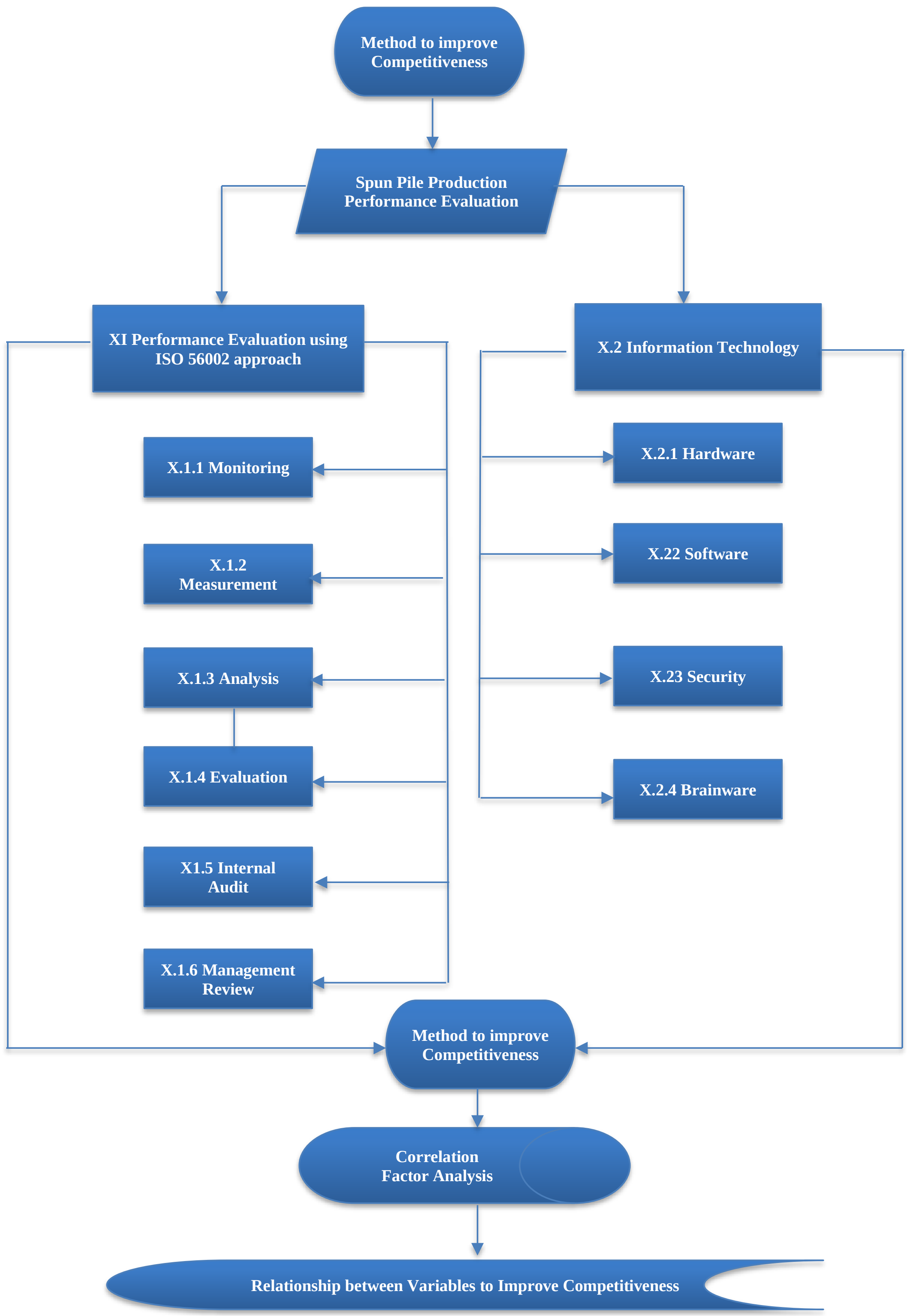

Fig. 2 Research framework

The linear regression model derived from regression analysis was tested through the F-test, T-test, and Durbin-Watson test. The outcome is a mathematical equation model that demonstrates and clarifies the relationship between performance evaluation using ISO 56002: 2019 approach (X1), information technology (X2), and competitiveness (Y).

3.2. Hypothesis

Based on the literature review, the hypothesis of this research is as follows:

H1: There is a positive relationship between evaluation performance using the ISO 56002 (X1) approach and competitiveness (Y).

H2: There is a positive relationship between information technology (X2) and competitiveness (Y).

H3: There is a positive relationship between evaluation performance using the ISO 56002 approach (X1) and information technology (X2)

4. Results and Discussion

4.1. Sampling Adequacy

The questionnaires were circulated to employees working in various spun pile manufacturing industries in the Indonesia area and were carried out for three weeks to gather some of the respondents and allow respondents to complete the questionnaires. Data collected from the content construct resulting activities of the performance evaluation and information technologies. Each contained the activities done using the dimension and indicator based on variables. From the 130 earlier respondents, only 103 samples passed the homogeneity tests.

Based on the KMO Measure of Sampling Adequacy test, The value is 0.787, which is greater than the minimum value 0,5. The sig value for X and Y is 0 (<0.05), meaning that the variables are not correlated. This test result means that X and Y indicator samples are sufficient and could proceed with another test.

4.2. Demography of Respondent

The distribution of questionnaire respondents in this research is as per the following:

Based on Figure 3 about the distribution of position levels, the most survey respondents are staff with 30.1%, the second is supervisor level with 29.13%; the third rank is department head with 15.53%; the fourth rank is manager with 12.62%; head of plant with 9.71% and least respondent is director level with 2.91%.

Table 1. KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.787
Bartlett's Test of Sphericity	Approx. Chi-Square	1149.274
	df	276
	Sig.	.000

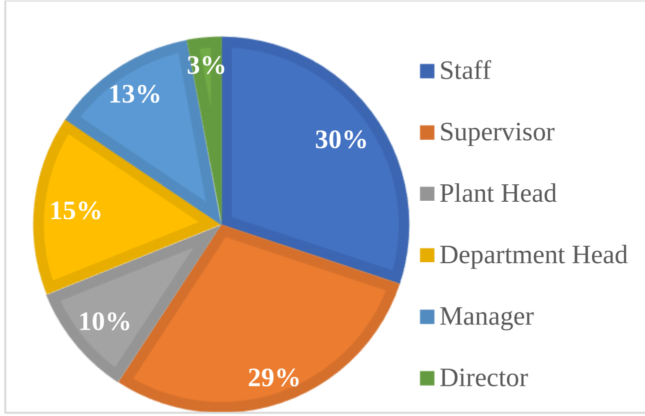

Fig. 3 Demography of respondent based on position level

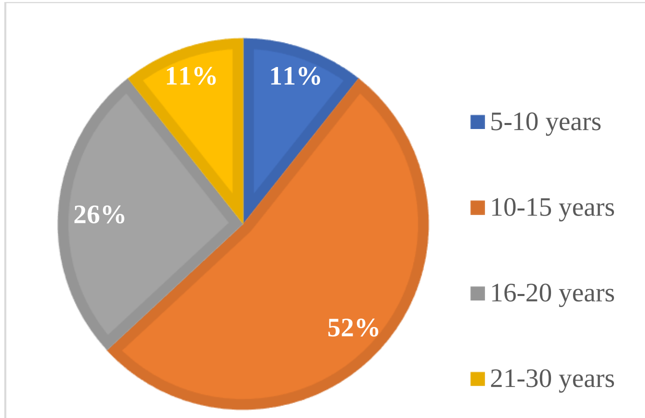

Fig. 4 Demography of respondents based on experience level

Based on Figure 4 about the distribution of experience levels, most respondents are 10–15 years of experience employees with 52.43%; the second rank is 16–20 years of experience employees with 26.21%; the third and fourth ranks are 21-30 and 5–10 years of experienced employees with 10.68% each. Based on Figure 5 about the distribution of education level, most respondents are a bachelor's degree with 74.76%, the second rank is associate degree employees with 10.68%, the third is master's degree employees with 8,74%, and the fourth rank is high school employees with 4,85%. The last is doctoral graduate employees, with 0,97% of respondents

4.3. Validity Test

The internal validity test (Figure 5) was aim to find out out if there are valid indicators regarding the competitiveness in this research, the internal validity is evaluated using Pearson Correlation. R table is 0,1937 with significance 0.05 and degree of freedom 101. All of the indicators in X1 are compared to the sum of all indicators X1, and All of the indicators in X2 are compared to the sum of all indicators X2. When the Pearson correlation value for all indicator comparisons to the sum value of each variable is more than the R table value of 0.1937, then the indicator is declared valid.

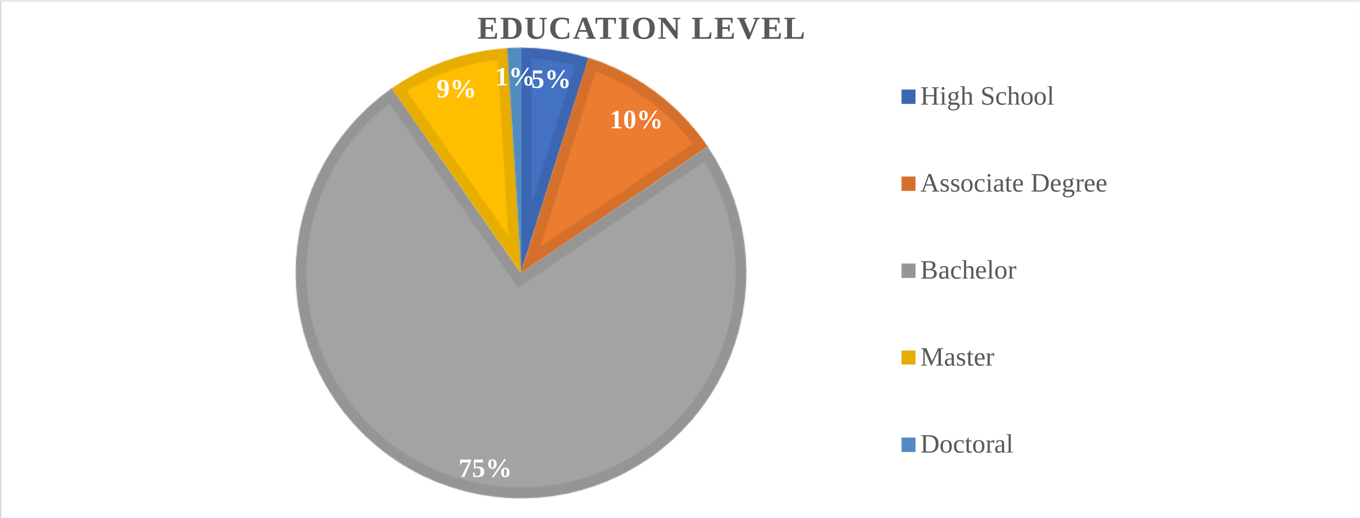

Fig. 5 Demography of respondents based on education level

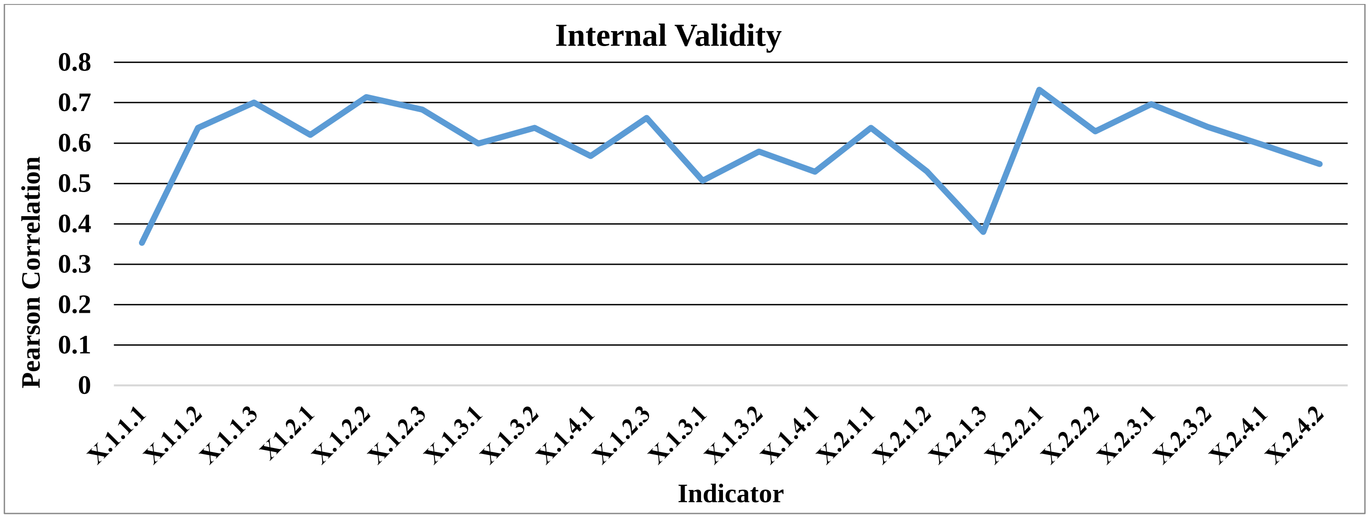

Fig. 6 Internal validity test using pearson correlation

4.4. Reliability Test

After the validity test was conducted, the reliability test was conducted using the Alpha Cronbach test, and the result was 0.911 for 25 items, exceeding the minimum reliability value of 0.7, as per Table 2.

Table 2. Correlation interpretation

Reliability Statistics	
Cronbach's Alpha	**N of Items**
0.911	25

4.5. X1-X2 and Y Correlation

The survey data used a Likert scale. Therefore correlation test was performed using the Spearman method.

Upon conducting the correlation test for X1, X2, and Y (Table 4), using the correlation interpretation based on Table 1 [28], it is revealed that there is a medium correlation between the X1 means and X2 mean with Y.

Moreover, a medium correlation is observed between the X1 mean and X2 mean. Therefore, while X1 and X2 also show medium effects on variable Y, X1 also has medium effects on X2.

Table 3. Correlation interpretation [28]

Correlation Coefficient (rs)	Correlation
0.0 – 0.19	Very Weak
0.2 – 0.39	Weak
0.4 – 0.69	Moderate
0.7 - 0.89	Strong
0.9 – 1.00	Very Strong

Regression analysis aims to determine how much independent variables influence the dependent variable Y. Regression analysis is conducted in the entire method. This methodology was selected based on the results of correlation analysis where there were no dominant variables identified and need to be eliminated.

This method assumes that all of the independent variables are equal in this research model.

Based on regression analysis, the R-value is 0.793, the R square is 0.63, and the adjusted R square is 0.622, included in the moderate level. It means that correlation model regression analysis is valid.

4.6. X1-X2 and Y F-Test

To determine the likelihood of the simultaneous impact between evaluation performance using ISO 56002 (X1) and the Information technology (X2) approach on competitiveness (Y), an F-test was executed. As per the regression model in the preceding section, the hypothesis is as follows:

H0: There is no relationship between evaluation performance using ISO 56002 (X1) and the information technology (X2) approach and competitiveness (Y).

H1: There is a relationship between evaluation performance using ISO 56002 (X1) and information technology (X2) approach and competitiveness (Y).

In the analysis of the F-test, the null hypothesis (H0) is refuted, and the alternative hypothesis (H1) is supported when the F research value exceeds the critical F value at a 95% level of confidence in a sample of 103 survey responses.

Table 4. Correlation between X1, X2, Y

Correlations					
			Y	**X1 Mean**	**X2 Mean**
Spearman's rho	Y	Correlation Coefficient	1.000	.585**	.625**
		Sig. (2-tailed)		.000	.000
		N	103	103	103
	X1Mean	Correlation Coefficient	.585**	1.000	.695**
		Sig. (2-tailed)	.000		.000
		N	103	103	103
	X2Mean	Correlation Coefficient	.625**	.695**	1.000
		Sig. (2-tailed)	.000	.000	
		N	103	103	103
**. Correlation is significant at the 0.01 level (2-tailed).					

Table 5. Regression analysis result for X1-X2-Y

Model Summary[b]					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	.793a	0.63	0.622	0.308	2.142
a. Predictors: (Constant), X2Mean, X1Mean					
b. Dependent Variable: Y1_Quality Competitiveness					

Table 6. ANOVA analysis result for X1-X2-Y

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	10.833	2	5.417	33.768	.000[b]
	Residual	16.041	100	.160		
	Total	26.874	102			
a. Dependent Variable: Y_ Competitiveness						
b. Predictors: (Constant), X2Mean, X1Mean						

Table 7. Coefficients analysis result for X1-X2-Y

Coefficients						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	.221	.338		.414	.001
	X1Mean	.431	.149	.308	2.895	.005
	X2Mean	.553	.154	.382	3.587	.001
a. Dependent Variable: Y_ Competitiveness						

The values of the F table and F research (Table 6) are 3,087 and 33.768. Based on this result, it means that F research is higher than the F table, therefore, hypothesis H0 is rejected and hypothesis H1 is accepted. Furthermore, there is a simultaneous relationship between evaluation performance using ISO 56002 (X1) and the Information technology (X2) approach and competitiveness (Y).

4.7. X1-X2 and Y T-Test

T-test was performed to check and determine if there is a difference between X1 and X2 in competitiveness. When the T research value is bigger than the T table value at a 95% confidence level, the null hypothesis (H0) will be rejected, and the alternative hypothesis (H1) will be accepted. Based on the regression model, the hypothesis of this research is as per the following statement:

H0: There is no significant difference between evaluation performance using ISO 56002 (X1) and information technology (X2) approach and competitiveness (Y).

H1: There is a significant difference between evaluation performance using ISO 56002 (X1) and Information technology (X2) approach and competitiveness (Y).

The value of T obtained through the regression-based SPSS calculation and t-table is 1,984. The research value of T from regression analysis, X1 (2,895) and X2 (3,587), exceeds the T value coming from T-table (1,984), indicating that the variables X1 and X2 influence variable Y directly. The calculated F table is 3,087. Additionally, the F research value from regression analysis, F research is 33.768, which is much larger than the F table. This finding suggests that variable X1 and X2 have a simultaneous effect on variable Y.

4.8. X1-X2 and Y Durbin Watson Test

Durbin-Watson's test was used to check and determine if there were any autocorrelation in a regression test. The condition of Durbin Watson is the following statement:

- If d < dL or d > 4-dL, autocorrelation occurs; therefore, the null hypothesis is rejected.
- If dU is less than d and d is less than 4-dU, it indicates the absence of autocorrelation, therefore leading to the rejection of the null hypothesis.
- If dL < d < dU or (4-dU) < d < (4-dL), there is no definitive conclusion.

The examination was carried out using 103 survey data samples involving two independent variables. As indicated in Table 5, the Durbin-Watson value in the regression analysis is 2.142. The Durbin Watson value in the standard table is dL is 1,65932 while dU is 1,69848. According to Figure 7, it can be observed that the value of D is greater than the value of dU but still smaller than 4-DU (1,69848< 2,1422< 2,30), thereby fulfilling the second criterion. This observation confirms the conclusion that there is no autocorrelation in the model. Based on the analysis of Table 7, the constant value of unstandardized B is 0.221, 0.4331 for X1 and 0.553 for X2, so the equation is Y1 = 0.221 + 0.431X1 + 0.553X2. These findings support hypotheses H1 and H2 and indicate that both X1 and X2 have a simultaneous effect on variable Y, competitiveness.

4.9. X1-X2 Correlation

To obtain a correlation between X1 and X2, the second regression test was run, using X1 as the dependent variable and X2 as an independent variable. The result of the test is as per the following table:

Based on the regression analysis in Table 8, R value = 0,734 dan R square = 0.538, included in the moderate level. This result means that correlation model regression analysis is valid.

4.10. X1-X2 T-test

T - test was conducted to determine the impact of factors of X1 on X2. When the T research value is bigger than the T table value at a 95% confidence level, the null hypothesis (H0) will be rejected, and the alternative hypothesis (H1) will be accepted. The hypothesis of this research is derived based on the regression model as follows:

H0: There is no relationship between evaluation performance using the ISO 56002 approach (X1) and information technology (X2) approach

H1: There is a relationship between evaluation performance using the ISO 56002 approach (X1) and Information technology (X2)

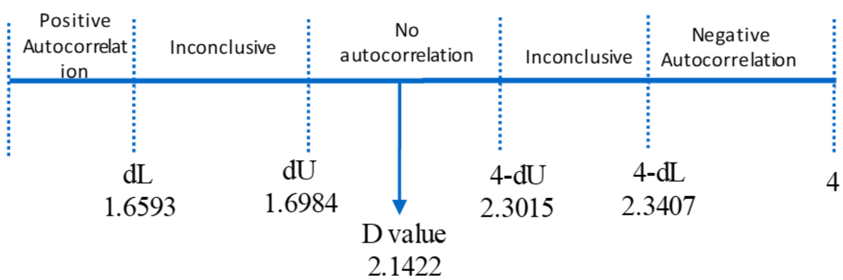

Fig. 7 D value position for X1-X2

Table 8. Regression Analysis Result for X1-X2

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.734[a]	.538	.529	.358	2.066
a. Predictors: (Constant), X2Mean					

Table 9. ANOVA analysis result for X1-X2

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.505	1	6.505	90.921	.000[b]
	Residual	7.226	101	.072		
	Total	13.731	102			
a. Dependent Variable: X1Mean						
b. Predictors: (Constant), X2Mean						

Table 10. Regression analysis result for X1-X2

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	(Constant)	B	Std. Error	Beta		
1	X2Mean		.330		4.070	.000
		.713	.075	.688	9.535	.000
a. Dependent Variable: X1Mean						

By comparing the T research value obtained from regression analysis, X2 (9,535) is larger than the T value coming from the T-table (1,984), H0 is rejected, and H1 is accepted. This suggests a direct influence of the variables evaluation performance using the ISO 56002 approach (X1) on variable Information technology (X2).

4.11. X1-X2 F-test

The F-test was performed in order to determine the potential concurrent impact between evaluation performance using the ISO 56002 approach (X1) and Information technology (X2). Drawing upon the regression model discussed in the preceding section, the hypothesis can be stated in the following way:

H0: No correlation occurs between evaluation performance using the ISO 56002 approach (X1) and the information technology (X2) approach

H1: There is a correlation between evaluation performance using the ISO 56002 approach (X1) and Information technology (X2)

In the analysis of the F-test, the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted when the F research value exceeds the F value obtained from the table. The table uses using 95% level of confidence in a sample of 103 survey data. Following the test, the F research value from regression analysis is 90.921 (Table 9), and the F table is 3,087, which is significantly higher than the F table. This finding indicates a direct influence of the variables evaluation performance using the ISO 56002 approach (X1) on variable Information technology (X2).

4.12. X1-X2 Durbin Watson Test

The Durbin-Watson statistic in the regression test is determined to be 2,066. The values of Durbin Watson statistic provided in the standard table (dL) is 1,65932 and dU is 1,69848. Based referring to Fig. 8, the D value exceeds the dU value. Therefore, the D value is between dU and 4-DU (1,69848< 2,066< 2,30), fulfilling the second requirement. As a result of the test, it can be concluded that there is no autocorrelation occurs in the model.

Based on Table 9, comparing the constant value of unstandardized B is 1.344, and 0.713 for X2. Therefore, the equation is X1 = 1.344 + 0.713X2**.** The result of the equation provides evidence to support Hypothesis H3, indicating that performance evaluation and technology information have a direct positive relationship.

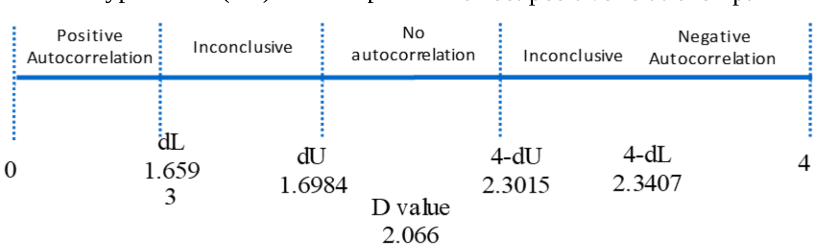

Fig. 8 D Value position for X1-X2

4.13. Discussion

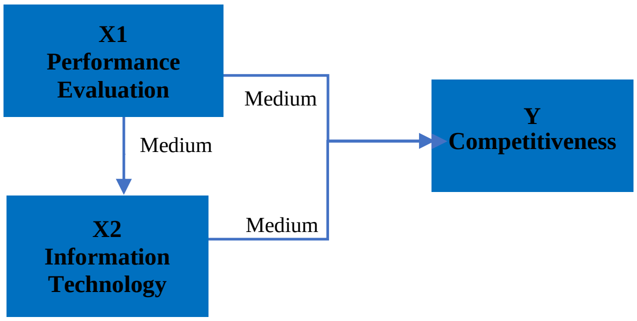

Fig. 9 External correlation inter-variables

According to all the tests conducted in this research (Figure 9), X1 affects variable Y in medium correlation, and X2 also affects variable Y in medium correlation. X1 also affects X2 in medium correlation. These results are aligned with the references where performance evaluation can positively affect competitive advantage [7]. On the other hand, information technology also gives more accurate information in order to make faster and better decisions and evaluations to improve competitiveness [6]. The manufacturing industry also gets the flexibility to produce better quality products using information technology [27]. This result means that in spun pile manufacturing, the integration of performance evaluation using the ISO 56002 approach and information technology has a positive effect on competitiveness, and performance evaluation using the ISO 56002 approach also has a positive effect on information technology.

5. Conclusion

Based on the tests performed in this research, it is shown that there is a medium relationship between evaluation performance using the ISO 56002 approach (X1) and information technology (X2) with competitiveness and the medium- medium relationship between evaluation performance using the ISO 56002 approach (X1) and information technology (X2). The correlation analysis findings reveal a moderate correlation between evaluation performance using the ISO 56002 approach (X1) and information technology (X2) with competitiveness, which confirmed a combined impact on competitiveness demonstrated by a linear equation model.

Based on the results obtained, the equation model holds importance in the T-test, F test and also Durbin Watson test. These findings, based on the results, indicate that there is a positive relationship towards competitiveness.

An improvement in both dimensions and indicators of each evaluation performance using the ISO 56002 approach (X1) and information technology (X2) would lead to an increase in indicators of competitiveness. The quantitative analysis stated the importance of identifying performance evaluation activities through a detailed dimension and indicator.

Therefore, implementing good spun pile production activities of performance evaluation and information technologies would increase the quality of the competitiveness of spun pile products in the market. This would allow Indonesian precast companies to compete in the global market and support the development of infrastructure projects in Indonesia.

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