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Customer Satisfaction Analysis of Project Performance at PUPRKIM Bali Province

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Abstract

One factor that has a significant impact on customer satisfaction is project performance. A government agency that also serves as a client for infrastructure development is the PUPRKIM. The objectives of this study are to identify the project performance factors at the PUPRKIM of Bali Province, to ascertain the relationship between project performance and customer satisfaction at the PUPRKIM of Bali Province, and the contractor's efforts to raise customer satisfaction at the owner. Customers at the PUPRKIM in Bali Province as a respondent comprised of 45 contract signing officers, board coordinators, and board members made up the research sample. Questionnaires were used during the data collection process. Factor analysis and partial least squares analysis of structural equation models are data processing techniques. The test results demonstrate that: the contractor's efforts to increase customer satisfaction by enhancing project performance; project performance has a positive and significant impact on customer satisfaction; and project performance has a positive and significant impact on contractor planning and strategy, worker capabilities, and supporting materials and equipment. The capacity of the contractor's workforce, human resources, and auxiliary supplies and equipment needs to be strengthened.

Keywords: Project Performance, Customer Satisfaction, Factor Analysis, SEM-PLS

Introduction

A construction project is a complex system as it involves many different parties from pre-contract to post-contract stages, this leads to issues affecting performance of project completion (Kiew et al., 2013). Performance is no longer defined as a fulfillment (conformance) of a requirement but is associated with a product/result that can satisfy the customers. Good performance of contractors is expected to improve service quality to meet the project goals and finally achieve customer expectations and satisfaction.

The relationship between the performance of a construction project and customer satisfaction has been conducted by numerous studies. A study by Trisnawati et al (2018) stated that the management performance factor for occupational health and safety (OSH/K3) has the greatest impact on stakeholder satisfaction. Research by Alshihre et al (2020) stated that factor that influence satisfaction are management of financial, adherence to standards and regulations, and the utilization of skilled workers.

The phenomenon that occurs at the Office of Public Works, Spatial Planning, Housing and Settlement Areas (PUPRKIM) of Bali Province, based on the Budget Implementation Document (DPA) of the Bali Province Regional Work Unit in 2022, especially in the field of human settlement, is that there are 19 work constructions dispersed throughout Bali Province. At the end of 2022, there were three projects experiencing delays, meaning that they weren't

being physically implemented according to the timeframe that had been set. Each project's delay is certainly influenced by various factors. The problems that occur certainly affect project performance. Project performance that is not by expectations will affect the customer satisfaction.

To assess the level of customer satisfaction with project performance, contractor performance results can be compared to customer wants and expectations. Customer expectations for contractor performance include timely and high-quality project completion. This research is expected to provide a deeper comprehension of ways to enhance project performance so that it can satisfy customers.

Literature Review

Project Performance

To properly determine the success of a project, some criteria or principles are important by which to determine the success of the project. These criteria are called project success criteria or project performance measures. Based on Sweis et al (2014), contractor performance which is the consequence of effective site management and strong contractor capabilities is the primary factor in a project's success (Masood et al., 2022; Ur Rehman et al., 2022). Project performance can be investigated and evaluated using several performance indicators, such as quality, client satisfaction, cost, time, client turnover, and health and safety factors (Cheung et al., 2004). According to Agsarini (2015) internal factors strongly influence on construction project performance. Managerial/organizational factors, resource factors, and economic factors are sequentially the dominant factors of internal project factors that affect project performance. Performance measurements should be performed with the goal of determining whether work is being performed outside of specification, whether services are being delivered on time, and whether services are meeting expectations.

Customer Satisfaction

In the construction industry, customer satisfaction has been identified as a quality dimension (Yasamis et al., 2002) and as an important factor indicating project success (Delgado-Hernandez & Aspinwall, 2005). Meeting expectations is the absis for customer satisfaction (Rahman & Alzubi, 2015), so understanding these expectations is critical (Durdyev et al., 2018; Soetanto & Proverbs, 2002) Research by Torbica & Stroh (2001) stated efforts to increase quality provide higher-quality products and services, which in turn boost consumer satisfaction. Client/customer satisfaction is increased by effective collaboration, the application of project management techniques, and communication between project managers and other stakeholders (Meng, 2012). The project manager's decision-making process can support effective activity management, successful project completion, and satisfying client needs (Meng, 2012). Walker (2013) pointed out that project managers' skills and perceptions in effectively managing various construction activities contribute to project success and customer satisfaction. The success of the project depends on the project team members maintaining positive relationships with the customer and with one another (Alinaitwe et al., 2013; Chan et al., 2004). Project participants' cooperation and coordination of project activities contribute to customer satisfaction (Jha & Iyer, 2007; Kärnä, 2004).

Methods

This research is a quantitative study conducted in February - March 2023. The independent variable of this research is project performance and customer satisfaction as the dependent variable. This study involved employees of the PUPRKIM of Bali Province in the field of Human Settlements, Highways, and Water Resources as the research population. There are

PPK (Commitment Maker Official), director coordinators, and board members in each field with a total of 45 respondents. The sampling technique used was non-probabilistic sampling with a saturated sample technique, so the total population was used as the research sample. The data in this study were obtained by filling out a questionnaire adapted from earlier studies and tailored to the research statement, using a Likert scale of 1-5. The data processing method uses factor analysis and SEM-PLS (Structural Equation Model-Partial Least Square) analysis. The factor analysis used exploratory factor analysis or principal component analysis (PCA) with the aid of the SPSS 26 program which aims to reduce data from the initial variable to a new variable or factor with a smaller number than the initial variable. SEM-PLS data processing uses the help of SmartPLS3 software which aims to analyze the relationship between variables.

Results and Discussion

Validity and Reliability

The validity test findings for the project performance variable were found 27 valid statements out of 31 statements. On the customer satisfaction variable, 12 statements were declared valid. In the reliability test of the two variables, the Cronbach's alpha value was obtained successively, namely 0.939; 0,911, the result showed the Cronbach alpha value> 0.70, hence questionnaire was deemed reliable.

Factor Analysis

The first step in factor analysis is to determine the value of Kaiser-Mayer-Olkin (KMO) must be > 0.5 and Bartlett's Test of Sphericity must be <0.05 (Malhotra & Birks, 2007). Project performance and customer satisfaction variables have KMO results with significance values of 0.654 and 0,738, respectively. Even though the significance level for the two variables is 0.000, factor analysis can still be performed. The Measures of Sampling Adequacy (MSA) value on the project performance variable has three statements below 0.5, this value will be removed from the model for the next step, while the MSA value on customer satisfaction has met the requirements. The communality value obtained in each variable has also met the requirements, which is greater than 0.5 (50%). This means that each factor can be explained well. In determining the number of factors, the criteria used is the eigenvalue > 1, in the project performance variable there are six components with an eigenvalue > 1, and will be able to explain the project performance variable by 75.077%. Meanwhile, in the customer satisfaction variable, there are three components with an eigenvalue> 1 and will be able to explain the customer satisfaction variable by 77.73%. The Component Transformation Matrix value obtained for each component is also greater than 0.5; this means that each component can be said to be able to summarize all variables. After each factor has been grouped based on the largest correlation value for each component, new factors can be formed. After the factors are formed, each of which consists of the variables studied, factor naming is carried out based on the characteristics that match its members, the results of naming the factors for each variable showed in Table 1 and Table 2 below.

Table 1. Project Performance Variables Factor Naming

Component	Code	Statement Description	Factor Naming
Component 1	KN1	Strategies taken by the contractors to catch up with the progress of work implementation.	Quality of Work
	KN24	Pay attention to worker productivity by calculating overtime hours and conducting training for workers.	
	KN26	Materials and the amount of materials used are by the specifications and budget plan.	

	KN27	Reporting important events related to work quality deviations.	
	KN31	Conduct monitoring every day to avoid work errors.	
Component 2	KN17	Contractor's readiness to anticipate risks that can hinder the progress of project implementation.	Cost and Time
	KN20	Conduct regular evaluations to monitor the duration of work items performed by contractors, obstacles that occur, and strategies to pursue activity progress.	
	KN23	Cost control by making project cash flow.	
	KN29	Arranging the sequence of work logically for time effectiveness.	
	KN30	Using the project budget appropriately such as direct and indirect costs.	
Component 3	KN5	Contractor strategy in determining the number of workers in the field with existing work activities.	Contractor Planning and Strategy
	KN15	Careful initial planning in the selection of foremen, suppliers, and Subcon that will be appointed to cooperate with project implementation.	
	KN16	Detailed schedule planning, information on the volume of work done each week, along with the amount and cost of labor and materials.	
	KN22	The existence of risk management and OHS/K3 planning carried out by the contractor.	
	KN28	Placing materials according to working drawings so the field site looks neat.	
Component 4	KN2	Project manager's ability to make decisions in handling problems.	Contractor's HR Capability
	KN3	The ability of personnel to apply their knowledge and insights to the work.	
	KN14	Work experience of project managers and experts in the field by their fields of expertise.	
	KN18	The accuracy of the methods used by the project manager in the implementation of contractor work.	
Component 5	KN6	Workers used to have good work quality.	Workers
	KN12	Errors often occur due to worker negligence in the execution of work.	
	KN25	Conduct attendance every day to discipline the workforce.	
Component 6	KN9	The occurrence of an increase in the price of materials from the bid price	Supporting Materials and Equipment
	KN13	Completeness and capability level of the contractor's work support equipment facilities	

Table 2. Customer Satisfaction Variables Factor Naming

Component	Code	Statement Description	Factor Naming
Component 1	KEP3	Respond quickly and execute the board of directors' requests	Service Quality
	KEP6	Minimal repair/rework during project implementation	
	KEP8	Easy to contact and discuss in problem-solving	
	KEP 12	Comply with obligations during the maintenance period	
Component 2	KEP1	Conformity of administrative reports to actual conditions in the field	Administration Completeness
	KEP9	Punctuality in the administrative collection as requested by the directors	
	KEP 11	Completeness of administration by the work plan and conditions (RKS)	
Component 3	KEP2	Punctuality in project completion by SPMK	Technical Aspects
	KEP4	Conformity of the actual volume in the field with the plan drawings	
	KEP5	Conformity of the quality of work as stated in the technical specifications	
	KEP7	Lab test results regarding quality by the RKS	
	KEP 10	Implementation of the K3/OHS management system in work implementation	

SEM-PLS (*Structural Equation Model-Partial Least Square*)

The second order PLS SEM model used to measure reflectively project performance variables and customer satisfaction.

Evaluation of Reflective Measurement Model

The loading factor value reveals the results of the first convergent validity test. According to Hair et al (2021) and Henseler et al (2009) a loading factor value is acceptable if it is ≥ 0.70. Values below 0.7 will be removed from the model and retested. In this study, the first stage loading factor value found one indicator below 0.7, namely KN2 with values of 0.666. The second stage obtained indicators KN15, KN28, and KEP10 below 0.7 with values of 0.673, 0.689, and 0.683. In the third stage, the overall loading factor value ≥ 0.70. Tables 3 and 4 show the findings of the third-stage loading factor value.

Table 3. Loading Factor Value of Project Performances Variables

Factor	Code	First stage value	Second stage value	Third stage value
Quality of Work	KN1	0,707	0,702	0,702
	KN24	0,901	0,909	0,909
	KN26	0,752	0,757	0,756
	KN27	0,826	0,819	0,819
	KN31	0,875	0,873	0,873
Cost and Time	KN17	0,844	0,851	0,851
	KN20	0,784	0,804	0,805
	KN23	0,722	0,71	0,71

	KN29	0,757	0,744	0,744
	KN30	0,793	0,78	0,78
Contractor Planning and Strategy	KN5	0,826	0,858	0,91
	KN15	0,705	0,673	
	KN16	0,793	0,795	0,794
	KN22	0,752	0,743	0,757
	KN28	0,706	0,689	
Contractor's HR Capability	KN2	0,666		
	KN3	0,83	0,853	0,853
	KN14	0,833	0,861	0,861
	KN18	0,795	0,762	0,761
Workers	KN6	0,894	0,904	0,904
	KN12	0,85	0,746	0,846
	KN25	0,847	0,839	0,839
Supporting Materials and Equipment	KN9	0,915	0,946	0,946
	KN13	0,835	0,785	0,785

Table 3. Loading Factor Value of Customer Satisfaction Variables

Factor	Code	First stage value	Second stage value	Third stage value
Service Quality	KEP3	0,901	0,904	0,904
	KEP6	0,773	0,763	0,763
Administration Completeness	KEP8	0,932	0,933	0,933
	KEP 12	0,853	0,858	0,858
	KEP1	0,898	0,901	0,901
	KEP9	0,837	0,827	0,827
	KEP 11	0,847	0,853	0,853
	KEP2	0,817	0,832	0,856
Technical Aspects	KEP4	0,792	0,779	0,761
	KEP5	0,777	0,797	0,837
	KEP7	0,736	0,726	0,717
	KEP 10	0,705	0,683	

The Average Variance Extracted (AVE) value, which illustrates how much the overall variable can explain the variation in measurement items, can be used to determine whether a test's convergent validity. The AVE value ≥ 0.50 according to Hair et al (2021) indicates that the average variance of the measurement items contained by the variable is above 50%. The findings of this study's AVE value can be seen in Table 5. These results show the AVE value of the three variables above 0.50, which means good convergent validity fulfillment for all measurement variables.

Table 2. Result of AVE Value

	Average Variance Extracted (AVE)
Project Performance	0.662
Customer Satisfaction	0.619

The recommended value for HTMT, a discriminant validity test proposed by Henseler et al (2015), is below 0.85 or below 0.90. HTMT is the ratio of Heterotrait (the average correlation between items measuring different variables) to the root of the geometric multiplication of

Monotrait (the correlation between items measuring the same variable). The HTMT value findings can be seen in Table 6. Each variable's connection with other variables is less significant than the overall AVE root value of that variable. Therefore, it can be said that the validity test can be fulfilled.

Table 3. HTMT Value Results

	Project Performance
Customer Satisfaction	0.659

Cronbach's Alpha and Composite reliability are used in the PLS reliability test, and a value of greater than 0.7 is required. Table 7 shows the Cronbach's alpha and composite reliability results. All measurement items that measure each variable are stated to be consistent and reliable, according to the composite reliability and Cronbach's alpha's total value.

Table 4. Results of Cronbach's Alpha and Composite Reliability Values

	Cronbach's Alpha	**Composite Reliability**
Project Performance	0.871	0.907
Customer Satisfaction	0.896	0.919

Evaluation of The Structural Model

The level of variation in changes in the independent variable on the dependent variable is assessed using the R Square value test. This R Square value falls into one of three categories, according to Chin et al (1998), namely R Square 0.66 substantial, 0.33 moderate, and 0.19 weak. The R Square value can be seen in Table 8.

Table 5. Results of R Square Value

	R Square
Customer Satisfaction	0.348

The results of Table 8 indicate the customer satisfaction variable shows a model on moderate criteria where the value of 0.348 ranges to a value of 0.33. Furthermore, the Q Square test illustrates how well the model has predictive relevance. According to Hair et al (2019), the Q square has values of 0, 0.25, 0.50, indicating low, moderate, and high predictive accuracy. Table 9 displays the outcomes of the Q Square Predict value. According to Table 9, the customer satisfaction variable has a Q square value of 0.251, which is higher than 0.25, indicating moderate prediction accuracy.

Table 6. Results of Q Square Predict Value

	SSO	SSE	Q^2 (=1-SSE/SSO)
Customer Satisfaction	315.000	254.564	0.192

Hypothesis testing is done through bootstrapping by taking into account the significance value between constructs t-statistics and p-values. The hypothesis is accepted if the p-value is 0.05 and the t-statistic value is more than 1.96 (Hair et al., 2014). Table 10 displays the outcomes of the direct effect bootstrapping test.

Table 7. Direct Effect Test Results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Project Performances →Customer Satisfaction	0.590	0.601	0.102	5.798	0.000

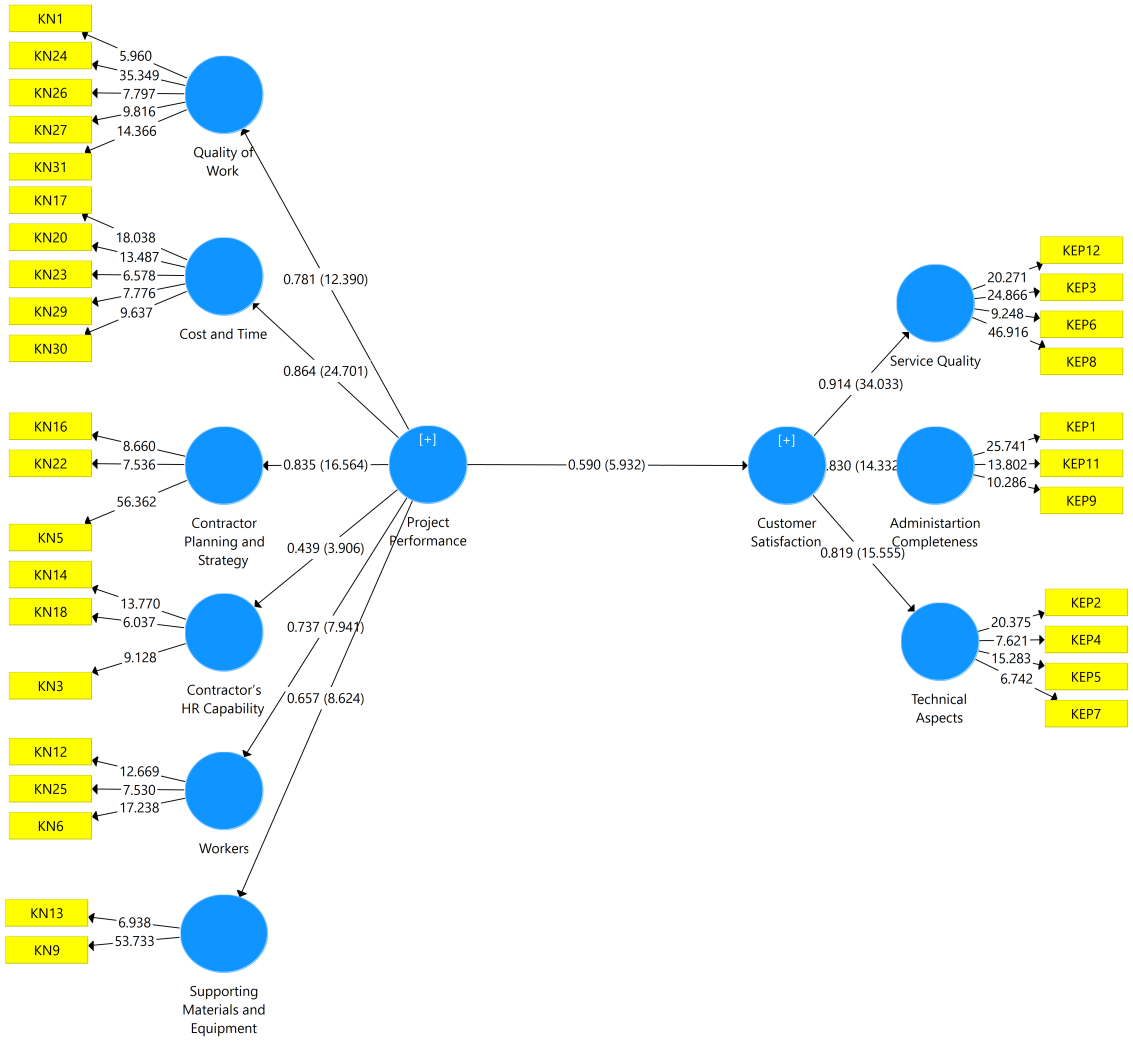

Figure 1. Boootstraping Results

The original sample value of project performance on customer satisfaction is 0.590, which is positive, meaning that performance has a positive effect on customer satisfaction, based on the bootstrapping results in Figure 1 with data presented in Table 10. Customer satisfaction is influenced by project performance, as shown by the t-statistic value of 5.798> 1.96 and p value of 0.000, which indicates that these results are significant. The better project performance consisting of factors of quality of work results, cost and time, contractor planning and strategy, contractor HR capabilities, workers, and supporting materials and equipment, the higher the level of customer satisfaction felt.

The results of this study are consistent with studies by (Agsarini & Wiguna, 2015; Huda, 2017; Maulana, 2020; Omran et al., 2012; Syamil, 2021), which state that project performance has a positive and significant effect on customer satisfaction. Customers are satisfied when their perceived performance exceeds standards. Dissatisfaction is felt when performance is below par. Knowing the relationship between project performance and customer satisfaction gives benefits to contractors in maintaining and improving performance. The findings of the analysis demonstrate that raising customer satisfaction can be accomplished through raising project performance. According to bootstrapping result, the lowest factor in measuring project performance variables is the factor of contractor human resources capabilities, workers, and supporting materials and equipment. This can be an evaluation for contractors to improve their performance.

Conclusion

The quality of work outcomes, cost and time, contractor planning and strategy, contractor HR capabilities, workers, and supporting materials and equipment are factors that affect project performance at the PUPRKIM Office of Bali Province. There is a positive and significant association between project performance and customer satisfaction at the PUPRKIM Office of Bali Province, the higher the project performance, the higher level of customer satisfaction. According to the analysis, the contractor's efforts to raise customer satisfaction can be done with the ability of contractor human resources, workers, and supporting materials and equipment. Recommendations for readers, the findings of this study are anticipated to add information about project performance and customer satisfaction and also the factors that affecting these variables. For the contractors, it is hoped that they can improve project performance to meet customer satisfaction. In order to achieve the best results, future researchers can incorporate additional variables like planning consultant performance variables and supervising consultant performance variables.

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