Customer Satisfaction Analysis of Supervisory Consultant Construction Performance at Badung Regency Public Works and Spatial Planning

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Abstract

Performance to maintain competitiveness in the construction sector. Based on direct observation and preliminary interviews with the construction work directors of the Badung Regency Public Works and Spatial Planning, the realization of physical progress is not in accordance with the time schedule, lack of administrative order, and lack of understanding of administrative documents are still commonly found. These problems affect the performance of supervisory consultants, which can cause a bad impression in the future. The purpose of this study is to analyze the factors that influence the performance of supervisory consultants and how the relationship between supervisory consultant performance and customer satisfaction and the performance of supervisory consultants that needs to be improved or maintained in order to increase customer satisfaction. This research was conducted by distributing questionnaires to project owners involved in project implementation at the Badung Regency Public Works and Spatial Planning. The data from the distribution of questionnaires will be analyzed using factor analysis and PLS-SEM methods. Based on the analysis results with factor analysis, the factors that affect the performance of supervisory consultants are cost, quality and time control, work inspection and correction, coordination meetings and documentation, administrative preparation, understanding contract documents, and problem-solving factors. The relationship between supervisory consultant performance and customer satisfaction results in a positive and significant relationship. Efforts to increase service user satisfaction are to improve the performance of supervisory consultants by understanding contract documents, controlling time project management, pay more attention to document completeness and service quality.

Keywords: Supervisory Consultant Performance, Customer Satisfaction, Factor Analysis, PLS-SEM

Introduction

A construction project that has good performance is caused by good supervision (Harsian and Zaitul, 2020). The role of the supervision consultant is to monitor, inspect/review, and evaluate the contractor's performance. Consultant supervision performance is declared good if the implementation of project supervision is in accordance with the request or expectations of the owner as customer. Supervisory consultant performance is used as a measurement of the level of effectiveness that links the quality of work products and consultant productivity. The services offered by supervisory consultants are not always assessed for quality from the final product, namely in the form of a supervisory report, but also from the supervision process during implementation (Abas et al., 2021).

Quality consultant services must be able to provide satisfaction to customer. Satisfaction is measured based on an expression of pleasure or disappointment with what is obtained by

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comparing his perception of the objects/services obtained and his expectations. In order for a business to perform better and remain in the construction market, one of the key factors determining project success is customer satisfaction. (Cheng et al., 2006).

Based on direct observation and preliminary interviews with the construction work directors of the Badung Regency Public Works and Spatial Planning, it was found that the realization of physical progress was not in accordance with the time schedule and lacked orderly administration. In 2022, construction projects in Badung Regency amounted to 36 construction projects for buildings, roads, and water/irrigation buildings with 38 work packages for supervision consultancy services, of which five projects experienced delays, so an extension of the project implementation time was required. Lack of understanding of supervisory consultants of contract documents is also still found. From the results of interviews with six supervisory consultants, there are four consultants who do not understand the scope of work and administrative provisions. These problems affect the performance of supervisory consultants, which can create an impression of poor performance in the future. Poor performance will affect the satisfaction of customer (Damayanti et al., 2022). Assessment of customer satisfaction with the performance of supervisory consultants results in factors that are prioritized to improve performance so that they can provide breakthrough improvements and quality results as expected in construction projects within government agencies, especially the Badung Regency Public Works and Spatial Planning and can still compete in the construction market.

Review of Construct Theory

Supervisory Consultant Performance

Supervision consultants have a vital role in assisting customer and especially in terms of supervision of construction implementation, both from the aspects of human resources, tools, materials, costs, time, quality, and HSE. Supervision aims to ensure that the process and results of the work carried out by the contractor are in accordance with the qualitative and quantitative requirements stated in the contract and provide administrative, technical documents during implementation as a means of monitoring work progress (Apriliasari and Indryani, 2010).

Customer Satisfaction

According to Kotler, quoted by Tjiptono and Diana, (2019), customer satisfaction is the level at which a person feels that the performance or outcomes have met his expectations. Quality service products play a significant role in determining customer satisfaction; as a result, the higher the level of service performance and the products offered, the higher the level of satisfaction felt by customer. This can be advantageous for service providers as well, as it is hoped that by achieving a certain level of satisfaction, there will be repeat purchases from customer who decide against switching service providers.

Method

This study uses the factor analysis method, which is used to find relationships between mutually independent variables, which are then grouped into groups so that one or more sets of variables can be formed which are fewer than the initial number of variables. In this study, the type of factor analysis used is exploratory factor analysis or Principle Component Analysis using the Statistical Package for the Social Sciences (SPSS) program tool and the PLS-SEM method, which is used to analyze how the relationship between variables.

Factor Analysis

PLS-SEM (Partial Least Square- Structural Equition Model) Analysis

The research model used in this study is second order. Where the variables of project performance, project team communication and customer satisfaction are measured reflectively. According to Hair et al., (2021) PLS-SEM evaluation consists of reflectometry model evaluation and structural model evaluation. A PLS evaluation model is performed by evaluating an external model and an internal model. Measurement models and external models are evaluated to assess the validity and reliability of the model. Evaluation of external models by reflective metrics is based on metric confidence, internal consistency confidence, convergence validity and discriminant validity. Structural and internal model evaluations aim to predict relationships between latent variables.

The Proposed Hypothetical Model

Each component was selected based on the literature review. Previous research reveals that service user satisfaction is influenced by project performance (Kotler, (2017); Harsian and Zaitul, (2020)) and communication (Tai et al., (2009); Kusuma, (2014)). The hypothesis of this research are Supervisory consultant performance has a positive and significant effect on customer satisfaction. For the detail can be seen in the following Figure 1
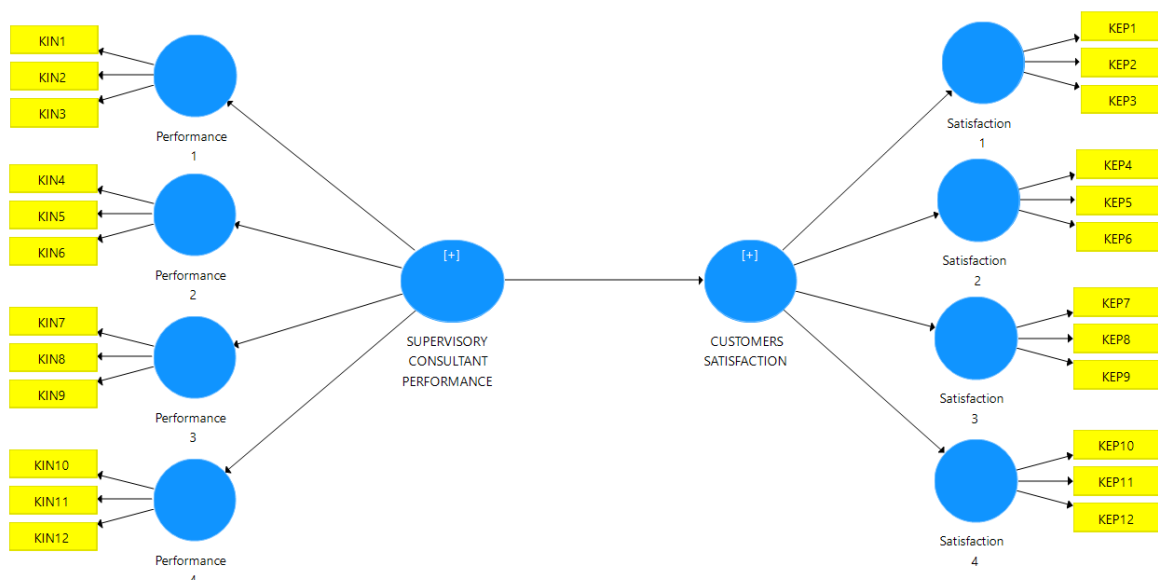

Figure 1. Hypotesis of Research

Results and Discussion

Research Instrument Testing

Validity Test

The validity test in this study used a construct validity test with a degree of freedom (df) of 50 respondents minus 2 to 48, with the significance level (a) used being 5% (five percent). The r (correlation) table value is 0.284 (Ghozali, 2021). The r (correlation) calculated value was obtained using the IBM SPSS V.26 program. Based on the validity test of supervisory consultant performance from 26 statements, the results for two statements KIN18 and KIN25 are invalid because of the r count (0,168 and 0,280) under the r table. The invalid statement will not be included in the further analysis. For customer satisfaction, there are 16 statements declared valid so that the whole can be used for the next stage, the Reliability Test.

Reliability Test

According to Ghozali, (2021), a construct or variable is said to be reliable if it provides a Cronbach Alpha value> 0.70. The results of reliability testing using the IBM SPSS V.26 program can be seen in Table. 3.

Table 1. Variable Reliability Test

Supervisory Consultant Performance		Customer Satisfaction	
Reliability		Reliability	
Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items
0.928	24	0.922	16

From the results of the reliability test the performance of supervisory consultants with 24 valid statements resulted in a Cronbach Alpha value of 0.928. On customer satisfaction with 16 valid statements resulting in a Cronbach Alpha value of 0.922. The results of the reliability test of the three variables show the Cronbach Alpha value> 0.70, so the instrument used has met the reliability criteria and can be said to be reliable.

Factor Analysis of Supervisory Consultant Performance Variables, Supervisory Consultant Team Communication and Customer Satisfaction

In processing the factor analysis data, this research uses the IBM SPSS 26 program and the analysis steps are as follows:

Kaiser-Mayer-Olkin (KMO) Measure of Sampling Adequacy (MSA) Value and Bartlett's Test of Sphericity

The first step is to determine the KMO MSA value, where the KMO MSA value must be more than 0.5 and the Bartlett's Test of Sphericity significance value is less than 0.05 (Malhotra and Birks, 2007). Based on the analysis results, the KMO MSA value of supervisory consultant performance and customer satisfaction is 0.729 and 0.824, where the values are more than 0.5, so the instrument used has met the KMO MSA and Bartlett's Test of Sphericity significance criteria and can be said to be reliable.

Factor Extraction (Determining the Number of Factors Based on Eigenvalue) and Factor Rotation

Kaiser (1960) recommends that the factor to be used is the factor that has an eigenvalue of more than 1. The percentage of the total variation that can be described by the number of to-be-produced components is used to determine the second criterion. The Total Variance Explained value of Supervisory Consultant Performance analysis results obtained from component one to component six has an eigenvalue of more than I with a value of 9,372; 2,622; 1,866; 1,583; 1,102; and 1,088. Components one to six can explain the variance of 39.051%; 10.926%; 7.775%; 6.596%; 4.590% and 4.533% respectively so the total variance is 73.471%. The total value of Variance Explained Customer Satisfaction shows the results of component one to component four having eigenvalues 1 with a value of 7.491%; 1.477%; 1.347% and 1.119%, respectively. Components one to four can explain the variance of 46.819%; 9.228%; 8.420%; and 5.991%, respectively so that the total variance is 71.459%. When viewed, the variables correlate with each factor, but the resulting factor loading has not been able to provide the meaning as expected. Therefore, the factor cannot be interpreted clearly, so it is necessary to rotate with the varimax method.

Factor Rotation and Factor Naming

The rotation procedure seeks to produce factor loadings that are comprehensible. Compared to the component matrix, the correlation matrix known as the rotated component matrix presents a clearer and more prominent distribution of variables. The rotated factor loadings have given the expected meaning and each factor can be interpreted clearly. After the formation of factors, 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 are:

Table 2. Factor Naming Result of Supervisory Consultant Performance

Component	Code	Statement	Factor Name
Component 1	KIN1	Supervision consultants can supervise the use of labor, materials, and equipment as well as the application of construction work implementation methods.	Cost, Quality and Time Control
	KIN3	The supervision consultant is able to supervise the suitability of the quality and results of the work as stated in the Technical Specifications.	
	KIN8	The supervision consultant is able to supervise the mobilization and demobilization of personnel, materials and equipment according to the assignment schedule.	
	KIN13	The supervision consultant provides recommendations to PPK to stop any work in the field that is not in accordance with the contract documents and SMKK documents.	
	KIN14	The Supervision Consultant approves the work permit (request of work) for the work implementation plan that has met the requirements.	
	KIN19	Implementation of work that has met the requirements	
	KIN21	The supervision consultants are able to oversee the accuracy of project construction costs in accordance with the contract value.	
	KIN24	The supervision consultant supervises the implementation of the Occupational and Environmental Health and Safety Management System	
Component 2	KIN6	The supervision consultant is able to supervise the progress of physical progress and timeliness of work completion in accordance with the time schedule	Inspection and Correction of Work
	KIN11	The supervision consultant is able to detect and provide corrections to work defects and supervise their repair before the first handover (Provisional Hand Over-PHO).	
	KIN17	The supervision consultant assists PPK in preparing the minutes of approval	
	KIN22	progress of work	

Component	Code	Statement	Factor Name
	KIN26	The supervision consultant checks, corrects, and approves the shop drawings submitted by the construction executor.	
Component 3	KIN9	Check, correct and approve as-built drawings prior to handover.	Coordination Meeting and Documentation
	KIN15	Collect data and information in the field to provide technical recommendations for solving problems during construction work.	
	KIN16	The supervision consultant is able to facilitate regular meetings for the delivery of work progress, obstacles and problem solving in the field.	
Component 4	KIN2	The supervision consultant is able to provide explanations and recommendations regarding changes in the implementation of the work.	Administration Preparation
	KIN4	Documenting meeting results and work implementation results	
	KIN7	Supervision consultants are able to prepare reports / monitoring & evaluation of the progress of work implementation periodically in the form of daily, weekly and monthly reports.	
Component 5	KIN10	The supervision consultant is able to check and evaluate the completeness of documents and as built drawings in accordance with the implementation of work in the field before the first handover (Provisional Hand Over-PHO).	Understanding Contract Documents
	KIN20	The supervision consultant is able to assist in the preparation of the 100% (one hundred percent) Work Report and Provisional Hand Over (PHO) Report.	
	KIN23	Examine and understand the work contract documents of the implementing contractor and supervisory consultant.	
Component 6	KIN5	The Supervision Consultant prepares a quality program for work supervision as a quality assurance document for the implementation of the activity process.	Problem Solving
	KIN12	Supervision consultants are able to review working drawings and specifications.	

Table 3. Factor Naming Result of Customer Satisfaction

Component	Code	Statement	Factor Name
Component 1	KEP10	Conformity of physical progress and timeliness of work completion with the time schedule and work start letter	Administrative Order and Work Inspection
	KEP11	The Supervision Consultant may ensure that the contractor has complied with the requirements of the contract documents before being allowed to carry out further work.	

	KEP14	Supervisory consultants are able to supervise the use of labor, materials, and equipment as well as the application of construction work implementation methods.	
	KEP15	The supervision consultant is able to supervise the suitability of the quality and results of the work as stated in the Technical Specifications.	
	KEP16	Supervision consultants are able to oversee the accuracy of project construction costs in accordance with the contract value.	
	KEP8	The lack of work accidents due to the supervision of the implementation of a good Occupational and Environmental Health and Safety Management System.	
Component 2	KEP1	Lack of rework during project construction implementation	Service Quality
	KEP3	The supervision consultant has professional work experience working on similar projects.	
	KEP5	The supervision consultant is open to input and easy to discuss problems in the implementation of project construction.	
	KEP9	Supervision consultants are proactive in providing recommendations, data, and field information during construction implementation to contractors and customer.	
Component 3	KEP4	Timeliness in submitting preliminary reports, monthly reports, and final reports in accordance with the provisions in the contract	Administration Completeness
	KEP12	Conformity of the content of administrative documents / reports with the outputs listed in the Terms of Reference (TOR)	
	KEP13	Conformity of administrative reports to actual conditions in the field	
Component 4	KEP2	The suitability of personnel and experts contained in the TOR and personnel in the field	Quality of Human Resources
	KEP6	Supervisory consultants are cooperative in every action and decision-making	
	KEP7	Supervision consultants can convey the needs and desires of customer quickly and precisely	

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

The evaluation stages consist of measurement model evaluation, structural model evaluation, and mediation testing.

Evaluation of Reflective Measurement Models

According to Ghozali, (2021) evaluation of the reflective measurement model consists of convergent validity, discriminant validity and reliability.

Convergent Validity

Parameter pengukuran validitas convergent terdiri dari pengujian loading factor, Average Variance Extracted (AVE).

Loading Factor (LF)

The loading factor value is the correlation between each measurement item and the variable. This measure illustrates how well the item describes the variable measurement. According to t Hair et al., (2021) LF value ≥ 0,70 is acceptable, but according to Chin, (1998) LF value is acceptable when its ≥ 0,60. In the test, three stages of factor testing were carried out to achieve the minimum value, with the final test results as the Figure 2 and the
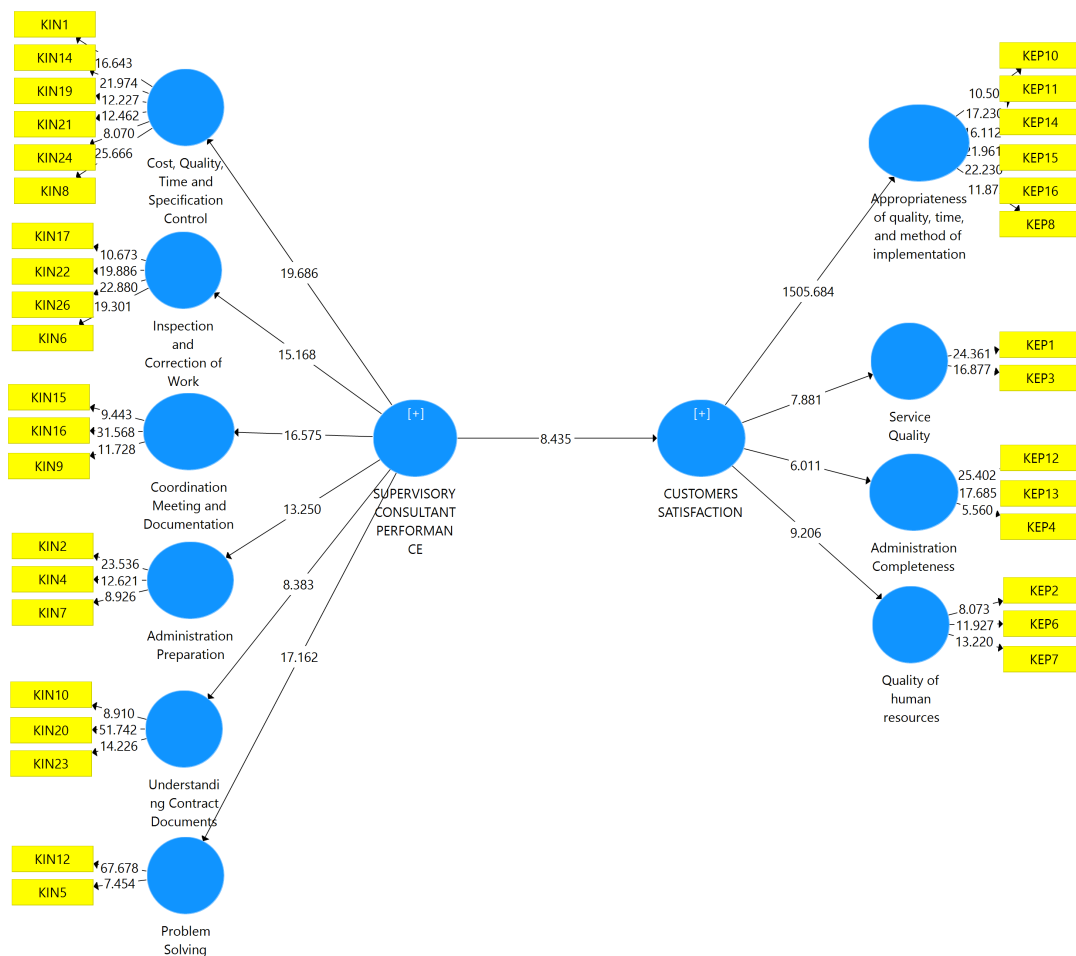
Table 4.

Figure 2. Model of Indicator Reliability Testing Results of the Third Stage

Table 4. Loading Factor Result

Supervisory Consultant Performance		Value	Customer Satisfaction	Value	
Cost, Quality, Time Control	KIN1	0.828	Appropriateness of quality, time, and method of implementation	KEP10	0.771
	KIN8	0.894		KEP11	0.812
	KIN14	0.861		KEP14	0.814
	KIN19	0.777		KEP15	0.862
	KIN21	0.894		KEP16	0.857

Dimension	Item	LF	Dimension	Item	LF
	KIN24	0.725		KEP8	0.765
Inspection of Work Implementation	KIN6	0.833	Service Quality	KEP1	0.896
	KIN17	0.794		KEP3	0.869
Inspection and Correction of Work	KIN22	0.859	Administration Completeness	KEP12	0.888
	KIN26	0.868		KEP13	0.872
	KIN9	0.792		KEP4	0.733
HR activeness	KIN15	0.788	Quality of Human Resources	KEP2	0.804
	KIN16	0.872		KEP6	0.813
Coordination Meeting and Documentation	KIN2	0.837		KEP7	0.834
	KIN4	0.883			
	KIN7	0.832			
Administration Preparation	KIN10	0.757			
	KIN20	0.927			
	KIN23	0.836			
Understanding Contract Documents	KIN5	0.766			
	KIN12	0.940			

Based on Figure 2 and

Table 4, the results of third stage testing show that the LF value of all statements is above 0.7 so that the evaluation can continue to the next analysis.

Average Variance Extracted (AVE)

According to Hair et al., (2021) AVE value ≥ 0.50 indicates that the average variance of the measurement items contained by the variable is above 50%. The results of the internal consistency reliability value and convergent validity can be seen in Table 5

Table 5. Composite Reliability and Average Variance Extracted (AVE) Value

	Cronbach's Alpha	rho_A	Average Variance Extracted (AVE)
Supervisory Consultant Performance	0.828	**0.830**	**0.594**
Customer Satisfsction	0.898	0,898	0.662

The results of the AVE value in this test can be concluded as; (1) The AVE value for the supervisory consultant performance variable is 0.594, which means that the amount of variation in the measurement items contained by the supervisory consultant performance variable is 59,4%. Because the AVE value of project performance is 0.594 > 0.50, the convergent validity evaluation is fulfilled; (2) The AVE value for the customer satisfaction variable is 0.662, which means that the amount of variation in the measurement items contained is 66.2%. The AVE value of customer satisfaction is 0.662 > 0.50, so the convergent validity evaluation is fulfilled.

Discriminant Validity

Discriminant validity test in PLS can use three methods, namely cross loading, square root of AVE and HTMT.

Cross Loading

Evaluation of discriminant validity at the indicator level is fulfilled, where each item / measurement dimension correlates more strongly / higher with the variable it measures. The

dimensions of cost, quality, and time control to their indicators are higher than the correlation of cost, quality, and time control indicators to other dimensions, as well as other dimensions/items.

Square Root Value AVE or *Fornell Lacker Criterion*

The fornell lacker criterion value is acceptable if the AVE root of each variable (on the diagonal axis) is higher than correlation of that variable with other variables. The results of the Fornell Lacker Criterion can be seen in Table 6

Table 6. Fornell Lacker Criterion value

	Supervisory Consultant Performance	Customer Satisfsction
Supervisory Consultant Performance	**0.771**	
Customer Satisfsction	0.658	**0.814**

Based on the results of the analysis of the Fornell Lacker Criterion value, it can be concluded that the supervisory consultant performance variable has an AVE root value of 0.771, this value is higher than its correlation with customer satisfaction (0.658). Customer satisfaction has an AVE root value of 0.814, this value is higher than its correlation with supervisory consultant performance (0.658).

ined *Heterotrait Monotrait Ratio* (HTMT)

The HTMT measure introduced by Henseler et al., (2015) recommended the value of HTMT is below 0.90. Based on the analysis results, the HTMT value on the performance of supervisory consultants and customer satisfaction is 0.759, where the HTMT value shows that all variables are below 0.90, indicating that discriminant validity is met. The HTMT value is more recommended to be reported because it has a higher level of sensitivity than fornell lacker and cross loadings (Hair et al., 2019).

Reliability

Cronbach's Alpha and Composite reliability are two ways to measure reliability in PLS. Cronbach's Alpha should be better than 0.7, and composite dependability should be greater than 0.7. Based on the results of the analysis of the internal consistency reliability value, it can be concluded that the Cronbach's Alpha value for the supervisory consultant performance variable is 0.828 and the customer satisfaction variable is 0.898. The Composite reliability value for the supervisory consultant performance variable is 0.880 and the customer satisfaction is 0.922. Overall, the Cronbach's Alpha Composite Reliability value meets the minimum value requirement of 0.7. So it can be concluded that all measurement items that measure each variable are said to be consistent / reliable.

Evaluation of Reflective Measurement Models

According to Ghozali, (2021) structural model evaluation consist of R-Square, Effect Size f^2, Q^2 preditcive relevance, and significance (two tailed).

R *square*

According to Hair et al., (2021) R Square value is in three classifications, namely R Square 0.75 (substantial influence), 0.50 (moderate influence) and 0.25 (weak influence). R Square customer satisfaction of 0.433 means that the variation in customer satisfaction can be explained by the suitability of quality, time, and implementation methods, Service Quality,

Administrative Completeness, and HR Quality by 43,3% while the remaining 56,7% is influenced by other variables not contained in this research model. This value also shows that the model in this study is included in the criteria for moderate influence where the value of 0.433 ranges from 0.25 to 0.50.

Effect Size f²

Hair et al., (2021) interpret the f square value (0.02 = low influence), (0.15 = medium influence, and (0.35 = high influence). The f square value of supervisory consultant performance of 0.763 has a high influence at the structural level in influencing customer satisfaction.

Q² Predictive Relevance

Hair et al., (2019) states that Q square is 0, 0.25, 0.50, the meaning of Q Square is low, moderate and high in predictive accuracy. The results of the Q² Predictive Relevance can be seen in .

Table 7.

Table 7. Q² Predictive Relevance value

	SSO	**SSE**	**Q² (=1-SSE/SSO)**
Supervisory Consultant Performance	250.000	250.000	
Customer Satisfsction	300.000	217.447	0.275

The Q Square value of the customer satisfaction is 0.275, the value is above 0.25, indicating moderate prediction accuracy. The Q Square value of customer satisfaction has a value above 0 which indicates the model has predictive relevance.

Significance and Relevance of The Path Coeffcients (Two-Tailed)/Direct Effect Testing

To determine a hypothesis can be accepted or rejected, it can be done by observing the significance value between constructs t-statistics and p-values. If the p-value <0.05 and the t-statistic value> 1.96 , the hypothesis will be accepted (Hair et al., 2014).

Table 8. Direct Effect Testing Value

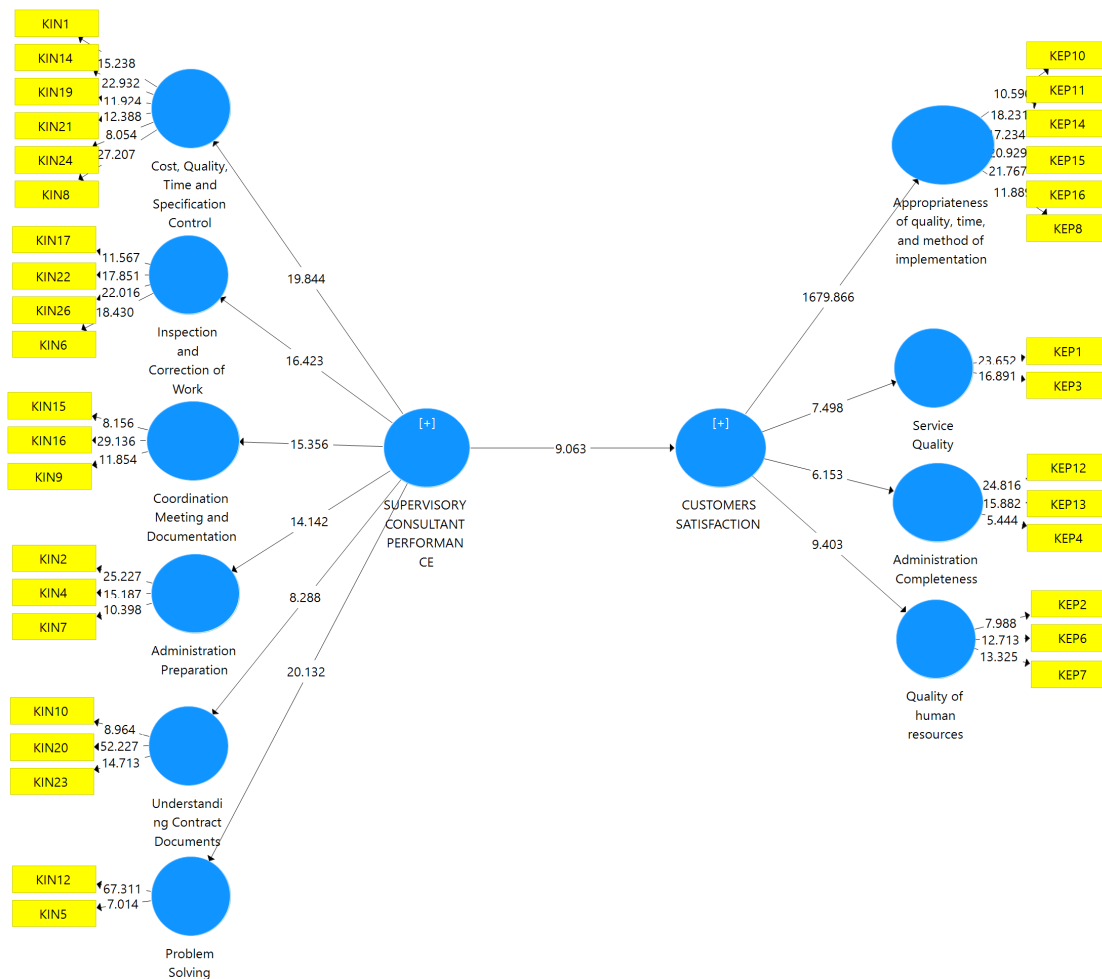|	**Original Sample (O)**	**Sample Mean (M)**	**Standard Deviation (STDEV)**	**T Statistics (|O/SYDEV|)**	**P Values**
Supervisory Consultant Performance $\Rightarrow$ Customer Satisfsction	0.658	0.654	0.078	8.465	0.000

Figure 3 Bootstrapping Result

Based on the results, it is known that the path coefficient value (original sample of supervisory consultant performance on customer satisfaction) is 0.658, which is positive, which means that performance has a positive effect on customer satisfaction. The results of the t-statistic value obtained are 8.465 > 1.96 and the p-value 0.000 <0.5, which means that these results are significant; it can be concluded that the performance of supervisory consultants has an effect on customer satisfaction (hypothesis accepted).

Conclusion

Based on the results of the study, the factors that affect the performance of supervisory consultants at the Badung Regency Public Works and Spatial Planning are cost, quality and time control factors, work inspection and correction factors, coordination and documentation meetings, administrative preparation factors, understanding of contract documents and problem solving factors. The relationship between supervisory consultant performance and customer satisfaction is that the performance of supervisory consultants has a positive and significant relationship to customer satisfaction, this means that the higher the performance of supervisory consultants, the higher the perceived customer satisfaction. Based on the results of the analysis that has been carried out, it can be concluded that the supervisory consultant's efforts in increasing customer satisfaction by improving performance in studying and understanding contract documents, improving time management project supervision, as well as improving administration completeness and service quality to maintain satisfaction and compete in the construction market.

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